2001 Atlantic Mackerel, *Loligo, Illex*
and Butterfish Specifications

Draft Environmental Assessment
Initial Regulatory Impact Review
Initial Regulatory Flexibility Analysis

EFH Assessment

November 2000

Mid-Atlantic Fishery Management Council
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Executive Summary

Table 1. Quota Recommendations for 2001[1] (mt)

	Loligo	*Illex*
Maximum OY - (Max. Optimum Yield)	26,000	24,000
ABC - (Allowable Biological Catch)	17,000	24,000
OY - (Optimum Yield)	17,000	24,000
DAH - (Domestic Annual Harvest)	17,000	24,000

	Mackerel	Butterfish
ABC - (Allowable Biological Catch)	347,000	7,200
IOY - (Initial Optimum Yield)	88,000	5,900
DAH - (Domestic Annual Harvest)	85,000	5,897
DAP - (Domestic Annual Processing)	50,000	5,897
JVP[2] - (Joint Venture Processing)	20,000	0
TALFF - (Total All. Lev. Foreign Fishing)	3,000	3[3]

Note: DAH for Atlantic mackerel includes 15,000 mt recreational allocation (based on Amendment 5) + 50,000 DAP + 20,000 JVP.

[1] Proposed for 2001. If an MAFMC omnibus framework action regarding quota set-asides is approved and research projects are approved by December 31, 2000, 2% of ABC, IOY, DAH and DAP for 2001 for each species may be set-aside for scientific research.

[2] The specifications for IOY, DAH, and JVP may increased by 10,000 mt each at the discretion of the Regional Administrator without further consultation with the Council.

[3] Bycatch TALFF as specified in current regulations (0.08% of Atlantic mackerel TALFF).

Recommended Special Conditions for Atlantic mackerel specifications are:

1. Joint ventures are allowed south of 37° 30' N. latitude, but the river herring bycatch south of that latitude may not exceed 0.25% of the over the side transfers of Atlantic mackerel.

2. Directed foreign fishing for Atlantic mackerel will be prohibited south of 37° 30' N. latitude. North of 37° 30' N. latitude, directed foreign fishing for Atlantic mackerel will be prohibited landward of a line 20 nautical miles from shore. No bycatch TALFF of river herring specified.

3. The Regional Administrator should do everything within his/her power to reduce impacts on marine mammals in prosecuting the Atlantic mackerel fisheries.

4. The mackerel OY may be increased during the year, but the total should not exceed 347,000 mt.

5. Applications from a particular foreign nation for a mackerel Joint Venture or TALFF allocation in 2001 may be decided based on an evaluation by the Regional Administrator of the nation's performance relative to purchase obligations for previous years.

6. No purchase ratios are specified. Upon approval, 50% of the foreign nations' TALFF allotment to be released. Additional TALFF to be released when foreign participant has purchased 25% of the JVP allotment to that nation.

7. Foreign fishing vessels (FFV) must purchase JVP caught fish from contracted US vessels. If FFV is engaged in directed fishing and is approached by a contracted US vessel, FFV must cease directed fishing and take transfer from US vessel as soon as practicable.

8. No in-season adjustment in TALFF (i.e., TALFF not to exceed 3,000 mt), unless the Regional Administrator, in concurrence with the Council, determines that it is appropriate to increase IOY to provide additional TALFF, but TALFF not to exceed a cap of 5,000 mt.

9. Directed foreign fishing for Atlantic mackerel limited to the use of mid-water trawl gear.

Introduction

The Mid-Atlantic Fishery Management Council (MAFMC) initiated the development of the Atlantic mackerel and *Loligo* and *Illex* squid Fishery Management Plans in March of 1977. Both the mackerel and squid FMP's were adopted by the Council in March 1978 and were subsequently approved by the NMFS in July of 1979. The Atlantic butterfish FMP was submitted to NMFS in December 1978 and a revised version was approved by NMFS in November 1979.

The MAFMC began work to merge the mackerel, squid, and butterfish Plans into a single FMP in 1980. The Atlantic mackerel, *Loligo* and *Illex* squid, and Atlantic butterfish Fishery Management Plan was implemented by emergency interim regulation on 1 April 1983. Since then the FMP has been amended five times. Amendment 1 was prepared to implement the squid optimum yield mechanism, and revised the mackerel mortality rate. Amendment 2 changed the fishing year to the calendar year, revised the squid bycatch TALFF allowances, put the four species on a framework basis, and changed the fishing vessel permit from permanent to annual. Amendment 4 established definitions of overfishing for all four species.

This species complex was heavily exploited by foreign fleets during the 1960's and 1970's. With the advent of passage of the Magnuson Act in 1976 and the subsequent development of the Atlantic mackerel, Squid, and Butterfish FMP and it's amendments described above, the MAFMC has worked towards the sound management of the resource. One of the primary goals of the FMP was to "Americanize" these fisheries by maximizing opportunities for growth and by promoting the development of the U.S. mackerel, squid, and butterfish fisheries. As a result, foreign fisheries for the squids and butterfish have been eliminated.

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; and expanded the management unit to include all Atlantic mackerel, *Loligo*, *Illex*, and butterfish under US jurisdiction. Three measures were disapproved: the proposed cap on ABC at long-term potential yield, the moratorium on entry to the *Illex* fishery, and the *Loligo* mesh exemption for the sea herring fishery. The Council chose to resubmit alternative management measures for the specification of ABC for Atlantic mackerel and qualifying criteria for an *Illex* moratorium permit which were subsequently approved by NOAA. The Council developed Amendment 6 which revised the definitions of overfishing for the squids and butterfish in recognition of the short life span of these species. Amendment 7 was developed to make the Atlantic mackerel, Squid, and Butterfish FMP consistent with other Northeastern FMP's with respect to vessel upgrade and replacement criteria. Amendment 8 was developed to bring the Atlantic mackerel, Squid, and Butterfish FMP into compliance with the Sustainable Fisheries Act. The Council is currently developing Amendment 9 to the FMP. The purpose of this document is to examine the biology, fisheries, and current stock status for this species complex and to specify the quotas and management measures recommended by the Council for 2001 pursuant to the current FMP and Amendments. As noted in the summary table, if an MAFMC omnibus framework action regarding quota set-asides is approved and research projects are approved by December 31, 2000, 2% of ABC, IOY, DAH and DAP for 2001 for each species may be set-aside for scientific research.

