FRAMEWORK ADJUSTMENT 3

TO THE

ATLANTIC MACKEREL, SQUID, AND BUTTERFISH FISHERY MANAGEMENT

PLAN

December 2002

Mid-Atlantic Fishery Management Council

in cooperation with

the National Marine Fisheries Service,

the New England Fishery Management Council,

and

the South Atlantic Fishery Management Council

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EXECUTIVE SUMMARY

Prior to the 1980's, the fishery for *Illex* in the US EEZ was prosecuted primarily by the foreign distant water fleets. With the implementation of the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan and it's subsequent Amendments, the fishery has become fully Americanized. At the same time that the domestic fishery was undergoing development, new biological data became available which indicated that *Illex* is an annual species. This resulted in downwardly revised estimates of the sustainable yield from this fishery.

The simultaneous growth of the domestic fishery and reduction in the estimate of sustainable yield resulted in the *Illex* fishery moving towards a fully capitalized and exploited state. As a result, a limited entry program became necessary and was implemented in Amendment 5. However, due to concerns that capacity might be insufficient to fully exploit the annual quota, a five year sunset provision was placed on the *Illex* moratorium when it was implemented in Amendment 5. The sunset provision for the moratorium on entry into the *Illex* fishery, implemented in 1997, was set to expire in July 2002, but was extended for one year under Framework 2. Therefore, the *Illex* moratorium is set to expire in July 2003 unless remedial action is taken by the Council. The sole purpose of this framework action is to extend the moratorium on entry to the *Illex* fishery while the Council addresses this issue in Amendment 9 to the FMP.

The Council is considering the following options for this framework action:

1. Extend the moratorium on entry to the *Illex* fishery for an additional year (preferred alternative).

2. Extend the moratorium on entry to the *Illex* fishery for an additional two years.

3. Extend the moratorium on entry to the *Illex* fishery for an additional three years.

4 No action.

There are no cumulative effects associated with the preferred alternative because it maintains the participation on the fishery at the same levels they have been since 1997. The intent of this action is to prevent the entry of new vessels while the issue is examined in more detail in Amendment 9. There are no expected biological, habitat, or economic impacts because the action will maintain current circumstances.

1.0 INTRODUCTION

Framework 3 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP), prepared by the Mid-Atlantic Fishery Management Council, is intended to manage the Atlantic mackerel, squid, and butterfish fisheries pursuant to the Magnuson-Stevens Fishery Conservation Act (MSFCMA) of 1976, as amended by the Sustainable Fisheries Act (SFA). The purpose of this action is to address the issue of limited access to the *Illex* fishery. Specifically, Framework 3 would extend the moratorium on entry to the *Illex* fishery until the Council addresses the problem of the expiration of the *Illex* fishery moratorium in Amendment 9 to the FMP.

2.0 PURPOSE AND NEED FOR ACTION

The sole purpose of this action is to extend the moratorium on entry to the *Illex* fishery while the Council addresses this issue in Amendment 9 to the FMP. This extension is needed because the *Illex* moratorium program is set to expire in July of 2003.

2.1 History of FMP Development

In March 1977, the Council initiated development of the Mackerel and Squid FMPs. The Council adopted the Mackerel FMP for hearings in September 1977 and the Squid FMP for hearings in October 1977. Hearings on Mackerel and Squid FMPs were held in December, 1977. The Mackerel and Squid FMPs were adopted by the Council in March 1978. The Mackerel FMP was submitted for NMFS approval in May 1978. The Squid FMP was submitted for NMFS approval in June 1978. However, based on NMFS comments, the Council requested that the Mackerel and Squid FMPs be returned.

The FMPs were revised, the revisions being identified as Mackerel FMP Supplement 1 and Squid FMP Supplement 1. These two Supplements, along with the original Butterfish FMP, were adopted for public hearings by the Council in July of 1978. Hearings on all three documents were held during September and October 1978 and all three FMPs were adopted in final form by the Council in November 1978. The Butterfish FMP was submitted for NMFS approval in December 1978. Mackerel FMP Supplement 1 and Squid FMP Supplement 1 were submitted for NMFS approval in January 1979. NMFS approved Squid FMP Supplement 1 in June 1979 and Mackerel FMP Supplement 1 in July 1979. Both FMPs were for fishing year (1 April - 31 March) 1979-80.

The Butterfish FMP was disapproved by NMFS in April 1979 because of a need for additional justification of the reasons for reducing OY below MSY. The Butterfish FMP was revised, adopted by the Council, and resubmitted for NMFS approval in June 1979. It was approved by NMFS in November 1979 for fishing year 1979-80.

The Council adopted Amendments 1 to both the Mackerel and Squid FMPs for hearings in August 1979. Hearings were held during October 1979. The Amendments were adopted by the Council and submitted for NMFS approval in November 1979. Both Amendments were approved by NMFS in March 1980. This extended the Squid FMP for an indefinite time beyond the end of fishing year 1979-80 and extended the Mackerel FMP through fishing year 1980-81. Butterfish FMP Amendment 1, extending the FMP through fishing year 1980-81, was adopted by the Council for hearings in December 1979 with hearings held during January 1980. During January 1980 the Amendment was adopted in final form by the Council and submitted for NMFS approval and was approved in March 1980.

The Council began work on an amendment to merge the Mackerel, Squid, and Butterfish FMPs in March 1980 the document being identified as Amendment 2 to the Mackerel, Squid, and Butterfish FMP. The Amendment was adopted by the Council for public hearings in August 1980. However, NMFS commented that there were problems with the Amendment that could not be resolved prior to the end of the fishing year (31 March 1981). The Council then prepared separate Amendments 2 to both the Mackerel and Butterfish FMPs to extend those FMPs through fishing year 1981-82. Since Amendment 1 to the Squid FMP extended that FMP indefinitely, there was no need to take this action for the Squid FMP. Those drafts were adopted for public hearing by the Council in October 1980 with hearings held in November. The Amendments were adopted in final form by the Council and submitted for NMFS approval in November 1980. Amendment 2 to the Mackerel FMP was approved by NMFS in January 1981 and Amendment 2 to the Butterfish FMP was approved by NMFS in February 1981.

In October 1980 the merger amendment, previously designated as Amendment 2, was redesignated Amendment 3. The Council adopted draft Amendment 3 to the Squid, Mackerel, and Butterfish FMP in July 1981 and hearings were held during September. The Council adopted Amendment 3 in October 1981 and submitted it for NMFS approval. NMFS review identified the need for additional explanation of certain provisions of the Amendment. The revisions were made and the revised Amendment 3 was submitted for NMFS approval in February 1982.

The Amendment was approved by NMFS in October 1982. However, problems developed with the implementation regulations, particularly with the Office of Management and Budget through that agency's review under Executive Order 12291. In an effort to have the FMP in place by the beginning of the fishing year (1 April 1983), the FMP, without the squid OY adjustment mechanism, or a revised Atlantic mackerel mortality rate, and retitled as the Atlantic Mackerel, Squid, and Butterfish FMP, was implemented by emergency interim regulations on 1 April 1983. By agreement of the Secretary of Commerce (Secretary) and the Council, the effective date of those emergency regulations was extended through 27 September 1983. The differences between the FMP and the implementing regulations resulted in a hearing before the House Subcommittee on Fisheries and Wildlife Conservation and the Environment on 10 May 1983.

Amendment 1 to the Atlantic Mackerel, Squid, and Butterfish FMP was prepared to implement the squid OY adjustment mechanism and the revised mackerel mortality rate. That Amendment was adopted by the Council on 15 September 1983, approved by NMFS on 19 December 1983, and implemented by regulations published in the *Federal Register* on 1 April 1984.

Amendment 2 was adopted by the Council on 19 September 1985 and approved by NOAA 6 March 1986. Amendment 2 changed the fishing year to the calendar year, revised the squid incidental catch TALFF allowances, put all four species on a framework basis, and changed the fishing vessel permits from permanent to annual.

Amendment 3 was adopted by the Council in two actions. The Atlantic mackerel overfishing definition was adopted by the Council at its October 1990 meeting. The *Loligo*, *Illex*, and butterfish overfishing definitions were adopted at the December 1990 meeting. This was done because the Northeast Fisheries Center proposed changes to the overfishing definitions proposed in the hearing draft for the squids and butterfish. The Center's concerns were incorporated in the version adopted at the December 1990 meeting.

Amendment 4, approved by NMFS 8 November 1991, authorized the Regional Director, Northeast Region, NMFS (Regional Director) to limit the areas where directed foreign fishing and joint venture transfers from US to foreign vessels may take place. Directed foreign fishing must be conducted seaward of at least 20 miles from the shore. Operations of foreign vessels in support of US vessels (that is, joint ventures) may operate anywhere in the Exclusive Economic Zone (EEZ) throughout the management unit unless specific areas are closed to them. The catch limitations were changed by requiring that, if the preliminary initial or final amounts differ from those recommended by the Council, the *Federal Register* notice must clearly state the reason(s) for the difference(s) and specify how the revised specifications satisfy the 9 criteria set forth for the species affected. Additionally, for Atlantic mackerel, the specification of OYs and other values may be specified for three years at one time. These annual values may be adjusted within any year and prior to the second and third years as set forth above. However, projecting specifications over several years should allow more orderly development of the fishery since the revisions to the specifications for the second and third years would be done by notice, rather than by regulatory measures. The joint ventures section was changed to allow the Regional Director may impose special conditions on joint ventures and directed foreign fishing activities. Such special conditions may include a ratio between the tonnage that may be caught in a directed foreign fishery relative to the tonnage that may be purchased over-the-side from US vessels and relative to the tonnage of US processed fish that must be purchased by the venture.

Amendment 5 was approved by NMFS 9 February 1996. It lowered the *Loligo* MSY, eliminated the possibility of directed foreign fisheries for *Loligo*, *Illex*, and butterfish, instituted a dealer and vessel reporting system, instituted an operator permitting system, implemented a limited access system for *Loligo*, *Illex* and butterfish, and expanded the management unit to include all Atlantic mackerel, *Loligo*, *Illex*, and butterfish under US jurisdiction. Amendment 6 revised the definitions of overfishing for *Loligo*, *Illex,* and butterfish and allowed for seasonal management of the *Illex* fishery.

Amendment 7 was developed to achieve consistency among FMP's in the NE region of the US relative vessel permitting, replacement and upgrade criteria. Amendment 8 was developed to bring the FMP into compliance with new and revised National Standards and other required provisions of the Sustainable Fisheries Act, which was passed by Congress in 1996. Specifically, Amendment 8 revised the overfishing definitions for Atlantic mackerel, *Loligo* and *Illex* squid, and butterfish and addressed the new and revised National Standards relative to the existing management measures. In addition, Amendment 8 added a framework adjustment procedure that allows the Council to add or modify management measures through a streamlined public review process.

Framework Adjustment 1 to the Atlantic Mackerel, Squid and Butterfish FMP established a program in which data collection projects can be funded in part through a percentage research set-aside from total annual quota for each species. The purpose of this program is to support research and the collection of additional data that would otherwise be unavailable. Framework Adjustment 2 extended the moratorium on entry to the *Illex* fishery until July 2, 2003, added a provision to the FMP that, in the event the annual specifications for Atlantic mackerel, squid and butterfish are not published by the NMFS prior to the start of the fishing year, that the previous year's specifications will apply (excluding TALFF specifications), and allows for the specification of management measures for *Loligo* for a period of up to three years.

2.2 Problem for Resolution

2.2.1 Moratorium on entry to *Illex* fishery expires in 2003

Prior to the 1980's, the fishery for *Illex* in the US EEZ was prosecuted primarily by the foreign distant water fleets. With the implementation of the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan and it's subsequent Amendments, the fishery has become fully Americanized. At the same time that the domestic fishery was undergoing development, new biological data became available which indicated that *Illex* is an annual species. This resulted in downwardly revised estimates of the sustainable yield from this fishery.

The simultaneous growth of the domestic fishery and reduction in the estimate of sustainable yield resulted in the *Illex* fishery moving towards a fully capitalized and exploited state. As a result, a limited entry program became necessary and was implemented in Amendment 5. However, due to concerns that capacity might be insufficient to fully exploit the annual quota, a five year sunset provision was placed on the *Illex* moratorium when it was implemented in Amendment 5. The sunset provision for the moratorium entry into the *Illex* fishery, implemented in 1997, was set to expire in July 2002, but was extended for one year under Framework 2. Therefore, the *Illex* moratorium is set to expire in July 2003 unless remedial action is taken by the Council. The sole purpose of this framework action is to extend the moratorium on entry to the *Illex* fishery while the Council addresses this issue in Amendment 9 to the FMP.

2.3 Management Objectives

The objectives of the FMP are:

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.
2. Promote the growth of the US commercial fishery, including the fishery for export.
3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this FMP.
4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.
5. Increase understanding of the conditions of the stocks and fisheries.
6. Minimize harvesting conflicts among US commercial, US recreational, and foreign fishermen.

2.4 Management Unit

The management unit is all northwest Atlantic mackerel (*Scomber scombrus*), *Loligo pealei, Illex illecebrosus*, and butterfish (*Peprilus triacanthus*) under US jurisdiction.

2.5 Management Strategy

Effective federal fishery management of Atlantic mackerel, *Loligo* and *Illex* squid, and butterfish has occurred for the past two decades. The management strategy during the first phase of the Atlantic Mackerel, Squid, and Butterfish FMP was to provide for the orderly development of the domestic fisheries for these resources under the purview of the Magnuson Act. This process involved the sequential phasing out of foreign fishing for these species in US waters and the gradual transfer of offshore fishing methods and technology to the domestic fishing fleet. For both squid species, the domestic fisheries have been fully developed.

All four species in the management unit are managed primarily via annual quotas to control fishing mortality. In addition, to the annual review and modifications to management measures specified in the FMP, the Council added a framework adjustment procedure in Amendment 8 which allows the Council to add or modify management measures through a streamlined public review process. As such, management measures that have been identified in the plan can be implemented or adjusted at any time during the year. This is the third framework action taken under the Atlantic Mackerel, Squid and Butterfish FMP since the framework procedure was implemented under Amendment 8. This framework action addresses the problems and issues described in section 2.2.

3.0 MANAGEMENT MEASURES BEING CONSIDERED

3.1 Extend the moratorium on entry to the *Illex* fishery for an additional year (Preferred Alternative).

The Council placed a five year sunset provision on the moratorium which was set to expire in July 2002, but was extended until July 2003 under Framework 2. This measure would extend the *Illex* moratorium for an additional year. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2004 unless extended in a future Amendment. Extension of the existing moratorium will maintain the harvesting capacity of the fleet which exceeds the current quota of 24,000 mt. For example, dealer weighout data indicate that *Illex* landings of 23,600 mt were taken in 1998 by 25 of the 77 vessels (32%) holding *Illex* moratorium permits. This action will prevent overcapitalization in the fishery from occurring while Amendment 9 is developed.

3.2 Extend the moratorium on entry to the *Illex* fishery for an additional two years

This alternative would extend the moratorium on entry to the *Illex* fishery for an additional two years, or until the final rule for Amendment 9 is published, whichever comes first.

Amendment 5 established a moratorium on new entry into the commercial fishery for *Illex* squid. The Council placed a five year sunset provision on the moratorium which was set to expire in July 2002, but was extended until July 2003 under Framework 2. This measure would extend the *Illex* moratorium for an additional two years. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2005, unless it is extended or otherwise altered in Amendment 9.

3.3 Extend the moratorium on entry to the *Illex* fishery for an additional three years

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2006 unless extended in a future Amendment.

3.4 No action

Under this alternative the moratorium on entry to the *Illex* fishery would be allowed to expire in 2003. Since the harvesting capacity of the *Illex* fleet exceeds the current quota of 24,000 mt, this alternative would allow open access into the *Illex* squid fishery and increase the probability of overcapitalization in the fleet.

4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.1 Description of EFH

A complete description of essential Fish Habitat for Atlantic mackerel, *Loligo* and *Illex* squid and butterfish is given in Amendment 8 to the FMP. The Council will be updating this

information in Amendment 9 during 2002 and 2003.

4.2 Port and Community Description

A complete description of the ports and communities dependent upon Atlantic mackerel, *Loligo* and *Illex* squid and butterfish is given in Appendix 1.

4.3 Protected Resources Description

4.3.1 Endangered or Threatened Species, Marine Mammals and Seabirds

There are numerous species which inhabit the management unit of this FMP that are afforded protection under the Endangered Species Act (ESA) of 1973 (i.e., for those designated as threatened or endangered) and/or the Marine Mammal Protection Act of 1972 (MMPA). Eleven are classified as endangered or threatened under the ESA, while the remainder are protected by the provisions of the MMPA. 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 mackerel, squid and butterfish 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

4.3.1.1 Protected Species of Particular Concern

4.3.1.1.1 North Atlantic Right Whale

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.* 1999). A Recovery plan has been published and 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).

North Atlantic right whales range from wintering and calving grounds in coastal waters of the southeastern US to summer feeding grounds, nursery and presumed mating grounds in New England and northward to the Bay of Fundy and Scotian shelf (Waring et al. 1999). Approximately half of the species' geographic range is within the area in which the summer flounder fishery is prosecuted. In the management area as a whole, right whales are present throughout most months of the year, but are most abundant between February and June. The species uses mid-Atlantic waters as a migratory pathway from the winter calving grounds off the coast of Florida to spring and summer nursery/feeding areas in the Gulf of Maine.

NMFS designated right whale critical habitat on June 3, 1994 (59 FR 28793). Portions of the critical habitat within the action area include the waters of Cape Cod Bay and the Great South Channel off the coast of Massachusetts, where the species is concentrated at different times of the year.

The western North Atlantic population of right whales was estimated to be 295 individuals in 1992 (Waring *et al.* 1999). 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. However, considerable uncertainty exists about the true size of the current stock (Waring *et al.* 1999).

4.3.1.1.2 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. In the western North Atlantic humpback whales feed during the spring through fall over a range which includes the eastern coast of the US (including the Gulf of Maine) northward to include waters adjacent to Newfoundland/Labrador and western Greenland (Waring *et al.* 1999). During the winter, the principal range for the North Atlantic population is around the Greater and Lesser Antilles in the Caribbean (Waring *et al.* 1999).

About half of the species' geographic range is within the management area of the summer flounder FMP. As noted above, humpback whales feed in the northwestern Atlantic during the summer months and migrate to calving and mating areas in the Caribbean. Five separate feeding areas are utilized in northern waters after their return; the Gulf of Maine (which is within the management unit of this FMP) is one of those feeding areas. As with right whales, humpback whales also use the Mid-Atlantic as a migratory pathway. Since 1989, observations of juvenile humpbacks in that area have been increasing during the winter months, peaking January through March (Swingle *et al.,* 1993). It is believed that non-reproductive animals may be establishing a winter feeding area in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. It is assumed that humpbacks are more widely distributed in the management area than right whales. They feed on a number of species of small schooling fishes, including sand lance and Atlantic herring.

The most recent status and trends of the for the Western North Atlantic stock of humpback whales are given by Waring *et al.* (1999). The current rate of increase of the North Atlantic humpback whale population has been estimated at 9.0% (CV=0.25) by Katona and Beard (1990) and at 6.5% by Barlow and Clapham (1997). The minimum population estimate for the North Atlantic humpback whale population is 10,019 animals, and the best estimate of abundance is 10,600 animals (CV=0.07; Waring *et al.* 1999).

4.3.1.1.3 Fin Whale

The fin whale was listed as endangered throughout it's range on June 2, 1970 under the ESA. The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic ice pack (Waring et al.1999). The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. However, based on acoustic recordings from hydrophone arrays, Clark (1995) reported a general southward "flow pattern" of fin whales in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indies. The overall distribution may be based on prey availability, and fin whales are found throughout the management area for this FMP in most months of the year. This species preys opportunistically on both invertebrates and fish (Watkins et al. 1984). As with humpback whales, they feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments.

Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the northeastern United States continental shelf waters. Shipboard surveys of the northern Gulf of Maine and lower Bay of Fundy targeting harbor porpoise for abundance estimation provided an imprecise estimate of 2,700 (CV=0.59) fin whales (Waring *et al.* 1999).

4.3.1.1.4 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 1998) 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 analysis also indicated the northern subpopulation of loggerheads may be experiencing a high decline (2.5% - 3.2% for various beaches). A recovery goal of 12,800 nests has been assumed for the Northern Subpopulation, but current nests number around 6,200 (TEWG 1998). 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.

Sea sampling data from the sink gillnet fisheries, Northeast otter trawl fishery, and Southeast shrimp and summer flounder bottom trawl fisheries indicate incidental takes of loggerhead turtles. Loggerheads are also known to interact with the lobster pot fishery. The degree of interaction between loggerheads and the summer flounder recreational fishery is unknown. However, by analogy with other fisheries (i.e., South Atlantic) interactions are expected to be minimal.

4.3.1.1.5 Leatherback Sea Turtle

The leatherback is the largest living sea turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS& USFWS 1995). Leatherback turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) and are often found in association with jellyfish. These turtles are found throughout the management unit of this FMP. While they are predominantly pelagic, they occur annually in Cape Cod Bay and Narragansett Bay primarily during the fall. Leatherback turtles appear to be the most susceptible to entanglement in lobster gear and longline gear compared to the other sea turtles commonly found in the management unit. This may be the result of attraction to gelatinous organisms and algae

that collect on buoys and buoy lines at or near the surface.

Nest counts are the only reliable population information available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NMFS & USFWS 1995). The status review notes that it is unclear whether this observation is due to natural fluctuations or whether the population is at serious risk. It is unknown whether leatherback populations are stable, increasing, or declining, but it is certain that some nesting populations (e.g, St. John and St. Thomas, U.S. Virgin Islands) have been extirpated (NMFS 1998).

Sea sampling data from the southeast shrimp fishery indicate recorded takes of leatherback turtles. As noted above, leatherbacks are also known to interact with the lobster pot fishery. However, by analogy with other fisheries (i.e., South Atlantic) interactions are expected to be minimal.

4.3.1.1.6 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).

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 (NMFS 1998). 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 (NMFS 1998). In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick 1985; NMFS 1998). The juvenile population in Chesapeake Bay is estimated to be 211 to 1,083 turtles (NMFS 1998).

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. However, by analogy with other fisheries (i.e., South Atlantic) interactions are expected to be minimal.

4.3.1.1.7 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 (NMFS 1998). 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. However, by analogy with other fisheries (i.e., South Atlantic) interactions are expected to be minimal.

4.3.1.1.8 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).

4.3.1.1.9 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 high. 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. Endangered, threatened or otherwise protected bird species, including the roseate tern and piping plover, are unlikely to be impacted by the gear types employed in these fisheries.

The proposed action and alternatives are not expected to have any adverse impacts on endangered or threatened species or marine mammal populations.

4.3.2 Fishery Classification under Section 114 of Marine Mammal Protection Act

Under section 114 of the MMPA , the NMFS must publish and annually update the List of Fisheries (LOF), which places all US commercial fisheries in one of three categories based on the level of incidental serious injury and mortality of marine mammals in each fishery (arranging them according to a two tiered classification system). The categorization of a fishery in the LOF determines whether participants in that fishery may be required to comply with certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements. The classification criteria consists of a two tiered, stock-specific approach that first addresses the total impact of all fisheries on each marine mammal stock (Tier 1) and then addresses the impact of the individual fisheries on each stock (Tier 2). If the total annual mortality and serious injury of all fisheries that interact with a stock is less than 10% of the PBR for the stock then the stock is designated as Tier 1 and all fisheries interacting with this stock would be placed in Category III. Otherwise, these fisheries are subject to categorization under Tier 2. Under Tier 2, individual fisheries are subject to the following categorization:

I. Annual mortality and serious injury of a stock in a given fishery is greater than or equal to 50% of the PBR level;

II. Annual mortality and serious injury of a stock in a given fishery is greater than one percent and less than 50% of the PBR level; or

III. Annual mortality and serious injury of a stock in a given fishery is less than one percent of the PBR level.

In Category I, there is documented information indicating a "frequent" incidental mortality and injury of marine mammals in the fishery. In Category II, there is documented information indicating an "occasional" incidental mortality and injury of marine mammals in the fishery. In Category III, there is information indicating no more than a "remote likelihood" of an incidental taking of a marine mammal in the fishery or, in the absence of information indicating the frequency of incidental taking of marine mammals, other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, and species and distribution of marine mammals in the area suggest there is no more than a remote

likelihood of an incidental take in the fishery. "Remote likelihood" means that it is highly unlikely that any marine mammal will be incidentally taken by a randomly selected vessel in the fishery during a 20-day period.

The Atlantic Squid, Mackerel, Butterfish Trawl Fishery is currently listed as a Category I fishery in of the final List of Fisheries for 2001 for the taking of marine mammals by commercial fishing operations under section 114 of the Marine Mammal Protection Act (MMPA) of 1972. The Atlantic Squid, Mackerel, Butterfish Trawl Fishery was previously NMFS classified as a Category II fishery. This change resulted from a Tier 1 evaluation of NMFS Sea Sampling data which demonstrated that the Atlantic Squid, Mackerel, Butterfish Trawl Fishery incidentally injured and killed the following marine mammal species and stocks during 1996-1998: common dolphin (WNA stock), white-sided dolphin (WNA stock) and Globicephala sp. (includes long-finned and short-finned pilot whales) (WNA stock). Based on data presented in the draft 2000 Stock Assessment Report (SAR), annual serious injury and mortality across all fisheries for pilot whale, common dolphin and white sided dolphin stocks exceeds 10% of the PBR (78, 184, and 107 respectively). Therefore, the Atlantic Squid, Mackerel, Butterfish Trawl Fishery was subject to Tier 2 analysis. The 2000 draft SAR analyses estimated an annual average mortality of 43 pilot whales and 367 common dolphins per year in this fishery, which is greater than 50% of PBR for each species. Therefore, the NMFS elevated this fishery to Category I in the 2001 LOF. Since this fishery has become a Category I fishery under MMPA, it will receive a high priority with respect to observer coverage and consideration for measures under future Take Reduction Plans for any of the species listed above.

5.0 Description of Fisheries

5.1 Atlantic mackerel

5.1.1 Status of the Stock

The Northwest Atlantic mackerel stock was most recently assessed at SAW-30 (NMFS 2000). The assessment concluded that the Atlantic mackerel stock is currently at a high level of abundance and is under-exploited. Based on trends in survey indices, recruitment has been well above average throughout most of the 1990's. However, estimates of fishing mortality and stock sizes based on virtual population analyses conducted in SAW 29 were considered unreliable.

The previous assessment of the Northwest Atlantic mackerel stock was conducted at SAW-20 and provided estimates of fishing mortality and stock sizes (NMFS 1995). In 1994, F was estimated to be 0.02 with an 80% confidence interval of 0.00-0.03, while SSB was estimated to be 2.1 million mt (with an associated 80% confidence interval of 1.2 - 8.2 million mt).

A recent Canadian assessment confirmed the conclusion that the Atlantic mackerel stock is currently at a high level of abundance (Gregoire 1996). Results of spawning stock size projections based on egg production in Canadian waters indicated that the northern (i.e., Canadian) portion of the adult stock remained constant at around 800,000 mt between 1992 and

1994. The Canadian assessment concluded that Atlantic mackerel stock biomass remains high and further that the appearance of one and two year old fish (the 1993 and 1994 year classes) in the 1995 Canadian catch indicates that two very large year classes are entering the fishery.

5.1.2 Stock Characteristics and Ecological Relationships

Atlantic mackerel (*Scomber scombrus*) is a fast swimming, pelagic, schooling species distributed between Labrador (Parsons 1970) and North Carolina (Anderson 1976a). The existence of separate northern and southern spawning contingents was first proposed by Sette (1950). The southern group spawns primarily in the Mid-Atlantic Bight during April-May while the northern group spawns in the Gulf of St. Lawrence in June-July. Both groups overwinter between Sable Island (off Nova Scotia) and Cape Hatteras in water generally warmer than 45 F (USDC 1984a).

Both groups make extensive northerly (spring) and southerly (autumn) migrations to and from spawning and summer feeding grounds. The southern contingent begins its spring migration from waters off North Carolina and Virginia in March- April, and moves steadily northward, reaching New Jersey and Long Island usually by April-May, where spawning occurs. These fish may spend the summer as far north as the Maine coast. In autumn this contingent moves southward and returns to deep offshore water near Block Island after October (Hoy and Clark 1967).

The northern contingent arrives off southern New England in late May, and moves north to Nova Scotia and the Gulf of St. Lawrence where spawning occurs usually by July (Hoy and Clark 1967, Bigelow and Schroeder 1953). This contingent begins its southerly autumn migration in November and December and disappears into deep water off Cape Cod.

Even though there are two spawning groups of mackerel in the Northwest Atlantic, biochemical studies (Mackay 1967) have not established that genetic differences exist between them. These two contingents intermingle off southern New England in spring and autumn (Sette 1950). Tagging studies reported by Beckett *et al.* (1974), Parsons and Moores (1974) and Moores *et al.* (1975) indicate that some mackerel that summer at the northern extremity of the range overwinter south of Long Island. Precise estimates of the relative contributions of the two contingents cannot be made (ICNAF 1975). Both contingents have been fished by the foreign winter fishery and no attempt was made to separate these populations for assessment purposes by the International Commission for the Northwest Atlantic Fisheries (ICNAF), although separate Total Allowable Catches (TAC) were in effect for Subareas 5 and 6 and for areas to the north from 1973- 1977. Since 1975 all mackerel in the northwest Atlantic have been assessed as a unit stock (Anderson 1982). Thus, Atlantic mackerel are considered one stock for fishery management purposes.

Mackerel spawning occurs during spring and summer and progresses from south to north. The southern contingent spawns from mid-April to June in the Mid-Atlantic Bight and the Gulf of Maine and the northern contingent spawns in the southern Gulf of St. Lawrence from the end of May to mid-August (Morse 1978). Most spawn in the shoreward half of continental shelf waters, although some spawning extends to the shelf edge and beyond. Spawning occurs in

surface water temperatures of 45-57 ºF, with a peak around 50-54 ºF (Grosslein and Azarovitz 1982).

All Atlantic mackerel are sexually mature by age 3, while about 50% of the age 2 fish are mature. Average size at maturity is about 10.5-11" FL (Grosslein and Azarovitz 1982). Growth is very rapid with fish reaching 7.9 in (20 cm) by their first autumn (Anderson and Paciorkowski 1978). The maximum age observed is 17 years (Pentilla and Anderson 1976).

Fecundity estimates ranged from 285,000 to 1.98 million eggs for southern contingent mackerel between 12-17" FL. Analysis of egg diameter frequencies indicated that mackerel spawn between 5 and 7 batches of eggs per year. The eggs are 0.04-0.05" in diameter, have one 0.1" oil globule, and generally float in the surface water layer above the thermocline or in the upper 30-50'. Incubation depends primarily on temperature; it takes 7.5 days at 52 ºF, 5.5 days at 55 ºF, and 4 days at 61ºF (Grosslein and Azarovitz 1982).

Mackerel are 0.1" long at hatching, grow to about 2" in two months, and reach a length of 8" in December, near the end of their first year of growth. During their second year of growth they reach about 10" in December, and by the end of their fifth year they grow to an average length of 13" FL. Fish that are 10-13 years old reach a length of 15-16" (Grosslein and Azarovitz 1982). MacKay (1973) and Dery and Anderson (1983) have found an inverse relationship between growth and year class size.