Goals and Objectives of Current FMP

The current 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 U.S. 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 the understanding of the conditions of the stocks and fisheries.
6. Minimize harvesting conflicts among US commercial, US recreational and foreign fishermen.

Management Unit

The current management unit is all Atlantic mackerel, *Loligo pealei*, *Illex illecebrosus*, and butterfish under US jurisdiction.

Loligo pealei

Biology and Distribution

Long-finned squid (*Loligo pealei*), also known as the common, bone or winter squid, are distributed in continental shelf and slope waters of the Western Atlantic Ocean from Newfoundland, Canada to the Gulf of Venezuela (Summers, 1983; Dawe et al. 1990). *Loligo* undergo seasonal migrations moving to shallow inshore waters in spring and summer to spawn and feed. In late autumn they move offshore to overwinter along the edge of the continental shelf (Summers, 1969; Serchuk and Rathjen, 1974).

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* indicated a life span of less than one year (Macy 1992). Consequently, the last two stock assessments for *Loligo* were conducted assuming that the species has an annual life-cycle and has the capacity to spawn throughout the year (NMFS 1994a, NMFS 1996), as now appears typical of pelagic squid species studied throughout the world (Jereb *et al.* 1991).

Fishery Description

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 bycatch 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 has 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. Since 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 in 1992.

In 1992 *Loligo* landings totaled 18,172 mt, 99% of which was taken by otter trawls. Nearly half of the 1992 harvest (8,112 mt) was take from statistical area 616, while six statistical areas (616, 537, 613, 622, 612, and 526) accounted for 87% of the total landings. Seasonally, 81% of the 1992 *Loligo* landings occurred in winter and autumn (Jan-Apr and Oct-Dec)(NMFS 1994a). Total US *Loligo* landings were 22,469 mt in 1993 valued at $29.1 million ($0.59/lb; $762/mt). NMFS data for 1994 indicate that US *Loligo* landings were 22,577 mt valued at $31.9 million. Unpublished NMFS weighout data indicate that *Loligo* landings declined to 17,928 mt in 1995 (dockside value declined to $23.0 million) and increased slightly to 18,008 mt (dockside value of $23.1 million) in 1995. NMFS weighout data indicate that 1996 US *Loligo* landings decreased to 12,459 mt (valued at $18.6 million) and then increased to 16,308 mt in 1997 (valued at $26.5 million). The most recent assessment (NMFS 1999) indicated that landings of Loligo were 18,385 mt in 1998 valued at $32.2 million. Unpublished NMFS dealer data indicate that *Loligo* landings were 18,674 mt valued at $32.2 million in 1999.

Status of the Stock Relative to Overfishing Definition and Quota Recommendations for *Loligo*

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 significantly revised. The most significant 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}.

The most recent assessment of the Loligo stock (SAW 29) concluded that the stock was approaching an overfished condition and that overfishing was occurring (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 is greater than F_{max} and stock biomass was among the lowest in the assessment time series (1987-1998). Recent survey indices of recruitment were well below average.

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. The current regulations still specify Max OY as the yield associated F_{max} or 26,000 mt. 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 the most recent assessment demonstrated that the stock could be rebuilt in a relatively short period of time, even at fishing mortality rates approaching F_{msy}. 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 (increase to 15,000 mt by Inseason Action) .

Management advice from SAW 29 made special note of the fact that yield from this fishery should be distributed throughout the fishing year. Given that the current permitted fleet historically demonstrated the ability to land *Loligo* in excess of the quota specified for 2000, the Council recommended that the annual quota be sub-divided into three quota period or trimesters for 2000. The quota was allocated to each period based on the proportion of landings occurring in each trimester from 1994-1998. Based on the seasonal distribution of landings during this time period, the quota for January-April was 5,460 mt (42% of the total), the quota for May-August is 2,340 mt (18% of the total), and the quota for September-December is 5200 mt (40% of the total). The directed fishery during the first two trimester periods was to be closed when 90% of the amount allocated to the period was landed and then a trip limit of 2,500 pounds was to remain in effect until the quota period ended. Any underages from trimesters one and two were to be applied to the next trimester and overages were to be deducted from trimester three. The directed fishery will be

closed in the third trimester when 95% of the annual quota has been taken. The intent of the Council is for the fishery to operate at the 2,500 trip limit level for the remainder of the third quota period.

The most recent survey data for *Loligo* squid indicate that abundance of this species has increased significantly since the most recent assessment was conducted (i.e, SAW-29). Estimates of biomass based on NEFSC fall 1999 and spring 2000 survey indices for *Loligo* indicate that the stock is currently at or near B_{msy}. In fact, 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 will be at or near B_{msy} in 2001, the Council recommended that the 2001 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).
As noted above, the 2000 quota was allocated among three four month trimesters in an attempt to ensure that landings and fishing mortality were distributed throughout the fishing year. During Quota Period I in 2000, the directed fishery was closed on March 25, 2000. During Quota Period II, the directed fishery was closed on July 2, 2000. In addition, the quota for each period was exceeded, causing the dislocation of quota from the Quota Period III. As a result of these premature closures and overages, the Council recommends that the 2001 quota of 17,000 mt be allocated as follows. The annual quota will be allocated to quarterly quota periods based on the quarterly seasonal distribution of landings during the period 1994-1998. Based on this criteria, the 2001 quota allocations among quarters will be as follows: Quarter 1: 5,649.1 mt (33.23%), Quarter 2: 2,993.7 mt, (17.61%),Quarter 3: 2,941 mt (17.3 %),Quarter 4: 5,416.2 mt (31.86 %). In addition, the Council recommends for Quarters 1 through 3, that the directed fishery be closed when 80% of the quarter's allocation has been taken and that vessels be restricted a 2,500 pound trip limit for the remainder of the quarter. In addition, the Council recommends that quarterly overages be deducted as follows: an overage in quarter 1 will be deducted from quarter 3 and an overage in quarter 2 will be deducted from quarter 4. When 95% of the total annual quota has been taken (i.e, 16,150 mt) the trip limit will be reduced to 2,500 pounds and will in remain in effect for the rest of the fishing year.

Other Management Measures for *Loligo*

An additional concern of the Council was the unanticipated practice of vessels making multiple trips in a single day in 2000. This practice occurred during the second trimester when large concentrations of *Loligo* squid were located relatively close to shore. Due to their close proximity to landing facilities, vessels were landing as many as five trips of 2,500 pounds in a single day. This result was that the second trimester quota was exceeded by a considerable amount (by about 40% as of July 15, 2000). To rectify this situation, the Council recommends that additional language be added in the 2001 annual specifications that prohibits vessels from landing more than the trip limit specified during any single day. A day is to be defined as a 24 hour period beginning at 0001 hrs and ending at 2400 hrs on the same calendar date. This specification of a trip limit will apply to *Loligo* as well as the other species managed under this FMP (i.e., *Illex*, butterfish, and Atlantic mackerel).

Table 2. Summary of specifications and landings for *Loligo* (mt).

	1996	1997	1998	1999	2000	2001[1]
Max OY	44,000	36,000[2]	26,000	26,000	26,000	26,000
ABC	30,000	21,000	21,000	21,000	15,000[4]	17,000
IOY	25,000	21,000	21,000	21,000	15,000[4]	17,000
DAH	25,000	21,000	21,000	21,000	15,000[4]	17,000
DAP	25,000	21,000	21,000	21,000	15,000[4]	17,000
JVP	0	0	0	0	0	0
TALFF	0	0	0	0	0	0
Landings (mt)	12,026	16,308	18,385	18,674	15,748[3]	-
Value (millions $)	18.6	26.5	32.2	32.2	-	-

[1] Proposed for 2001. If an MAFMC omnibus framework action regarding quota set-asides is approved and research projects are approved by December 31, 2000, 2% of ABC, IOY, DAH and DAP for 2001 may be set-aside for scientific research.
[2] 26,000 mt when overfishing threshold in Amendment 6 was approved.
[3] Preliminary landings as of November 8, 2000.
[4] Increase from 13,000 mt to 15, 000 mt by Inseason Adjustment.

Illex illecebrosus

Biology and Distribution

The short-finned or summer squid, *Illex illecebrosus*, is a neritic squid of the Northwest Atlantic Ocean whose distribution extends from Newfoundland, Canada to Florida, USA. The species migrates seasonally, moving into shallow waters of New England to Newfoundland and onto the continental shelf of the Mid-Atlantic Bight during summer to feed. In late fall, *Illex* begin to move offshore and south to the edge of the continental shelf to spawn during winter (Dawe *et al.* 1981). The principal spawning area is believed to be south of Cape Hatteras over the Blake Plateau during December and January. During late winter and early spring larvae and juveniles are transported Northward by the Gulf Stream. In late spring, juveniles begin to move onto the shelf into shallow water.

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).

Description of the Fishery

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 bycatches 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 (NMFS 1994a).

Illex landings reached 18,012 mt in 1993 and then rose slightly to a 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). NMFS weighout data indicate that 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. The most recent assessment (NMFS 1999) indicated that landings of *Illex* were 22,705 mt in 1998 valued at $9.2 million. *Illex* landings for the period 1994-1998 averaged 17,142 mt. Unpublished NMFS weighout data indicate that 7,361 mt of *Illex* valued at $3.9 million was landed in 1999.

Status of the Stock and Quota Recommendations for *Illex*

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 significantly revised. The most significant changes were made to National Standard 1, which imposed new requirements concerning definitions of overfishing in fishery management plans. The overfishing definition for *Illex* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Illex* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{MSY} is exceeded. Annual quotas will be specified which correspond to a target fishing mortality rate of 75% of F_{MSY}. 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 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.

Since data limitations did not allow an update of yield estimates at the threshold and target fishing mortality rates, the Council recommends that the specification of MAX OY and ABC be specified at 24,000 mt (yield associated with F_{msy}) in 2001 (same as in 2000). Under this option, the directed fishery for Illex would remain open until 95% of ABC is taken (22,800 mt). When 95% of ABC is taken, the directed fishery will be closed and a 5,000 pound trip limit will remain in effect for the remainder of the fishing year.

Table 3. Summary of specifications and landings for *Illex* (mt).

	1997	1998	1999	2000	2001[1]
Max OY	30,000	24,000	24,000	24,000	24,000
ABC	19,000	19,000	19,000[2]	24,000	24,000
IOY	19,000	19,000	19,000[2]	24,000	24,000
DAH	19,000	19,000	19,000[2]	24,000	24,000
DAP	19,000	19,000	19,000[2]	24,000	24,000
JVP	0	0	0	0	0
TALFF	0	0	0	0	0
Landings (mt)	13,632	22,706	7,361	2,008[3]	-
Value (millions $)	6.1	9.2	3.9	-	-

[1] Proposed for 2001. If an MAFMC omnibus framework action regarding quota set-asides is approved and research projects are approved by December 31, 2000, 2% of ABC, IOY, DAH and DAP for 2001 may be set-aside for scientific research.
[2] 22,800 mt when Amendment 8 was approved.
[3] Preliminary landings as of July 15, 2000.

Atlantic Butterfish

Biology and Distribution

Atlantic butterfish, *Peprilus triacanthus*, are distributed along the Atlantic coast of North America from Newfoundland to Florida (Bigelow and Schroeder 1953), and are found in commercially exploitable concentrations from Southern New England south to Cape Hatteras (Murawski and Waring 1979). Butterfish north of Cape Hatteras exhibit migratory patterns typical of temperate fishes of the Mid-Atlantic Bight. During the winter months, butterfish are found in deep waters (ca. 200 m) along the edge of the continental shelf. During late spring and summer, butterfish move inshore and northward. Butterfish begin to move offshore again as northern inshore waters begin to cool (Murawski and Waring 1979).

Butterfish are partially recruited to the spawning stock by the end of their first year, and essentially all individuals are mature by age two (Hildebrand and Schroeder 1928; Murawski *et al*. 1978). Spawning occurs from May-July in near shore coastal waters, with chief egg production in June. Growth of butterfish is rapid with a maximum size of 30 cm being achieved in six years, however few fish are observed which are greater than 20 cm or three years of age (Murawski and Waring 1977).