Atlantic mackerel are opportunistic feeders that can ingest prey either by individual selection of organisms or by passive filter feeding (Pepin *et al.* 1988). Filter feeding occurs when small plankton are abundant and mackerel swim through patches with mouth slightly agape, filtering food through their gill rakers (MacKay 1979). According to MacKay (1979) particulate feeding is the principal feeding mode in the spring and fall while filter feeding predominates in the summer in the Gulf of St Lawrence. Moores *et al.* (1975) maintains that the diet of fish from Newfoundland suggests that particulate feeding occurs there throughout the season.

Larvae feed primarily of zooplankton. First-feeding larvae (0.140 in; 3.5 mm) collected from Long Island Sound were found to be phytophagous while slightly larger individuals (greater than 0.176 in; 4.4 mm) fed on copepod nauplii (Peterson and Ausubel 1984; Ware and Lambert 1985). Fish >0.2 in (5 mm) fed on copepodites of *Acartia* and *Temora* while diets of fish >0.24 in (6 mm) contained adult copepods (Peterson and Ausubel 1984). Larvae >0.256 in (6.4 mm) were cannibalistic, feeding on 0.14-.018 in (3.5-4.5 mm) conspecifics (Peterson and Ausubel 1984). Consumption rates of larvae average between 25 and 75% body weight per day. Larvae feed selectively, primarily on the basis of prey visibility (Peterson and Ausubel 1984). Fortier and Villeneuve (1996), studying larval mackerel from the Scotian Shelf, found that with increasing larval length, diet shifted from copepod nauplii to copepod and fish larvae including yellowtail flounder, silver hake, redfish and a large proportion of conspecifics. Predation was stage-specific: only the newly hatched larvae of a given species were ingested. However, piscivory was limited at densities of fish larvae $<0.1/m^3$ and declined with increasing density of nauplii and with increasing number of alternative copepod prey ingested.

Juveniles eat mostly small crustaceans such as copepods, amphipods, mysid shrimp and decapod larvae. They also feed on small pelagic molluscs (*Spiratella* and *Clione*) when available. Adults feed on the same food as juveniles but diets also include a wider assortment of organisms and larger prey items. For example, euphausid, pandalid and crangonid shrimp are common prey; chaetognaths, larvaceans, pelagic polychaetes and larvae of many marine species have been identified in mackerel stomachs. Bigelow and Schroeder (1953) found many Gulf of Maine mackerel feeding on *Calanus* as well as other copepods. Larger prey such as squids (*Loligo*) and fishes (silver hake, sand lance, herring, hakes and sculpins) are not uncommon, especially for large mackerel (Bowman *et al.* 1984). Under laboratory conditions, mackerel also fed on *Aglanta digitale*, a small transparent medusa common in temperate and boreal waters (Runge *et al.* 1987). While there is variability between the two size classes and between the two survey periods, copepods and euphausids and various crustaceans could be considered relative staples in the diet.

Immature mackerel begin feeding in the spring; older fish feed until gonadal development begins, stop feeding until spent and then resume prey consumption (Berrien 1982). Under experimental conditions in which larval fish (0.12-0.4 in; 3-10 mm in length) were presented as part of natural zooplankton assemblages, prey preference by mackerel was positively size selective and predation rates were not influenced by larval fish density (Pepin *et al.* 1987). Subsequent studies indicated that mackerel may achieve a higher rate of energy intake by switching to larger prey and increasing search rate as prey size and total abundance increase (Pepin *et al.* 1988). Filter feeding activity also increased with increasing prey density and Pepin *et al.* (1988) conjecture that feeding rates under natural conditions of prey abundance (0.1g wet weight/m^3) indicate that mackerel would not be satiated if foraging were restricted only to daylight.

Predation has a major influence on the dynamics of Northwest Atlantic mackerel (Overholtz *et al.* 1991b). In fact, predation mortality is probably the largest component of natural mortality on this stock, and based on model predictions, may be higher than previously thought (Overholtz *et al.* 1991b). Atlantic mackerel serve as prey for a wide variety of predators including other mackerel, dogfish, tunas, bonito, striped bass, Atlantic cod (small mackerel), and squid, which feed on fish <4-5.2 in (10 to 13 cm) in length. Pilot whales, common dolphins, harbor seals, porpoises and seabirds are also predators (Smith and Gaskin 1974; Payne and Selzer 1983; Overholtz and Waring 1991; Montevecchi and Myers 1995). Other predators include swordfish, bigeye thresher, thresher, shortfin mako, tiger shark, blue shark, spiny dogfish, dusky shark, king mackerel, thorny skate, silver hake, red hake, bluefish, pollock, white hake, goosefish and weakfish (Scott and Tibbo 1968; Maurer and Bowman 1975; Stillwell and Kohler 1982, 1985; Bowman and Michaels 1984).

5.1.3 Economic and Social Environment

5.1.3.1 Description of the Fisheries for Atlantic mackerel

5.1.3.1.1 Historical Commercial Fishery

Atlantic mackerel have a long history of exploitation off the northeastern coast of the United States dating back to colonial times. American colonists of the 1600's considered mackerel one of their most important staple commodities (Hoy and Clark 1967). The principal commercial gear was the haul seine prior to 1800. Hook and line then became the primary gear until about 1850 when the purse seine was introduced and largely replaced the traditional hook and line method (Anderson and Paciorkowski 1978).

Formal record keeping for Atlantic mackerel in the US began in 1804. During 1804-1818, the US fishery was confined to near shore waters and annual landings averaged about 3,100 mt. Reported landings then increased sharply when the offshore salt mackerel fishery developed in 1818. As the market for salt mackerel grew, so did the fleet in both size and number of vessels. Within 20 years, more than 900 sailing vessels operated from US ports and landings subsequently reached a pre-1850 peak of 80,300 mt in 1831. Annual US landings averaged 41,700 mt from 1819 to 1885 but varied from 10,500 mt in 1840 to 81,300 in 1884. The Canadian mackerel fishery developed later than in the US, and although catch statistics were first reported in 1876, their fishery was probably high since 1850. Combined US and Canadian landings peaked in 1889 at 106,000 mt, but declined sharply to 13,300 mt by 1889 (Anderson and Paciorkowski 1978).

Landings remained low during the period 1886-1924, averaging 18,100 mt per year (9,400 mt US, 11,700 mt Canadian). The fishery changed during this period as vessels changed from sail to motor power and market demand shifted from salted to fresh mackerel. Average landings subsequently increased to 35,200 mt (23,500 mt US, 11,700 mt Canadian) for the period 1925-1949 with the highest level of 49,200 mt in 1944. Landings gradually declined during the next decade, falling to 6,100 mt in 1959 (Hoy and Clark 1967; Anderson and Paciorkowski 1978).

The modern northwest Atlantic mackerel fishery underwent dramatic change with the arrival of the European distant-water fleets (DWF) in the early 1960's. While the first DWF landings reported in 1961 were not large (11,000 mt), they increased substantially to over 114,000 mt by 1969. Total international commercial landings (NAFO Subareas 2-6,) peaked at 437,000 mt in 1973 and then declined sharply to 77,000 by 1977 (Overholtz 1989).

The Magnuson Act of 1976 established control of the portion of the mackerel fishery occurring in US waters (NAFO Subareas 5-6) under the auspices of the Mid-Atlantic Fishery Management Council. Reported foreign landings in US waters declined from an unregulated level of 385,000 mt in 1972 to less than 400 mt from 1978-1980 under Magnuson (the foreign mackerel fishery was restricted by NOAA Foreign Fishing regulations to certain areas or "windows"). Under the control of MAFMC mackerel FMP and subsequent amendments, foreign mackerel catches were permitted to increase gradually to 15,000 mt in 1984 and then to a peak of almost 43,000 mt in 1988.

Recent US management policy of no TALFF combined with political and economic changes in Eastern Europe resulted in a decline in foreign landings from 9,000 mt in 1991 to 0 in 1992 and 1993. US commercial landings of mackerel increased steadily from roughly 3000 mt in the early

1980's to greater than 31,000 mt in 1990. However, US mackerel landings declined to 12,418 mt in 1992 and 4,666 mt in 1993. NMFS weighout data indicate that US landings were roughly 8,500 mt in 1994 and 1995. US Atlantic mackerel landings increased to about 15,500 mt in 1996 and 1997 (valued at ranged from $4.6 million to $9.5 million). NMFS weighout data indicate that US Atlantic mackerel landings then declined to approximately 12,500 mt in 1998 and 1999 (valued at $4.7 million and $3.6 million, respectively). Atlantic mackerel landings declined further to 5,645 mt in 2000 (valued at $2.0 million).

5.1.3.1.2 Description of 2001 Commercial Fishery

Based on NMFS dealer reports, Atlantic mackerel landings increased to 12,322 mt (valued at $2.2 million) in 2001. The 2001 landings of Atlantic mackerel by state are given in Table 1. The state of New Jersey accounted for the majority (93%) of landings in 2001. Other important states included Rhode Island (4%) and Massachusetts (1.4%). The 2001 landings of Atlantic mackerel by month are given in Table 2. The mackerel season extends from January through April when greater than 97% of the annual landings are taken. The principal gear used to land mackerel in 2001 were mid-water trawls (93%) and bottom trawls (5%)(Table 3).

The landings of Atlantic mackerel by port in 2001 are given in Table 4 . Cape May, NJ accounted for the vast majority of mackerel landings in 2001 (92%) , followed by North Kingstown, RI (3.2%), Chatham, MA (0.8%), Newport, RI (0.4%) and Gloucester, MA (0.3%). No ports were dependent on Atlantic mackerel for more than 10% of the value of total fishery landings in 2001 (Table 5).

5.1.3.1.3 Analysis of Human Environment/Permit Data

According to unpublished NMFS permit file data, there were 2242 vessels with Atlantic mackerel permits in 2001. These permits are currently open access and are available to any vessel which meets the size and horsepower restrictions implemented in Amendment 8 to the FMP. The distribution of vessels which possessed Atlantic mackerel permits in 2001 by home port state is given in Table 6. Most of these vessels were from the states of Massachusetts (44.6%), Maine (11.0%), New York (10.4%), New Jersey (9.7%), Rhode Island (6.2%), Virginia (5.2%), New Hampshire (3.9%) and North Carolina (3.8%).

In addition, there were 362 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2001. The distribution of these dealers by state is given in Table 7. Of the 362 dealers which possessed an Atlantic mackerel, squid and butterfish dealer permits in 2001, there were 105 dealers that reported buying Atlantic mackerel in 2001 (Table 8).

Based on NMFS dealer reports, a total of 461 vessels landed 12,322 mt of Atlantic mackerel valued at $2.2 million in 2001 (Table 9). Most of the vessels which landed mackerel also possessed *Loligo*/butterfish moratorium permits and *Illex* permits (Table 10). There were 229 vessels which landed 18 mt of Atlantic mackerel which possessed incidental catch permits.

5.1.3.1.4 Recreational Fishery for Atlantic mackerel

The Atlantic mackerel is seasonally important to the recreational fisheries of the Mid-Atlantic and New England regions. They are available to recreational anglers in the Mid-Atlantic primarily during the spring migration. Historically, mackerel first appear off Virginia in March and gradually move northward. Christensen *et al.* 1979 found mackerel to be available to the recreational fishery from Delaware to New York for about three weeks (generally from early April to early May). As a result, the annual recreational catch of mackerel appears to be sensitive to changes in their migration and subsequent distribution pattern (Overholtz *et al.* 1989).

Recreational landings of Atlantic mackerel since 1981, as estimated from the NMFS Marine Recreational Fishery Statistics Survey, are given in Table 11. Total recreational mackerel landings have varied from 284 mt in 1992 to 4,223.4 mt in 1986. In recent years, recreational mackerel landings have varied from roughly 690 mt in 1998 to 1740 mt in 1997. However, recreational mackerel landings have exceeded 1,200 mt in most years since 1994. Annual recreational mackerel landings by state (Table 12) indicate that, in most years, the majority of recreational mackerel landings occur from Virginia to Maine, with highest catches occurring from New Jersey to Massachusetts. Most Atlantic mackerel were taken from boats (Table 13).

5.1.4 Description of areas fished

Atlantic mackerel landings in 2001 by statistical area are given in Table 14. Statistical areas 616, 615, 612, 613, and 621 accounted for greater than 95% the commercial Atlantic mackerel landings in 2001. Mackerel landings were nearly evenly distributed between areas 616, 615, and 612 in 2001.

5.2 *Loligo pealei*

5.2.1 Status of the stock

Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP) was developed to bring the FMP into compliance with the Sustainable Fisheries Act (SFA). The SFA, which reauthorized and amended the Magnuson-Stevens Act, made a number of changes to the existing National Standards, as well as to definitions and other provisions in the Magnuson-Stevens Act, that caused the Guidelines to be revised. The most changes were made to National Standard 1, which imposed new requirements concerning definitions of overfishing in fishery management plans. The overfishing definition for Loligo was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Loligo* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{max} is exceeded (F_{max} is a proxy for F_{msy}). When an estimate of F_{msy} becomes available, it will replace the current overfishing proxy of F_{max}. Annual quotas will be specified which correspond to a target fishing mortality rate. Target F is defined as 75% of the F_{msy} when biomass is greater than B_{msy}, and decreases linearly to zero 50% of B_{MSY}. Maximum OY is specified as the catch associated with a fishing mortality rate of F_{max}. In addition, the biomass target is specified to equal B_{MSY}.

A 1999 assessment of the Loligo stock (SAW 29) concluded that the stock was approaching an overfished condition and that overfishing was occurring at that time (NMFS 1999). A production model indicated that current biomass was less than B_{msy}, and near the biomass threshold of 50% B_{MSY}. There was high probability that fishing mortality exceeded F_{msy} in 1998. The average F from the winter fishery (October to March) over the last five years averaged 180% of F_{MSY}, and F from the summer fishery equaled F_{MSY}. However, the production model also indicated that the stock has the ability to quickly rebuild from low stock sizes. Length based analyses indicated that fully-recruited fishing mortality in 1998 was greater than F_{max} and stock biomass was among the lowest in the assessment time series (1987-1998). Survey indices of recruitment were well below average in the years prior to the 1999 assessment.

The new requirements of the SFA required the Council to take remedial action for 2000 to rebuild the stock to a level which will produce MSY (B_{msy}) given the status determination that *Loligo* was approaching an overfished state. The control rule in Amendment 8 specifies that the target fishing mortality rate must be reduced to zero if biomass falls below 50% of B_{msy}. The target fishing mortality rate increases linearly to 75% of F_{msy} as biomass increases to B_{msy}. However, projections made in SAW 29 indicate that the control rule appears to be overly conservative. Projections from SAW 29 indicated that the *Loligo* biomass could be rebuilt to

levels approximating B_{msy} in three years if fishing mortality was reduced to the target mortality rate specified in Amendment 8 of 75% of F_{msy}. The yield associated with this fishing mortality rate (75% of F_{msy}) in 2000, assuming status quo F in 1999, was estimated to be 11,732 mt in SAW 29. In determining the specification of ABC for the year 2000, the Council considered advice offered by SAW 29 which indicated that the control rule adopted in Amendment 8 was too conservative. Model projections presented in SAW-29 demonstrated that the stock could be rebuilt in a relatively short period of time. Based on the SAW-29 projections, the Council chose to specify ABC as the yield associated with 90% F_{msy} or 13,000 mt in 2000.

In 2001, the Council examined more recent survey data for *Loligo* squid which indicated that abundance of *Loligo* had increased since analyses were presented in SAW-29. Estimates of biomass based on NEFSC fall 1999 and spring 2000 survey indices for *Loligo* indicated that the stock had been at or near B_{msy} since 1998 The 1999 fall survey index was the sixth highest value observed in the time series since 1967 and the second highest since 1987. The 2000 spring survey index for *Loligo* was the tenth highest in the time series since 1968 and the fifth highest since 1987 (Lai, pers. comm.). Based on the assumption that the stock was at or near $B_{msy,}$ the Council recommended that the 2001 and 2002 quotas be specified as the yield associated with 75% of F_{msy} . The yield associated with 75% of F_{msy} at B_{msy} is 17,000 mt based on projections in SAW-29 (NMFS 1999).

The *Loligo* stock was most recently assessed by the 34th Northeast Regional Stock Assessment Committee (SARC 34). New analyses of survey data indicated that *Loligo* stock biomass since 1967 has fluctuated without trend and has supported annual catches around 20,000 mt. A new surplus production model suggests that biomass has fluctuated between 14,000 and 27,000 mt since 1987. During this period quarterly F fluctuated between 0.06 and 0.6 about a mean of 0.24. While estimates of biomass have increased in recent years based on survey data, biomass in the longer term has fluctuated without trend.

SARC 34 concluded that it is unlikely that overfishing is occurring. The largest feasible scaled catch-survey estimates of fishing mortality for 2000-2001 ranged from 0.11-0.17 per quarter. Estimates of fishing mortality from a surplus production model ranged from 0.12-0.31 per quarter. Thus all recent estimates of fishing mortality are well below the biomass weighted estimates of F_{max} for *Loligo*. Results from length based virtual population analyses (LVPA) and catch survey biomass estimates for winter and spring surveys generally indicated that fishing mortality rates for *Loligo* declined to relatively low levels during 2000 and 2001.

SARC 34 also concluded that it is unlikely that the *Loligo* stock is overfished. Survey data (with the exception of the Massachusetts inshore spring survey), LVPA results, scaled survey biomass estimates, and production modeling estimates all indicate that *Loligo* biomass was high in 2000 and 2001. The smallest feasible catch-survey biomass estimate for 2001 was 34,000 mt, which is smaller than the best available estimate of $B_{msy}/2$ (40,000 mt). However, the probability that the *Loligo* biomass is less than or equal to the lowest feasible biomass is small. SARC 34 recommended that the Council maintain the current catch of 20,000 mt (to include both landings and discards).

Based on the assumption that the stock will be at or near B_{msy} in 2001, the Council recommended that the 2002 quota be specified as the yield associated with 75% of F_{msy} . The yield associated with 75% of F_{msy} at B_{msy} is 17,000 mt based on projections in SAW-29 (NMFS 1999). Given the management advice in SARC 34 and that the FMP currently specifies that the annual target quota be specified as the yield associated with 75% Fmsy, the Council recommended that the status quo be maintained for *Loligo* in 2003 (i.e., at 17,000 mt).

5.2.2 Stock Characteristics and Ecological Relationships

Previous studies of the life history and population dynamics of this species assumed that *Loligo* died after spawning at an age of 18-36 months based on the analysis of length frequency data (which suggested a "crossover" life cycle (Mesnil 1977, Lange and Sissenwine 1980)). However, recent advances in the aging of squid have been made utilizing counts of daily statolith growth increments (Dawe *et al.* 1985, Jackson and Choat 1992). Preliminary statolith ageing of *Loligo* indicates a life span of less than one year (Macy 1992, Brodziak and Macy 1994). Consequently, the most recent stock assessment for *Loligo* was conducted assuming that the species has an annual life-cycle and has the capacity to spawn throughout the year (NMFS 1994), as now appears typical of pelagic squid species studied throughout the world (Jereb *et a*l. 1991).

Loligo eggs are collected in gelatinous capsules as they pass through the female's oviduct during mating. Each capsule is about 3" long and 0.4" in diameter. Mating activity among captive *Loligo* was initiated when clusters of newly spawned egg capsules were placed in the tank. During spawning the male cements bundles of spermatophores into the mantle cavity of the female, and as the capsule of eggs passes out through the oviduct its jelly is penetrated by the sperm. The female then removes the egg capsule and attaches it to a preexisting cluster of newly spawned eggs. The female lays between 20 and 30 of these capsules, each containing 150 to 200 large (about 0.05"), oval eggs, for a total of 3,000 to 6,000 eggs. These clusters of demersal eggs, with as many as 175 capsules per cluster, are found in shallow waters (10-100') and may often be found washed ashore on beaches (Grosslein and Azarovitz 1982).

Loligo eggs in captivity develop in 11 to 27 days at temperatures ranging from 73 to 54 F; in nature, they may develop over a 40 F span of seawater temperature, beginning at 46 F. Little is known about the larval stages of *Loligo*; larvae are about 0.1" at hatching. They are not often found in the spawning areas and are assumed to be washed away by currents. A few 0.8" and many 1 to 2" juveniles appear in autumn research vessel catches in shallow waters. High numbers of these juveniles have also been found around Hudson Shelf Valley in late winter when adults are mostly found offshore. These are presumably October spawned individuals just beginning to move offshore (Grosslein and Azarovitz 1982).

The diet of *Loligo* changes with increasing size; small immature individuals feed on planktonic organisms (Vovk 1972a, Tibbetts 1977) while larger individuals feed on crustaceans and small fish (Vinogradov and Noskov 1979). Cannibalism is observed in individuals larger than 2 in (5 cm) (Whitacker 1978). Juveniles 1.6-2.4 in (4.1-6 cm) long fed on euphausiids and arrow worms, while those 2.4-4 in (6.1-10 cm) fed mostly on small crabs, but also on polychaetes and

shrimp (Vovk and Khvichiya 1980, Vovk 1985). Adults 4.8-6.4 in (12.1-16 cm) long fed on fish (Clupeids, Myctophids) and squid larvae/juveniles, and those >6.4 in (16 cm) fed on fish and squid (Vovk and Khvichiya 1980, Vovk 1985). Fish species preyed on by *Loligo* include silver hake, mackerel, herring, menhaden (Langton and Bowman 1977), sand lance, bay anchovy, menhaden, weakfish, and silversides (Kier 1982). Maurer and Bowman (1985) demonstrated seasonal and inshore/offshore differences in diet: in the spring in offshore waters, the diet was composed of crustaceans (mainly euphausiids) and fish; in the fall in inshore waters, the diet was composed almost exclusively of fish; and in the fall in offshore waters, the diet was composed of fish and squid.

The NEFSC bottom trawl survey data on food habits demonstrates a similar ontogenetic shift in the diet of *Loligo*. During 1973-1980, the diet of 0.4-4 in (1-10 cm) long squid was composed primarily of crustaceans (23%), while fish were the most important prey item in the diet of 4.4-16 in (11-40 cm) long squid. During 1981-90, the diet of squid 0.4-4 in (1-10 cm) in length was composed of 42% cephalopods (i.e., squid), 26% fish, and 21% crustaceans, while the diet of larger squid, 4.4-16 in (11-40 cm) in length, was dominated by fish (39%) and cephalopods (22%).

Juvenile and adult *Loligo* are preyed upon by many pelagic and demersal fish species, as well as marine mammals and diving birds (Lange and Sissenwine 1980, Vovk and Khvichiya 1980, Summers 1983). Marine mammal predators include long-finned pilot whale, *Globicephala melas*, and common dolphin, *Delphinus delphis* (Waring *et al.* 1990, Overholtz and Waring 1991, Gannon *et al.* 1997). Fish predators include bluefish, sea bass, mackerel, cod, haddock, pollock, silver hake, red hake, sea raven, spiny dogfish, angel shark, goosefish, dogfish and flounder (Maurer 1975, Langton and Bowman 1977, Gosner 1978, Lange 1980).

5.2.3 Economic and Social Environment

5.2.3.1 Description of the Historical Fisheries for *Loligo*

United States fishermen have been landing squid along the Northeastern coast of the US since the 1880's (Kolator and Long 1978). The early domestic fishery utilized fish traps and otter trawls but was of relatively minor importance to the US fishery due to low market demand. The squid taken were used primarily for bait (Lux et al. 1974). However, squid have long been a popular foodfish in various foreign markets and therefore a target of the foreign fishing fleets throughout the world, including both coasts of North America (Okutani 1977). USSR vessels first reported incidental catches of squid off the Northeastern coast of the United States in 1964. Fishing effort directed at the squids began in 1968 by USSR and Japanese vessels. By 1972, Spain, Portugal and Poland had also entered the fishery. Reported foreign landings of *Loligo* increased from 2000 mt in 1964 to a peak of 36,500 mt in 1973. Foreign *Loligo* landings averaged 29,000 mt for the period 1972-1975.

Foreign fishing for *Loligo* began to be regulated with the advent of extended fishery jurisdiction in the US in 1977. Initially, US regulations restricted foreign vessels fishing for squid (and other

species) to certain areas and times (the so-called foreign fishing "windows"), primarily to reduce spatial conflicts with domestic fixed gear fishermen and minimize incidental catch of non-target species. The result of these restrictions was an immediate reduction in the foreign catch of *Loligo* from 21,000 mt in 1976 to 9,355 mt in 1978.

By 1982, foreign *Loligo* catches had again risen above 20,000 mt. At this time, US management of the squid resources focused on the Americanization of these fisheries. This process began with the development of joint ventures between US fishermen and foreign concerns. Domestic annual harvest (DAH) was increased from 7,000 mt in the 1982-83 fishing year to 22,000 mt for 1983-84. Foreign allocations were reduced from 20,350 mt during 1982-83 to 5,550 mt during 1983-84 (Lange 1985). The foreign catch of *Loligo* fell below 5,000 mt by 1986, to 2 mt in 1987 and finally to zero in 1990.

The development and expansion of the US squid fishery was slow to occur for several reasons. First, the domestic market demand for squid in the US had traditionally been limited to the bait market. Secondly, the US fishing industry lacked both the catching and processing technology necessary to exploit squid in offshore waters. In the late 19th and early 20th century, squid were taken primarily by pound nets. Even though bottom otter trawls eventually replaced pound nets as the primary gear used to capture squid during this century, the US industry did not develop the appropriate technology to catch and process squid in deep water until the 1980's.

The annual US domestic squid landings (including *Illex* landings) from Maine to North Carolina averaged roughly 2,000 mt from 1928-1967 (NMFS 1994a). During the period 1965-1980, US *Loligo* landings ranged from roughly 1,000 mt in 1968 to 4,000 mt in 1980. The US *Loligo* fishery began to increase dramatically beginning in 1983 when reported landings exceeded 15,000 mt. With the cessation of directed foreign fishing in 1987, the US domestic harvest of *Loligo* averaged 17,800 mt during 1987-1992. The ex-vessel value of US caught *Loligo* increased from 7.8 million dollars in 1983 to 23.3 million by 1992.

US *Loligo* landings were about 22,500 mt in 1993 and 1994 (valued at $29.1 and $31.9 million, respectively). *Loligo* landings declined to 17,928 mt in 1995 (value declined to $23.0 million) and then increased slightly to 18,008 mt in 1995 (dockside value remained stable at $23.1 million). *Loligo* landings declined to 12,459 mt in 1996 (valued at $18.6 million) and then increased to 16,203 mt in 1997 (valued at $26.5 million). *Loligo* landings were about 18,500 mt in 1998 and 1999 and then declined to 16,561 mt in 2000.

5.2.3.2 Description of the 2001 *Loligo* Fishery

Based on NMFS dealer reports, a total 14,091 mt (31.1 million pounds) of *Loligo* (valued at $20.5 million) was landed in 2001. The 2001 landings of *Loligo* by state are given in Table 15. Three states, Rhode Island, New York and New Jersey accounted for the majority (92%) of *Loligo* landings in 2001. Rhode Island accounted for roughly half of the 2001 *Loligo* landings. The 2001 landings of *Loligo* by month are given in Table 16. The majority of *Loligo* landings occurred in the late winter/spring (35%) and fall (41%) months. Most (95%) were taken by otter trawls (Table 17).

According to unpublished NMFS permit file data, there were 384 vessels with *Loligo*/butterfish moratorium permits in 2001. These are limited access permits and are available only to vessels which meet the qualifications specified in Amendment 5 to the FMP in 1997. The distribution of vessels which possessed *Loligo*/butterfish moratorium permits in 2001 by home port state is given in Table 18. Most of these vessels were from the states of Massachusetts (28.4%), New York (22.7%), Rhode Island (17.4%), New Jersey (14.8%), North Carolina (6.2%), Virginia (4.2%), and Connecticut (2.1%). In addition, there were 362 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2001. The distribution of these dealers is given by state in Table 7. Of the 362 dealers which possessed an Atlantic mackerel, squid and butterfish dealer permits in 2001, there were 114 dealers that reported buying *Loligo* in 2001 (Table 19).

The landings of *Loligo* by port in 2001 are given in Table 20. Point Judith, RI accounted for nearly one-third of the *Loligo* landings in 2001. Other important ports in terms of *Loligo* landings included Cape May, NJ (12%), North Kingstown, RI (11.8%), Hampton Bay, NY (11.6%), Montauk, NY (10.6%), and Newport, RI. There were 11 ports that were dependent on *Loligo* for more than 10% of the value of total fishery landings in 2001 (Table 21).

5.2.3.3 Analysis of Human Environment/Permit Data

Based on NMFS dealer reports, a total of 447 vessels landed 14,091 mt (31.1 million pounds) of *Loligo* valued at $20.5 million in 2001 (Table 9). Most of *Loligo* landed in 2001 was taken by *Loligo*/butterfish moratorium permit holders (Table 10). About 74% of the vessels which possessed *Loligo*/butterfish moratorium permits in 2001 actually landed *Loligo*. Most of the vessels which possessed *Illex* permits (82%) also landed *Loligo* during 2001 (Table 10). There were 182 vessels which landed 2398 mt of *Loligo* which possessed incidental catch permits.

5.2.4 Description of areas fished

The 2001 landings of *Loligo* by NMFS statistical area (three digit) are given in Table 22. There were four statistical areas which, individually, accounted for greater than 10% of the *Loligo* landings in 2001: 616, 537, 622, and 626. Collectively, these four areas accounted for more than half of the 2001 *Loligo* landings. The top seven statistical areas accounted for greater than 80% of the 2001 *Loligo* landings.

5.3 *Illex illecebrosus*

5.3.1 Status of the Stock

The most recent assessment of the *Illex* stock (SAW 29) concluded that the stock was not in an overfished condition and that overfishing was not occurring (NMFS 1999). However, due to a lack of adequate data, an the estimate of yield at F_{msy} was not updated in SAW 29. However, an upper bound on annual fishing mortality was computed for the US EEZ portion of the stock based on a model which incorporated weekly landings and relative fishing effort and mean squid weights during 1994-1998. These estimates of F were well below the biological reference points. Current absolute stock size is unknown and no stock projections were done in SAW 29 or since then.

5.3.2 Stock Characteristics and Ecological Relationships

The age and growth of *Illex* has been well studied relative to other squid species, being one of the few for which the statolith ageing method has been validated (Dawe *et al.* 1985). Research on the age and growth of *Illex* based on counts of daily statolith growth increments indicates an annual life span (Dawe *et al.* 1985).

Illex is a semelparous, terminal spawner with a protracted spawning season. There have been no direct observations of spawning in nature, but speculation about the timing and location is based on squid size and timing of advanced male maturity stages (O'Dor and Dawe 1998), back-calculated hatch dates from aging studies, and the collection of hatchling (Hendrickson pers. comm). *Illex* spawning takes place in the deep waters of the continental slope during winter (MAFMC 1995). Spawning likely occurs throughout the year (O'Dor and Dawe 1998) with most intense spawning generally occurring from December to March (Lange and Sissenwine 1980), but this varies among years and locations. Between Cape Canaveral, Florida and Charleston, North Carolina, spawning occurs during December to January (Rowell *et al.* 1985a, MAFMC 1995), while off Newfoundland, spawning has been reported from January through June (Squires 1967).

The principal spawning area is believed to be south of Cape Hatteras over the Blake Plateau (Black *et al.* 1987, MAFMC 1995), but other spawning occurs between the Florida Peninsula and central New Jersey at depths down to 990 ft (300 m; Fedulov and Froerman 1980, MAFMC 1995). Spawning probably occurs in the northern part of the Gulf Stream/Slope Water frontal zone (Dawe and Beck 1985, O'Dor and Balch 1985, Rowell et al 1985a).

5.3.3 Economic and Social Environment

5.3.3.1 Description of the Historical Fisheries for *Illex*

As in the case of *Loligo*, *Illex* have been exploited by US fishermen since at least late 1800's, being used primarily as bait. From 1928 to 1967, reported annual US squid landings from Maine to North Carolina (including *Loligo pealei*) ranged from 500-2,000 mt (Lange and Sissenwine 1980). However, foreign fishing fleets became interested in exploitation of the neritic squid stocks of the Northwest Atlantic Ocean when the USSR first reported squid incidental catches in the mid-1960's. By 1972, foreign fishing fleets reported landing 17,200 thousand mt of *Illex* from Cape Hatteras to the Gulf of Maine. During the period 1973-1982, foreign landings of *Illex* in US waters averaged about 18,000 mt, while US fisherman averaged only slightly more than 1,100 mt per year. Foreign landings from 1983-1986 were part of the US joint venture fishery which ended in 1987 (NMFS 1994a). The domestic fishery for *Illex* increased steadily during the 1980's as foreign fishing was eliminated in the US EEZ. US landings first exceeded 10,000 mt in 1987 and ranged roughly from 11,000 mt in 1990 to 17,800 mt in 1992.

Because their geographical range extends well beyond the US EEZ, *Illex* are subject to heavy exploitation in waters outside of US jurisdiction. During the mid-1970's, a large directed fishery for *Illex* developed in NAFO subareas 2-4. Reported landings of *Illex* increased dramatically from 17,700 mt in 1975 to 162,000 mt in 1979. *Illex* landings in NAFO subareas 2-4 subsequently plummeted to slightly less than 13,000 mt by 1982. Hence, within the total stock of *Illex* (NAFO Subareas 2-6) landings peaked in 1979 at 180,000 mt but have since declined sharply, ranging from 2,800 to 22,200 mt during the period 1983-1991 (NMFS 1994a).

In 1992, US *Illex* landings were a then record high 17,827 mt with an ex-vessel value of $9,700,000 (average price=$0.54 per kg/$0.25 per lb). Statistical area 622 accounted for 63% of the total harvest, while three areas (SA 622,626, and 632) accounted for 96% of the total in 1992. Temporally, 94% of the 1992 *Illex* landings were taken during June through October. Otter trawl gear accounted for virtually all (99.9%) of the 1992 landings.

Illex landings reached 18,012 mt in 1993 and then rose slightly to a then record high 18,344 mt in 1994. In 1993, prices fell to $473/mt but rose sharply in 1994 to $569/mt. NMFS weighout data indicate that *Illex* landings declined to 14,049 mt in 1995 (dockside value declined to $8.0 million). In 1996, US *Illex* landings increased to 16,969 mt (valued at $9.7 million) and then declined to 13,632 mt (valued at $6.1 million) in 1997. *Illex* landings were 22,705 mt in 1998 valued at $9.2 million. *Illex* landings averaged 17,142 mt for the period 1994-1998. Unpublished NMFS weighout data indicate that 7,361 mt of *Illex* valued at $3.9 million was landed in 1999and that 9,041 mt of *Illex* valued at $3.7 million was landed in 2000.

5.3.3.2 Description of 2001 *Illex* Fishery

Unpublished NMFS weighout data indicate that 3,939 mt of *Illex* valued at $1.8 million was landed in 2001. The 2001 landings of *Illex* by state are given in Table 23 . Two states, Rhode Island and New Jersey accounted for the majority (>97%) of *Illex* landings in 2001. Rhode Island accounted for more than 80% of the 2001 *Illex* landings. The 2001 landings of *Illex* by month are given in Table 24. The majority of *Illex* landings (88%) occurred in the summer months. Virtually all (99.5%) were taken by bottom otter trawls (Table 25).

The landings of *Illex* by port in 2001 are given in Table 26. North Kingstown, RI accounted for greater than 82 % of the *Illex* landings in 2001. Other important ports in terms of *Illex* landings included Cape May, NJ (12.5%), and Elizabeth, NJ (2.4%). North Kingstown, RI was the only port that was dependent on *Illex* for more than 10% of the value of total fishery landings in 2001 (Table 27).

According to unpublished NMFS permit file data, there were 73 vessels with *Illex* moratorium permits in 2001. These are limited access permits and are available only to vessels which meet the qualifications specified in Amendment 5 to the FMP. The distribution of vessels which possessed *Illex* moratorium permits in 2001 by home port state is given in Table 28. Most of these vessels were from the states of New Jersey (31.5%) Massachusetts (17.8%), Rhode Island (12.3%) New York (10.9%), North Carolina (9.6%),and Virginia (8.2%). In addition, there were 362 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2001. The distribution of these dealers is given by state in Table 7. Of the 362 dealers which possessed an Atlantic mackerel, squid and butterfish dealer permit in 2001, there were 19 dealers that reported buying *Illex* in 2001 (Table 29).

5.3.3.3 Analysis of Human Environment/Permit Data

Based on NMFS dealer reports, a total of 31 vessels landed 3,939 mt (8.7 million pounds) of *Illex* valued at $1.9 million in 2001 (Table 9). Virtually all of the *Illex* landed in 2001 was taken by *Illex* moratorium permit holders (Table 10). However, only 20% of the vessels which possessed *Illex* moratorium permits in 2001 actually landed *Illex*. Thus, most of the *Illex* fleet was inactive in the 2001 *Illex* fishery. Most of the vessels which landed *Illex* during 2001 also possessed *Loligo* /butterfish moratorium and Atlantic mackerel permits (Table 10). There were 11 vessels which landed 0.3 mt of *Illex* which possessed incidental catch permits.

5.3.4 Description of the areas fished

The 2001 landings of *Illex* by statistical area are given in Table 30 (includes only the three digit statistical areas that individually accounted for greater than 1% of the *Illex* landings in 2002). Three statistical areas (622,626and 632) accounted for the vast majority (95%) of *Illex* landings in 2001. Two-digit statistical area 62 accounted for 72% of total *Illex* landings in 2001.

5.4 Atlantic butterfish

5.4.1 Status of the stock

The SAW 17 (NMFS 1994a) Advisory Report included the following concerning the state of the stock:

"The Atlantic butterfish stock is at a low to medium biomass level and current catch levels are below the MSY of 16,000, however, exploitation rate is unknown. Although recruitment of butterfish has remained high in recent years, the stock size of adults has declined since 1990 and is currently well below average. Since 1988, annual butterfish landings have averaged 2,500 mt, or only 25% of the domestic allowable harvest (DAH) of 10,000 mt. Landings in 1993 are projected to be 3,000 mt. Survey biomass indices in autumn 1992 and spring 1993 were among the lowest in the survey time series. Fishing effort increased in 1992 but, overall, has been relatively stable since 1984. Commercial landings per unit of effort (LPUE) in 1992 remained at the low levels observed since 1988."

SAW 17 (NMFS 1994a) offered the following management advice:

"Butterfish landings in recent years have been well below historical average yields. Japanese demand for butterfish has waned and this has had a negative impact on harvest levels. Butterfish landings are thus unlikely to increase unless market demand improves. If demand does improve, however, the stock in its current condition may not be able to sustain landings in excess of the long term historical average (1965-1992) of 7,200 mt because of recent declines in abundance as indicated by survey indices."

"Historical information suggests that discarding of butterfish may be an important source of fishing-induced mortality. The SARC recommends that data be collected that would allow discard levels to be reliably estimated."

"Given that butterfish is a short-lived species, new approaches to the assessment and management of the stock are required. A more adaptive, real-time assessment/management system will be needed to maintain full exploitation of the stock while simultaneously ensuring that adequate spawning stock levels are achieved. This would involve both real-time evaluation of stock status and in-season catch level adjustments."

5.4.2 Stock Characteristics and Ecological Relationships

Butterfish spawning takes place chiefly during summer (June- August) in inshore waters generally less than 100' deep. The times and duration of spawning are closely associated with changes in surface water temperature. The minimum spawning temperature is approximately 60 ^{o}F. Peak egg production occurs in Chesapeake Bay in June and July, off Long Island and Block Island in late June and early July, in Narragansett Bay in June and July, and in Massachusetts Bay June to August (Grosslein and Azarovitz 1982).

Butterfish eggs, 0.027-0.031" in diameter, are pelagic, transparent, spherical, and contain a single oil globule. The egg membrane is thin and horny. Incubation at 65 ^{o}F takes less than 48 hours. Newly hatched larvae are 0.08" long and like most fish larvae are longer than they are deep. At 0.2" larval body depth has increased substantially in proportion to length, and at 0.6" the fins are well differentiated and the young fish takes on the general appearance of the adult. Larvae are found at the surface or in the shelter of the tentacles of large jelly fish (Grosslein and Azarovitz 1982).

Butterfish eggs are found throughout the New York Bight and on Georges Bank, and they occur in the Gulf of Maine, but larvae appear to be relatively scarce east and north of Nantucket Shoals. In 1973, from mid-June to early September, larvae were common in the plankton off Shoreham, NY. Post larvae and juveniles were common in plankton net samples taken in August in the vicinity of Little Egg Inlet, NJ. Juveniles 3-4" long have been taken in Rhode Island waters in late October (Grosslein and Azarovitz 1982).

Growth is fastest during the first year and decreases each year thereafter. Young of the year butterfish collected in October trawl surveys (at about 4 months old) average 4.8" long. Fish about 16 months old are 6.6", at about 28 months old fish are 6.8", and at 40 months old they are 7.8". Maximum age is reported as six years. More recent studies showed that the population was composed of four age groups ranging from young of the year to over age three (Grosslein and Azarovitz 1982). Some butterfish are sexually mature at age one, but all are sexually mature by age two (Grosslein and Azarovitz 1982).

5.4.3 Economic and Social Environment

5.4.3.1 Description of the Historical Fisheries for Butterfish

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962 (Murawski and Waring 1979). Reported landings averaged about 3,000 mt from 1920-1962 (Waring 1975). Beginning in 1963, vessels from Japan, Poland and the USSR began to exploit butterfish along the edge of the continental shelf during the late-autumn through early spring. Reported foreign catches of butterfish increased from 750 mt in 1965 to 15,000 mt in 1969, and then to about 18,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign landings declined sharply from 10,353 mt in 1976 to 1,326 mt in 1978. Foreign landings were slowly phased out by 1987. Since 1988, foreign butterfish landings have averaged about 1 mt.

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, a historical peak of slightly less than 12,000 mt landed in 1984. Since then US landings have declined sharply to an average of 2,500 mt since 1988. Recent reductions in Japanese demand for butterfish has probably had a negative effect on butterfish landings.

Butterfish landings totaled 2,700 mt in 1992. Almost half (45%) of the 1992 total came from

southern New England waters (Statistical area 53). Two statistical areas, 53 and 61, accounted for over 75% of the 1992 total. About half of the landings occurred during January and February, the remainder being distributed throughout the rest of the year. Butterfish landings were 3,631 mt and 2,013 mt in 1994 and 1995 , respectively. NMFS weighout data indicate that US butterfish landings increased to 3,489 mt in 1996 (valued at $5.1 million) and then decreased to 2,797 mt (valued at $4.7 million) in 1997. NMFS weighout data indicate that butterfish landings were 1,964 mt in 1998 (valued at $2.5 million) and that butterfish landings increased to 2,116 mt in 1999 (valued at $2.7 million). Butterfish landings decreased to 1,432 mt in 2000 (valued at $1.5 million).

5.4.3.2 Description of 2001 Butterfish Fishery

Unpublished NMFS weighout data indicate that 4,380 mt of butterfish valued at $3.2 million was landed in 2001. The 2001 landings of butterfish by state are given in Table 31. Two states, Rhode Island and New Jersey accounted for the majority (>91%) of butterfish landings in 2001. Rhode Island accounted for 80% of the 2001 butterfish landings. The 2001 landings of butterfish by month are given in Table 32. The majority (88%) of butterfish landings occurred in the winter months. Most (95%) were taken with bottom otter trawls (Table 33).

The landings of butterfish by port in 2001 are given in Table 34. Two Rhode Island ports, North Kingstown and Port Judith accounted for 78% of the butterfish landings in 2001. Other important ports in terms of butterfish landings included Montauk, NY (5.2%), Hampton Bay, NY (3.0%), and East Haven, CT (2.4%). There were four ports that were dependent on butterfish for more than 10% of the value of total fishery landings in 2001 (Table 35). These included North Kingstown , RI (16.2%), Mattituck, NY (15.3%), Ammagansett, NY (10.8%) and Greenport, NY (10.0%).

5.4.3.3 Analysis of Human Environment/Permit Data

According to unpublished NMFS permit file data, there were 384 vessels with *Loligo*/butterfish moratorium permits in 2001. These are limited access permits and are available only to vessels which meet the qualifications specified in Amendment 5 to the FMP in 1997. The distribution of vessels which possessed *Loligo*/butterfish moratorium permits in 2001 by home port state is given in Table 18. Most of these vessels were from the states of Massachusetts (28.4%), New York (22.7%), Rhode Island (17.4%), New Jersey (14.8%), North Carolina (6.2%), Virginia (4.2%), and Connecticut (2.1%). In addition, there were 362 dealers which possessed Atlantic mackerel, squid and butterfish dealer permits in 2001. The distribution of these dealers is given by state in Table 7. Of the 362 dealers which possessed an Atlantic mackerel, squid and butterfish dealer permits in 2001, there were 112 dealers that reported buying butterfish in 2001 (Table 36).
Based on NMFS dealer reports, a total of 485 vessels landed 4,380 mt (9.6 million pounds) of butterfish valued at $3.2 million in 2001 (Table 9). Most of the butterfish landed in 2001 was taken by *Loligo/*butterfish moratorium permit holders (Table 10). There were 215 vessels which landed 344 mt of butterfish which possessed incidental catch permits. The distribution of vessels

which possessed incidental catch permits in 2001 by home port state is given in Table 37.

5.4.4 Description of the areas fished

The 2001 landings of butterfish by statistical area are given in Table 38. Statistical area 537 was the most important area, accounting for 71% of total butterfish landings in 2001. Other important statistical areas for butterfish included areas 616,613, 525, 539, and 611.

6.0 Environmental Consequences of the Alternatives

6.1 Biological Impacts

6.1.1 Extend the moratorium on entry to the *Illex* fishery for an additional year (Preferred Alternative).

Amendment 5 established a moratorium on new entry into the commercial fishery for *Illex* squid. The Council placed a five year sunset provision on the moratorium which is set to expire in July 2002. This measure would extend the *Illex* moratorium for an additional year. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2004, unless it is extended or otherwise altered in Amendment 9.

The extension of the moratorium under this framework option would maintain the status quo in the fishery at least until 2004. This will allow the Council more time to consider longer term measures for the *Illex* moratorium in Amendment 9 to the FMP. Vessels which took small quantities in the past will be able to continue to do so under the incidental catch provision of the FMP. However, further expansion of entry into the directed *Illex* fisheries will be controlled for at least an additional year, thus additional capitalization will be avoided.

The *Illex* fishery is managed pursuant to this FMP through an annual quota specification process. Annual quotas are specified based on the overfishing definition established in Amendment 8. The approved overfishing definition for *Illex* is, "Overfishing for *Illex* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{MSY} is exceeded. Maximum OY will be specified as the catch associated with a fishing mortality rate of F_{MSY}. In addition, the biomass target is specified to equal B_{MSY}. The minimum biomass threshold is specified as ½ B_{MSY}." The Max OY for *Illex* squid is currently specified at 24,000 mt. The Council specified ABC at 24,000 mt for 2002, which is equal to the quota associated with F_{MSY}.

Since the annual quota is the chief mechanism used to control fishing mortality in the *Illex* fishery, an extension of the moratorium on entry to the *Illex* fishery is not expected to have any negative biological impacts on the *Illex* stock or non-target species. To the contrary, this measure is expected to have a positive impact on the *Illex* stock because it would prevent additional over-capitalization of the *Illex* fishery and help to prevent overfishing. If the moratorium on entry to the *Illex* fishery was not extended, the fishery would revert to open access conditions. Under open access conditions, it is likely that a much larger number of

vessels would enter the fishery. This could result in dramatic increases in fishing effort in the *Illex* fishery and, in turn, increase the chance that the annual quota might be exceeded and that the overfishing threshold might be exceeded.

Since this option maintains the status quo for an additional year, there are no biological impacts expected as a result of this alternative. However, if the Council failed to extend the moratorium beyond 2003, the biological consequences would be expected to be similar to those described under the no action alternative.

6.1.2 Extend the moratorium on entry to the *Illex* fishery for an additional two years

This alternative would extend the moratorium on entry to the *Illex* fishery for an additional two years, or until the final rule for Amendment 9 is published, whichever comes first.

Amendment 5 established a moratorium on new entry into the commercial fishery for *Illex* squid. The Council placed a five year sunset provision on the moratorium which is set to expire in July 2002. This measure would extend the *Illex* moratorium for an additional two years. Under this measure, only vessels which possess *Illex* moratorium permits would be eligible for *Illex* moratorium permits under the moratorium extension. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2005, unless it is extended or otherwise altered in Amendment 9.

The extension of the moratorium under this framework option would maintain the status quo in the fishery at least until 2005. This will allow the Council more time to consider longer term measures for the *Illex* moratorium in Amendment 9 to the FMP. Vessels which took small quantities in the past will be able to continue to do so under the incidental catch provision of the FMP. However, further expansion of entry into the directed *Illex* fisheries will be controlled for at least an additional two years, thus additional capitalization will be avoided.

The biological impacts of this alternative are expected to be the same as for the option discussed above under section 6.1.1. However, if the Council failed to extend the moratorium beyond 2003, the biological consequences would be expected to be similar to those described under the no action alternative.

6.1.3 Extend the moratorium on entry to the *Illex* fishery for an additional three years

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2006 unless extended in a future Amendment. The biological impacts of this alternative are expected to be the same as for the option discussed above under section 6.1.1 and 6.1.2.

6.1.4 No action

Under this alternative the moratorium on entry to the *Illex* fishery would be allowed to expire in 2003. If the moratorium on entry to the *Illex* fishery was not extended, the fishery would revert

to open access conditions. Under open access conditions, it is likely that a much larger number of vessels would enter the fishery. This could result in dramatic increases in fishing effort in the *Illex* fishery and, in turn, increase the chance that the annual quota might be exceeded and that the overfishing threshold might be exceeded.

This would have a negative impact on the *Illex* stock which, in turn, would be expected to negatively affect the large number of species and stocks of marine mammals and predatory fish which prey on *Illex* squid. Known predators of *Illex* are the fourspot flounder, goosefish, and swordfish. *Illex* is probably eaten by a substantially greater number of fish, however, partially digested animals are often difficult to identify and are simply recorded as squid remains, with no reference to the species. There are at least 47 other species of fish that are known to eat "squid". All of these species could be negatively impacted if the abundance of *Illex* were to decline as a result of overfishing.

6.2 Socioeconomic impacts

6.2.1 Extend the moratorium on entry to the *Illex* fishery for an additional year (Preferred Alternative).

This alternative would extend the moratorium on entry to the *Illex* fishery for an additional year, or until the final rule for Amendment 9 is published, whichever comes first.

Prior to the 1980's, the fishery for *Illex* in the US EEZ was prosecuted primarily by the foreign distant water fleets. With the implementation of the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan and it's subsequent Amendments, the fishery has become fully Americanized. At the same time that the domestic fishery was undergoing development, new biological data became available which indicated that *Illex* is an annual species[1]. This resulted in downwardly revised estimates of the potential yield from this fishery. The simultaneous growth of the domestic fishery and reduction in estimates of sustainable yields resulted in the fishery moving towards a fully capitalized and exploited state. Hence, there was a moratorium on entry of additional commercial vessels into the *Illex* squid fisheries in the EEZ implemented as part Amendment 5.

Under the Amendment 5, a vessel was eligible for a moratorium permit in the *Illex* fishery if it met any of the following criteria: 1) The vessel had five landings (including at-sea joint venture transfers) of 5,000 pounds of *Illex* (that is, landed 5 trips of at least 5,000 pounds) between 13 August 1981 and 13 August 1993, or 2) The vessel is replacing a vessel of substantially similar harvesting capacity which involuntarily left the *Illex* squid fishery during the moratorium, and both the entering and replaced vessels are owned by the same person. "Substantially similar harvesting capacity" means the same or less GRT and vessel registered length for commercial vessels, or 3) the vessel was under construction for, or was being rerigged for, use in the

[1]life span of less than one year.

directed fishery for *Illex* on 13 August 1993 and provided the vessel has landed the required amount of *Illex* for sale specified above (5 trips of at least 5,000 lbs) prior to December 31, 1994. For the purpose of this paragraph, "under construction" means that the keel had been laid or the vessel was under written agreement for construction or the vessel was under written contract for purchase. "Being rerigged" means physical alteration of the vessel or its gear had begun to transform the vessel into one capable of fishing commercially for *Illex*. 4) Vessels that are judged unseaworthy by the Coast Guard for reasons other than lack of maintenance may be replaced by a vessel with the same GRT and vessel registered length for commercial vessels 5) The moratorium terminates at the end of the fifth year following implementation unless extended by FMP Amendment.

One of the major concerns raised during the development of the original moratorium program in Amendment 5 was that the fleet which would qualify under the proposed *Illex* moratorium program would not be capable of taking the entire annual quota. In response to this concern, the Council placed the five year sunset provision on the *Illex* moratorium program. The intent of this measure was to allow time to determine if the harvest capacity of the fleet was sufficient to take all of the available annual quota. Since then, the *Illex* fleet has demonstrated that fleet capacity was more than sufficient to land the annual quota when the *Illex* fleet landed in excess of the annual quota in 1998. During 1998, a number of factors contributed to the record harvest of the domestic squid *Illex illecebrosus* and early closure of the fishery. These included relatively high abundance and availability of *Illex illecebrosus* to the US fleet combined with high world market price and demand resulting from a major decline in production of *Illex argentenius* in the Falkland Islands in the South Atlantic. As a result of these conditions, US production of *Illex* exceeded 23,000 mt in1998, thus demonstrating that US harvest capacity under the *Illex* moratorium program adopted in Amendment 5 was more than sufficient to land the long term sustainable level of harvest. While more recent landings data are available to describe the *Illex* fishery, a discussion of the 1998 fishery is given here because it demonstrates that the harvest capacity of the *Illex* moratorium fleet is sufficient to land the long term level of sustainable yield for this resource. In addition, a discussion of the data available at the time that Amendment 5 was being developed is also given to describe the context within which the Council made decisions relative to limiting access to the *Illex* fishery.

The most recent data available at the time that Amendment 5 was being developed indicated that there were 3,061 vessels with Federal commercial permits issued pursuant to the Atlantic Mackerel, Squid, and Butterfish FMP (based on 1993 NMFS data). The hold capacity of those vessels was determined to be approximately 50,000 mt. Based on unpublished 1993 NMFS weighout data for *Illex*, 18 out of 53 vessels (33%) which reported landing any *Illex* accounted for 99% of the total. Total US *Illex* landings were 18,012 mt in 1993. A total of 53 vessels made these landings in 438 trips during 1993. The average catch per trip was 90,662 lbs. The majority of vessels landed in excess of 50,000 lbs per trip. In terms of landings per year, the average vessel in the *Illex* fishery landed roughly 750,000 lbs in 1993. These data were high in determining the need for entry limitation into the *Illex* fishery because they highlighted the nature of the vessels engaged in this fully-utilized fishery. Unlike the *Loligo* fishery, the *Illex* fleet and fishery are comprised of relatively large vessels which land substantial quantities of

Illex per vessel. As a result, the Council concluded during the development of Amendment 5 that incremental entry of new effort into this fishery would quickly result in it's over-capitalization and jeopardize both the stock and the fishery. This situation has not changed.

Discussion of the number of vessels that would qualify for the *Illex* squid moratorium was based on the Northeast Fishery Science Center weighout files. Under the preferred alternative qualifying criteria for an *Illex* moratorium permit in Amendment 5, 52 vessels were expected to qualify based on NMFS weighout data. However, the number of vessels which actually qualified for an *Illex* moratorium permit under Amendment 5 was much larger. Initially, there were 77 vessels which qualified for *Illex* moratorium permits. As noted above, analyses conducted for Amendment 5 estimated that approximately 52 vessels would qualify for *Illex* moratorium permits. This estimate was based on an analysis of NMFS weighout data which did not include landings taken as a result of joint venture activities during the 1980's. Vessels could qualify for an *Illex* moratorium permit if they demonstrated landing five trips of 5,000 pounds over a qualifying period which extended back to 1981 (landings made as a result of joint ventures were also eligible). As a result, a much larger number of vessels qualified for an *Illex* moratorium permit than was anticipated based on data and analyses considered during the development of Amendment 5 (i.e., as estimated based on weighout data alone). Hence, the harvest capacity of the vessels which qualified under the *Illex* moratorium program established in Amendment 5 substantially exceeds the level necessary to harvest the long term sustainable yield for *Illex*. This became apparent in 1998, when a total of 110 vessels landed 23,567 mt of *Illex* squid (i.e., the annual quota was exceeded). These vessels included two categories: vessels with moratorium permits and vessels with incidental catch permits. While there were 77 vessels which could have landed *Illex* in the directed fishery because they possessed moratorium permits, 18 vessels accounted for more than 95% of the *Illex* landings in 1998.

Fishery performance and production in 1998 clearly indicate that the *Illex* moratorium fleet possesses harvest capacity far in excess of what is necessary to harvest the long term potential yield from this fishery. For example, there were 34 vessels which possessed moratorium permits that landed *Illex* in 1998. Therefore, the remaining 43 vessels which possessed *Illex* permits did not land any *Illex* in 1998. An estimate of latent capacity of the fleet possessing *Illex* which was idle in 1998 was derived by expanding the landings by vessel size class for vessels which did report landing *Illex* in 1998. Based on this expansion, had the entire *Illex* moratorium fleet fished in 1998, total landings of *Illex* would have been 52,000 mt (114,746,619 lbs). The 2002 allowable biological catch for *Illex* is 24,000 mt (52.9 million lbs). Thus, the *Illex* moratorium fleet possessed enough harvest capacity to land at least about 2.2 times the long term sustainable yield for *Illex* in 1998.

Failure to extend the moratorium would result in further overcapitalization of this sector of the fishing industry, which in turn would have negative economic consequences for the vessels and communities which depend upon the *Illex* resource. The distribution of vessels which possessed *Illex* moratorium permits in 2001 by home port state is given in Table 28. Overall, New Jersey would appear to be the state most dependent on the *Illex* resource followed by New York, Massachusetts and Rhode Island. Additional entry into this fishery would be expected to

proportionately reduce the landings and revenue of vessels currently operative within the moratorium fleet (see analyses contained in RIR Section). The only port dependent upon *Illex* for more than 10 % of total revenues in 2001 was North Kingstown, RI (24.4%). Therefore, the vessel owners, crew, dealers or processors and fishing communities associated with this port are expected to be affected the most by failure to extend the moratorium program for *Illex*.

The extension of the moratorium under preferred alternative described in this framework action would maintain the status quo in the fishery at least until 2004. This will allow the Council more time to consider longer term measures for the *Illex* moratorium in the next amendment to the FMP. Vessels which took small quantities in the past will be able to continue to do so under the incidental catch provisions of the FMP. However, further expansion of entry into the directed *Illex* fisheries will be controlled for at least one more year, thus overfishing and over-capitalization will be avoided.

6.2.2 Extend the moratorium on entry to the *Illex* fishery for an additional two years

The extension of the moratorium under this framework option would maintain the status quo in the fishery at least until 2005. This will allow the Council more time to consider longer term measures for the *Illex* moratorium in the next amendment to the FMP. Vessels which took small quantities in the past will be able to continue to do so under the incidental catch provisions of the FMP. However, further expansion of entry into the directed *Illex* fisheries will be controlled for at least two more years.. The social and economic impacts of this alternative are expected to be the same as for the option discussed above under section 6.2.1, with the only difference being that the moratorium would expire a year later.

6.2.3 Extend the moratorium on entry to the *Illex* fishery for an additional three years

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2006 unless extended in a future Amendment. However, further expansion of entry into the directed *Illex* fisheries will be controlled for at least three more years. The social and economic impacts of this alternative are expected to be the same as for the option discussed above under section 6.2.1, with the only difference being that the moratorium would expire two years later.

6.2.4 No action

Under this option, the *Illex* moratorium would expire in July of 2002 and the fishery would revert to open access conditions. As noted above, the *Illex* moratorium fleet demonstrated the capacity to harvest the long term sustainable level of harvest as defined under the SFA in 1998. The key questions relative to extension of this moratorium hinge on the likely effects of allowing the *Illex* fishery to revert to open access.

The development of excess fishing capacity in US marine fisheries, especially since the passage of the Magnuson Act, has been identified as the single most important problem currently facing the US fishing industry (NMFS 1996; NRC 1999). Most US fisheries can be characterized as

overcapitalized, with too many vessels, too much gear and too much time spent at sea harvesting fish at too high a cost to both harvesters and society. Adding to the problem is the fact that the increase in fishing capacity in the US has been accompanied by a dramatic increase in technological advances (NMFS 1996). The US commercial fishery has developed from a fleet of primarily sailing vessels in the 1800's to a modern fleet of vessels which has resulted in an enormous increase in fishing power throughout the 20th century. This increase in fishing vessel capacity and efficiency has resulted in over-exploitation and economic losses throughout most US marine fisheries.

The net economic benefits that could be gained by ending the open access problem in US fisheries are high. Managing single-species fisheries with a conservative, risk averse approach should be the first step in achieving sustainable marine fisheries (NRC 1999). The NRC (1999) recommended that a moderate level of exploitation might be a better goal for fisheries management than full exploitation since the latter has almost universally resulted in over-exploitation of marine resources. The NRC (1999) concluded "At the core of today's overcapacity problem is the lack of, or ineffective, definition of fishing rights in most fisheries. Therefore, the committee recommends for many fisheries a management approach that includes the development and use of methods of allocation of exclusive shares of the fish resource or privileges and responsibilities (as opposed to open competition) and the elimination of subsidies that encourage overcapacity. A flexible and adaptive approach is essential, and careful attention must be given to equity issues associated with such approaches." In addition, the NRC (1999) strongly recommended that managers and policy makers should focus on developing or encouraging socioeconomic and other management measures that discourage overcapacity and that reward the conservative and efficient use of marine fishery resources.

Analyses presented above clearly indicate that *Illex* fishery is fully exploited and additional capacity in the fishery is both unnecessary and undesirable. Excess fishing capacity in the Northeast region of the US, if transferred into the *Illex* fishery, would easily result in additional overcapitalization of the fishery and potential over-exploitation of the resource. Based on the recommendation of the NRC (1999), the Council determined that the *Illex* moratorium should be extended to prevent the development of overcapacity in this fishery. Failure to extend the moratorium would result in further overcapitalization of this sector the fishing industry, which in turn would have negative economic consequences for the vessels and communities which depend upon the *Illex* resource. The distribution of vessels which possessed *Illex* moratorium permits by home port state is given in Table 28. Overall, New Jersey would appear to be the state most dependent on the *Illex* resource followed by New York, Massachusetts and Rhode Island. Additional entry into this fishery would be expected to proportionately reduce the landings and revenue of vessels currently operative within the moratorium fleet (see analyses contained in the RIR Section of the RIR). Table 27 indicated that the only port dependent upon *Illex* for more than 10 % of total revenues in 2001 was North Kingstown, RI (24.4%). Therefore, the vessel owners, crew, dealers or processors and fishing communities associated with this port are expected to be affected the most by failure to extend the moratorium program for *Illex*.