Description of the Fishery

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).

Status of the Stock and Quota Recommendations for Butterfish

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."

No new assessment information is available. Based on the recommendations of SAW-17, the Monitoring Committee recommends that ABC should not exceed 7,200 mt. In addition, the Committee chose a risk averse approach by recommending DAP and DAH at 5,900 mt. This level was chosen because considerable uncertainty exists about the level of discards in the directed fishery. The quota of 5,900 mt was set to allow for discards such that the ABC of 7,200 mt should not be exceeded. In addition, if TALFF for Atlantic mackerel is specified at zero by the Council, there is no bycatch TALFF specification necessary for butterfish.

Table 4. Summary of specifications and landings for butterfish (mt).

	1997	1998	1999	2000	2001[1]
Max OY	16,000	16,000	16,000	16,000	16,000
ABC	7,200	7,200	7,200	7,200	7,200
lOY	5,900	5,900	5,900	5,900	5,900
DAH	5,900	5,900	5,900	5,900	5,897
DAP	5,900	5,900	5,900	5,900	5,897
JVP	0	0	0	0	0
TALFF[2]	0	0	0	0	3
Landings (mt)	2,798	1,964	2,116	-	-
Value (millions $)	4.7	2.5	2.7	-	-

[1] Proposed for 2001. If an MAFMC omnibus framework action regarding quota set-asides is approved and research projects are approved by December 31, 2000, 2% of ABC, IOY, DAH and DAP for 2001 may be set-aside for scientific research.
2 Bycatch TALFF as specified in current regulations (0.08% of Atlantic mackerel TALFF).

Atlantic mackerel

Biology and Distribution

Atlantic mackerel, *Scomber scombrus*, in the Northwest Atlantic are distributed from Labrador to North Carolina. Sette (1950) first hypothesized the existence of two spawning components, a southern group which spawns primarily in the Mid-Atlantic Bight during April-May and a northern group which spawns in the Gulf of St. Lawrence in early summer. Both groups overwinter in shelf waters generally south of Georges Bank, with extensive seasonal migrations undertaken to and from spawning and summering grounds (north in spring, south in autumn). Even though there appears to be two spawning groups, both groups overwinter and are subject to fishing in the same vicinity (shelf waters south of Georges Bank). As a result, mackerel in the Northwest Atlantic have been considered a unit stock since 1975 (Anderson 1982).

All Atlantic mackerel are sexually mature by age 3, while about 50% of the age 2 fish are mature. Eggs are buoyant and incubate for about one week. Growth is very rapid with fish reaching 20 cm (7.9 in) by their first autumn (Anderson and Paciorkowski 1978). The maximum age observed is 17 years (Pentilla and Anderson 1976).

Description of the Fishery

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 significant 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 significantly 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 8,543 mt in 1994 and 8,442 mt in 1995. NMFS weighout data indicate that US Atlantic mackerel landings increased to 15,712 mt in 1996 (valued at $4.6 million) and then declined slightly to 15,406 mt in 1997 (valued at $9.5 million). NMFS weighout data indicate that US Atlantic mackerel landings were 12,509 mt in 1998 (valued at $4.7 million) and 12,405 mt (valued at $3.6 million) in 1999.

Recreational Fishery

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).

Since 1979, recreational mackerel landings have varied from 284 mt in 1992 to 4,032 mt in 1987. In recent years, recreational mackerel landings have increased steadily from 1,249 mt in 1995 to 1,736 mt in 1997. NMFS recreational fisheries data indicate that recreational mackerel landings declined to 690 mt in 1998. Recreational mackerel landings occur from Virginia to Maine, with highest catches from New Jersey to Massachusetts. New Jersey accounted for 37% of the recreational mackerel landings for the period 1979-1991, followed by Massachusetts (25%) with the remaining States landing roughly equal amounts of Atlantic mackerel.

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.

Processor Survey Results for Mackerel

Each year the Mid-Atlantic Council surveys East Coast processors to ascertain their expectations on current and future mackerel production. Totals are not directly comparable between years because the respondents (and their numbers) will differ from year to year.

Production estimates for Atlantic mackerel for 2000 and 2001 were as follows (mt):

Product/Market	2000 (10 Reporting)	2001(8Reporting)
US Food Market	2,062	1,900
US Bait Market	3,078	3,100
Foreign Export Market	12,620	21,400
TOTAL	38,235	26,400

Given the number of number of reporting units in 2001 these production estimates will likely increase due to the lower number of respondents. A number of the larger known processors failed to return the survey. One firm indicated that they were interested in establishing joint ventures for mackerel in the amount of 10,000 mt.

In order to more accurately assess processors' expectations, amounts expected to be processed in 2000 v. 2001 were compared for only those firms which provided estimates for both years. For these firms, projected needs increased 75% for 2001. As a result, the Council recommended that the status quo specification for DAP for 2000 be maintained in 2001 at 50,000 mt. In addition, the Council also recommended that the 2000 JVP specification be increased to 20,000 mt and TALFF be specified at 3,000 mt in 2001.

Recommendations for Atlantic Mackerel

Overfishing for Atlantic mackerel is defined to occur when the catch associated with a threshold fishing mortality rate of F_{msy} is exceeded. When SSB is greater than 890,000 mt, the overfishing limit is F_{MSY} (F=0.45), and the target F is the tenth bootstrap percentile of F_{MSY} (F=0.25). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero at 225,000 mt SSB (1/4 B_{MSY}), and the target F decreases linearly from 0.25 at 890,000 mt SSB to zero at 450,000 mt SSB (½ B_{MSY}). Annual quotas are be specified which correspond to a target fishing mortality rate according to this control law. The yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt. The ABC recommendation is 347,000 mt (F=0.25 yield estimate of 369,000 mt - the estimated Canadian catch of 22,000 mt).

The recreational mackerel catch allocation is 15,000 mt.

It is recommended that DAP be maintained at 50,000 mt.

Recommended Special Conditions for Atlantic mackerel specifications are:

1. Joint ventures are allowed south of 37° 30' N. latitude, but the river herring bycatch south of that latitude may not exceed 0.25% of the over the side transfers of Atlantic mackerel.