6.3 EFH Impacts

6.3.1 Extend the moratorium on entry to the *Illex* fishery for an additional year (Preferred Alternative)

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2004 unless extended in a future Amendment.

Otter trawls are the principal gear used in this fishery. In general, bottom tending mobile gear have the potential to reduce habitat complexity and change benthic communities. Available research indicates that the effects of mobile gear are cumulative and are a function of the frequency and intensity with which an area is fished, the complexity of the benthic habitat (structure), energy of the environment (high energy and variable or low energy and stable), and ecology of the community (long-lived versus short lived). The extent of an adverse impact on habitat requires high resolution data on the location of fishing effort by gear and the location of specific seafloor habitats. While the otter trawls utilized in this fishery have the potential to adversely affect EFH, available effort data are currently insufficient to predict the extent of adverse impact from this fishery. However, since this alternative simply extends the moratorium for an additional year (thereby maintaining the status quo), it should not result in an increase in fishing effort or redistribute effort by gear type. Therefore, this alternative is not expected to increase any existing impacts on EFH caused by this fishery.

6.3.2 Extend the moratorium on entry to the *Illex* fishery for an additional two years

This alternative would extend the moratorium on entry to the *Illex* fishery for an additional two years, or until the final rule for Amendment 9 is published, whichever comes first.

Amendment 5 established a moratorium on new entry into the commercial fishery for *Illex* squid. The Council placed a five year sunset provision on the moratorium which was set to expire in July 2002, but was extended until July 2003 under Framework 2. This measure would extend the *Illex* moratorium for an additional two years. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2005, unless it is extended or otherwise altered in Amendment 9. Otter trawls are the principal gear used in this fishery. In general, bottom tending mobile gear have the potential to reduce habitat complexity and change benthic communities. Available research indicates that the effects of mobile gear are cumulative and are a function of the frequency and intensity with which an area is fished, the complexity of the benthic habitat (structure), energy of the environment (high energy and variable or low energy and stable), and ecology of the community (long-lived versus short lived). The extent of an adverse impact on habitat requires high resolution data on the location of fishing effort by gear and the location of specific seafloor habitats. While the otter trawls utilized in this fishery have the potential to adversely affect EFH, available effort data are currently insufficient to predict the extent of adverse impact from this fishery. However, since this alternative simply extends the moratorium for two years (thereby maintaining the status quo), it should not result in an increase in fishing effort or redistribute effort by gear type. Therefore, this alternative is not expected to increase any existing impacts on EFH caused by this fishery.

6.3.3 Extend the moratorium on entry to the *Illex* fishery for an additional three years

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2006 unless extended in a future Amendment.

Otter trawls are the principal gear used in this fishery. In general, bottom tending mobile gear have the potential to reduce habitat complexity and change benthic communities. Available research indicates that the effects of mobile gear are cumulative and are a function of the frequency and intensity with which an area is fished, the complexity of the benthic habitat (structure), energy of the environment (high energy and variable or low energy and stable), and ecology of the community (long-lived versus short lived). The extent of an adverse impact on habitat requires high resolution data on the location of fishing effort by gear and the location of specific seafloor habitats. While the otter trawls utilized in this fishery have the potential to adversely affect EFH, available effort data are currently insufficient to predict the extent of adverse impact from this fishery. However, since this alternative simply extends the moratorium for three years (thereby maintaining the status quo), it should not result in an increase in fishing effort or redistribute effort by gear type. Therefore, this alternative is not expected to increase any existing impacts on EFH caused by this fishery.

6.3.4 No action

Under this alternative the moratorium on entry to the *Illex* fishery would be allowed to expire in 2003.

Otter trawls are the principal gear used in this fishery. In general, bottom tending mobile gear have the potential to reduce habitat complexity and change benthic communities. Available research indicates that the effects of mobile gear are cumulative and are a function of the frequency and intensity with which an area is fished, the complexity of the benthic habitat (structure), energy of the environment (high energy and variable or low energy and stable), and ecology of the community (long-lived versus short lived). The extent of an adverse impact on habitat requires high resolution data on the location of fishing effort by gear and the location of specific seafloor habitats. While the otter trawls utilized in this fishery have the potential to adversely affect EFH, available effort data are currently insufficient to predict the extent of adverse impact from this fishery. However, since this alternative would allow the moratorium to expire, it could result in an increase in fishing effort or redistribute effort by gear type. Therefore, this alternative could potentially increase any existing impacts on EFH caused by this fishery.

6.4 Protected Resources Impacts

6.4.1 Extend the moratorium on entry to the *Illex* fishery for an additional year (Preferred Alternative)

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2004 unless extended in a future Amendment.

Since this alternative simply extends the moratorium for a year and thereby maintains the status quo, it should not result in an increase in fishing effort or redistribute effort by gear type. As such, the implementation of this alternative is not expected to impact the protected species described in section 6.1.4 relative to the current FMP for *Illex*. However, if the moratorium were allowed to expire in 2004, entry of additional fishing effort into the *Illex* fishery could result. This would have the potential for increased interactions with the protected species described in section 6.1.4.

6.4.1.2 Extend the moratorium on entry to the *Illex* fishery for an additional two years

This alternative would extend the moratorium on entry to the *Illex* fishery for an additional two years, or until the final rule for Amendment 9 is published, whichever comes first.

Amendment 5 established a moratorium on new entry into the commercial fishery for *Illex* squid. The Council placed a five year sunset provision on the moratorium which was set to expire in July 2002, but was extended until July 2003 under Framework 2. This measure would extend the *Illex* moratorium for an additional two years. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2005, unless it is extended or otherwise altered in Amendment 9.
Since this alternative simply extends the moratorium for two years, thereby maintaining the status quo, it should not result in an increase in fishing effort or redistribute effort by gear type. As such, the implementation of this alternative is not expected to impact the protected species described in section 6.1.4 relative to the current FMP for *Illex*.

6.4.1.3 Extend the moratorium on entry to the *Illex* fishery for an additional three years

Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2006 unless extended in a future Amendment.

Since this alternative simply extends the moratorium for three years, thereby maintaining the status quo, it should not result in an increase in fishing effort or redistribute effort by gear type. As such, the implementation of this alternative is not expected to impact the protected species described in section 6.1.4 relative to the current FMP for *Illex*.

6.4.1.4 No action

Under this alternative the moratorium on entry to the *Illex* fishery would be allowed to expire in 2003.

If the *Illex* moratorium was allowed to expire in 2003 through no action, entry of additional fishing effort into the *Illex* fishery could result. The expected level of increased effort is difficult

to predict because it would depend on variety of factors including world demand and price of *Illex*, abundance and availability of *Illex* in US waters and conditions in other fisheries. None the less, any level of increased fishing effort in this fishery would have the potential for increased interactions with the protected species described in section 6.1.4

6.5 Cumulative Impacts

A cumulative impact analysis is required as specified by the Council on Environmental Quality's (CEQ) regulation for implementing the 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 § 1508.7)."

Effective federal fishery management of Atlantic mackerel, *Loligo* and *Illex* squid, and butterfish has occurred for the past two decades. Atlantic mackerel, *Loligo* and *Illex* squid, and butterfish were heavily exploited off the Northeastern Coast of the United States by distant-water foreign fleets during the 1960's and 1970's. With the advent of extended jurisdiction following passage of the Magnuson Act in 1976, foreign fishing for the species complex began to be strictly regulated. The Mid-Atlantic Fishery Management Council initiated formal management of these resources through the development of the Atlantic Mackerel, *Loligo* and *Illex* squid, and Atlantic Butterfish Fishery Management Plan which was adopted in 1983.

The management strategy during the first phase of the Atlantic Mackerel, Squid, and Butterfish FMP was to provide for the orderly development of the domestic fisheries for these resources under the purview of the Magnuson Act. This process involved the sequential phasing out of foreign fishing for these species in US waters and the gradual transfer of offshore fishing methods and technology to the domestic fishing fleet. For both squid species and butterfish, the domestic fisheries have been fully developed. All three species are considered to be fully utilized by the US domestic fishery and none are considered to be overfished as a result of the management plan developed by the Council.

For Atlantic mackerel, the full development of the domestic fishery is still ongoing. While the Atlantic mackerel fishery in US waters has been utilized domestically for the past two centuries, the modern northwest Atlantic mackerel fishery underwent dramatic change with the arrival of the European distant-water fleets (DWF) in the early 1960's. While the first DWF landings reported in 1961 were not large (11,000 mt), they increased substantially to over 114,000 mt by 1969 and exceeded 350,000 mt by 1973. This fishery expansion led to overfishing and the depletion of the Atlantic mackerel spawning stock biomass. As noted above, the Magnuson Act established control of the portion of the mackerel fishery occurring in US waters (NAFO Subareas 5-6) under the auspices of the Mid-Atlantic Fishery Management Council. Reported foreign landings in US waters declined from an unregulated level of 385,000 mt in 1972 to less than 400 mt from 1978-1980 under Magnuson Act control (the foreign mackerel fishery was restricted by NOAA Foreign Fishing regulations to certain areas or "windows"). Under the control of Council's FMP and subsequent amendments, foreign mackerel catches were permitted

to increase gradually to 15,000 mt in 1984 and then to a peak of almost 43,000 mt in 1988. Following that increase, Council policy under led to the elimination of the foreign fishery for mackerel in US waters by 1993. The Atlantic mackerel stock is currently considered to be in good condition and is designated as under-exploited. While it appears that this stock is capable of supporting increased levels of exploitation by the US domestic fishery, the Council is currently considering the development of a controlled access plan to control expansion of harvest capacity and avoid over-capitalization in the Atlantic mackerel fishery.

The cumulative impacts of this FMP were last fully addressed in EIS completed for Amendment 5. All four species in the management unit are managed primarily via annual quotas to control fishing mortality. The 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 8 which allows the Council to add or modify management measures through a streamlined public review process. As noted above, the cumulative impact of this FMP and annual specification process has been positive since it's implementation after passage of the Magnuson-Stevens Act. All four species are not overfished, and only one (Atlantic mackerel) is considered underutilized.

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 Sustainable Fisheries Act. First and foremost, the Council has met the obligations of National Standard 1 by adopting and implementing conservation and management measures under this FMP that have prevented overfishing, while achieving, on a continuing basis, the optimum yield for the Atlantic mackerel, *Loligo* and *Illex* squid and butterfish fisheries for the United States. By continuing to meet the national standards requirements of the SFA through future FMP amendments and actions under the annual specification process, the Council will insure that cumulative impacts of these actions will remain positive, both for the ports and communities that depend on these fisheries and the Nation.

Non-fishery related effects such as water quality, ship traffic, and ocean dumping have inconsequential effects on the *Illex* resource in federal waters and are far removed from shore and may have more of a local effect on habitat in near shore areas.

6.5.1 Extend the moratorium on entry to the Illex fishery for an additional year (Preferred Alternative).

The Council placed a five year sunset provision on the moratorium which was set to expire in July 2002, but was extended until July 2003 under Framework 2. This measure would extend the Illex moratorium for an additional year. Under this alternative, the moratorium on entry to the Illex fishery would expire in 2004 unless extended in a future Amendment. Extension of the existing moratorium will reduce the probability of overexploitation of this resource, which has a life span of less than one year. The harvesting capacity of the fleet exceeds the current quota of 24,000 mt. For example, dealer weighout data indicate that Illex landings of 23,600 mt were taken in 1998 by 25 of the 77 vessels (32%) holding Illex moratorium permits.

6.5.2 Extend the moratorium on entry to the Illex fishery for an additional two years

This alternative would extend the moratorium on entry to the Illex fishery for an additional two years, or until the final rule for Amendment 9 is published, whichever comes first.

Amendment 5 established a moratorium on new entry into the commercial fishery for Illex squid. The Council placed a five year sunset provision on the moratorium which was set to expire in July 2002, but was extended until July 2003 under Framework 2. This measure would extend the Illex moratorium for an additional two years. Under this alternative, the moratorium on entry to the Illex fishery would expire in 2005, unless it is extended or otherwise altered in Amendment 9. With the life span of Illex being less than one year, this alternative would increase the probability of overexploitation of this resource.

6.5.3 Extend the moratorium on entry to the Illex fishery for an additional three years

Under this alternative, the moratorium on entry to the Illex fishery would expire in 2006 unless extended in a future Amendment. Again, with the life span of Illex being less than one year, this alternative would increase the probability of overexploitation of this resource.

6.5.4 No action

Under this alternative the moratorium on entry to the Illex fishery would be allowed to expire in 2003. Since the harvesting capacity of the Illex fleet exceeds the current quota of 24,000 mt, this alternative would allow open access into the Illex squid fishery and increase the probability of overexploitation of this resource.

7.0 The Framework Action Relative to the National Standards

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 standards and how this framework meets them.

7.1 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 US 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 each of the species managed under this FMP was modified in Amendment 8 to comply with the SFA. The extension of the moratorium proposed in this framework action will not affect the overfishing definition and fishing mortality control rule for *Illex* squid adopted in Amendment 8. Since the current overfishing definition for *Illex* will be unchanged and contains the necessary elements and provisions for stock rebuilding prescribed by the SFA, this framework action is consistent with National Standard 1.

7.2 National Standard 2 - Scientific Information

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

The analyses in this framework are based on the best scientific information available. Therefore, this framework action is consistent with National Standard 2.

7.3 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 Florida. The proposed action does not alter the management unit. Therefore, this framework action is consistent with National Standard 3.

7.4 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 framework action is not expected to significantly alter the allocation of any of the resources

managed under this FMP. If the *Illex* moratorium was allowed to expire, the fishery would revert to an open access condition. The likely outcome would be an influx of new entry into the fishery (additional overcapitalization of the fishery) and a reduction in the amount landed by current permit holders. Depending on the level of entry, the allocation effects of *not* extending the moratorium could be severe. However, since the moratorium for *Illex* is already in place and is being extended, no allocation effects from the extension are anticipated.

7.5 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 Atlantic Mackerel, Squid, and Butterfish 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 management measures proposed in Framework 3 place no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting. Therefore the proposed action is consistent with National Standard 5.

7.6 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 5, 6 and 8. The purpose of the proposed action is to simply extend the moratorium for *Illex* squid until the issue can be addressed in Amendment 9 to the FMP. The action does not alter the basic management measures already in place in the FMP. Therefore, the proposed action is consistent with National Standard 6.

7.7 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 5, 6 and 8. This framework action is not expected to alter the costs of management under this FMP. Therefore, there is no reason to alter the conclusion that this framework is consistent with National Standard 7.

7.8 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."

A complete description of the ports and their reliance on various species, including Atlantic mackerel, squid and butterfish is given in Appendix 1. The purpose of this FMP has been to provide a framework for the orderly development of the Atlantic mackerel, *Loligo* and *Illex* squid and butterfish fisheries while preventing overfishing. Therefore, most if not all of the fishing communities along the US east coast have been positively impacted by the FMP. There were likely some fishermen who may have caught *Illex* that did not qualify for the moratorium under Amendment 5 and were reduced to catching incidental catch quantities. This issue was discussed in section 9.2.2 of Amendment 5 to the FMP and in the Resubmission document for Amendment 5.

Another issue raised during the development of Amendment 5 was that the limited entry provisions reduced the possibility that fishermen would enter the fishery that never participated in these fisheries. The most frequently mentioned group of fishermen identified in this category are those that have been negatively impacted by the severely overfished condition of the North East groundfish resources. They are seeking alternative species. However, it was the Council's conclusion that the harvesting capacity of the fleet that would qualify for the moratoria plus the fleet that will harvest the incidental catch allowance can take the maximum optimum yields for the species involved and no extra capacity is needed in the fishery. The major benefit to be realized through implementation of recent Amendments to this FMP is that overfishing and over-capitalization in these fisheries will be avoided in the future. This framework action would extend the moratorium on entry into the *Illex* fishery for an additional year.

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 and recreational 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, this Framework Action is consistent with National Standard 8.

7.9 National Standard 9 - Incidental catch

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

This national standard requires Councils to consider the incidental catch effects of existing and planned conservation and management measures. Incidental catch 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, incidental catch 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, incidental catch may also preclude other more productive uses of fishery resources.

The term "incidental catch" means fish that are harvested in a fishery, but that are not sold or kept for personal use. Incidental catch 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). Incidental catch 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. Incidental catch 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 incidental catch.

Compliance with this national standard and the general issue of incidental catch in the commercial fishery for *Illex* was addressed in Amendment 8 and Framework 2. The moratorium extension proposed in this framework action will have no effect on incidental catch in this fishery because it maintains the status quo. The commercial fishery for *Illex* is primarily prosecuted with otter trawls. For example, unpublished NMFS dealer reports indicated that greater than 99% of all *Illex* landings in 2001 were taken with otter trawls. The fishery is managed through the specification of annual quotas. No management measures will be put into place as result of this framework action which will cause discarding of *Illex* in the commercial fishery.

One measure imposed in Amendment 5 to the FMP designed to minimize discards in the squid and butterfish fisheries was the creation of a non-moratorium incidental catch allowance. Amendment 5 created a limited access program for the squids and butterfish. To avoid discarding of squid and butterfish taken by non-moratorium vessels during the prosecution of other fisheries, a non-moratorium incidental permit category was created. Vessels that did not qualify for an *Illex* moratorium permit may land *Illex*, if (1) it possesses an incidental catch permit, (2) fishes with a net legal in the directed fishery, (3) lands no more than 5,000 pounds of *Illex* per trip, and (4) the operator of the vessel files the appropriate trip reports. The incidental catch allowance may be adjusted by the Regional Administrator based on the recommendation of the Council. This management measure was implemented specifically to minimize discarding of this species in non-directed fisheries.

The amount of discarding in the commercial fisheries for these species should be also be minimized since capping the fishery at 1996 levels avoided overfishing of *Illex* squid . In addition, Amendment 8 added framework provisions to deal with discard problems in the future, should they arise. Specifically, if a discard problem is identified, gear restrictions could be implemented to reduce discard mortality. All of these factors will result in the minimization of incidental catch and discard mortality in the commercial fisheries for these species, to the extent practicable. Therefore, National Standard 9 is satisfied.

The Council recognizes the need for improved estimates of discards for all of the fisheries managed under this FMP. This will require increased at-sea sampling intensity over a broader temporal and geographical scope than is currently available. The Council's Comprehensive

Management Committee has begun to address this issue and has appointed a member to participate on the Atlantic Comprehensive Coastal Statistics Programs (ACCSP) Discard Prioritization Committee. This committee was formed to address the need for collection of discard data. The Discard Prioritization Committee will provide guidance to the At-Sea Observer Program by initiating development of priorities and target sampling levels for collection of discard/releases information on recreational, for-hire and commercial fisheries. The Committee is developing a plan to implement sampling through existing or new data collection programs. The data collected through the ACCSP qualitative release, discard and protected species interactions monitoring program will be used to prioritize and modify the quantitative release, discard and protected species interactions data collection programs.

7.10 National Standard 10 - Safety at Sea

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

No changes to the management system are proposed in this framework, and therefore, this action should not affect the vessel operating environment, gear loading requirements or create derby style fisheries for *Illex*. 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 framework action will not impact or affect the safety of human life at sea. Therefore the action is consistent with National Standard 10.

7.11 OTHER MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT REQUIREMENTS

Section 303(a)(12) of the MSFCMA requires the Councils to assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish. This requirement was addressed under section 3.4.9 of Amendment. 8.

Section 303(a)(13) of the MSFCMA requires the Councils to include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extend practicable, quantify trends in landings of the managed fishery resources by the commercial, recreational, and charter fishing sectors. The description of fishing activities for the Atlantic mackerel, squid and butterfish fisheries are presented in section 7 (Description of Fishing Activities) of Amendments 5. However, additional information pertaining the recreational and charter fishing sectors is presented below in section 5.2.1 of Amendment 8 (Additional Characterization of the Recreational and Party/Charter Fisheries).

Section 303(a)(14) of the MSFCMA requires that to the extent that rebuilding plans or other conservation and management measures, which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among

commercial, recreational, and charter fishing sectors in the fishery. This requirement has been addressed under the section 3.4 (The Amendment Relative to the National Standards) in Amendment 5.

8.0 Essential Fish Habitat Assessment

Atlantic mackerel, squid and butterfish have EFH designated in many of the same bottom habitats that have been designated as EFH for most of the groundfish within the Northeast Multispecies FMP, including: Atlantic cod, haddock, monkfish, ocean pout, American plaice, pollock, redfish, white hake, windowpane flounder, winter flounder, witch flounder, yellowtail flounder, Atlantic halibut and Atlantic sea scallops. Broadly, EFH is designated as the bottom habitats consisting of varying substrates (depending upon species) within the Gulf of Maine, Georges Bank, and the continental shelf off southern New England and the mid-Atlantic south to Cape Hatteras for the juveniles and adults of these groundfish. In general, these areas are the same as those designated for Atlantic mackerel, squid and butterfish.

Fishing activities for Atlantic mackerel, squid and butterfish occur in these EFH areas. The primary gear utilized to harvest these species is the otter trawl. Since the otter trawl is a bottom-tending mobile gear, it is most likely to be associated with adverse impacts to bottom habitat. The primary impact associated with this type of gear is reduction of habitat complexity (Auster and Langton, 1998).

Amendment 8 included overfishing definitions which are the same or more conservative than overfishing definitions from previous Amendments. As a result, the quota specifications resulting from these new overfishing definitions are the same or lower than in previous years. This should effectively result in the same or reduce gear impacts to bottom habitats by reducing or maintaining the harvest of the managed species within this FMP. In addition, by maintaining the *Illex* moratorium for an additional year, effort increases due to new entry into the fishery will be avoided. Any reductions in harvesting effort may indirectly benefit EFH by creating an overall reduction of disturbance by a gear type that impacts bottom habitats. Other management actions already in place should control redirection of effort into other bottom habitats. Therefore, the Council has concluded that this framework action will have no more adverse impacts on EFH than those listed in Amendment 8. This action minimizes the adverse effects of fishing on EFH to the extent practicable pursuant to Section 303(a)(7) of the MSA.

9.0 List of Agencies and persons consulted in formulating the action

In preparing this framework analysis the Council consulted with the NMFS, New England and South Atlantic Fishery Management Councils, Fish and Wildlife Service, Department of State, and the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina through their membership on the Council. In addition, states that are members within the management unit were be consulted through the Coastal Zone Management Program consistency process. Letters were sent to the states within the management unit reviewing the consistency of the proposed

action relative to each state's Coastal Zone Management Program.

10.0 LIST OF PREPARERS

This environmental assessment was prepared by the following members of the MAFMC staff: Dr. Christopher M. Moore, Richard J. Seagraves, Valerie Whalon, James Armstrong, and Kathy Collins.

11.0 Finding of no significant environmental impact

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

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

The proposed one year extension of the *Illex* moratorium is not expected to jeopardize the sustainability of any target species affected by the action. To the contrary, the moratorium extension should avoid additional capitalization of the fishery and reduce the chance that overfishing will occur. Since the proposed action simply extends the status quo for one additional year, sustainability is unaffected.

2. Can the proposed 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 this framework action for the Atlantic mackerel, squid, and butterfish fisheries has been identified as EFH for the above mentioned species as well as tilefish, summer flounder, scup, black sea bass, and species associated with the Northeast multispecies FMP. The action maintains the status quo relative to the *Illex* fishery moratorium. However, the fisheries as a whole have the potential to have an adverse impact on EFH. However, because the adverse impact on EFH is not substantial, NMFS conducted an abbreviated EFH consultation pursuant to 50 CFR 600.920(h) and an EFH Assessment that incorporates all of the information required in 50 CFR 600.920(g)(2), that was prepared and included in the most recent Framework document. The preferred alternative under this framework action should not result in any increase in or redirection of effort. As a result, no new EFH Conservation Recommendations are necessary.

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

The proposed action is not expected to have a substantial adverse impact on public health or safety. The proposed moratorium extension will not alter 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. The proposed moratorium extension will not impact public health.

4. Can the proposed action be reasonably expected to have an adverse impact on endangered

or threatened species, marine mammals, or critical habitat of these species?

The proposed action would extend the *Illex* moratorium for an additional year. It does not otherwise alter any management measures already in place nor does it affect the annual quota specifications. 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 action will have no adverse impacts on marine mammals.

5. Can the proposed 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 proposed action is not expected to result in cumulative effects on target or non-target species. The proposed measure will simply maintain the *Illex* moratorium for one additional year. This will not alter fishing methods or activities.

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

The proposed action is not expected to jeopardize the sustainability of any non-target species. The proposed measure maintains the *Illex* moratorium for an additional year. This action is not expected to result in increased fishing effort or change current levels of exploitation. Therefore this action is not expected to jeopardize the sustainability of any non-target species.

7. Can the proposed 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 proposed action is not expected to have a substantial impact on biodiversity and ecosystem function within the affected area because the proposed action merely continue for one year an existing category of vessel permit.

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

As discussed in Section 6.0 of this EA, the moratorium extension in the *Illex* fishery is not expected to result in high social or economic impacts, or high natural or physical environmental effects not already analyzed. Therefore, there are no high social or economic impacts related to this action.

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

The proposed action maintains the status quo in the *Illex* fishery for one additional year. Therefore, the this action is not expected to be highly controversial.

FONSI Statement

Having reviewed the environmental assessment and the available information relating to this proposed action pursuant to Framework 3 to the Atlantic Mackerel, Squid and Butterfish FMP, I have determined that there will be no significant adverse environmental impact resulting from the action and that preparation of an environmental impact statement on the action is not required by Section 102(2)(c) of the National Environmental Policy Act or its implementing regulations.

Assistant Administrator for
Fisheries, NOAA_____
Date_____

OTHER APPLICABLE LAWS

1.0 PAPERWORK REDUCTION ACT OF 1995

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the Federal paperwork burden for individuals, small business, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government. There are no changes to the existing reporting requirements previously approved under this FMP for vessel permits), dealer reporting and vessel logbooks.

As stated above, this action does not implement new reporting or record keeping measures. There are no changes to existing reporting requirements. Currently, all Atlantic mackerel squid and butterfish Federally-permitted dealers must submit weekly reports of fish purchases. In addition to detailed weekly reports of all purchases for all species from fishing vessels, dealers must also submit a weekly summary of their purchases via the Interactive Voice Response (IVR) system. The owner or operator of any vessel issued a vessel permit for Atlantic mackerel squid and butterfish must maintain on board the vessel, and submit, an accurate daily fishing log report for all fishing trips, regardless of species fished for or taken. The owner of any party or charter boat issued an Atlantic mackerel party/charter permit and carrying passengers for hire shall maintain on board the vessel, and submit, an accurate daily fishing log report for each charter or party fishing trip that lands Atlantic mackerel, unless such a vessel is also issued another permit that requires regular reporting, in which case a fishing log report is required for each trip regardless of species retained. These reporting requirements are critical for monitoring the harvest level of these fisheries.

2.0 RELEVANT FEDERAL RULES

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

REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY

ANALYSIS (IRFA)

1. 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.

1.1 EVALUATION OF E.O. 12866 SIGNIFICANCE

The proposed action does not constitute a significant regulatory action under Executive Order 12866 for the following reasons. (1) It will not have an annual effect on the economy of more than $100 million. Based on unpublished NMFS preliminary data (Maine-North Carolina) the total commercial value for the Atlantic mackerel, squid and butterfish fisheries combined was estimated at $27.9 million in 2001. The measures considered in this regulatory action will not affect total revenues generated by the commercial industry to the extent that a $100 million annual economic impact will occur. The proposed action is necessary to maintain the harvest of *Illex* squid at sustainable levels. The proposed action benefits in a material way the economy, productivity, competition and jobs. The proposed action will not adversely affect, in the long-term, competition, jobs, the environment, public health or safety, or state, local, or tribal government communities. (2) 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 mackerel, squid and butterfish fisheries in the EEZ. (3) The proposed action will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of their participants. (4) The proposed action does not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

The economic benefits of the Atlantic Mackerel, Squid and Butterfish FMP have been evaluated periodically as amendments to the FMP have been implemented. These analyses have been conducted at the time a major amendment is developed and interim action (framework adjustments or quota specifications) may be presumed to leave the conclusions reached in the initial benefit-cost analyses unchanged provided the original conservation and economic objectives of the plan are being met.

Amendment 8 implemented overfishing definitions which are the same or more conservative than overfishing definitions from previous Amendments. As a result, the quota specifications

resulting from these new overfishing definitions are the same or lower than in previous years. The economic effects of these overfishing definitions and quota specifications were evaluated at the time Amendment 8 was implemented. The economic analysis presented at that time Amendment 8 implemented was largely qualitative in nature.

For each alternative, potential impacts on several areas of interest are discussed. 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 landings, prices, consumer and producer benefits, harvesting costs, enforcement costs, and distributional effects. Due to the lack of an empirical model for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach to the economic assessment was adopted. Nevertheless, quantitative measures are provided whenever possible.

A more detailed description of the economic concepts involved can be found in "Guidelines for Economic Analysis of Fishery Management Actions" (USDC 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 changes in CS represent 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. Since an empirical model describing the elasticities of supply and demand for these species is not available, it was assumed that the price for these species was determine by the market clearance price market or the interaction of the supply and demand curves. These prices were the base prices used to determine potential changes in prices due to changes in landings.

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.

Alternatives 1, 2, and 3 for extension of the *Illex* moratorium

The first three alternatives considered in this framework action are similar in their anticipated economic effects. They differ only in the length of time which each extends the *Illex* moratorium. Alternative 1 would extend the moratorium on entry to the *Illex* fishery for an additional year, or until the final rule for Amendment 9 is published, whichever comes first. Under this alternative, the moratorium on entry to the *Illex* fishery would expire in 2004, unless it is extended or otherwise altered in Amendment 9. Alternative 2 would extend the moratorium on entry to the *Illex* fishery for an additional two years (i.e., it would expire in 2005 unless extended in a future Amendment). Alternative 3 would extend the moratorium on entry to the *Illex* fishery for an additional three years (the moratorium on entry to the *Illex* fishery would expire in 2006 unless extended in a future Amendment). Due to a lack of an empirical model for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach to the economic assessment was adopted. Nevertheless, quantitative measures are provided whenever possible.

Landings

No change in the harvest of *Illex* would be expected as a result of the proposed actions contemplated under these alternative since they preserve the status quo in the *Illex* fishery.

Prices

Given the likelihood that the status quo in the *Illex* fishery will result in no change in *Illex* landings and that *Illex* prices are a function of numerous factors including world supply and demand, it is assumed that there will not be a change in the price for this species as a result of alternatives 1-3.

Consumer Surplus

Assuming *Illex* prices will not be affected under the alternatives described, there will be no corresponding change in consumer surplus associated with this fishery.

Harvest Costs

No changes to harvest costs are expected as a result of alternatives 1-3.

Producer surplus

Assuming *Illex* prices will not be affected under alternatives 1-3 described above, there will be no corresponding change in producer surplus associated with this fishery.

Enforcement Costs

Properly defined, enforcement costs are not equivalent to the budgetary expense of dockside or at-sea inspection of vessels. Rather, enforcement costs from an economic perspective, are

measured by opportunity cost in terms of foregone enforcement services that must be diverted to enforcing regulations. Alternatives 1-3 are not expected to change enforcement costs.

Distributive Effects

There are no changes to the quota allocation process for *Illex* squid. As such, no distributional effects are identified for this fishery.

Alternative4 - No action

Under this alternative the moratorium on entry to the *Illex* fishery would be allowed to expire in 2003.

A cessation of the moratorium would yield negative economic impacts for vessels engaged in the moratorium fishery and economic benefits for all other vessels entering the fishery. In general, in the short term, there would be some economic loss to the fishery as a whole, due to increased costs resulting from less efficient vessels prosecuting the fishery and a possible crowding effect which could further reduce catch per unit of effort due to a larger volume of vessels competing for the same stock of fish. The reintroduction of open access would negate all benefits derived from elimination of common property distortions and could result in negative impacts that are not immediate but would be cumulative and long term in nature.

There is also the danger of a overrun of the quota due to a potentially large number of vessels entering the fishery. This fishery is particularly vulnerable to overruns since large volumes of fish are harvested during a relatively short season. Any damages to stocks or stock structure would yield a reduction in long term economic profitability resulting from a higher cost per unit of effort associated with harvesting smaller stocks. Other economic components of the fishery such as processors, fuel and food suppliers, and stevedores could suffer economic losses resulting from stock reductions.

Costs of administration and enforcement should increase minimally since a larger number of vessels would be in the fishery, thus, causing reporting, recordkeeping, monitoring, and enforcement tasks to increase.

Summary of Impacts

The overall impacts of *Illex* landings on prices, consumer surplus, and consumer surplus are difficult to determine without detailed knowledge of the relationship between supply and demand factors for these fisheries. In the absence of detailed empirical models for these fisheries and knowledge of elasticities of supply and demand, a qualitative approach was employed to assess potential impacts of the proposed management measures.

The impact of each the regulatory alternatives relative to the base year (2001) is summarized in Table IRFA-1. A “-1" indicates that the level of the given feature would be reduced given the

action as compared to the base year. A "+1" indicates that the level of the given feature would increase relative to the base year and a "0" indicates no change. In this analysis, the base line condition was 2001 landings. This comparison will allow for the evaluation of the potential fishing opportunities associated with each alternative versus the fishing opportunities that occurred in 2001.

Alternatives 1-3 are expected to have similar overall impacts (i.e., none are expected as a result of the actions under each of these alternatives). However, alternative 4 (no action) shows a decrease in prices associated with increased landings. As such, consumer surplus is expected to decrease and producer surplus is expected to increase.

No change in the competitive nature of these fisheries is expected to occur if any of these management measures were implemented, except for the no action alternative. Alternatives 1-3 will maintain the competitive structure of the fishery. However, the potential increase in new entrants into the fishery under alternative 4 may affect vessels already engaged in the fishery.

No changes in enforcement costs or harvest costs have been identified for alternative 1-3. Under alternative 4 for *Illex*, harvest costs could increase as a result of derby fishing conditions created under this alternative.

Table 1. Qualitative comparative summary of potential long term economic effects of alternatives for Framework 3.

Feature	Alternative 1	Alternative 2	Alternative 3	Alternative 4 No Action
Landings	0	0	0	-1
Prices	0	0	0	+1
Consumer Surplus	0	0	0	-1
Harvest Costs	0	0	0	+1
Producer Surplus	0	0	0	-1
Enforcement Costs	0	0	0	+1
Distributive Impacts	0	0	0	Indeterminate
"-1" denotes a reduction relative 2001; "0" denotes no change relative 2001; and "+1" denotes an increase.				

2.0 INITIAL REGULATORY FLEXIBILITY ANALYSIS

2.1 INTRODUCTION AND METHODS

The Regulatory Flexibility Act (RFA) requires the Federal rulemaker to examine the impacts of proposed and existing rules on small businesses, small organizations, and small governmental jurisdictions. In reviewing the potential impacts of proposed regulations, the agency must either certify that the rule "will not, if promulgated, have a high economic impact on a substantial number of small entities." The Small Business Administration (SBA) defines a small business in the commercial fishing and recreational fishing activity, as a firm with receipts (gross revenues) of up to $3.5 million.

The proposed measures regarding Framework 3 could affect any vessel holding an active Federal permit for *Illex*. According to 2002 NMFS permit file data, 2242 commercial vessels were holding Atlantic mackerel permits, 384 vessels were holding *Loligo*/butterfish moratorium permits, 73 vessels possessed *Illex* permits, 1828 vessels held incidental catch permits. All of these vessels readily fall within the definition of small business. In addition, this framework action could affect any dealer which holds a federal Atlantic mackerel, squid and butterfish dealer permit. According to 2002 NMFS permit file data, there were 363 dealers which possessed federal Atlantic mackerel, squid and butterfish dealer permits.

Since all permit holders may not actually land *Illex*, the more immediate impact of the specifications may be felt by the commercial vessels that are actively participating in these fisheries. An active participant was defined as being any vessel that reported having landed one or more pounds of any one of the four species in the Northeast dealer data during calendar years 1998. The dealer data covers activity by unique vessels that hold a Federal permit of any kind and provides summary data for vessels that fish exclusively in state waters. This means that an active vessel may be a vessel that holds a valid *Illex* permit, a vessel that holds a valid Federal permit but no *Illex permit*, a vessel that holds a Federal permit other than Atlantic mackerel, squid, or butterfish permit and fishes for those species exclusively in state waters; or may be a vessel that holds no Federal permit of any kind. Of the four possibilities the number of vessels in the latter two categories cannot be estimated because the dealer data provides only summary information for state waters vessels and because the vessels in the last category do not have to report landings.

In the present RFA the primary unit of observation for purposes of performing a threshold analysis is vessels that landed *Illex* during calendar years 1998 irrespective of their permit status.

Not all landings and revenues reported through the Federal dealer data can be attributed to a specific vessel. Vessels with no Federal permits are not subject to any Federal reporting requirements with which to corroborate the dealer reports. Similarly, dealers that buy exclusively from state waters only vessels and have no Federal permits, are also not subject to Federal reporting requirements. Thus, it is possible that some vessel activity cannot be tracked with the landings and revenue data that are available. Thus, these vessels cannot be included in the threshold analysis, unless each state were to report individual vessel activity through some additional reporting system - which currently does not exist. This problem has two consequences for performing threshold analyses. First, the stated number of entities subject to the regulation is a lower bound estimate, since vessels that operate strictly within state waters

and sell exclusively to non-Federally permitted dealers cannot be counted. Second, the portion of activity by these uncounted vessels may cause the estimated economic impacts to be over- or underestimated.

The effects of actions were analyzed by employing quantitative approaches to the extent possible. In the current analysis, effects on profitability associated with the proposed management measures should be evaluated by looking at the impact the proposed measures on individual vessel costs and revenues. However, in the absence of cost data for individual vessels engaged in these fisheries, changes in gross revenues are used a proxy for profitability.

Procedurally, the economic effects of the quota alternatives were estimated as follows. First, the Northeast dealer data were queried to identify all vessels that landed at least one or more pounds of *Illex* in calendar year 1998

The implementation of the framework management alternatives 1-3 extend the moratorium for a time certain and thus maintain the status quo in this fishery, at least in the short term. As a result, none of these measures are expected to change gross revenues as a consequence of the proposed actions. Therefore it is correct to assume that the these alternatives represent no constraint on vessels in these fisheries in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

In the case of the no action alternative, the moratorium on entry into the *Illex* fishery would expire in July of 2003. Under this option, the fishery will revert to open access and which will result in an increase in fishing effort in the *Illex* fishery.

A description of the action, why it is being considered, and the legal basis for this action are contained at in the Section 2 of the Environmental Assessment. This proposed rule does not duplicate, overlap, or conflict with other Federal rules. There are no new reporting or recordkeeping requirements contained in any of the alternatives considered for this action. There are 73 vessels that have been issued moratorium permits all of which would be impacted by this action. The distribution of these vessels by size and home port state is described in Table 28.

Since per vessel costs are not available for vessels participating in the Illex moratorium fishery, individual vessel profitability could not be estimated. Therefore, changes in gross revenue of the aggregate fleet is used as a proxy for changes in individual vessel profitability. Furthermore, assumptions are made that revenues losses and gains are shared equally among these vessels. There are no large entities (vessels) participating in this fishery, as defined in Section 601 of the Regulatory Flexibility Act, therefore, there are no economic impacts resulting from disproportionate sizes of vessels in the fishery.

In addition to the preferred alternative 1, the Council considered three non-preferred alternatives. Alternative 2 would extend the moratorium on entry to the Illex fishery for an additional 2 years (through July 1, 2005); Alternative 3 would extend the moratorium on entry to the Illex fishery for an additional 3 years (through July 1, 2006); and Alternative 4 would allow

the moratorium on entry to the Illex fishery to expire on July 1, 2003 (no action).

The preferred alternative and alternatives 2 and 3 would extend the moratorium on entry of new vessels into the Illex fishery; therefore, no impact is expected on vessels in the fishery in 2003 (and the first half of 2004), compared to individual vessel revenues in 2002. The Council assumed that the market and prices would remain stable. Therefore, any changes in individual vessel revenues would be the result of factors outside the scope of the moratorium (e.g., change in fishing practices for individual vessels, or changes in abundance and distribution of Illex squid).

For the no-action alternative 4, new vessels entering the fishery would limit per vessel share of the Illex squid quota and reduce revenues for the existing moratorium vessels. Computing the negative impacts of revenue losses for the existing moratorium vessels is impossible due to the unpredictability of redirection of effort into the Illex squid fishery. Therefore, the Council developed three scenarios that presumed revenues derived from landings of Illex squid would be reduced by 75, 50, and 25 percent due to an assumed entry into the fishery by vessels that have not participated in the Illex squid fishery. It was also assumed that changes in Illex revenues associated with changes in effort would be the same for all vessels participating in the fishery (109 vessels with moratorium permits or that landed Illex under the incidental catch permit). The analysis was based on 1998 data because in 1998 the Illex quota was completely harvested. Therefore, those data would allow the greatest impact to be assessed. These scenarios assess the impact under the no-action alternative, with the only difference between them the time when the impacts are felt by participants. The preferred alternative was selected because the Council was advised that an FMP amendment should be prepared out to extend the moratorium beyond 1 year.

Under scenario 1, the review of revenue impacts examined the landings of vessels in the existing moratorium fishery and presumed that revenues derived from landing Illex for these vessels would be reduced by 75 percent. The 109 impacted vessels were projected to be impacted by revenue losses that ranged from less than 5 percent for 79 vessels, to a maximum of 40-49 percent for 2 vessels. There were no impacted vessels home-ported in Maryland, New Hampshire, or Virginia; a high of 15 vessels had home ports in New Jersey. Other impacted vessels were home ported in Massachusetts, Maine, Rhode Island, New York, and North Carolina. Presumably, other vessels entering the fishery would experience gains in revenues.

Under scenario 2, the review of revenue impacts presumed that vessel revenues derived from landing Illex would be reduced by 50 percent. The 109 impacted vessels were projected to be impacted by revenue losses that ranged from less than 5 percent for 84 vessels, to a maximum of 30-39 percent for one vessel. There were no impacted vessels home-ported in Maryland, New Hampshire, or Virginia; a high of 11 vessels had home ports in New Jersey. Others were in Massachusetts, Maine, Rhode Island, and North Carolina. Presumably, other vessels entering the fishery would experience gains in revenues.

Under scenario 3, the review of revenue impacts presumed that vessel revenues derived from

landing Illex would be reduced by 25 percent. The 109 impacted vessels were projected to be impacted by revenue losses that ranged from less than 5 percent, for 88 vessels, to a maximum of 10-19 percent for 8 vessels. The number of impacted vessels by home state ranged from none in Maryland, New Hampshire, New York, and Virginia, to a high of 11 in New Jersey. Other impacted vessels were home ported in Massachusetts, Maine, Rhode Island, and North Carolina. Presumably, other vessels entering the fishery would experience gains in revenues.

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Table 1. Landings of Atlantic mackerel by state in 2001 based on unpublished NMFS dealer reports.

2001 MACKEREL LANDINGS BY STATE	MT	
	Sum	Pct Sum
CT	9.052	0.07
DE	0.011	0.00
JV	31.901	0.26
MA	175.692	1.43
MD	2.988	0.02
ME	1.415	0.01
NC	10.867	0.09
NH	4.151	0.03
NJ	11441.62	92.86
NY	33.752	0.27
RI	513.099	4.16
VA	97.213	0.79
All	12321.76	100.00

Table 2. Landings of Atlantic mackerel by month in 2001 based on unpublished NMFS dealer reports.

2001 MACKEREL LANDINGS BY MONTH	MT	
	Sum	Pct Sum
MONTH		
1	3639.733	29.54
2	2756.046	22.37
3	2877.043	23.35
4	2769.252	22.47
5	178.860	1.45
6	3.123	0.03
7	5.136	0.04
8	7.484	0.06
9	4.635	0.04
10	4.032	0.03
11	15.853	0.13
12	60.562	0.49
All	12321.76	100.00

Table 3. Landings of Atlantic mackerel by gear in 2001 based on unpublished NMFS dealer reports.

2001 MACKEREL LANDINGS BY GEAR	MT	
	Sum	Pct Sum
BOTTOM TRAWL	566.698	4.60
GILL NET	166.750	1.35
LINE	16.392	0.13
MIDWATER TRAWL	11396.39	92.49
OTHER	174.767	1.42
UNKNOWN	0.766	0.01
All	12321.76	100.00

Table 4. Atlantic mackerel landings by port in 2001.

Port	MT	Percent (%)
Cape May, NJ	**11,371**	**92.28**
North Kingstown, RI	**393**	**3.19**
Chatham, MA	**92**	**0.75**
Newport, RI	**50**	**0.41**
Point Judith, RI	**40**	**0.33**

Source: Unpublished NMFS Dealer Reports (for top five ports landing Atlantic mackerel)

Table 5 . Value of landings all species landed and Atlantic mackerel by port in 2001 (for ports where mackerel comprised >1% of total value of all species and total port value for mackerel exceeded $25,000).

Port	Number of vessels	Value All species ($)	Mackerel value ($)	Percent (%)
Cape May, NJ	15	18,661,397	1,634,407	6.0
North Kingstown, RI	2	9,754,110	195,916	2.0
Little Compton, RI	6	2,9850420	30,761	1.0

Table 6. Frequency distribution of Atlantic mackerel vessel permit holders in 2001 by home port state.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
AL	1	0.04	1	0.04
CT	42	1.87	43	1.92
DE	12	0.54	55	2.45
FL	12	0.54	67	2.99
GA	3	0.13	70	3.12
MA	999	44.58	1069	47.70
MD	22	0.98	1091	48.68
ME	247	11.02	1338	59.71
NC	85	3.79	1423	63.50
NH	87	3.88	1510	67.38
NJ	217	9.68	1727	77.06
NY	234	10.44	1961	87.51
PA	16	0.71	1977	88.22
RI	138	6.16	2115	94.38
SC	3	0.13	2118	94.51
TX	1	0.04	2119	94.56
VA	117	5.22	2236	99.78
VT	1	0.04	2237	99.82
WA	2	0.09	2239	99.91
WV	2	0.09	2241	100.00

Table 7. Frequency distribution of Atlantic mackerel, squid and butterfish dealer permit holders in 2001 by state.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CA	1	0.28	1	0.28
CT	7	1.93	8	2.21
DE	2	0.55	10	2.76
FL	8	2.21	18	4.97
HI	1	0.28	19	5.25
LA	1	0.28	20	5.52
MA	105	29.01	125	34.53
MD	5	1.38	130	35.91
ME	25	6.91	155	42.82
NC	30	8.29	185	51.10
NH	6	1.66	191	52.76
NJ	33	9.12	224	61.88
NY	71	19.61	295	81.49
PA	2	0.55	297	82.04
PR	2	0.55	299	82.60
RI	39	10.77	338	93.37
VA	23	6.35	361	99.72
VI	1	0.28	362	100.00

Table 8. Frequency distribution of Atlantic mackerel, squid and butterfish dealer permit holders who bought Atlantic mackerel in 2001 by state.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CT	2	1.79	2	1.79
MA	17	15.18	19	16.96
MD	3	2.68	22	19.64
ME	1	0.89	23	20.54
NC	17	15.18	40	35.71
NH	1	0.89	41	36.61
NJ	10	8.93	51	45.54
NY	32	28.57	83	74.11
RI	24	21.43	107	95.54
VA	5	4.46	112	100.00

Table 9. Total landings and value of Atlantic mackerel, *Loligo*, *Illex*, and butterfish during 2001.

	Landings (mt)	Value ($)	Vessels (number)	Trips (number)
Mackerel	12,322	2,212,979	461	2,981
Loligo	14,091	20,507,316	447	6,861
Illex	3,939	3,705,708	31	121
Butterfish	4,380	1,471,626	485	6,923

Source: Unpublished NMFS Dealer reports.

Table 10. Total landings of Atlantic mackerel, *Loligo*, *Illex*, and butterfish during 2001 by permit category.

	Permit Categories							
	Loligo/Butterfish Moratorium		Squid/Butterfish Incidental Catch		Atlantic Mackerel		*Illex* Squid Moratorium	
	Landings (mt)	Vessels (number)	Landings (number)	Vessels (mt)	Landings (mt)	Vessels (number)	Landings (mt)	Vessels (number)
Mackerel	11,313	184	18	229	12,057	337	11,123	40
Loligo	13,678	283	2,398	182	12,236	300	7,089	60
Illex	3,938	22	0.3	10	3,938	22	3,938	15
Butterfish	4,125	250	344	215	3,934	320	3,224	52

Source: Unpublished NMFS Dealer reports.

Table 11. Recreational landed and released Atlantic mackerel, 1981-2001 MRFSS data.

Year	LANDINGS (A+B1) ('000 fish)	LANDINGS (A+B1) (metric tons)	RELEASED ALIVE (B2) ('000 fish)
1981	4,919.1	3,210.0	189.0
1982	1,533.1	1,190.7	9.8
1983	3,995.7	3,001.9	123.7
1984	3,448.9	2,319.3	376.3
1985	7,169.5	2,713.2	655.0
1986	5,275.7	4,223.4	112.3
1987	6,399.4	4,031.9	1,334.0
1988	5,548.6	3,264.8	450.7
1989	3,613.5	1,786.6	421.6
1990	3,688.0	1,866.9	303.2
1991	5,235.3	2,565.9	219.9
1992	809.1	283.9	229.6
1993	2,119.6	599.5	185.5
1994	4,567.4	1,705.3	292.7
1995	3,241.1	1,249.2	876.0
1996	3,039.8	1,340.4	401.8
1997	4,549.9	1,736.6	643.8
1998	1,874.4	689.5	339.1
1999	3,235.8	1,335.1	402.4
2000	4,193.8	1,447.8	672.7
2001	4,127.1	1,535.7	795.6

Table 12. Recreational landings of Atlantic mackerel by state, 1981-2001 MRFSS data.

	ME (mt)	NH (mt)	RI (mt)	MA (mt)	CT (mt)	NY (mt)	NJ (mt)	DE (mt)	MD (mt)	VA (mt)	NC (mt)	East FL (mt)
1981	383.9	99.5	32.0	239.1	112.2	67.5	2,275.7	0.0	0.0	0.0	0.0	0.0
1982	23.5	80.6	27.2	24.0	227.6	101.4	706.5	0.0	0.0	0.0	0.0	0.0
1983	77.3	51.1	123.4	243.8	0.0	0.2	430.3	47.2	392.7	1,618.5	17.4	0.0
1984	138.7	172.4	157.6	312.8	1.6	20.5	731.9	605.3	170.8	7.8	0.0	0.0
1985	1,110.0	83.9	162.6	507.4	39.9	35.5	752.5	8.5	0.0	12.9	0.0	0.0
1986	133.4	14.3	46.1	628.7	36.5	22.7	1,839.3	775.0	0.0	487.6	0.0	239.8
1987	318.5	55.3	0.1	485.4	330.6	1,681.8	992.3	0.0	132.0	35.8	0.0	0.0
1988	538.7	72.6	5.5	1,952.5	2.0	0.0	1.0	524.9	159.3	0.0	0.0	8.3
1989	147.2	73.8	9.9	877.5	0.2	119.0	253.1	106.7	194.9	4.3	0.0	0.0
1990	79.7	65.6	41.7	1,009.7	0.0	11.2	400.2	16.3	220.2	22.4	0.0	0.0
1991	298.3	0.4	150.5	1,172.9	0.0	364.6	457.5	21.1	79.3	21.2	0.0	0.0
1992	71.2	4.9	10.0	154.4	0.0	0.6	2.2	9.5	19.8	11.4	0.0	0.0
1993	136.1	3.9	0.0	53.9	0.2	33.5	26.1	0.0	345.8	0.0	0.0	0.0
1994	337.0	390.7	43.7	895.3	0.0	0.1	32.4	1.7	4.3	0.0	0.0	0.0
1995	276.5	52.2	3.2	517.3	0.0	7.1	372.6	16.4	3.1	0.8	0.0	0.0
1996	146.6	215.4	10.9	793.0	2.8	0.5	112.7	3.7	52.2	1.8	0.7	0.0
1997	409.3	211.9	18.3	556.4	0.0	23.4	438.7	25.8	28.2	24.6	0.2	0.0
1998	149.2	89.7	7.7	351.7	0.0	7.3	70.1	2.6	6.3	4.7	0.2	0.0
1999	258.2	156.1	44.9	624.0	0.0	15.3	214.1	0.0	17.1	5.3	0.0	0.0
2000	364.3	166.0	2.5	857.2	0.0	9.8	31.2	0.3	1.4	15.1	0.0	0.0
2001	287.3	223.6	7.2	885.2	0.0	17.5	77.8	12.6	22.1	2.4	0.0	0.0

Table 13. Recreational landings (A+B1) of Atlantic mackerel by mode, 1981-2001 MRFSS data.

	SHORE (metric tons)	PARTY/CHARTER (metric tons)	PRIVATE/RENTAL (metric tons)	TOTAL (metric tons)
1981	12.3	2,521.2	676.5	3,210.0
1982	110.3	482.2	598.2	1,190.7
1983	37.2	2,646.1	318.6	3,001.9
1984	52.1	1,206.2	1,061.0	2,319.3
1985	55.8	1,898.1	759.3	2,713.2
1986	54.1	1,679.3	2,490.0	4,223.4
1987	81.9	1,253.6	2,696.4	4,031.9
1988	78.5	459.8	2,726.5	3,264.8
1989	183.4	652.3	950.9	1,786.6
1990	98.7	585.2	1,183.1	1,867.0
1991	87.0	627.5	1,851.4	2,565.9
1992	57.7	41.9	184.4	284.0
1993	85.3	73.1	441.2	599.6
1994	239.8	420.6	1,045.0	1,705.4
1995	149.9	418.7	680.5	1,249.1
1996	160.2	232.1	948.1	1,340.4
1997	300.4	661.4	774.8	1,736.6
1998	66.4	109.5	513.6	689.5
1999	87.2	292.9	955.1	1,335.2
2000	127.0	81.3	1,239.5	1,447.8
2001	81.6	164.0	1,290.1	1,535.7

Table 14 . Statistical areas where 1% or more of Atlantic mackerel commercial landings occurred in 2001.

Statistical Area	Landings (mt)	Percent of Total
616	2645.155	29.5
615	2123.657	23.69
612	1947.898	21.73
613	1428.999	15.94
621	405.815	4.53

Table 15. Landings of *Loligo pealei* by state in 2001.

2001 LOLIGO LANDINGS BY STATE	MT	
	Sum	Pct Sum
CT	328.702	2.33
MA	401.045	2.85
MD	18.894	0.13
ME	0.036	0.00
NC	16.708	0.12
NH	0.235	0.00
NJ	2557.530	18.15
NY	3448.440	24.47
RI	7019.351	49.81
VA	299.898	2.13
All	14090.84	100.00

Table 16. Landings of *Loligo pealei* by month in 2001 based on unpublished NMFS dealer reports.

2001 LOLIGO LANDINGS BY MONTH	MT	
	Sum	Pct Sum
MONTH		
1	851.124	6.04
2	1024.133	7.27
3	2025.893	14.38
4	1459.890	10.36
5	603.375	4.28
6	460.620	3.27
7	807.091	5.73
8	609.650	4.33
9	502.794	3.57
10	1898.832	13.48
11	2094.421	14.86
12	1753.016	12.44
All	14090.84	100.00

Table 17. Landings of *Loligo pealei* by gear in 2001 based on unpublished NMFS dealer reports.

2001 BUTTERFISH LANDINGS BY GEAR	MT	
	Sum	Pct Sum
BOTTOM TRAWL	4152.130	94.79
GILL NET	34.712	0.79
LINE	3.923	0.09
MIDWATER TRAWL	1.087	0.02
OTHER	82.325	1.88
UNKNOWN	106.173	2.42
All	4380.349	100.00

Table 18. Home port state of vessels with *Loligo*/butterfish moratorium permits in 2001.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CT	8	2.08	8	2.08
DE	1	0.26	9	2.34
FL	1	0.26	10	2.60
MA	109	28.39	119	30.99
MD	3	0.78	122	31.77
ME	5	1.30	127	33.07
NC	24	6.25	151	39.32
NJ	57	14.84	208	54.17
NY	87	22.66	295	76.82
PA	5	1.30	300	78.13
RI	67	17.45	367	95.57
VA	16	4.17	383	99.74
WV	1	0.26	384	100.00

Table 19. Frequency distribution of dealers which bought *Loligo* in 2000 by state.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CT	1	0.8	1	0.8
MA	28	21.1	29	21.8
MD	3	2.3	32	24.1
ME	2	1.5	34	25.6
NC	17	12.8	51	38.3
NJ	9	6.8	60	45.1
NY	38	28.6	98	73.7
RI	27	20.3	125	94.0
VA	8	6.0	133	100.0

Table 20. *Loligo* squid landings (mt and value) by port in 2001.

Port	MT	Percent (%)
Point Judith, RI	4,142.7	29.4
Cape May, NJ	1,690.3	12.0
North Kingstown, RI	1,667.7	11.8
Hampton Bay, NY	1,633.6	11.6
Montauk, NY	1,491.4	10.6
Newport, RI	1,156.0	8.2
Elizabeth, NJ	440.3	3.1
Point Pleasant, NJ	335.8	2.4
Freeport, NY	254.1	1.8
Hampton, VA	214.3	1.5
New London, CT	200.0	1.4
New Bedford, MA	150.8	1.1

Source: Unpublished NMFS Dealer Reports (for ports landing >1% of total *Loligo* landings)

Table 21. Value of landings all species landed and *Loligo* by port in 2001 (for ports where *Loligo* comprised >10% of total value of all species) .

Port	Number of Vessels	Value All Species ($)	Loligo Value ($)	Percent (%) of Total
Falmouth, MA	5	36,009	33,849	94.0
Elizabeth, NJ	3	797,027	719,964	90.3
Freeport, NY	13	1,035,874	407,493	39.3
Hampton Bay, NY	68	8,741,260	2,956,422	33.8
North Kingstown, RI	7	9,754,110	2,552,721	26.2
Montauk, NY	45	12,341,137	2,491,378	20.2
New London, Ct	6	1,604,737	321,837	20.1
New port, RI	38	7,439,026	164153792	19.0
Point Judith, RI	100	33,258,023	5,865,466	17.6

Table 22. NMFS statistical areas where 1% or more of *Loligo* was landed in 2001.

Statistical Area	Landings (mt)	Percent of Total
616	2491.4	18.02
537	2079.8	15.05
622	1529.7	11.07
626	1416.9	10.25
613	1245.9	9.01
632	1234.3	8.93
525	1226.4	8.87
562	413.7	2.99
526	346.9	2.51
612	256.5	1.86
166	236.1	1.71
539	190.2	1.38
75	182.7	1.32
621	156.2	1.13

Table 23. Landings of *Illex illecebrosus* by state in 2001.

2001 ILLEX LANDINGS BY STATE	MT	
	Sum	Pct Sum
CT	15.725	0.40
MA	0.264	0.01
ME	16.942	0.43
NC	0.211	0.01
NH	0.002	0.00
NJ	588.414	14.94
RI	3240.298	82.27
VA	76.846	1.95
All	3938.701	100.00

Table 24. Landings of *Illex illecebrosus* by month in 2001.

2001 ILLEX LANDINGS BY MONTH	MT	
	Sum	Pct Sum
MONTH		
1	23.130	0.59
2	17.839	0.45
3	3.542	0.09
4	14.686	0.37
5	2.087	0.05
6	671.305	17.04
7	1631.745	41.43
8	705.610	17.91
9	469.480	11.92
10	70.254	1.78
11	317.481	8.06
12	11.543	0.29
All	3938.701	100.00

Table 25. Landings of *Illex illecebrosus* by gear type in 2001.

2001 ILLEX LANDINGS BY GEAR	MT	
	Sum	Pct Sum
BOTTOM TRAWL	3922.975	99.60
GILL NET	0.002	0.00
UNKNOWN	15.725	0.40
All	3938.701	100.00

Table 26. *Illex* squid landings by port in 2001.

Port	MT	Percent (%)
North Kingstown, RI	3,240	82.3
Cape May, NJ	493	12.5
Elizabeth, NJ	96	2.4
Hampton, VA	77	1.9

Source: Unpublished NMFS Dealer Reports (for ports which landed >1% of *Illex* landed in 2001).

Table 27. Value of landings all species landed and *Illex* by port in 2001 (for ports where *Illex* comprised >1% of total value of all species) .

Port	Number of Vessels	Value All Species ($)	Illex Value ($)	% of Total
North Kingstown, RI	3	8,522,877	2,077,703	24.37
Cape May, NJ	10	23,936,235	1,403,624	5.56

Table 28. Home port state of vessels with *Illex* moratorium permits in 2001.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CT	2	2.74	2	2.74
FL	1	1.37	3	4.11
MA	13	17.81	16	21.92
ME	1	1.37	17	23.29
NC	7	9.59	24	32.88
NJ	23	31.51	47	64.38
NY	8	10.96	55	75.34
PA	3	4.11	58	79.45
RI	9	12.33	67	91.78
VA	6	8.22	73	100.00

Table 29. Frequency distribution of dealers which bought *Illex* in 2001 by state.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CT	1	5.26	1	5.26
MA	3	15.79	4	21.05
NC	5	26.32	9	47.37
NH	1	5.26	10	52.63
NJ	2	10.53	12	63.16
RI	4	21.05	16	84.21
VA	3	15.79	19	100.00

Table 30. NMFS statistical areas where 1% or more of *Illex* was landed in 2001.

Statistical Area	Landings (mt)	Percent of Total
622	1350.1	39.15
626	1124.4	32.61
632	788.8	22.87
615	68.0	1.97
621	40.6	1.18

Table 31. Landings of butterfish by state in 2001.

2001 BUTTERFISH LANDINGS BY STATE	MT	
	Sum	Pct Sum
CT	131.682	3.01
DE	0.147	0.00
MA	51.876	1.18
MD	11.248	0.26
ME	0.557	0.01
NC	21.214	0.48
NH	2.252	0.05
NJ	116.607	2.66
NY	511.334	11.67
RI	3507.656	80.07
VA	25.894	0.59
All	4380.466	100.00

Table 32. Landings of butterfish by month in 2001.

2001 BUTTERFISH LANDINGS BY MONTH	MT	
	Sum	Pct Sum
MONTH		
1	1626.554	37.13
2	952.340	21.74
3	610.050	13.93
4	297.868	6.80
5	186.507	4.26
6	127.879	2.92
7	117.160	2.67
8	78.452	1.79
9	57.947	1.32
10	111.382	2.54
11	116.608	2.66
12	97.720	2.23
All	4380.466	100.00

Table 33. Landings of butterfish by gear type in 2001.

2001 BUTTERFISH LANDINGS BY GEAR	MT	
	Sum	PctSum
BOTTOM TRAWL	4152.130	94.79
GILL NET	34.712	0.79
LINE	3.923	0.09
MIDWATER TRAWL	1.087	0.02
OTHER	82.325	1.88
UNKNOWN	106.173	2.42
All	4380.349	100.00

Table 34. Landings of butterfish by port in 2001.