2. Directed foreign fishing for Atlantic mackerel will be prohibited south of 37° 30' N. latitude. North of 37° 30' N. latitude, directed foreign fishing for Atlantic mackerel will be prohibited landward of a line 20 nautical miles from shore. No bycatch TALFF of river herring specified.

3. The Regional Administrator should do everything within his/her power to reduce impacts on marine mammals in prosecuting the Atlantic mackerel fisheries.

4. The mackerel OY may be increased during the year, but the total should not exceed 347,000 mt.

5. Applications from a particular foreign nation for a mackerel Joint Venture or TALFF allocation in 2001 may be decided based on an evaluation by the Regional Administrator of the nation's performance relative to purchase obligations for previous years.

6. No purchase ratios are specified. Upon approval, 50% of the foreign nations' TALFF allotment to be released. Additional TALFF to be released when foreign participant has purchased 25% of the JVP allotment to that nation.

7. Foreign fishing vessels (FFV) must purchase JVP caught fish from contracted US vessels. If FFV is engaged in directed fishing and is approached by a contracted US vessel, FFV must cease directed fishing and take transfer from US vessel as soon as practicable.

8. No in-season adjustment in TALFF (i.e., TALFF not to exceed 3,000 mt), unless the Regional Administrator, in concurrence with the Council, determines that it is appropriate to increase IOY to provide additional TALFF, but TALFF not to exceed a cap of 5,000 mt.

9. Directed foreign fishing for Atlantic mackerel limited to the use of mid-water trawl gear.

If the projected recreational catch (15,000 mt), DAP (50,000 mt), and JVP (20,000 mt), are summed, the total is 85,000 mt, which is the recommended estimate of initial DAH. Since the Council recommended that TALFF be specified at 3,000 mt, then IOY equals

88,000 mt. It is recommended that any increases to IOY during the year do not result in OY exceeding 347,000 mt. In summary:

Table 5. Summary of Specifications and Landings for Atlantic Mackerel (mt).

	1997	1998	1999	2000	2001
ABC	1,178,000	382,000	383,000[1]	347,000[1]	347,000[1]
IOY	90,000	80,000	75,000	75,000	88,000
DAH	90,000	80,000	75,000[2]	75,000[2]	85,000[2]
DAP	50,000	50,000	50,000	50,000	50,000
JVP[3]	25,000	15,000	10,000	10,000	20,000
TALFF	0	0	0	0	3,000
US Commercial	15,406	12,509	12,045	-	-

US Value(millions $)	9.5	4.7	3.6	-	-
US Recreational	1,736	690	1000	-	-
Total US	17,142	13,199	13,045	-	-
Canadian	-	-	-	-	-

[1] ABC = 369,000 - 22,000 (F_{target} - Canadian).
[2] Includes recreational allocation of 15,000 mt.
[3] The specifications for IOY, DAH, and JVP may increased by 10,000 mt each at the discretion of the Regional Administrator without further consultation with the Council.

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1.0 Purpose and Need for Action

The Mid-Atlantic Fishery Management Council (Council) approved its 2001 recommendations for specifications at its August 2000 meeting and submitted them to the Regional Administrator, Northeast Region, National Marine Fisheries Service (Regional Administrator). A document titled "Annual Quota Specifications for Atlantic Mackerel, *Loligo*, *Illex*, and Butterfish for 2001" (quota paper) was submitted to the Regional Administrator in September 2000. The quota paper not only serves as a vehicle for the Council's formal submission of recommendations for specifications, but also contains analyses upon which the recommendations are based. This Environmental Assessment is written in response to a need for analyses of the impacts of the proposed 2001 specifications for the Atlantic mackerel, squid and butterfish (specifications) on the human environment pursuant to the National Environmental Policy Act. The preferred alternatives for the proposed specification for Atlantic mackerel, *Loligo* and *Illex* squid and butterfish are summarized in the Table EA-1 below:

Table EA-1. Preferred Alternative Quota Recommendations for 2001[1] (mt)

	Loligo	*Illex*
Maximum OY - (Max. Optimum Yield)	26,000	24,000
ABC - (Allowable Biological Catch)	17,000	24,000
OY - (Optimum Yield)	17,000	24,000
DAH - (Domestic Annual Harvest)	17,000	24,000

	Mackerel	Butterfish
ABC - (Allowable Biological Catch)	347,000	7,200
IOY - (Initial Optimum Yield)	88,000	5,900
DAH - (Domestic Annual Harvest)	85,000	5,897
DAP - (Domestic Annual Processing)	50,000	5,897
JVP[2] - (Joint Venture Processing)	20,000	0
TALFF - (Total All. Lev. Foreign Fishing)	3,000	3[3]

Note: DAH for Atlantic mackerel includes 15,000 mt recreational allocation (based on Amendment 5) + 50,000 DAP + 20,000 JVP.

[1] Proposed for 2001. If an MAFMC omnibus framework action regarding quota set-asides is approved and research projects are approved by December 31, 2000, 2% of ABC, IOY, DAH and DAP for 2001 for each species may be set-aside for scientific research.

[2] The specifications for IOY, DAH, and JVP may increased by 10,000 mt each at the discretion of the Regional Administrator without further consultation with the Council.

[3] Bycatch TALFF as specified in current regulations (0.08% of Atlantic mackerel TALFF).

Recommended Special Conditions for Atlantic mackerel specifications are:

1. Joint ventures are allowed south of 37° 30' N. latitude, but the river herring bycatch south of that latitude may not exceed 0.25% of the over the side transfers of Atlantic mackerel.

2. Directed foreign fishing for Atlantic mackerel will be prohibited south of 37° 30' N. latitude. North of 37° 30' N. latitude, directed foreign fishing for Atlantic mackerel will be prohibited landward of a line 20 nautical miles from shore. No bycatch TALFF of river herring specified.

3. The Regional Administrator should do everything within his/her power to reduce impacts on marine mammals in prosecuting the Atlantic mackerel fisheries.

4. The mackerel OY may be increased during the year, but the total should not exceed 347,000 mt.

5. Applications from a particular foreign nation for a mackerel Joint Venture or TALFF allocation in 2001 may be decided based on an evaluation by the Regional Administrator of the nation's performance relative to purchase obligations for previous years.