Port	MT	Percent (%)
North Kingstown, RI	2,656	60.6
Point Judith, RI	756	17.3
Montauk, NY	226	5.2
Hampton Bay, NY	132	3.0
East Haven, CT	107	2.4
Newport, RI	75	1.7
Cape May, NJ	74	1.7
Greenport, NY	59	1.3
Ammagansett, NY	44	1.0

Table 35. Value of landings all species landed and butterfish by port in 2001 (for ports where butterfish comprised >1% of total value of all species) .

Port	No. of vessels	Value of all species($)	Value of butterfish ($)	%Value of butterfish
North Kingstown, RI	6	9,754,110	1,581,918	16.2
Mattituck, NY	6	357,412	54,617	15.3
Ammagansett, NY	5	559,933	60,987	10.9
Greenport, NY	14	834,070	83,890	10.0

Table 36. Frequency distribution of dealers which bought butterfish in 2001 by state.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CT	2	1.79	2	1.79
MA	17	15.18	19	16.96
MD	3	2.68	22	19.64
ME	1	0.89	23	20.54
NC	17	15.18	40	35.71
NH	1	0.89	41	36.61
NJ	10	8.93	51	45.54
NY	32	28.57	83	74.11
RI	24	21.43	107	95.54
VA	5	4.46	112	100.00

Table 37. Home port state of vessels with squid/butterfish incidental catch permits in 2001.

STATE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
AK	1	0.05	1	0.05
AL	1	0.05	2	0.11
CT	34	1.86	36	1.97
DE	12	0.66	48	2.63
FL	8	0.44	56	3.06
GA	3	0.16	59	3.23
LA	1	0.05	60	3.28
MA	846	46.28	906	49.56
MD	15	0.82	921	50.38
ME	161	8.81	1082	59.19
NC	105	5.74	1187	64.93
NH	62	3.39	1249	68.33
NJ	179	9.79	1428	78.12
NY	167	9.14	1595	87.25
PA	9	0.49	1604	87.75
RI	104	5.69	1708	93.44
SC	2	0.11	1710	93.54
TX	1	0.05	1711	93.60
VA	113	6.18	1824	99.78
WA	2	0.11	1826	99.89
WV	2	0.11	1828	100.00

Table 38. Statistical areas where 1% or more of butterfish was landed in 2001.

Statistical Area	Landings (mt)	Percent of Total
537	2683.9	71.19
616	219.8	5.83
613	152.5	4.04
525	142.2	3.77
539	105.1	2.79
611	87.4	2.32
621	54.2	1.44
526	39.5	1.05
148	37.7	1

Table 39. Threshold analysis of revenue impacts for participating vessels, assuming a 75% decrease in *Illex* revenues associated with a 75% increase in effort.

Scenario I	Number of Impacted Vessels by Reduction Percentile (%)

Total Vessels	Number of Vessels Impacted by ≥ 5 Reduction	<5	5-9	10-19	20-29	30-39	40-49	$50
109	30	79	6	6	10	6	2	0

Table 40. Review of revenue impacts under Scenario I, by home state.

State	Participating Vessels	Number of Vessels Impacted ≥5 percent	Number of Impacted Vessels by Reduction Percentile (percent)						
			<5	5-9	10-19	20-29	30-39	40-49	$50
MA	16	3	13	1	1	0	1	0	0
MD	5	0	5	0	0	0	0	0	0
ME	5	1	4	0	0	1	0	0	0
NC	21	4	17	0	1	3	0	0	0
NH	13	0	13	0	0	0	0	0	0
NJ	20	15	5	4	1	4	4	2	0
NY	11	1	10	1	0	0	0	0	0
RI	7	3	4	0	2	1	0	0	0
VA	6	0	6	0	0	0	0	0	0
OTHER[a]	5	3	2	0	1	1	1	0	0
Total	109	30	79	6	6	10	6	2	0

[a]States with fewer than 4 vessels were aggregated.

Table 41. Threshold analysis of revenue impacts for participating vessels, assuming a 50% decrease in *Illex* revenues associated with a 50% increase effort.

Scenario II		Number of Impacted Vessels by Reduction Percentile (%)						
Total Vessels	Number of Vessels Impacted by ≥ 5 Reduction	<5	5-9	10-19	20-29	30-39	40-49	$50
109	25	84	4	13	7	1	0	0

Table 42. Review of revenue impacts under Scenario II, by home state.

State	Participating Vessels	Number of Vessels Impacted ≥5 percent	Number of Impacted Vessels by Reduction Percentile (percent)						
			<5	5-9	10-19	20-29	30-39	40-49	$50
MA	16	3	13	1	1	1	0	0	0
MD	5	0	5	0	0	0	0	0	0
ME	5	1	4	0	1	0	0	0	0
NC	21	4	17	1	3	0	0	0	0
NH	13	0	13	0	0	0	0	0	0
NJ	20	11	9	0	5	5	1	0	0
NY	11	0	11	0	0	0	0	0	0
RI	7	3	4	1	2	0	0	0	0
VA	6	0	6	0	0	0	0	0	0
OTHER[a]	5	3	2	1	1	1	0	0	0
Total	109	25	84	4	13	7	1	0	0

[a]States with fewer than 4 vessels were aggregated.

Table 43. Threshold analysis of revenue impacts for participating vessels, assuming a 25% decrease in *Illex* revenues associated with a 25% increase effort.

Scenario III		Number of Impacted Vessels by Reduction Percentile (%)						
Total Vessels	Number of Vessels Impacted by ≥ 5 Reduction	<5	5-9	10-19	20-29	30-39	40-49	$50
109	21	88	13	8	0	0	0	0

Table 44. Review of revenue impacts under Scenario III, by home state.

State	Participating Vessels	Number of Vessels Impacted ≥5 percent	Number of Impacted Vessels by Reduction Percentile (percent)						
			<5	5-9	10-19	20-29	30-39	40-49	$50
MA	16	2	14	1	1	0	0	0	0
MD	5	0	5	0	0	0	0	0	0
ME	5	1	4	1	0	0	0	0	0
NC	21	3	18	3	0	0	0	0	0
NH	13	0	13	0	0	0	0	0	0
NJ	20	11	9	5	6	0	0	0	0
NY	11	0	11	0	0	0	0	0	0
RI	7	2	5	2	0	0	0	0	0
VA	6	0	6	0	0	0	0	0	0
OTHER[a]	5	2	3	1	1	0	0	0	0
Total	109	21	88	13	8	0	0	0	0

[a]States with fewer than 4 vessels were aggregated.

Appendix 1

Port and Community Profiles for the Atlantic Mackerel, Squid and Butterfish Fisheries

The following port and community profiles were excerpted from a report prepared for the Mid-Atlantic Council and submitted by Bonnie J. McCay on behalf of The Fisheries Project, Rutgers University, with the assistance of Kevin St. Martin, Brent Stoffle, Bryan Oles, Eleanor Bochenek, Teresa Johnson, Johnelle Lamarque, Giovani Graziosi, Barbara Jones, Judie Hope, and Kate Albert. The correct citation for this report is given under McCay *et al.* 2002 in the references listed above.

" According to 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." Guidelines to the SFA indicate that by community is meant a recognized place, such as a village, town, or city. For the purposes of this social impact assessment, community is defined as a fishing port or a place where fish (and squid) are processed, although it is recognized that people involved in the fisheries may live and work elsewhere and that there are important social networks and cultural identities that transcend municipal boundaries.

Communities from Rhode Island to North Carolina are involved in the harvesting and processing of Loligo and Illex squid, Atlantic mackerel, and butterfish. The communities chosen for the profiles that follow are those with the greatest participation and dependency on the four species in the year 2000 (see Table 1).

Table 1: Major Fishing Ports, Squid, Atlantic Mackerel, and Butterfish (SMB) Fisheries, as Ranked by Total Value of Fish Landings, Value of SMB Landings, and Percent SMB Landings to Total Landings, 2000

PORT	STATE	COUNTY	Rank:Total Value	Rank: SMB Value	Rank SMB/Total %
New Bedford	MA	Bristol	1	9	12
Point Judith	RI	Washington	2	1	8
No. Kingstown	RI	Washington	7	2	2
Newport	RI	Newport	8	6	9
Stonington	CT	New London	9	11	10
Montauk	NY	Suffolk	5	5	6
Hampton Bays/ Shinnecock	NY	Suffolk	6	4	4
Greenport	NY	Suffolk	11	12	5
Freeport	NY	Nassau	10	7	3
Elizabeth	NJ	Union	12	10	1
Point Pleasant	NJ	Ocean	4	8	11
Cape May	NJ	Cape May	3	3	2

Source: National Marine Fisheries Service Weighout Data, 2000.

Profiles are provided for the ports listed in Table 1 as well as for Shinnecock, NY, Brooklyn, NY, Newark, NJ, Hampton, VA, and Wanchese, NC , which are included in the study because of their engagement in one or more of the SMB fisheries. Numerous other ports are involved in the squid, mackerel, and butterfish fisheries but at a lower level of participation and/or dependence; information on most of the major fishing communities of New England and the Mid-Atlantic regions can be found in "New England's Fishing Communities" (Hall-Arber et al. 2002) and "Fishing Ports of the Mid-Atlantic" (McCay and Cieri, 2000), both of which have contributed to these profiles, supplemented by more recent research.

The following profiles are organized from north to south, from Massachusetts to North Carolina; in most cases the county in which a port or other community is found is also briefly described, as an indicator of the larger socio-economic system.

Bristol County and New Bedford, Massachusetts

Bristol County, MA

According to the 2000 Census, Bristol County had a population of 534,678 (Table MA-RI). This was a 5.6% increase from 1990. Ninety-one percent of the county population was white and of the total population 24.6% were under 18 years of age and 14.1% were 65 years of age or over. In 1999, Bristol had a per capita income of $27,461. Based on a 1997 model based estimate, 11.9% were living below the poverty level. In 2000, the unemployment rate was 3.9% and seasonally the rate ranged from a high of7.2% to a low of 3.9%. In 1990, of those 16 years of age or older, 1.5% of the total number employed were engaged in the agriculture, forestry, and fisheries industry.

New Bedford, MA

New Bedford's census profile is that of a struggling, impoverished industrial city. According to the 2000 Census, New Bedford had a population of 93,768, a 6.2% decrease from 1990 (Table MA-RI). Seventeen percent of the population was minority, primarily Hispanic, and the median age was only 35.9 years. In 1990, New Bedford had a per capita income of $10,923 and of the total population 16.8% were classified as living below the poverty level. In 1990, the unemployment rate was 12.2%.

Of those 16 years of age or older, only 1.3% of the total number employed were engaged in the agriculture, forestry, and fisheries industry in 1990, suggesting that the fisheries are marginal to the community. However, more extensive research shows that between 5 and 8 percent of the people in the New Bedford metropolitan statistical area receive their livelihoods primarily from fishing. Even a conservative estimate, assuming two other individuals are supported by each fisherman and fishing-related worker employed, places the proportion of the population dependent on fishing between 11 and 18% (Hall-Arber et al. 2002).

Fisheries Infrastructure

New Bedford is a major deep-water port with a long history of commercial fishing (Hall-Arber et al. 2002). Fishing and allied industries still contribute one-fifth of the city's income. New Bedford remains one of the three premier fishing ports in New England and it is consistently numbered among the top U.S. ports for the value of its commercial fishery landings, number 1 in the year 2000. Its highly differentiated fishing infrastructure was developed early in its history and has continued to grow (Hall-Arber et al. 2002).

Of all major groundfishing ports in the eastern U.S., New Bedford and environs, including neighboring Fairhaven, has the most developed infrastructure for fishing, together with Portland, Maine and Chatham, MA (Hall-Arber et al. 2002). It has the most total capital invested in the fishing industry and the largest fleet of any port. According to one report (Hall-Arber et al. 2002), in the late 1990s there were a total of 1,131 crew manning 265 vessels. Of these, 82 are scallopers, typically with 7 member crews, and 183 were draggers with average crew size of four. In 2000 there were also 9 large ocean quahog vessels. There are also smaller lobstering and gill-net boats.

Estimates of the numbers of fishermen vary. Crew sizes on scallop and groundfish vessels have diminished in the past few years, partly due to regulations (e.g., scallop boats are restricted to 7 crewmembers). Consultants in a 1999 harbor planning process identified 2,600 jobs and $609 million in sales directly attributable to the core seafood industry. Another 500 jobs were indirectly related, as was about $44 million in sales (Hall-Arber et al. 2002.).

In addition to boat owners, captains, and crew, the full New Bedford/ Fairhaven fleet (neighboring Fairhaven is the home of many of the vessels) generates business for around 75 seafood processors and wholesale fish dealers and 200 other shoreside industries. Together, these businesses provide employment for around 6,000 to 8,000 additional workers (Hall-Arber et al. 2002).

Squid, Atlantic Mackerel, and Butterfish

New Bedford ranks 9th in terms of the value of squid, Atlantic mackerel, and butterfish landings, and 12th in terms of the proportion of total landings from these species (Table 1). They are part of a large suite of species caught by the draggers of New Bedford. The fishing grounds used are generally northeast of the areas considered as Essential Fish Habitat in this amendment to the FMP, with the consequence that there are few if any direct impacts of potential closures of EFH areas in the Mid-Atlantic, although this may change as groundfish regulations are stricter and more stringently applied. This port was not visited for the SIA but discussions with people in the industry indicate that there is currently little or no processing of these species in New Bedford; most facilities are just packing them. The 2000 weighout data indicate that 64 boats landed Loligo squid, 15% of the total boats landing in New Bedford that year.

Rhode Island's Fishing Ports and Communities

The following Rhode Island ports were determined to have a high dependence on the species included in the FMP based on the value of the four species as a percent of the total value of all landings in the 2000 weigh-out data: North Kingstown, Point Judith, and Newport (Table 1). Newport and Point Judith, each having sizeable numbers of seagoing vessels, are located in the lower part of Narragansett Bay, as is North Kingstown, where there is an area called Quonset Point that hosts seafood processing and freezer trawlers.

Census data for 1990 and 2000 as well as other data are presented in Table MA-RI for the census units and counties. Newport is in Newport County, which has a total population of 85,433, in 2000, a 2% decline from 1990; Newport itself numbered 26,475 in 2000, a 6.2% decline. Newport has a sizeable minority population, primarily Black/African American (7.8%) and Hispanic (5.5%), a low median age (34.9 years) and high percentage of people living in poverty, based on a 1997 model (12.5%).

North Kingstown and Point Judith are in Washington County, population 123,546 in 2000, a 12.3% increase from 1990. North Kingstown's population was 26,326 in 2000, a 10.7% increase, and Point Judith's population (Narragansett census tract) was 16,361 in 2000, a 9.2% increase. These places have relatively small minority populations (Table MA-RI).

Newport and Point Judith were studied extensively by Hall-Arber et al. (2002). Newport is far less dependent on fishing than Point Judith is, based on fishing infrastructure and alternative activities. Point Judith ranked fifth and Newport 13th out of 36 New England ports in terms of fishing infrastructure differentiation (Hall-Arber et al. 2002: 39-40). However, they also ranked near the top of a scale of gentrification, Point Judith ranking 7 and Newport 5 out of 36 (Hall-Arber et al. 2002: 44). Rhode Island fishing communities are among the most "gentrified" in New England, many with long histories of tourism focusing on water sports, sailing, and summer "cottages." One consequence is that dockage (and other waterfront amenities) has become a problem in Newport and Point Judith due to competition for waterfront land and space, including areas for parking and gear. In Newport, commercial fishing activities have moved away from the tourist center, but they continue to be pressured to move farther away, competing with a highly active tourist trade and recreational boating sector (Hall-Arber et al. 2002: 45).

Point Judith remains one of the top fishing ports in the U.S. on the basis of quantity and value of landings. It is the most fisheries-dependent of Rhode Island's communities, with about 500 households directly involved in and another 400 indirectly dependent on the commercial fisheries (Hall-Arber et al. 2002: 80). Point Judith "fulfills the definition of a fishing community on the basis of central place theory. Fish are legally sold ex-vessel to a dealer, processor o r the public; fishing support services are provided; there are public facilities providing dockage; fishing people satisfy their daily and weekly social and/or economic needs here, and some fishermen and their representatives participate in fisheries resource management" (Hall-Arber et al. 2002: 78). In addition, "Despite changes," as one respondent put it, "there is still a distinct community of fishermen here." Fishermen comprise a social and occupational network: "People know each other." The small town atmosphere is punctuated by functions such as the Fishermen's Scholarship Fund's annual game feast where $6,000 was recently raised for the sons and daughters of fishermen" (Hall-Arber et al. 2002: 78).

The Blessing of the Fleet has become largely an activity of the recreational fishing community. There is little ethnic diversity in the fishing population, and many are relatively newcomers to fishing. Fishermen tend to live in small local communities of southern Rhode Island, within a 20-mile radius of the port; there is little residential housing near the port. The majority of the fish processing workers are ethnic minorities, often bussed in from the city of Providence, RI. There are numerous fisheries organizations in Point Judith (some serving the entire state) and fishing-related programs and services (Hall-Arber 2002: 83-84).

Newport, RI, has a long history of tourism and recreational boating, which started in the 1700s, but also a long and persistent engagement in commercial fishing historically based on floating fish traps but today divided between lobstering and a fleet of draggers and scallopers. Approximately 200 families are involved in the fisheries of Newport. The groundfish fleet has dramatically declined over the last 20 years, spurred by increasing property values that have restricted access to waterfront and other property, and the fisheries are minor compared with other economic and social activities (Hall-Arber 2002: 93-100). However, Newport remains a sizeable port. In 2000 90 boats landed fish and shellfish at Newport, according to the weighout data. There is no processing of squid, mackerel, or butterfish in Newport. The cultural importance of fishing to the community is evidenced in the museum at the Fishermen's Church Institute. Recreational fishing is mostly rod and reel fishing from shore for stripers.

North Kingstown is a large township with nine villages, one of which is maintained as a historic district (Wickford) (www.northkingstown.org, www.northkingstown.com). There is a charter boat company and about six marine-related businesses including marine repair, a mooring service, and a marina. The commercial fisheries are mainly found in the Quonset Point area, which was the site of a U.S. Naval Air Station, now a state airport, and a large industrial park, the Quonset Davisville Port and Commerce Park, the contested focus of plans for economic development including a container port (see www.sierraclubri.org/quonset).

Squid, Atlantic Mackerel, and Butterfish

Squid and butterfish have long been primary targets of fishermen from this area, together with whiting and scup--the diversified "small mesh" fishery of the Mid-Atlantic--and with the decline of groundfish in the northeast, these species have become even more important. According to the 2000 weigh-out data, 90 boats landed *Loligo* in Point Judith, or about 40% of all the boats that landed fish in Point Judith that year. Forty-two boats (47%) landed *Loligo* in Newport, and for North Kingstown, 7 boats landed *Loligo* in 2000, 20% of all the boats that year. Newport, North Kingstown and Pt. Judith land high volumes of *Illex*, *Loligo*, mackerel and butterfish, especially as groundfish landings in the area have declined. Loligo accounted for between 12 and 16% of the value of total landings in Point Judith,

Newport and North Kingstown in 2000. Butterfish played a very small role in Point Judith and Newport, less than 2% of the total landings value, but in North Kingstown butterfish accounted for over 17% of the total value of landings.

Illex is important only in North Kingstown, where three vessels landed Illex in 2000; their catches accounted for 22% of the value of total landings in 2000. In North Kingstown a processor reported that 95% of his business is from *Loligo*, *Illex*, mackerel and butterfish and some percentage from Atlantic herring. This processor unpacks frozen fish and squid from the boats. Seven boats pack out at his facility; these boats have been unpacking at his facility for about 17 years. The dependency of North Kingston processing on these species has already been shown by the Gear Restricted Areas which went into effect in 2001. According to one processor, the GRAs reduced his business by 20-30%: "There are no other species to target if we can't catch these fish."

Most fish processing in Pt. Judith is done in a large industrial area, the location of six processing plants, including Town Dock, the former Point Judith Cooperative (now the Pt. Judith Fishermen's Company), South Pier Fish, and Sea Fresh Corporation (Hall-Arber et al. 2002: 79). In recent years the processors have shifted their focus away from groundfish (fluke, yellowtail flounder, cod, whiting, and other species) and toward squid, herring, and mackerel (Ibid). A processor from Pt. Judith interviewed in 2002 noted that their busy season is during the winter and slow season is in the summer with *Loligo* being his primary product for processing. He used to process a lot of butterfish, but because of the down turn in the Japanese market, there is less demand for butterfish. He derives 50% of his revenue from *Loligo*. He buys product from 20-22 boats. Most of the boats have landed at his dock for many years; only a few move around to other docks. Another Pt. Judith processor indicated that *Loligo* and butterfish are important to his business, but not *Illex* and mackerel. If he could obtain more volume of butterfish he could sell it. Thirteen boats land at his facility. He has bought product from the same boats for 20 years.

Connecticut's Fishing Ports and Communities

Connecticut's coast has been transformed by the expansion of metropolitan populations. "Most fishermen in Connecticut are embedded as fishing 'clusters' within their communities, and as such do not make up a high economic component of local economies. The decline in the fishery is directly related to the loss of fishing community as a definite space and place dominated by a population sharing traditions of fishing. Nevertheless, fishing persists as enclaves,.... The historic loss of the core fishing population has proceeded simultaneously with an intense gentrification process that has converted fishing neighborhoods and dock space into expensive tourist weekend and summer homes surrounded by gentrified shops, restaurants, and marinas" (Hall-Arber et al. 2002: 52).

East Haven and Stonington, CT

East Haven numbered 28, 189 in 2000, a 7% increase from 1990 (Table CT). It is within New Haven County, and differs from it in having a much smaller minority population but also lower per capita incomes. The percent of those aged 16 and older employed in agriculture, forestry, and fisheries was only 0.3% in 1990. The importance of coastal tourism is indicated by the fact that of the vacant housing units, 30% have seasonal, recreational, or occasional uses.

Only Stonington persists as a port with an established and distinct dock space for fisheries, "the home port of Connecticut's last remaining commercial fishing fleet" (www.stonington.ct/harborplan.html). Stonington itself is a large township, made up of the Borough of Stonington and the villages of Mystic, Old Mystic, Pawcatuck, and Wequetequock. Stonington's population was 17,906 in 2000, a 6%

increase from 1990. It has a very small minority population, and a relatively high median age, 41.7 years (Table CT). The per capita income was higher than that of New London County.

Tourism is the major emphasis for development of the Stoninigton area, building on the proven popularity of Old Mystic and the Mystic Aquarium (www.munic.state.ct.us/Stonington). The fishing community is an enclave within one borough, and its ties to the town and borough are not very strong. For example, no fishermen now live on the main street of Stonington, which consists of gift shops and fashionable year round and summer residences. However, the commercial fleet survives in part because of political support from the town, which has reserved the Town Dock for commercial operations (www.stonington.ct/harborplan.html). In other Connecticut ports, fishing boats must compete with recreational marinas and dockside tourist facilities as well as rising property values (Hall-Arber et al. 2002: 51). In Stonington there appears to be strong recognition of the economic and symbolic value of the commercial fisheries.

Stonington's fishing fleet is split between day boats and offshore draggers; the latter target scallops, squid, fluke, butterfish, shrimp, monkfish, and whiting (Hall-Arber et al. 2002: 56). Lobstering is important (although affected by the lobster disease problems of Long Island Sound), and conch has emerged as a niche fishery here as in other ports of the region. The commercial dock, the Town Dock, is maintained under a lease from the town and is reserved for fishing-related activities. Two packing houses handle fish and shellfish, and the Southern New England Fishermen and Lobstermen Association (SNEFLA) helps lower costs of ice, fuel, gear, and supplies (Hall-Arber et al. 2002: 57). Members of SNEFLA are from Connecticut, Rhode Island, and Massachusetts; it began in 1931 to help with common problems such as the hijacking of trucked shipments of fish to the urban markets (Hall-Arber et al. 2002: 58). Members are allotted tie-up space at the Stonington Pier and have attempted to join the fishermen's health care plan initiated by the Massachusetts Fishermen's Partnership. Stonington ranked fairly high in terms of fishing infrastructure differentiation (10 out of 36), which includes the presence oor absence of icehouses, boat insurance, dockside diesel fuel, local trucking, a fishermen's supply house, monuments, and so forth (Hall-Arber et al. 2002: 38-39). Surprisingly, it ranked fairly low in the gentrification ranking of New England ports, 20 out or 36 (Ibid: 44). Comparable information is not available for East Haven.

There are very few fishermen living in the central part of Stonington, the historic "village" or Borough, but the Portuguese Holy Ghost Society and the Feast of the Holy Ghost persist as a social nexus, through the church, even though few Portuguese speakers are now in the fisheries.. The Portuguese first came to Stonington industry from the Azores or Cape Verde Islands in the 1700s as participants in the sealing and whaling, and Portuguese ethnicity remains associated with Stonington (Hall-Arber et al. 2002). The SNEFLA hosts an annual Blessing of the Fleet after a requiem mass for fishermen who lost their lives at sea:

"St. Mary's Church is home to a tall pastel statue of St. Peter, the patron saint of fishermen. Every July the statue makes its way in a parade from St. Mary's Church down Water Street to the docks and up Main Street to the Holy Ghost Hall. The parade is a somewhat solemn occasion. It follows a requiem mass in honor of the fishermen who have lost their lives at sea. A pickup truck drags a decorated dory in back of it. The truck is followed by a car carrying several grieving widows of local fishermen. The wives are in mourning and are dressed in black, respectfully indicating their loss to the solemn-faced spectators who are watching the truck pass. The fishing draggers moored at the Stonington dock are loaded with visitors and passengers and then the procession of draggers heads out to the inner breakwater. The bishop rides on the first fishing boat along with the fisherman's widow. As the draggers pass the first fishing boat, the bishop blesses each boat with holy water and prayers are said requesting a safe and prosperous fishing season. The draggers then form a circle so all can view the honored widow

as she throws the wreath overboard in honor of those fishermen who have lost their lives at sea." (Www.clemclay.com/thevillage.index.html).

Squid, Atlantic Mackerel, and Butterfish

The ports of East Haven and Stonington, CT, have small commercial fisheries that are engaged in fishing for the species of this FMP. For example, eleven out of the 17 boats in East Haven landed butterfish in 2000, and this species accounted for almost 5% of the total value in the port. Its landings of butterfish were roughly comparable in value to those of Point Pleasant, NJ, Freeport, NY, and Newport, RI. East Haven and Stonington also saw landings of *Illex* squid, at a low level but ranking 7th and 8th of the top 10. Stonington's catches of *Loligo* squid brought it into the top 10 for Loligo, comparable to the landings of Point Pleasant, NJ, in 2000.

New York's Fishing Ports and Communities

New York fishing ports, like those of Rhode Island and northern New Jersey, are on the boundary of the New England and the Mid-Atlantic ecological and institutional systems, and the diversity of species as well as fisheries agencies and laws involved is very high. In addition, the fisheries have a premium on adaptability, because of changes in the distribution and abundance of different species as well as market changes. Commercial fishing ports in New York State are concentrated on Long Island, which extends from Brooklyn, a borough of New York City, to the far eastern ports of Montauk (on the South Fork) and Greenport (on the North Fork). There are also small, but historically and culturally important, fisheries for migratory species on the Hudson River and other rivers (McCay and Cieri 2000).

New York's commercial fisheries are difficult to characterize in relation to NMFS weigh-out data and other information because they are quite widely dispersed. There are many well-known ports but large quantities of fish and shellfish are landed elsewhere. In addition, state waters (to 3 nautical miles) are extremely important. New York State's data on those fisheries do not include NMFS port codes. Consequently, the category "Other New York" in the NMFS weigh-out data is very large, accounting for 35% of the value and 23% of the pounds landed in 1998. Many of the fisheries of Long Island and Long Island Sound, particularly for lobsters, are represented in this category and not assigned to particular ports. The category also includes surf clamming and other fisheries that take place exclusively in state waters (McCay and Cieri 2000).

Of the four species included in the FMP, *Loligo* or long-finned squid figures most prominently in weigh-out data for the fishing ports on Long Island, followed by butterfish. *Loligo* accounted for 12% of the total value of commercial landings, as reported in weigh-out data for the year 2000. Butterfish accounted for 1% of the total value. Atlantic mackerel and *Illex*, or short-finned squid, accounted for less than 1% of the total value of fish landed in New York in 2000.

The following ports were determined to have a high dependence on the species included in the FMP based on the value of the four species as a percent of the total value of all landings in the 2000 weigh-out data: Brooklyn, Freeport, Greenport, Hampton Bays, and Montauk. The value of the four species in each of these ports was between 20% and 50% of the total catch value in each port. Visits were made to each of these ports and interviews were conducted with fishermen, dock personnel, processing plant managers, and community representatives. Additional information for the following port profiles is derived from "Fishing Ports of the Mid-Atlantic" (McCay and Cieri 2000).

Suffolk County, NY

Suffolk County is the eastern half of Long Island and encompasses major fishing ports that include Hampton Bays/Shinnecock, Montauk, and Greenport, as well as numerous smaller ports that were not included in this analysis. The fisheries of Suffolk County are highly diverse and also highly dispersed, such that much of what is landed is recorded as "other" rather than assigned to a specific port. Although Suffolk County is being rapidly developed, it produces the largest agricultural revenue of the counties in New York. Table (NY) presents 1990 and 2000 census data for the county and the county's ports that are included in this analysis.

Montauk, NY

Montauk, the largest fishing port in New York, is situated near the eastern tip of the South Fork of Long Island. A sign near the bay front marinas and docks welcomes visitors to Montauk: "The Fishing Capital of the World". The region's economy is heavily dependent on commercial and recreational fishing. Many of the local businesses provide services to the fishing industry. One informant estimated that there are approximately 300 fishing families in the area. According to the 1990 U.S. Census, there were approximately 290 residents who reported "fishing" as their occupation. Also of note is the 14.02% increase in the number of Hispanic residents since 1990 (Table NY). A large number of the dock workers in Montauk are Hispanic. Seasonal tourism is also extremely important to the local economy. The median house value in 1990 was $238,600, reflecting the high cost of housing in the vicinity. Informants working in the fishing industry who were interviewed for this study cite high housing costs as a challenge.

Fishing Infrastructure

The commercial fishing docks in Montauk are clustered at the northern end of the South Fork,in Montauk Harbor. Commercial dock space is limited in the area. Commercial fishing boats are docked in three primary locations, including a town dock next to the Coast Guard Station on the East side of the harbor, another town dock located near one of the packing businesses and the fish markets on the West side of the harbor, and a packing business located near the East side of the harbor's inlet. There are two primary businesses that pack commercial landings and a third that buys small quantities for both its retail market and for wholesale to restaurants. According to an informant at one of the docks, a packing business that used to operate recently moved out of the commercial packing business and now caters to recreational fishermen. In addition to the commercial docks in Montauk Harbor, there are a number of marinas dedicated to recreational fishing boats and pleasure craft. Numerous party and charter boats in Montauk Harbor cater to tourists and seasonal visitors.

Fishing Overview

According to NMFS weigh-out data for 1998, otter-trawls accounted for 80% of the pounds landed and 60% of the value in Montauk. *Loligo* squid (20% of the value) and silver hake (16% of the value) were the two most important finfish caught in 1998. Butterfish accounted for 2% of the value, and small amounts of *Illex* and Atlantic mackerel were also reported. Bottom longlining is traditionally important in Montauk. It accounted for 21% of the value in 1998, mainly derived from tilefish, swordfish and tunas. Montauk is the leading tilefish port in the U.S., but this fishery has declined greatly. In 1998 and 1999 some of the Montauk-based tilefish boats landed their catches in Rhode Island. Nonetheless, tilefish accounted for 21% of the value of landings in this port in 1998. There were 90 species landed at Montauk. The methods used to harvest fish and shellfish are diverse, including pound nets or fish weirs, box traps, haul seines, and spears, along with the more usual pots, lines, and trawl nets (McCay and Cieri 2000).

Squid, Atlantic Mackerel, and Butterfish

In 2000, 42 boats landed *Loligo* in Montauk, which was 21.6% of all the boats that landed catch in Montauk in that year. *Loligo* accounted for 18.9% of the value of total landings in Montauk in 2000. Thirty-eight boats, or 19.6% of all boats that packed in Montauk, landed butterfish in 2000.

Most of the fish and squid included in the plan are landed at one commercial packing facility in Montauk. Of the four species, *Loligo* has been the most significant for this facility. Six fishermen own this business, each of whom have been fishing for over 30 years. This packing facility is one of the only year-round labor employers in Montauk with the exception of a few resorts. During the winter when most other businesses are shut down, the dockworkers at this facility are putting in long hours to handle the large landings of *Loligo* and whiting. The business employs between six and 10 dockworkers, a secretary, and a manager. Ninety percent of the dockworkers are Hispanic. All of the employees live in Montauk or East Hampton.

According to the manager, 13 trawlers pack with the facility. In addition, 20 to 30 "pinhookers", or hand line boats, use the dock. The activity at the dock slows in the summer for the trawlers, but picks up for the small pinhookers. The business also relies on the charter boat businesses for buying fuel, bait, and ice. The majority of the business's revenue is generated through the packing and shipping of fish to dealers at Fulton Market, and processing plants in New Jersey and New York.

The commercial draggers that land *Loligo* and butterfish at this dock engage in a mixed-trawl fishery. In other words, the fishermen target a diversity of species that include *Loligo*, whiting, butterfish, mackerel, scup, flounder, and fluke, among others, depending on the boat size, season, and regulations. A number of the draggers that land here also engage in the groundfish fishery during the summer months. Diversification and adaptability are considered essential among those engaged in Montauk's mixed trawl fishing. One boat owner said that he maintains 17 permits on his vessel to allow him the option of moving into different fisheries as circumstances demand. *Loligo* are harvested all year long, but the winter months and early spring (December - April) are often the most productive times. *Loligo* are often harvested between 80 and 120 fathoms when they are offshore, but are also caught in shallow inshore water when they are spawning (Georgianna et al. 2001).

A number of the boat owners who pack *Loligo* at this dock explained the history of their involvement in the fishery. About fifteen years ago, management began to encourage fishermen who engaged in groundfish fishing to focus more of their fishing effort on the abundant stocks of underutilized, low value fish like *Loligo*, butterfish, mackerel, and whiting. Low interest government loans were provided for the purchase of the necessary boats and equipment.

Fishermen who took advantage of this opportunity were subsequently allotted fewer days at sea (DAS) in the multi-species groundfish plan of the New England Fishery Management Council. They now feel vulnerable to further cutbacks in DAS that have resulted from the May 2002 settlement of a lawsuit brought by environmental groups against the NMFS. The fishermen interviewed also expressed grave concern about the possibility that the new ruling will force fishermen from New England to move into their mixed-trawl fishery. They noted that current regulations are already having a negative impact on their operations. In 2000, the packing facility experienced a 66% decline in income between November and December due to the closure of area 6A, the Gear Restricted Area (GRA) designated to protect scup. The company had to let 2 employees go because of this decline, and the manager believes that it had an even greater impact on fishermen. Other regulations have limited the profitability of *Loligo* fishing including the 2500-pound trip limit that is triggered when 80% of the quota has been landed. One captain who had just returned from a trip that netted approximately 60,000 pounds of *Loligo* said that the 2500-pound trip limit does not allow him to even consider going out for *Loligo*. *Loligo*

fishermen in Montauk feel especially frustrated by the fact that management decisions for an animal with a one-year lifespan are being based on 3-year-old data. Most expressed support for "real time management" of *Loligo*.

Fishing Community/Relations

Informants note that Montauk has a rich historical connection to commercial fishing that is very important to the village's identity. The manager of one of the commercial packing docks is also a member of the East Hampton Town Board's Fishing Committee. This committee represents the interests of those who are dependent on the fishing industry of the area for the development of the new Comprehensive Plan. The Fishing Committee recently reported to the board that commercial fishing contributes an estimated 34 million dollars ex-vessel to the town, 90% of which comes from Montauk. The East Hampton Comprehensive Plan, which is set to be ratified in the coming year, acknowledges that, "fishing is East Hampton's largest and most historically significant industry." The committee has submitted a number of recommendations for inclusion in the Comprehensive Plan that promote and encourage the development of businesses that are critical for the support of commercial fishing. In general, the municipal government has been supportive of the fishing industry. However, informants note that local ordinances and zoning laws make expansion of commercial fishing areas difficult (McCay and Cieri 2000).

Other fishermen interviewed for the study indicated that Montauk has few multigenerational fishing families. Most of the commercial fishermen in Montauk are first generation who moved into the area from other coastal towns on Long Island. One fisherman contrasted the single generation fishermen of Montauk with the multigenerational families of baymen in neighboring Amagansett. While there are few multigenerational fishing families in Montauk, there are many fishing families in Montauk. One informant in the industry estimated that there are at least 300 fishing families in the region. In addition, the fishermen and industry representatives who were interviewed expressed a very strong sense of solidarity and pride in their community. They also expressed an awareness of how dependent the local society and economy is on fishing. One fisherman cited a NOAA-funded study on the region reporting that the community of Montauk is highly dependent on commercial fishing. Another fisherman pointed out the businesses that rely on his fishing operation. He and his crew spend approximately $40,000 each year at the local supermarket for supplying the voyages, and at least $2000 per week on ice alone. In addition, there are a host of ancillary businesses across the state and across the country that depend on the fishing industry of Montauk.

Shinnecock/Hampton Bays, NY

Shinnecock/Hampton Bays is the second most important commercial port in New York in terms of the value of total landings. Hampton Bays is located at the western end of the South Fork on the Southern shore of Long Island. It is located just between East Quogue to the west and Southampton Village and Shinnecock Hills on the east. Its boundary extends to Great Peconic Bay on the north, and to the Atlantic Ocean on the south. The Shinnecock Inlet provides access to the Atlantic Ocean. The area surrounding the commercial fishing docks is considered to be "Shinnecock." The separate villages of the area consolidated under the name of Hampton Bays in 1922, in order to take advantage of the increasing tourism to the region (http://www.hamptonbaysonline.com/external/historical_history.cfm#intro). Hampton Bays is highly dependent on its commercial fishing fleet. According to 1990 census data, 3.63% of the residents of Hampton Bays, and 5.59% of the residents in Shinnecock were employed in agriculture, forestry, and fisheries, relatively high percentages for the urban-industrial northeast/Mid-Atlantic region. The area is

also dependent on seasonal tourism as evidenced by 2000 U.S. Census data (Table NY). In 2000, 29.06% of the housing units in Hampton Bays were vacant, and of these 84.28% were used for seasonal, recreational, or occasional use.

Fishing Infrastructure

The offshore commercial fishing fleet is concentrated on the bay side of an isolated barrier island, to the west of Shinnecock Inlet. According to a fisheries management official, Shinnecock Inlet has a tendency to silt over, which can completely curtail ocean fishing. The official said that when the inlet silts over now, Shinnecock/Hampton Bays plummets in importance as far as landings go, whereas it usually vies with Montauk as the most important port on Long Island. The Shinnecock informant said that the last time the inlet closed up the federal government dredged the inlet very quickly. Pressure from the commercial fishing industry expedited the process (McCay and Cieri 2000).

The commercial docks are located on an isolated stretch of road, far removed from residential neighborhoods and beachfront rental property. They are bounded on the east and west by county parklands. The nearest building is a public beach access facility located a few hundred yards to the west of the dock area.

There are one municipal dock, two privately owned facilities for packing catch that have limited docking space, and a fishing cooperative that operates as a packing facility and a dock. According to data gathered in 1999 by key informants, there are 24 slips at the Municipal Dock but only 18 are being used by vessels, the other 6 being in a state of disrepair. The fishermen lease their slips from the town. The dock was created as the result of lobbying by one of the fishermen about 12 years ago and was financed by federal, state and local money. Since that time, the town and the county have been fighting over who owns it and should administer it (McCay and Cieri 2000). The manager of one of the commercial packing facilities indicated that dock space is severely limited. He and other fishermen have made numerous attempts to convince the county of the need for expanding the municipal dock but have not been successful.

Next to the municipal dock is a fish packing facility that also has four slips for commercial boats. The business sells ice and fuel to fishermen. According to one informant, eleven boats pack with this company. Next to this business is a fishing cooperative that packs out between 13 and 15 boats. The coop buys fuel, ice and other supplies in bulk, which is necessary in order to keep members' costs down. Most of the fish that's brought into the coop is sold to Fulton Fish Market, though some of it goes to local buyers. The business on the other side of the coop packs commercial landings and also provides slips for recreational/pleasure boats. The owner of this operation also runs a restaurant on the premises. There is a large fillet operation with a retail market in Shinnecock/Hampton Bays. Shinnecock/Hampton Bays has also been a surf clamming port but demand for clams from New York State waters has been low (McCay and Cieri 2000). Many of the marine supplies for the commercial fleet come from a well-known business in nearby Riverhead, Long Island, which services other ports in the eastern end of Long Island as well.

Fishing Overview

Codes for both Shinnecock (or Shinnecock Hills) and Hampton Bays are used in the NMFS weigh-out data. These are combined in this analysis because both refer to the same fishing port.

Shinnecock/Hampton Bays is primarily a dragger fishing port. Otter trawl landings accounted for 84% of the poundage and 74% of the value in 1998. Silver hake (whiting) and *Loligo* squid made up over 70% of these landings. Loligo accounted for 23% of the landings by weight and 27% by value in 1998. Butterfish, Atlantic mackerel, and Illex squid were much less important. Draggers landed 66 other species, reflecting the diversity of the region's fisheries. Gillnets were second in importance, accounting for 12% of the value of landings in 1998. They too had diverse landings, totaling 39 species, led by bluefish, monkfish, and skates. Bottom longlines were used for tilefish and pelagic longlines for swordfish and tunas. There is also a diverse assemblage of inshore techniques, including haul seines, pound-nets, pots (for crab, fish, eel, conch, and both inshore and offshore lobster), fyke-nets, and the shellfish techniques of shovels, rakes, and "by hand" (McCay and Cieri 2000).

Squid, Atlantic Mackerel, and Butterfish

Loligo and butterfish are important to the trawler fishing fleet that operates out of Shinnecock/Hampton Bays. There were approximately 30 draggers working out of Shinnecock/Hampton Bays in 1999: 10 in the 45' to 60' range; 16 in the 60' to 65' range; 4 boats between 80' and 90'; and, 4 boats over 90' in length (McCay and Cieri 2000). In 2000, 64 boats (many from other ports) landed *Loligo*, which was 66% of all the boats that landed catch in Shinnecock/Hampton Bays in that year. Forty-nine boats, or 50.5% of all boats that packed in Shinnecock/Hampton Bays, landed butterfish in 2000. Mackerel, though less important in overall value, was landed by 35 boats, or 36% of the boats that landed catch in Shinnecock/Hampton Bays in 2000. *Illex* is infrequently landed at this port due to the highly perishable nature of *Illex* and the need to transport it in boats set up for RSW (refrigerated sea water). The commercial draggers that land *Loligo* and butterfish at the three packing facilities engage in a mixed-trawl fishery. Like the draggers in Montauk, the fishermen target a diversity of species depending on the boat size, season, and regulations. A number of the draggers that land here also engage in the groundfish fishery during the summer months.

Loligo makes up a large part of the catch that is landed in Shinnecock. *Loligo* accounted for 39.2% of the value of the total landings in Shinnecock/Hampton Bays in 2000. During the summer of 2000, *Loligo* was being caught in unusually large numbers just off the beach of Shinnecock. Fishermen from Montauk and Rhode Island landed their catch in Shinnecock rather than steaming home. The local packing facilities did very well as did the fishermen. Compared to the lucrative summer of 2000, squid fishing in the summer of 2001 was not profitable. One local fisherman explained that his operation took a serious financial hit when the 2500 lb trip limit was instated. This fisherman lost his crew members due to the drop in income. He explained that it is difficult to find good crew, especially when the boat is not making money. He retained only one original crew member and the rest went "to bang nails," or work in construction, a common alternative to fishing.

Fishing Community/Relations

Inshore fishing has a long history in Shinnecock/Hampton Bays. Offshore commercial fishing started late relative to other places on Long Island due to the time needed to stabilize the Shinnecock Inlet in the 1950s (McCay and Cieri 2000). Most of the boat owners/operators and crew members live in Shinnecock/Hampton Bays. According to one informant, there are a number of fishing families that have historical roots in the area. This is primarily the case for baymen, but a number of offshore draggers also have roots in the area and strong family ties to the industry. However, like Montauk, a number of fishermen are first generation who came to the area from towns further west on Long Island. Many of the dockworkers in the area are immigrants from Central and South America.

Overall, the relationship between the fishermen and the municipality has been positive. According to one informant, the town has been supportive of the local fishing industry. However, fishermen have lobbied unsuccessfully for an expanded municipal dock and the area remains difficult if not impossible to develop for the commercial industry. Commercial fishermen in the area have also organized efforts designed to convince the federal government to assist in dredging the Shinnecock Inlet (McCay and Cieri 2000).

Greenport, NY

Greenport is the largest fishing port on the North Fork of Long Island. The village was a prominent whaling port in the early to mid 1800s and later became an important port for menhaden or "bunker" fishing and processing between the mid 1800s and the mid 1900s. Oystering was also an important industry up until the mid 1900s. At one point there were 14 oyster processing companies in the port (http://www.greenport.cc/ourhist.htm). Today, commercial fishing is still important in Greenport, but the economy has increasingly become geared to the tourist trade. A sign that greets visitors who come across the North Ferry from Shelter Island welcomes people to Greenport: "Shopping Hub of the North Fork." Despite the growing tourist trade, the town has demonstrated a commitment to maintaining Greenport's "working waterfront."

Fishing Infrastructure

The number of commercial fishing boats in Greenport has declined over the past several decades. In 1999, one informant estimated that there were 5 large offshore vessels, one medium-sized dragger, two small 40' draggers, 3 trap vessels (with pound nets), approximately 4 lobstermen, 4 or 5 people who do conch potting, 4 or 5 gill netters and 25 or so baymen (McCay and Cieri 2000). Two large scallop boats owned by a company in Cape May, NJ use Greenport's docks for repairs, but they land their catch in New Bedford and New Jersey.

The municipal Railroad Dock, located next to the North Ferry on Peconic Bay, is the primary commercial dock used by the large boats. The village leases the space from the train company and charges fees for tying up at the dock and for the use of water and electricity. The village has also provided a municipal dock for baymen located in Stirling Harbor. There is one packing facility located in Stirling Harbor that usually packs 2-3 small draggers and a number of small handline, trap, and gillnet boats. They also pack an occasional longliner. This facility also runs a retail fish market. The

business sells some of the product landed at the fish market, while the rest is typically sent to Fulton Fish Market on consignment. They provide their own ice and cartons and pay for the shipping. A whiting exporter recently moved out of the area and relocated in Massachusetts. Greenport used to have another packing and processing facility, but this went out of business some 15 years ago. Greenport is also home to a shipyard and a welding company that gets business from commercial boats that come from other areas. The one marine supply shop in Greenport no longer operates as a supply shop. The owners now use the business for commercial rental space and as a freezer facility for the storage of bait for area lobstermen.

Fishing Overview

Otter trawling accounted for 95.6% of the total poundage and 92.5% of the total value landed in Greenport and nearby Mattituck in 1998. Species harvested were led by silver hake (46.1% of total value) and *Loligo* (27.2% of total value), but also included butterfish, summer and winter flounder, scup, striped bass, monkfish, and other species. Pound-net fishing, haul-seining, gill-netting, handlining, pelagic longlining, lobster and conch pot fishing, and raking for clams and dredging for bay scallops also accounted for landings in 1998. (McCay and Cieri 2000).

Squid, Atlantic Mackerel, and Butterfish

Loligo and butterfish are important to the draggers that operate out of Greenport. In 2000, 11 boats landed *Loligo*, which was 61% of all the boats that landed in Greenport that year. *Loligo* accounted for 16.1 % of the total value of catch landed in Greenport in 2000. Eleven boats, again, landed butterfish in 2000. Butterfish accounted for 11.8 % of the total value of landings in Greenport in 2000. Very small quantities of mackerel and *Illex* were landed in Greenport. The smaller draggers of Greenport engage in a mixed trawl fishery, targeting a diversity of species, depending on seasons and regulations. In addition to dragging, the fishermen of Greenport engage in a diversity of additional fishing activities such as clamming, pound-netting, trapping, and gillnetting. The diversity of activities has allowed the fishermen to adapt to the changing natural and regulatory environments. One fisherman from Greenport explained that he used to do more squid fishing, but that the recent Scup GRAs made it difficult to make squid fishing profitable. He stayed with groundfishing all last winter, landing his catch away from Greenport, in places like New Bedford. The recent groundfish ruling, which is going to reduce his operations by 40%, will drive him to do more squid fishing than he has done recently. According to this informant, the other draggers who pack out of Greenport already rely heavily on *Loligo*. Regulations and state-by-state quotas are a concern to local fishermen because reduced limits have forced them to fish in different waters and pack their catch in different ports (McCay and Cieri 2000). One fisherman noted that area closures, if they occur, will be "another nail in the coffin" of the industry.

Fishing Community/Relations

The Village of Greenport is said to be "fisherman friendly," and is generally more supportive of the fishing industry than other communities according to informants. Greenport projects an image of being a seaport community through its tourism literature and waterfront revitalization efforts. The village features a maritime museum and also hosts a maritime festival. One example of the village's

commitment to commercial fishing involves a local fish processing plant. Condominium residents located near the plant complained about noise and smells associated with the plant's operation. The village board upheld the plant's right to operate as it saw fit because it had been there for 100 years while the condominiums had just been built. The board said that while the plant must comply with health regulations, it could operate in the middle of the night if it had to in order to ship fish. The board had previously changed zoning so that no new condominiums could be built in the commercial waterfront district. A second development already existed and was allowed to stay (McCay and Cieri 2000). Greenport's waterfront revitalization program, which is the first in the state, includes a clause protecting the commercial docks. The "Waterfront Commercial" zoning areas allow most uses related to commercial fishing, often to the exclusion of other uses (McCay and Cieri 2000).

Despite the village's commitment to the fishing industry, one informant pointed to the reduced number of boats and the loss of fishing infrastructure as signs of the decline of Greenport's fishing industry. According to one fisherman, the reason for the decline is associated with the over regulation of fish stocks, restrictive quotas, and New York State's apparent lack of commitment to commercial fishermen.

Freeport, NY

Commercial fishing activity in Freeport, Nassau County, is concentrated in two areas - along a revitalized waterfront area known as "Nautical Mile," and in Point Lookout, a small beach town on the south side of Jones Inlet, across from Freeport. Freeport began promoting itself as the “Boating and Fishing Capital of the East” in the 1940s (http: www.lihistory.com/spectown/ hist001k.htm). Commercial fishing has been declining in the area over the last several decades as tourism has expanded. According to one fisherman, "Nautical Mile" was once the homeport of 15 draggers. There are only four draggers that operate from small docks in this vicinity now, as well as a small number of lobster, clamming, and potting boats. A strip of restaurants, marinas, fish markets and small businesses that rely on tourism now dominates the waterfront. The canal that provides access to the bay is packed tightly with party boats, charter boats, gambling boats, and numerous pleasure craft. Unlike port towns located further east on Long Island, Freeport is much less reliant on seasonal tourism. In 2000, only 2.28% of the housing units were vacant, and of these only 14.6% were used for seasonal, recreational, or occasional use (Table NY).

Fishing Infrastructure

The following profile on Point Lookout comes from data gathered in 1999 (McCay and Cieri 2000). The main commercial fishing business in Point Lookout is family-run and consists of a wholesale fish market, retail fish market, clam bar and restaurant. The restaurant was started in part because a developer was going to build residential units right out to the waterfront on the land next to the business' dock. Not long ago there was a boatyard across the street where there are now only parking lots and private homes. The business has freezer space for 15-20,000 lb. of product. According to one informant who was interviewed in 1999, the business runs two of its own boats while other owner/ operators sell exclusively to it. Each boat has four crewmembers and multi-species permits. The business also buys from five local gillnetters. The business has a network of over 100 local restaurants that it wholesales to; the rest of its wholesale product goes to Fulton's Fish Market. Between the four

phases of the business they employ 30-35 people at any one time, 10 of those on the fish dock. All the dock's crew and employees live within a couple of miles of the dock. According to one informant at the business, there used to be fourteen trawlers tied up in Pt. Lookout and that the operation used to do a lot of out-of-state business. Now all their sales are local. However, another observer reports that out-of-state boats still land there. In addition to this operation, there is a surf clam processing plant on the same road that has been in the seafood business since the beginning of this century. It primarily handles surf clams caught in New York state waters as well as other shellfish. Several surf clam boats also work out of Freeport (McCay and Cieri 2000).

In the town of Freeport, three fish docks are located along the waterfront of the "Nautical Mile" on Woodcleft Road. One of the docks also runs a seafood restaurant and retail market. One dragger ties up and unpacks here. A separate commercial docking and packing facility is associated with another fish market. There are 2 draggers and a number of lobster boats that dock and pack with this operation. The commercial infrastructure is literally surrounded by pleasure boats, party and charter boats, gambling boats and a host of tourist related businesses.

Fishing Overview

According to NMFS weigh-out data (which do not include all landings by port, including surfclams, which are important to Freeport), Freeport and neighboring Point Lookout (included in the Freeport port code) are almost entirely dependent on otter trawl landings. In 1998, otter trawling accounted for over 89% of the poundage, and 87% of the value. The primary species landed included *Loligo* (39.3% of total value) and silver hake (16.2% of total value), with smaller amounts of scup, weakfish, bluefish, butterfish, summer flounder, other flounders, and Atlantic mackerel. Gillnet, small handline, pot, pound-net and bay shellfisheries were also associated with these ports in the weigh-out data. These data are misleading in that surfclams were not reported by port in 1998.

Squid, Atlantic Mackerel, and Butterfish

Loligo is important to the draggers that operate out of Freeport, as is butterfish to a smaller degree. In 2000, 18 of the 43 boats that landed catch in Freeport landed *Loligo*. *Loligo* accounted for 45.5 % of the total value of landings in Freeport in 2000. Twelve boats, or 27.9% of all boats that packed in Freeport, landed butterfish in 2000. Butterfish accounted for 2.8% of the total value of landings in 2000. Very small quantities of mackerel were landed in Freeport.

The smaller draggers of Freeport engage in a mixed trawl fishery, targeting a diversity of species, depending on seasons and regulations. They are day boats for the most part, leaving in the early morning and returning by day's end. One fisherman who owns a 60' dragger said that he fishes for *Loligo* full-time from mid-May into August. He explained that regulations, including highly restrictive trip limits, prevent him from fishing for fluke when he is most capable of catching them. *Loligo* fishing has become a necessity. From January 1 to May 1 they can catch a limit of 500 lbs of fluke, but this is when the fish are offshore. The limit gets cut down precisely when the fish come inshore which prevents him from profiting because he has a smaller, inshore boat. This forces him to concentrate on *Loligo*.

Fishing Community/Relations

According to interviews conducted in 1999 the relationship between fishermen and the local community are strained (McCay and Cieri 2000). One informant explained that the town of Freeport was opposed to the idea of having a cooperative commercial fishing dock despite lobbying efforts on the part of local fishermen. He thinks they are developing the area for tourists and pleasure boaters, squeezing the commercial fishermen off the docks. According to him, the town views the fishing operations as an eyesore and an impediment to the development and revitalization of the waterfront. He thinks that the commercial fishermen are being pushed out. In June of 1999, major upgrades were being made to the road that ran directly in front of the commercial operations. According to the informant, the new sidewalk took away their parking. The relationship between the fishing industry and the town of Point Lookout is reportedly much less problematic. According to one informant, relationships with the community have been good and there has been no pressure to force them off the docks to this point. He added that he "pounds the people with pro-commercial fishing propaganda" (McCay and Cieri 2000).

Brooklyn, NY

Commercial fish landings in New York City's boroughs have declined markedly over the years. Landings for Brooklyn amounted to less than 30,000 pounds in 1998, mainly from otter-trawling and sink gillnets. The principal species, out of 17 landed, were butterfish, bluefish, weakfish, and *Loligo* squid. Sport fishing at Sheepshead Bay and other sites has become more important than commercial fishing in recent years. Table (NY) presents 1990 and 2000 census data for Brooklyn.

Loligo accounted for 28.5% of the total value of landings in Brooklyn in 2000. Fifty percent of the boats that landed catch in Brooklyn landed *Loligo*. There is a major *Loligo* processing plant in Brooklyn. This facility employs 50 full-time employees, including 40 processing personnel, and 10 secretarial and managing personnel. The number of processing personnel increases by 15 to 20 workers in the winter when more *Loligo* is being caught. Fifty percent of the company's processing personnel are Hispanic and 20% are female. For the most part, the employees are long standing Brooklyn residents who grew up in the area. According to one of the operation's managers, it is difficult to find employees, but they have a stable workforce with very little turnover. Nearly 100% of the business is based on the processing of *Loligo*. The *Loligo* is trucked in fresh from Cape May, Montauk, and Shinnecock. It is cleaned and packaged into 2.5-pound boxes that are made ready for sale. The product is shipped all over the U.S. but Long Island is the biggest market. The company buys *Loligo* from 10 to 15 boats on a consistent basis. He has been buying from the same boats for 10-12 years and although there has been some flux, the same boats have been fishing for squid through the years. According to the informant, the business is extremely important to the local Brooklyn area. The company makes a point of dealing with local businesses for supplies, trucking, and storage.

New Jersey's Fishing Ports and Communities

New Jersey is the most densely populated and one of the most industrialized and urbanized states in the nation. Although small in area, it also has a long coastline, about 100 miles, as well as two major tidal

rivers, the Hudson and Delaware, and numerous estuaries inside its barrier islands and embayments. Much like New York, Connecticut, Rhode Island, and Massachusetts, its fisheries are found in both urban and rural settings and are often embedded in communities with very different orientations, whether industrial or tourist.

The major ports in New Jersey for the Squid, Atlantic Mackerel, and butterfish fisheries are Elizabeth, Point Pleasant, and Cape May (Table 1). Cape May ranked 3rd overall for fisheries value and 3rd for SMB in the northeast in 2000. It ranked 7th for dependence on these species. Point Pleasant ranked 4th in 2000 in terms of fisheries value; it ranked 8th for the value of SMB, and 11th in dependence on SMB fisheries that year. Elizabeth is an old industrial port city; its commercial fishing activities area very small, the catches going to a processing plant in the city of Newark, NJ. However, the value of Elizabeth s SMB fisheries ranks 12th, and it holds the top spot in the northeast for dependence on these fisheries (Table 1). The port of Belford also has high landings of these species, and the recreational fisheries of Atlantic Highlands, Brielle, Cape May, and other ports are at times highly involved in the Atlantic mackerel fisheries, but these are not discussed below (see McCay and Cieri 2000 for more information).

Union and Essex Counties, NJ

A major Squid, Atlantic Mackerel, and butterfish processing facility is located in the city of Newark, NJ, Essex County, and some of the raw materials processed there are landed in the nearby port town of Elizabeth, NJ, Union County. Although the quantities landed in Elizabeth are small relative to landings at other ports, the processing facility is an important part of the industry and heavily dependent on the species covered by this FMP.

Union County, the site of the port of Elizabeth, is small in area, densely populated, highly urbanized and bounded on the east by the Newark Bay and Arthur Kill. Essex County is just to its north, dominated by the large city of Newark, the container port of Newark Bay, and Newark International Airport. Both are urban areas with high proportions of minority populations and large pockets of unemployment and poverty (Table NJ-1). In 2000 over 35% identified themselves as other than “white” in Union County, and over 63% in Essex County. Fisheries are extremely minor in terms of employment: in 1990 0.2% were in the occupational category of agriculture, fisheries, and forestry. However, unemployment is very high, especially in Newark, making the provision of any jobs there very important.

Elizabeth, NJ

The city of Elizabeth is located along New Jersey’s northern waterfront, on Arthur Kill between New Jersey and Staten Island, New York. Elizabeth is one of New Jersey s oldest cities. It has gone through a long period of urban decline, recently checked by the creation of regional shopping centers on its periphery. In 2000 the population was 120,568, a 9.6% increase since 1990. In 2000 fifty percent of the population were Hispanic, 20% black (Table NJ-1). Twenty-five percent of the houses were vacant, and 19% of the family households were headed by females. The people of Elizabeth match the county's percentages for high school graduates. However, the percentage of people with bachelor’s degrees, 7.5%, is less than the

county level.

Newark, NJ

The city of Newark had a population of 273, 546 in 2000, a slight decline from 1990 (Table NJ-1). The white population was only 26.5% of the total. Fifty-five percent identified wholly or in part as black or African-American, and over 29% indicated Hispanic or Latino. The median age was 30.8, and 29% of the households were female-headed. In 1997 26% were living in poverty (compared with 16% in Elizabeth and 9.3% for the state as a whole).

Fishing Infrastructure

Although the fishery of Elizabeth is very small relative to that of other ports, it is particularly dependent on Loligo and Illex squid. *Loligo* accounted for 70% and *Illex* 21% of the value of total landings in Elizabeth in 2000. The squid and fishes offloaded in Elizabeth are processed at a plant in the city of Newark, NJ.

The owner of the Newark plant and one vessel that offloads in Elizabeth indicated that about 98% of his company's business comes from squid, primarily *Loligo*. He was the first one to start processing Loligo squid in this region, in 1977. In addition to the catch of his own vessel, he buys squid from 12 to15 docks in Rhode Island, Long Island, New Jersey and Virginia. The plant employs 8 skilled, 7 semi-skilled, and 105 unskilled workers who clean and pack mostly squid. The semi-skilled team captains and the unskilled line workers are almost entirely women, foreign-born, and speakers of Spanish or Portuguese, who are paid on a wage basis.

Ocean County, NJ

Ocean County is a long, large county the coast of which is dominated by seasonal tourism and commuter and retirement housing, shopping, and services. The commercial and recreational fisheries of Ocean County have very long histories of being ensconced in complex communities. A century ago, the barrier beach communities of Ocean and neighboring Monmouth County were referred to as the Riviera of the Atlantic because of the early development of elegant hotels and homes along the beaches, which the fishing communities supplied. Today Ocean County is more often called The St. Petersburg of the Northeast (Sokolic, 2001), referring to the fact that it has the largest retirement communities in the State. Several important fishing centers are found in Ocean County, particularly Point Pleasant, at the Monmouth County boundary, Barnegat Light, on one of the long barrier islands, and small bayman places such as Forked River and Cedar Creek. Sport fishing is done from every coastal community, especially those surrounding Barnegat Bay and Toms River. Major charter and party boat fleets are concentrated in Point Pleasant and Barnegat Light, where there is ready access to deep-draft inlets to the sea.