6. No purchase ratios are specified. Upon approval, 50% of the foreign nations' TALFF allotment to be released. Additional TALFF to be released when foreign participant has purchased 25% of the JVP allotment to that nation.

7. Foreign fishing vessels (FFV) must purchase JVP caught fish from contracted US vessels. If FFV is engaged in directed fishing and is approached by a contracted US vessel, FFV must cease directed fishing and take transfer from US vessel as soon as practicable.

8. No in-season adjustment in TALFF (i.e., TALFF not to exceed 3,000 mt), unless the Regional Administrator, in concurrence with the Council, determines that it is appropriate to increase IOY to provide additional TALFF, but TALFF not to exceed a cap of 5,000 mt.

9. Directed foreign fishing for Atlantic mackerel limited to the use of mid-water trawl gear.

Regulations implementing the Fishery Management Plan for the Atlantic Mackerel, Squid, and Butterfish Fisheries (FMP) prepared by the Council appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish a notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP. No reserves are permitted under the FMP for any of these species. Procedures for determining the initial annual amounts are found in §648.21. The term IOY is used in this fishery to reinforce the fact that the Regional Administrator may alter this specification up to the ABC if economic and social conditions warrant an increase. Therefore, this specification is no different than OY or optimum yield.

2.0 Management Objectives

The management objectives of the FMP remain unchanged and are as follows:

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 the 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 fishing.

3.0 Atlantic Mackerel

3.1 Description of the Fisheries

Atlantic mackerel (Scomber scombrus) is a fast swimming, pelagic, schooling species distributed in the Northwest Atlantic between Labrador and North Carolina. There are two major spawning components of this population, a southern group which spawns primarily in the Mid-Atlantic Bight during April-May, and a northern group which spawns in the Gulf of St. Lawrence in June-July. Both groups spend the winter between Sable Island (off Nova Scotia) and Cape Hatteras in waters generally warmer than 7EC, with extensive northerly (spring) and southerly (autumn) migrations to and from spawning and summering grounds. Maximum observed size in recent years is about 47 cm or 18.5 inches (fork length) and 1.3 kg (3 pounds) in weight. Sexual maturity begins at age 2 and is usually complete by age 3. Maximum age is about 20 years.

The Atlantic mackerel fishery takes place over the Mid-Atlantic shelf region from Cape Hatteras to Southern New England. Vessels pursue the migrating fish up to Georges Bank. Smaller coastal fisheries work the stocks within the Gulf of Maine.

Atlantic mackerel are subjected to seasonal fisheries, both commercial and recreational, throughout most of their range. U.S. commercial catches occur mainly during December-May in southern New England and Mid-Atlantic shelf waters. Foreign distant-water-fleets and joint venture efforts, wherein U.S. vessels unload to foreign fishing/processing vessels, operate in the same areas and seasons. Mackerel fishing continues in coastal Gulf of Maine waters during May-December. Catches in Canadian waters off Nova Scotia and Newfoundland have typically been during May-November.

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).

Since 1979, recreational mackerel landings have varied from 4,032 mt in 1987 to 284 mt in 1992 In recent years, recreational mackerel landings have increased steadily from 1,249 mt in 1995 to 1,736 mt in 1997. Recreational mackerel landings occur from Virginia to Maine, with highest catches from New Jersey to Massachusetts. New Jersey accounted for 37% of the recreational mackerel landings for the period 1979-1991, followed by Massachusetts (25%) with the remaining States landing roughly equal amounts of Atlantic mackerel.

3.2 Status of the stock (Report of the Twenty-Ninth Regional Stock Assessment Workshop)

The consensus of the Twenty-Ninth Northeast Regional Stock Assessment Workshop is that the stock of Atlantic mackerel is currently under-exploited. Recruitment to the northwest Atlantic mackerel stock has been increasing in recent years. Following a period of poor year classes from

1976 through 1980, there has been a series of years with relatively good recruitment with especially strong year classes in 1982, 1987, and 1988. These cohorts have contributed to the marked increase in stock biomass in recent years. The time series of mean spawning stock biomass (1000s MT) is given in the table below:

1962- 191.2	1973- 916.8	1984- 876.8
1963- 208.8	1974- 708.5	1985- 1444.5
1964- 229.2	1975- 558.0	1986- 1449.1
1965- 250.7	1976- 498.2	1987- 1305.5
1966- 278.4	1977- 552.0	1988- 1305.3
1967- 307.7	1978- 734.2	1989- 1307.7
1968- 577.0	1979- 697.0	1990- 1462.4
1969- 1037.0	1980- 642.3	1991- 1669.0
1970- 1166.6	1981- 525.5	1992- 1789.2
1971- 1219.5	1982- 494.6	1993- 1935.3
1972- 1268.5	1983- 434.5	

The projected mean spawning stock biomass is estimated to be 2.1 million MT in 1994 with current F = 0.02 (2% exploitation rate). At this stock biomass level, an $F_{0.1}$ catch is projected to be greater than 400,000 MT in the short term. The reference is $F_{0.1}$ = 0.27 (21% annual exploitation rate). While the mean spawning stock is unusually high, the standard error of the mean is also extremely high resulting in an 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.

Historically, catches of Atlantic mackerel have been dominated by large foreign fleets, especially during the late 1960s and early 1970's. The stocks were at relatively low levels for most of the 1960's and began to rebuild toward the end of that decade reaching a mean biomass of 1.3 million MT. However, substantial fishing pressure by the foreign fleets in the early 1970's ranging from catches of 205,000 MT to 379,808 MT caused a collapse of the stock to a point where the stocks were overfished per the overfishing definition which appears in Amendment 3 to the FMP. Overfishing for Atlantic mackerel is defined to occur when the catch associated with a threshold fishing mortality rate of F_{msy} is exceeded. When SSB is greater than 890,000 mt, the overfishing limit is F_{MSY} (F=0.45), and the target F is the tenth bootstrap percentile of F_{MSY} (F=0.25). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero at 225,000 mt SSB (1/4 B_{MSY}), and the target F decreases linearly from 0.25 at 890,000 mt SSB to zero at 450,000 mt SSB (½ B_{MSY}). Annual quotas are be specified which correspond to a target fishing mortality rate according to this control law. The yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt.

A 1988 study by the Northeast Fisheries Center of recent trends in growth showed that cohorts from 1980 to 1988 were growing much more slowly and that average size of fish had declined by 30-40 percent. Predation on young Atlantic mackerel, primarily ages 1 and 2, had increased; predation mortality rates on large year classes were higher than on smaller ones. Results from modeling exercises suggested that recent assessments had correctly followed new trends in this stock, but advice based on a standard single species model had been too optimistic. Stock rebuilding had been very successful as suggested by the very large estimated spawning stock biomass which exceeded 1.4 million MT by 1985. However, if catches were increased at that time to 150,000-200,000 MT, the spawning stock would not have been appreciably lowered, density dependency may have been relieved, and trends in growth could have been reversed.

3.3 Ecology of the Stock

Ecological relationships were discussed at length in the original fishery management plan for Atlantic mackerel and its accompanying environmental impact statement (1978). These relationships are summarized below.

3.3.1 Prey and Predator Relationships

Atlantic mackerel have been identified in the stomachs of a number of different fish. They are preyed upon be spiny dogfish, silver hake, white hake, weakfish, goosefish, and Atlantic cod. They also comprise part of the diet of swordfish, red hake, Atlantic bonito, bluefin tuna, blue shark, porbeagle shark, sea lamprey, shortfin mako, thresher sharks, harbor porpoise, and several species of whales and dolphin.

Atlantic mackerel prey most heavily on crustaceans such as Copepoda, krill, and shrimp. They also feed on squid, and less intensively on fish and ascidians. Investigations into the relationship between a large stock of mackerel and the rates of growth and recruitment of groundfish, such as cod and haddock, have yielded some interesting data suggesting that a relationship may exist. The data, however, is inconclusive and any causal relationships are speculative at this time.

3.3.2 Relationship between Atlantic sea herring and Atlantic mackerel

The Atlantic sea herring and the Atlantic mackerel share common characteristics, i.e., distribution, abundance, and size. Ecologically, they can be described as pelagic, schooling and fast swimming zooplankton feeders associated with similar water masses along the continental shelf of the northeast coast of the United States from Cape Hatteras, ranging in winter to boreal waters. Morphologically, both species are laterally compressed and possess pronounced visual acuity. Their general feeding strategies are also alike as either can select prey items or "filter feed". With so many similar niche parameters a measurable degree of overlap between food resources might be expected.

In the spring of 1974, the Northeast Fisheries Center initiated a preliminary study to investigate the similarities and measure the overlap of the food habits of herring and mackerel.

A total of 32 different prey items was identified in the stomachs of Atlantic sea herring. Chaetognaths dominated the diet by weight (43%) and number (68%). Euphausiids as a group accounted for 34% of the stomach content weight, but only 0.6% of the numbers.

A total of 38 different prey were identified for Atlantic mackerel. Copepoda (32.7%) and pteropods (33.5%) contributed almost equally to diet weight with smaller Copepoda constituting 81.5% of the diet numbers.

4.0 Economic and Social Environment

4.1 Commercial Fishery

4.1.1 Current Market Overview for Mackerel

According to the FAO, world landings of Atlantic mackerel were on an increasing trend in the early 1990's. In 1993, Atlantic mackerel world landings were estimated to be 841,000 mt. This represented a 7% increase from the 1992 landings (FAO 1993). Total world landings of Atlantic mackerel peaked in 1994 at 857,410 mt. Since then, world landings of Atlantic mackerel have decreased steadily to about 566,000 my in 1997 (FAO 1997).

Production of frozen mackerel (all species) increased from 1.2 million mt in 1994 to 1.35 million mt in 1996 (FAO 1996). However, total world production of frozen mackerel (all species) declined slightly to 1.2 million mt in 1996 (FAO 1997). Total world production of all mackerel species and products was 1.3 million mt in 1997, down from 1.5 million mt in 1996.

Mackerel had been reported to be in short supplies in major international markets prior to 1997 (FN 1995, ITN 1996 and 1996a, FAO 1996, and SFI 1996). Limited supplies have generated intense pressure in the European Union (EU) mackerel market (ITN 1996a). This situation appeared unchanged through 1997. As a result, large quantities of mackerel were purchased by East European countries like Poland Russia, and Latvia. These purchases have increased pressure on prices, while leaving fewer supplies for more traditional markets such as Japan (SFI 1996). Quota reductions in western mackerel grounds are creating additional market uncertainty. Present market conditions might be expected to cause larger traders to increase “sourcing” and prices are likely to stay high or increase further.

Canada and Jamaica continued to be the two most important markets for U.S. mackerel during the early to mid-1990's. Jamaica has been considered as one of the most steady and promising markets for US frozen mackerel. In 1995, the US exported 985 mt of frozen mackerel to Jamaica, this represented a 68% increase from 1994, and a 22% decrease from the 1991-1994 average. The frozen mackerel exported to Jamaica in 1995 was valued at $641/mt. US exports of frozen mackerel to Jamaica have continued to increase steadily to 1,700 mt in 1999.

In 1995, Canada purchased 1,269 mt ($798/mt) of frozen mackerel from the US, this represented a 120% increase from 1994, and a 303% increase from the 1991-1994 average. The overall US export of fresh/chilled and frozen mackerel in 1995 was estimated at 3,296 mt, this represented a 12% increase from 1994, and a 22% decrease from the 1991-1994 average (Ross 1996). In 1996, the US exported 3501 mt of Atlantic mackerel to Canada.

Total US exports of all mackerel species have declined from 58,921 mt (valued at $56.7 million) in 1996 to only 11,748 mt (valued at $8.2 million) in 1999. Total US exports of all mackerel species was 17,367 mt in 1998.

Canada continued to be the largest importer of US fresh mackerel in 1999 (645 mt valued at $0.8 million). Japan was the largest importer of US frozen mackerel in 1998 (5,804 mt valued at $3.5 million) followed by Australia (2,917 mt/$1.7 million), Jamaica (1,742 mt/ $1.65 million), Canada (1,579 mt/$1.3 million), Hong Kong (1,005 mt/$1.1 million), Philippines (901 mt/$1.1 million), and Uruguay (839 mt/$ 0.7 million). However, Japan imports of US frozen mackerel declined sharply to 751 mt in 1999. Nigeria was the largest importer of US frozen mackerel in 1998 (2,050 mt valued at $0.9 million) followed by Egypt (1,665 mt/$0.7 million), South Korea (1,641 mt/$1.3 million), Jamaica (1,614 mt/ $1.4 million), and Canada (809 mt/$0.7 million). US exporters placed an additional 102 mt of prepared/preserved mackerel products in foreign markets in 1998 valued at $0.15 million.