The total population in Ocean County was 510,916 in 2000 (Table NJ-2). This was an 8.6 percent increase from 1990. Ocean County has grown rapidly from coastal tourism, retirement community development, and general suburban expansion within the NY-NJ Metropolitan Area. In 1990, only

20.4% of the population was rural, and less than 1% lived on a farm. The population is ethnically diverse: In 2000, the white population was only 65.9% of the total. Twenty two percent were 65 years of age or older, and the median age was 41 years, making it second in New Jersey only to Cape May County, where the median age was 42.3 years.

In 1999, Ocean County had a per capita personal income of $27,694. Based on a 1997 model based estimate, 7.8% of the population was classified as living in poverty, compared with 9.3% for the State as a whole. In 2000, 3.9% of the population was unemployed. In 1990, of the employed persons 16 years of age and older, 1.5% were in the agriculture, forestry, and fishery industries sector.

Point Pleasant, NJ

Point Pleasant comprises the municipality of Point Pleasant Beach and Point Pleasant borough, located at the mouth of the Manasquan Inlet, where Ocean County borders on Monmouth County. The town's economy is geared toward the summer tourist and recreational business, as shown by the fact that according to the 2000 census, 26.6% of the vacant housing units in Point Pleasant Beach were used for seasonal, recreational, or occasional use (the figure for Point Pleasant borough, the more residential part of the town, was 6.4%).

The fisheries are concentrated in an area known as Channel Drive in Point Pleasant Beach, a sandy strip on which are found restaurants, a fisherman's supply store, small marinas, charter and party boat docks, and two large commercial fishing docks as well as several smaller ones. Although tourism is the major business, the town recognizes and builds on its commercial and recreational fisheries. For example, the web-site www.pointpleasant.com features a photograph of a memorial to fishermen who lost their lives at sea, as well as advertisements for local party boats.

According to the 2000 Census for Point Pleasant Beach, the population was 5,314, a small (3.95%) increase from 1990 (Table NJ-2). Point Pleasant borough was much larger in 2000 with 19,306 persons, a 6.21% increase from 1990. There are very few minority residents. In 2000, 95.9% and 97.8% of the population in Point Pleasant Beach and Point Pleasant borough were white, respectively. Mirroring the county as a whole, the median ages are high: 39.4 years for the borough, and 42.6 years for the beach.

Per capita incomes for 1999 were considerably lower in Point Pleasant than in the county as a whole (about $28,000 for the county, $19,000 for the borough and $16,500 for the beach) (Table NJ-2). In 1990, 1.45% and 3.0% of the persons 16 years of age or older were in the agriculture, forestry, and fisheries industries sector in Point Pleasant Borough and Point Pleasant Beach, respectively, an indicator of the importance of fishing. However, interviews conducted in 2002 indicate that most of the fishermen do not live in Point Pleasant Beach or Point Pleasant Borough but rather are spread among many other towns of coastal New Jersey.

Fisheries Infrastructure

Point Pleasant is primarily an ocean fishing port, with a long history involving ocean pound-nets and otter trawl and gillnet fisheries, as well as sportfishing, focusing on the nearshore wrecks and the

offshore canyons of the New York Bight. In terms of landings, the commercial fisheries of Point Pleasant rank third in New Jersey to those of the Cape May-Wildwood area and Atlantic City.

Like so many ports of the Mid-Atlantic region, the port of Point Pleasant Beach is inlet-dependent. Ocean-going fishers must pass through the often dangerous Manasquan Inlet, a challenge shared with the recreational fishing community including the party and charter boat businesses of Point Pleasant and neighboring Brielle, in Monmouth County. This is a highly developed coastal region. Currently, there is a wholesale finfish packing dock and seafood retail store at Point Pleasant run by a fishermen's cooperative. Another dock is primarily used for offloading surfclams and ocean quahogs although finfish may be handled there as well. A dock once used for pelagic tunas and swordfish is now being used by a lobster boat.

As elsewhere in the Mid-Atlantic, the fisheries of Point Pleasant Beach are very diverse. Two stand out in terms of volume and value: otter trawls and gillnetting, the latter particularly important for spiny dogfish as well as bluefish, weakfish, and other species. However, sea scallop dredging has been very important, as are surfclamming/ocean quahogging and offshore lobstering. According to the 1998 landings (McCay and Cieri, 2000), the most valuable species was angler or monkfish, which was partly incident to the scallop fishery but also caught by specialized gill-netters both local and migrating from other ports in the northeast and mid-Atlantic. Sea scallops were next in terms of ex-vessel value , followed by *Loligo* squid, a major focus of the local dragger fishery in the last decade. Also important were summer flounder, also a traditional fishery of the area but sharply cut back by regulations; lobster; spiny dogfish (like monkfish, caught by gill-netters as well as other fishers), and silver hake, or whiting. Whiting was one of the mainstays of this port from the 1970s through the 1980s but its availability and abundance have since declined. In terms of pounds landed, menhaden (purse-seined) and surfclams and ocean quahogs were the leading species in 1998, having come to replace the traditional otter trawl finfish fishery in importance over the past decade. The total landings value for 1998 was over 16 million dollars, indicating the high value of the fisheries to the local economy and community.

Two of the fishing properties in Point Pleasant are owned by a Cape May seafood business. Each of these docks had been used for finfish until about 10 years ago. They are now used for offloading and trucking surfclams and ocean quahogs. From 6 to 10 boats, most homeported in Atlantic City or Cape May, land clams and quahogs here. There are 15 crew at the docks and up to about 50 on the boats, many of whom commute from South Jersey or even other states to the south. In 2000 a small hand-shucking plant for surfclams began business and continues in 2002 at a site that had been a surfclam processing facility in the 1960s and early 1970s.

A fishermen's dock and marketing cooperative owns two other waterfront properties, one for storing and working on gear and some dockage, the other including the coop's offices, gear storage, ice-making, packing house, and a retail market with a small restaurant (which serves both local fishermen and tourists alike). The cooperative mostly depends on its sixteen or so members, who have switched from older, wooden-hulled vessels to larger steel-hulled boats. They are outfitted for bottom otter trawling in a mixed-species, diversified fishery. The vessels usually have a two or three man crew, including the captain, who are paid shares of the profits. They are all hired locally. Although there are families with several generations in the fisheries, in recent years crewmembers are not often related to the captain or

owner. Members of the cooperative are typically first-, second-, or third-generation immigrants from Northern and Mediterranean Europe and other places. A few women have crewed on these boats. The boats are all owner-operated. They tend to fish in areas of Hudson Canyon and "the Mudhole," an area between the Hudson Canyon and the mouth of the Hudson River.

Most of the draggermen at the cooperative consider themselves *Loligo* squid and whiting specialists, but different species are targeted at different times, depending on the conditions of the ocean, the market, and the preferences of the captain. Squid landings began to overtake silver hake landings in this fleet in 1992 and by the latter 1990s accounted for over 50% of the landed value of Point Pleasant trawlers. At first *Loligo* was a by-catch while silver hake fishing in the Gully. Then it was targeted by most of the captains. As one captain stated, "You can't help but target squid sometimes, there is so much out there." Squid is sold to processors in Cape May, Newark, and elsewhere in the region. The cooperative is at a disadvantage in marketing squid because members lack freezer boats or refrigerated sea water boats, and thus do not receive the same price that boats so equipped receive.

Declining catches and restricted fisheries, especially the scup GRAs [gear restricted areas] during the winter along the continental shelf, have hurt this fishing community severely. It is estimated that the GRAs have reduced the landings by 30 to 35% for the local cooperative (mostly for *Loligo* squid). Some boats have left the fishery or are for sale. Existing operations have difficulty investing in major improvements, either to the waterfront properties or to the vessels. However, even in the face of these difficulties, members of the cooperative banded together in order to raise enough money to make the required dock repairs, approximately one million dollars. It is this investment that the fishermen feel is necessary in order to compete and have an appropriate facility. Their fear is that with increased restrictions on what, where and when they can fish their profit margin will be so small that it will be impossible to meet the financial obligations.

Point Pleasant Beach also has a sizeable charter/party boat fleet which, like the neighboring one of Brielle, is well known for diverse fishing opportunities, including overnight and two-day offshore canyon trips and nearshore, bottom-fishing and wreck fishing. The Channel Drive area also hosts a recreational marina, a fisherman's supply company, and popular seafood restaurants. Nearby is a popular amusement park and beach and a U.S. Coast Guard station.

Squid, Atlantic Mackerel, Butterfish Fishery

In Point Pleasant, *Loligo* squid are more important than *Illex*, butterfish, or Atlantic mackerel. All but one of the members of the cooperative fish for *Loligo* during the winter months. According to the manager, *Loligo* squid makes up about 25% of the annual catch (value) for the draggers. However, while out targeting squid it is common to find large schools of butterfish and occasional Atlantic mackerel, especially in the areas around the head of the Hudson Canyon and the Hudson Canyon itself.

Point Pleasant's fisheries have declined. In 2001, 81 boats landed in Point Pleasant, down from 123 in 2000 and 142 in 1997, and the total value of fish landed declined by 63% from 2000. In 2001, *Loligo* represented only 3.4% of the total value landed in Point Pleasant (which was dominated by surfclam and ocean quahog landings). In contrast, Loligo landings represented 9% of the total value of landings in

1994. In 2000 and 2001, Illex, butterfish, and mackerel contributed very little to the total value in Point Pleasant, even though they are recognized as important, especially to the recreational fisheries.

SMB and the Recreational Fisheries

Recreational fishermen use Atlantic mackerel in three ways: food, fun, and bait. As a food first generation Italians and other Mediterranean people enjoy it smoked, Asians eat it fresh (not smoked) and Polish people are said to can it. As a fun species, party boat captains report that it is a fun fish to catch because of the fight it puts up. As a bait, it is said to be a good all around bait, but especially good for sharks and marlin.

Atlantic mackerel is an important target for the party boat fishery in Point Pleasant (and elsewhere in the region). For many of the party boat fishermen and some of the charter boat fishermen Atlantic mackerel is a " fill in" or a "get you through" fish because it appears at times when other sport fish are usually not available. Normally there are two discrete seasons, winter and spring, as Atlantic mackerel migrate up and down the coast, and these seasons tend to last from two to three weeks. The winter season is between late November and the beginning of January and the spring season is between mid-March and May. However, the winter and spring of 2002 saw Atlantic mackerel throughout the entire time period. Fishermen interviewed suggested that this was due to the warm air and sea temperatures. For some recreational fishermen, Atlantic mackerel makes up 12 to 15% of their annual trips, a high contribution if not as important as bluefish, fluke or sea bass.

Recreational fishermen do not target squid, but there is little doubt about the importance of squid as bait, especially for the party boats going after fluke and sea bass. Most bait and tackle shops sell squid as a universal bait. Any reduction in the availability of squid for bait would diminish access to high quality bait for party, charter, and private boats, as well as shore and pier anglers.

Butterfish is not targeted by the recreational fishermen, but again there is little doubt to its importance in the recreational fishing industry as a high quality bait. It is considered to be such a good bait because once frozen and then used it holds its firmness and makes a good presentation in the water. Party boat captains say that butterfish is tremendously important for tuna fishing as well as bluefish. Considering the importance of both tuna and bluefish to the recreational fisheries of Point Pleasant and the larger region, a reduction in availability of butterfish would create a similar problem to that of squid. Charter and party boat captains are afraid that if they can no longer obtain such high quality bait, they will lose customers who otherwise are willing to pay large sums of money to run offshore to fish for tuna: why pay a large sum only to be "skunked" for want of high quality butterfish?

Fishing Community/Relations

The fishing community of Point Pleasant has received support of various kinds, including zoning for water-dependent uses which helps moderate the pace of gentrification of the waterfront. Although few fishermen live close to the docks, they use local supermarkets, convenience stores, and bars.

The fishing community of Point Pleasant was hard struck by the January 1999 tragedies in the surfclam and ocean quahog fishery. The Adriatic, the Beth Dee Bob, and the Ellie B, all working out of Point Pleasant, went down during storms that month, as well as another vessel, the Cape Fear, formerly based in New Jersey, up in Buzzards Bay, Massachusetts. Ten lives were lost. In the aftermath, members of the fishing community, led by the dock managers at the surfclam/ocean quahog dock, began the work of designing and funding a fishermen's memorial with support from the larger community. It was built by a local sculptor and set in a small park alongside the Manasquan inlet. The wall around it has the names of fishermen of this part of the coast who lost their lives at sea as well as the ship's bell of one of the vessels lost in January 1999. It is telling of the nature of Mid-Atlantic fisheries that both recreational and commercial fishermen are remembered on the memorial.

Cape May County, NJ

Cape May County, and the municipalities of Cape May and Lower Township, are major centers of the Squid, Atlantic Mackerel, and butterfish fisheries. Cape May County encompasses a large peninsula at the southern end of New Jersey, bounded by the Atlantic Ocean at one side and the Delaware Bay at the other. Its beaches have long been the focus of summer tourism, principally from the Philadelphia region, and in recent years the once rural county has also become the site of commuter and vacation home housing developments. However, both commercial and recreational fishing remain critical mainstays of the year-round economy of places like Cape May and Wildwood within the county.

In 2000 the population was 102,326, a 7.6% percent increase from 1990 (Table NJ-2). The minority population is very small, less than 8%. In 2000, the median age for Cape May County of 42.3 years was the oldest of any New Jersey county, bespeaking its increasing popularity as a retirement center. In 1999, Cape May County had a per capita income of $29,455. Based on a 1997 model based estimate, 11% of the population was classified as living in poverty. Unemployment tends to be higher in Cape May County than in most other parts of the state. In 2000, 8.6% of the civilian labor force was unemployed. Of the individuals in the labor force in 1990, 7.5% of the civilian labor force was unemployed . In 2000, 2.1% of the population were in the agriculture, forestry, and fisheries industries sector, an indicator of the importance of fishing (but also farming) in this area.

Cape May and Lower Township, NJ

The area popularly thought of as Cape May, at the very tip of the peninsula, is a popular tourist destination, famous for its Victorian architecture and the high quality of its “bed-and-breakfast” inns and restaurants. It is treated in the census separately from the area where much of the fishing activity takes place, Lower Township, which is more diversified. However, both are part of the effective community of the fisheries. Cape May’s 2000 population was 4,034, actually a 14% decline from 1990, and that of Lower Township was 22,945, a 10% increase from 1990 (Table NJ-2). Both are predominantly “white” in race/ethnicity. The median age for Lower Township, of 42 years, is identical to that of the larger county, which is known to be a haven for retirees from the Pennsylvania/New Jersey region. Per capita incomes are lower and poverty levels higher in Lower Township than in Cape May (Table NJ-2). In 1990, 1.6% of the population of Cape May 16 years of age or older, and 3% of the equivalent population in Lower Township, was in the agriculture, forestry, and fisheries industries sector.

Fisheries Infrastructure

Commercial and recreational fishing docks are found in Cape May but the majority are clustered in Lower Township along Ocean Drive, a road that leaves the main highway and crosses the marshes toward Wildwood. Another major dock is found at Schellenger's Landing, just over a large bridge that connects the mainland with the center of Cape May and its beaches.

Cape May is one of the largest commercial ports on the Atlantic seaboard. When combined with neighboring Wildwood (the fishing port is often referred to as "Cape May/Wildwood"), its 1998 landings exceeded 93 million lbs., worth over $29 million. Finfishing, squid fishing, and scalloping have been very important. It is a highly diversified port (McCay and Cieri 2000).

In 1998 otter-trawl equipped draggers accounted for 69% of Cape May's landings and 70% of its value. As elsewhere in the Mid-Atlantic region, they are highly diversified, and some in Cape May are also used for scalloping. Cape May has a long history of combined or alternating fin-fishing and scalloping. Squid is very important: In 1998 17% of Cape May's landed value came from Illex squid and another 22% from Loligo squid (McCay and Cieri 2000). Much of the squid is processed locally as is Atlantic mackerel, caught with draggers and midwater pair trawls. Summer flounder has been a major species but regulations have severely reduced catches. Scup is another dragger-caught species of historic importance in Cape May. Cape May is also the home of one of the very few vessels allowed to use purse seines for bluefin tuna in U.S. waters; this vessel lands its catch in Gloucester, MA. The only purse seine landings in Cape May in 1998 were for menhaden, using smaller vessels. Fishing for large pelagics is also done with longlines and troll lines (McCay and Cierri 2000).

A city planner interviewed in 1999 estimated that 500 people work in the fishing, processing, fresh fish market and restaurant enterprises of Lower Township and Cape May (McCay and Cieri 2000). However, “gentrification” has taken hold in Cape May as in many other coastal communities of the northeast and the mid-Atlantic. Despite being the most important commercial fishing port in New Jersey, commercial fishing businesses and uses of the waterfront are considered by planners and business people as lower priority than recreational and resort-oriented uses. Private recreational boating and fishing marinas are said to be a powerful political force in the township. Cape May has a substantial recreational fishery, both for-hire and private boat. Whale watching and dinner cruises have emerged as a profitable alternative or adjunct to recreational fishing charters (McCay et al 2002).

Schellenger s Landing is the most visible center of fishing in the Cape May area. Although most obviously a large restaurant and fish market, it is zoned “marine general business” with allowance for expansion of the marine industrial character. There is also a marine railway nearby.. Other marine-related businesses in and around the landing include two recreational marinas, two marine suppliers, two bait and tackle shops, a whale research center, and a "marlin and tuna club." Also there are a pizza shop, a motel, a bar, a wildlife art gallery, an antique store, two restaurants, and a gasoline station. Some cater to people in the fishing industry and some do not. Further expansion of the fishing industry, commercial or recreational, is limited by the high cost of land near the waterfront (McCay et al 2002).

Lower Township has three "marine development" zones located along Ocean Drive, towards Wildwood, at Two Mile Landing and at Shaw Island and Cresse Island adjacent to Wildwood Crest. Recreational boats currently use these areas. Across from Shaw Island is a new development, where 325 new slips are being built. A complex on a saltwater creek includes a marina, bait and tackle, marine supply, and charter boats. The marina itself is small, about 28 slips. Access to this particular area is now difficult for large vessels because of silting due to a canal built between Cape May and the mainland (McCay et al 2002).

Ocean Drive is the location of several important commercial fishing businesses. One commercial fishing business in the Ocean Drive area owns a surf clam/ocean quahog vessel (currently at Point Pleasant) as well as a freezer trawler and seven “wet” boats and 2 refrigerated seawater (RSW) vessels. According to its owner, at this facility there are 15 shore employees, approximately 20 seasonal packers, and about 45 crew on the boats.(McCay et al 2002).

There are two other large commercial fishery companies on Ocean Drive, both of which are largely involved with finfish. One has a long history as a processor, wholesaler, and exporter. In 1999 14 vessels landed their catch here full-time, including a couple of freezer trawlers. Crew sizes are 3-5 men, and 8-9 for the freezer trawlers. There were 75 to 80 shoreside employees. In 1999 about 40% were Hispanic, 40% white, and 20% African-American, Asian, and other. They lived in the Cape May and Cumberland County region; many of the Hispanics came from the agricultural town of Bridgeton (McCay and Cieri 2000). The second large firm has a retail store as well as packinghouse and processing facility. There were 15 boats in 1999. About 20 people worked on the dock and in the retail store, and in 1999 at the time of a visit to the facility, about 35-40 people were processing squid. Five or so were Black-Americans. The rest were identified as Vietnamese, who came daily to work from Philadelphia through a labor contractor. Since then this firm has filed for Chapter 11 bankruptcy (McCay et al 2002).

Squid, Atlantic Mackerel, and Butterfish

Squid, Atlantic mackerel, and butterfish are important products for the first commercial packing and processing facility mentioned above, which is the only year-round industry in Cape May. Their primary business is with these “underutilized” species, and they handle large volumes. Decline in stocks of groundfish, whiting and summer flounder over the years has increased the importance of squid and mackerel to this business. The plant workers are primarily Hispanic and live in nearby Wildwood as well as the inland towns of Bridgeton and Vineland, and the office staff live within 20 mile radius of the facility. Many of the plant workers come through a labor contractor; the others are long-standing employees. The only competition for workers is from the tourist industry during the summer. He stated that seafood is the number two employer in Cape May. He derives all of his business from Loligo, Illex, mackerel and butterfish with Loligo and Illex comprising about 50% of his business. The only species that is important is Atlantic herring and is not part of this plan. He handles both fresh and frozen product from fishing boats and processes squid. About 90% of his product comes from the port of Cape May. A total of 15 boats land fish at his facility and the boats have been selling to his facility for generations.

In 2000, 51 boats landed Loligo in Cape May, which was 36.2% of all the boats that landed catch in Cape may in that year. Loligo accounted for 6.1% of the value of total landings in Cape May in 2000. However, Cape May lands scallops that are a high value product. Loligo is an important fishery during the winter months for Cape May draggers. As a result of the GRAs particularly the southern GRA (January-March 15 closure), fishermen and processor reported losing from 10-30% of their income. Fishermen were forced to fish for less valuable species such as scup or spend more time searching and steaming for Loligo in non-traditional grounds.

Ten boats landed Illex in Cape May during the 2000 fishing season and these were 7% of all the boats that landed catch in Cape May. According to the fishermen, 2000 was not a good fishing season for Illex. The Illex remained further east and were unavailable for capture in their gear. As a result, fewer boats participated in the 2000 fishery. Illex is primarily a June through September fishery for Cape May vessels. In Cape May in 2000, 15 boats landed mackerel out of 141 boats. Mackerel are not a high value product, but this fish did account for 7% of the value of total landings in Cape May in 2000. Fishermen stated that only larger vessels with the capacity to land high volume of mackerel participate in the fishery because they are only the boats who can make money on this species.

Fishing Community/Relations

Although Cape May portrays itself as a Victorian seaside resort with "gingerbread" homes and inns, it also includes emblems of the fisheries. A pamphlet "This Week in Cape May" lists a 45-minute Fisherman's Wharf Tour that is scheduled to occur four times in May and June at the above-mentioned dock and fish packing plant. The tours are sponsored by the Mid-Atlantic Center for the Arts. There is a bronze plaque for fishermen lost at sea in a central pedestrian mall. A fisherman's memorial at the end of Missouri Avene portrays a woman and a child looking out to sea. A fishermen's wives organization, now defunct, played a major role in creating this memorial. The inscription says,

Dedicated to the fishermen lost at sea - 1988
He hushed the storm to a gentle breeze,
And the billows of the sea were stilled .

Many of the captains of fishing vessels in Cape May indicated that they are from multigenerational fishing families. However, a few are first generation fishermen. Most of the captains as well as the crew live in Cape May County and many grew up in communities in or around Cape May.

A Seafood Festival in Cape May had been moribund for a while until it was taken over by the Chamber of Commerce in the mid-1990s. When asked whether the commercial fishers in the area had been involved in organizing or supporting the seafood festival, a representative of the Chamber of Commerce said that there is a "non-existent relationship between us and them. We tried, they tried, but it never worked out" (McCay and Cieri 2000).

One of the seafood companies has been very successful in marrying seaside tourism and the commercial fisheries (the Lobster Dock at Schellenger's Landing), but the other companies tend to keep their

businesses separate from the larger community. As one of the managers said in an interview in the spring of 2002, “It’s not like New England; people do not think of this as a fishing community even though fishing provides a lot of the jobs.”

Hampton, Virginia

“Hampton Roads” is the fishing region at the mouth of the Chesapeake Bay which sees most of the EEZ fishing activity in Virginia. It is largely within the Metropolitan Statistical Area of Norfolk-Virginia Beach-Newport News. The "Hampton Roads" ports have close connections with Wanchese, North Carolina. They are within a major tourist region, anchored by Chincoteague, Williamsburg, and Virginia Beach. The military is also a large presence, as are numerous heavy and high tech industries. Chincoteague is also one of several ports where local seafood businesses depend on migratory fishing vessels from other regions, such as North Carolina or Massachusetts, for landings. The port of Hampton is the focus of this report; closely associated with Wanchese, in North Carolina, it has a recent history of high engagement in the squid fisheries, including Illex, even though since 1998 these have been very minor due to shifts in the availability of the squid populations.

Hampton generally has a poor minority population, and fisheries are a very small part of the total employment mix (Table VA-NC). In 1990, less than 1% of the employed persons 16 years of age and older were in the agriculture, forestry, and fishery industries sector. The total population was 146,437 in 2000, a 9.5% increase from 1990. In 2000, the white population was 49.5% of the total, while Blacks and Hispanics made up much of the rest of the population. According to the 2000 census, the median age in Hampton is very young, 34 years. In 1999, Hampton had a per capita personal income of $22,250. Based on a 1997 model based estimate, 14.6% of the population were classified as living in poverty.

Hampton, like Newport News and nearby Seaford, is an important sea scalloping port. However, species diversity of the fisheries is extremely high. In 1998 there were 79 species landed, for all gear types, in Hampton and Seaford, combined (weighout data for these two ports were combined to preserve business confidentiality). Fourteen had either poundage or value at or above 2% in 1998, led by sea scallops, summer flounder, *Illex* squid, Atlantic croaker, blue crab, and angler (McCay and Cieri 2000). The value of the landings in 1998 was approximately 13 million dollars, showing that despite little appearance of fisheries in census data, the fisheries are high contributors to the local economy. The species of this FMP are particularly important to the otter trawl fleet of Hampton. In 1998 the otter trawl fleet of Hampton took Illex and Loligo squid, black sea bass; Atlantic mackerel; Atlantic croaker, and angler. Some draggers were also used for scallops, although most scallops were caught with dredges. A small amount of pelagic longlining was also done from Hampton, for sharks and tuna. Gill-netting, crab potting, and bay clamming were also important activities.

The fisheries have declined. In 1993 there were 192 boats landing one or more of the species of this FMP in Hampton, according to weighout data, but in 2001 only 43 boats landed there. The total value of all landings in Hampton in 2001 was about $8.8 million, down from $13 million in 1998. Both *Loligo* and *Illex* squid landings have declined to less than 1% of the total value of landings in Hampton. *Illex*

have not been available to this fleet since the end of 1997, according to leading fishermen in the area. In 1997, mackerel landings accounted for 1.3% of the total value of landings in Hampton, but in 2001, mackerel and butterfish landings were negligible.

Dare County and Wanchese, North Carolina[2]

Squid, Atlantic mackerel, and butterfish are currently not very important to the fisheries of North Carolina, except as bait for other fisheries. In this report, Dare County and Wanchese are the foci. Wanchese-based fishermen often use Hampton, VA, and more northern ports.

Wanchese is the site of the primary landing facilities for the ocean-going trawlers of North Carolina. In the early 1990s 30 to 40 vessels offloaded at 6 fish houses in Wanchese (North Carolina Division of Marine Fisheries 1993: 4). Beaufort-Morehead City was the 2nd largest port, with 5-6 fish houses serving 10 to15 full-time trawlers. At that time there were 26 to 32 other otter-trawl draggers fishing out of both Oregon and Ocracoke Inlets and packing out of ports of Lowland, Vandemere, Bayboro, Englehard, Pamlico Beach and Oriental.

Dare County, NC

In 2000 the population of Dare County was 29,967, a 32% increase from its 1990 level. It is almost entirely rural. About 95% of the population was white, 2,7% were Black/African American, and 2.2% identified as Hispanic or Latino (Table VA-NC). The median age of the county's population was 40.4 years. In 2000, 74.5% of all housing units were owned and 52.4% were vacant. Of the vacant housing units, 50.1% were for seasonal, recreational or occasional use, reflecting the importance of tourism in the rapid development of North Carolina's Outer Banks.

In 1990, 5.35% of the civilian labor force were employed in agriculture, forestry, and fisheries, a very high percentage for the northeast and mid-Atlantic regions. There were 30 white male vessel captains or officers, as well as 391 male and 49 female fishers, living in Dare County, according to the Census Bureau. According to Diaby (1999: 35), the fishing incomes of Dare County in 1997 ($29,296) were considerably higher than all wages combined ($17,989), bespeaking the importance of fishing.

Profile of Dare County Fisheries

Dare County saw over 36.6 million pounds and 23.5 million dollars from fish and shellfish (and turtle) landings in 1998. Fishing centers include Wanchese, Hatteras, and Mann's Harbor. Fluke (15%) was second to crabs (40%) in terms of value, but a much wider range of products were significant than in other North Carolina counties because of the importance of ocean as well as estuarine fisheries. These included bluefish, dogfish, squid, weakfish, anglerfish, king mackerel, sharks, and tuna. The fisheries

[2]Commercial fisheries data are kept on a county basis rather than port basis by the North Carolina Division of Marine Fisheries, the source of the data used, and that many of the data are confidential, due to there being only one or two dealers involved.

range from estuarine fisheries (crab-pots, pound-nets, turtle pots, fyke nets, etc.) to offshore longlining (McCay and Cieri 2000).

Since 1998, North Carolina s commercial and recreational fishermen have been affected by new fishery regulations (such as for dogfish and monkfish) as well as what is believed by fishermen to be a climatic shift causing a warming of the ocean and changing some of the migratory patterns of certain species. For example, while 1998 was a good year for squid landings, the three years after 1998 have been disappointing: the three years combined are not equal to 1998 (North Carolina Division of Marine Fisheries 2001).

Wanchese, NC

Wanchese is a small village on the Outer Banks that is heavily dependent on the fisheries. It is on the northern part of North Carolina's coast, not far from the Virginia border, and on the southern end of Roanoke Island, which is where English efforts to settle North America began–and failed. In 1990 the village, together with neighboring Nags Head and Roanoke Island, had only 1,374 residents, and in 2000 there were 1,527, an increase of 11% (Table VA-NC). The resident population is almost entirely "white," and the median age is 37.2, lower than that of the county as a whole. The per capita income in 1999 was very low, $10,830, and only 67% of those 25 years of age or older had completed high school. Tourism is much less important here than elsewhere on the Outer Banks: only 7% of the vacant housing units were used for seasonal, recreational, or occasional purposes.

In 1990, 20% of the community's workers were employed in "agriculture, forestry and fishing," the highest of all mid-Atlantic and northeast coastal communities. According to local residents interviewed in the spring of 2002, this level of dependency continues and may have increased. It is rooted in a history of commercial fishing that goes back to the 19th century (Wilson and McCay 1998). Today the village still revolves around fishing but has expanded to include processing plants and boat building (which began in 1992). Though traditionally a commercial fishing community, recent growth in tourism and recreational fishing has sparked competition between the new and the old for a restricted resource. However, residents interviewed in 2002 indicated that at least half, if not more, of the labor force of Wanchese and environs is engaged in fishing and boat building.

One of the major ethnic shifts, as reported by fishermen interviewed in 2002, is the increased numbers of Hispanic people working in the fish houses and plants, some of whom have reportedly settled in the Wanchese area. Hispanics have also come to Wanchese to work in the developing boat building industry, reportedly from the agricultural sector.

In 2001, a total of 116 boats landed in Wanchese. The number of boats landing in Wanchese increased dramatically from 1996-1997, from 45 to 95 boats. The number of boats landing in Wanchese continued to increase until 2000, to 119 boats. In 2001, the total value of all fisheries landed was over $8 million, and *Loligo*, *Illex*, butterfish, and Atlantic mackerel landings represented less than one percent of that value, altogether, in contrast with 1998 when *Illex* itself represented 1.2% of the total value.

Fishing Community/Relations

Fishing related associations include the Oregon Inlet Users Association and the North Carolina Fisheries Association. The former is involved with supporting the plans for jetties at Oregon Inlet; they are responsible for organizing both the Wanchese Seafood Festival and the Blessing of the Fleet. The latter is a trade organization of seafood dealers and commercial fishermen from the state; two members of the 18 member Board of Directors are from Wanchese.