National Marine Fishery Service weighout data (Maine-Virginia), shows that the average exvessel prices for Atlantic mackerel in the US declined steadily from $400/mt ($0.18/lb) in 1989 to $281/mt ($0.13/lb) in 1994. Since then, however exvessel prices have moved upward from $296/mt ($0.13/lb) in 1994 to $321/mt ($0.15/lb) in 1995 (based on preliminary NMFS data). NMFS weighout data also show that US commercial landings of Atlantic mackerel increased from 4,653 mt in 1993 to 8,438 mt in 1995. Unpublished NMFS landings data indicate that US Atlantic mackerel landings increased to 15,406 mt in 1996, and subsequently declined to 12,509 mt and12,045 mt in 1998 and 1999, respectively. Ex-vessel prices for Atlantic mackerel declined slightly in 1996 to $296/mt ($0.13/lb) and then increased to $376/mt ($0.17/lb) in 1998. Ex-vessel prices for Atlantic mackerel declined again in 1999 to $299/mt ($0.13/lb).

4.1.2 Criteria for Review

The Management Plan for Atlantic Mackerel, Squid, and Butterfish Fisheries requires that specific evaluations be made in the quota setting process before harvest rights are granted to foreign interests in the form of TALFF or joint venture allocations. The nine criteria to be evaluated in the following sections are:

1. total world export potential by producing countries;
2. total world import demand by consuming countries;
3. US export potential based on expected US harvests, expected US consumption, relative prices, exchange rates, and foreign trade barriers;
4. increased/decreased revenues to the US from foreign fees;
5. increased/decreased revenues to US harvesters (with/without joint ventures);
6. increased/decreased revenues to US processors and exporters;
7. increases/decreases in US harvesting productivity due to decreases/increases in foreign harvest;
8. increases/decreases in US processing productivity; and
9. potential impact of increased/decreased TALFF on foreign purchases of US products and services and US caught fish, changes in trade barriers, technology transfer, and other considerations.

4.1.3 Major Producers of Atlantic Mackerel

World Atlantic mackerel landings were estimated at 841,445 mt in 1993, this represented a 7% increase from the 1992 landings (FAO 1993). Total world landings of Atlantic mackerel peaked in 1994 at 857,410 mt. Since then, world landings of Atlantic mackerel have decreased steadily to about 566,000 mt in 1996 and 1997 (FAO 1997). The leading producers of Atlantic mackerel in 1993 were the United Kingdom, Norway, Ireland, Russian Federation, USSR, the Netherlands, and Denmark (FAO 1993):

Country	1993 Landings (mt)	1997 Landings (mt)
United Kingdom	253,058	149,448
Norway	223,838	137,214
Ireland	94,979	53,094
Russian Federation	46,716	53,732
Netherlands	42,532	23,702
Denmark	42,056	24,054
Others	94,126	124,748
Total	841,445	565,992

4.1.4 Major Exporters of Mackerel

According to FAO statistics, total global mackerel exports (all species of mackerel combined) in 1993 were estimated at 945,206 mt and valued at $454 million. This represented an increase in exports and value of 12% and 3.6% from 1992, respectively (FAO 1993a). Total global mackerel exports (all species of mackerel combined) in 1996 declined to 819,214 mt (a 13% decline compared to 1993). However, the total value of exports increased to $753 million. Total global mackerel exports in 1997 declined again to 789,111 mt . However, the total value of exports increased to $763 million in 1997. In 1993, major exporting countries of mackerel (fresh/frozen/chilled) include Norway, United Kingdom, Ireland, and the Netherlands (FAO 1993a). In 1997, Norway continued to be the leading exporter of mackerel products accounting for about 29 % of all exports (FAO 1997).

Country	1993 Exports (mt)	1997 Exports (mt)
Norway	293,854	224,406
United Kingdom	216,517	134,624
Ireland	161,772	22,560
Netherlands	104,777	47,382
Korea	10,329	18,498
USA	4,273	37,686
Other	153,684	313,951
Total	945,206	789,107

4.1.5 Major Importers of Mackerel

According to FAO statistics, global mackerel imports (fresh/frozen/chilled) in 1993 were estimated at 770,165 mt, and valued at $446 million. This represented an increase in imports and value of 12% and 6.6% from 1992, respectively (FAO 1993a). Major importing countries of mackerel (fresh/frozen/chilled) in 1997 included Japan, Philippines, Norway, Egypt, and the Russian Federation (FAO 1996):

Country	1993 Imports (mt)	1997 Imports (mt)
Japan	211,030	159,057
Nigeria	99,289	22,370
Norway	60,789	6,589
Netherlands	38,387	28,647
Poland	36,940	41,684
France	26,756	19,009
Côte d'Ivory	24,440	10,000
Russian Fed.	-	93,847
Egypt	15,819	13,864
Philippines	-	94,282
Thailand	15,038	17,021
Other	241,677	255,861
Total	770,165	762,243

4.1.6 Key Events in the World Mackerel Market

Much of what is important in the world market for mackerel revolves around events in a few key nations and markets. In the late 70's and early 80's Japan was the world's leading producer of mackerel (FAO 1982 and USITC 1993). Since then, Japan's mackerel landings have declined annually. In 1991 Japans' mackerel landings reached an estimated low of 255 thousand mt. Since then, landings have increased to 602 thousand mt in 1997, making Japan again a leading world producer (FAO 1997) -- still, this landing figure represents over a twofold decrease from the 1978 record landings by Japan. Japan is also the leading importer of mackerel. In 1993, Japan imported over 211 thousand mt of mackerel (27% of the world total). This represented a 50% increase in Japan's mackerel imports compared to 1992 (FAO 1993a). Japan was the leading exporter of mackerel again in 1997.

In 1993, mackerel exports for Norway and the United Kingdom were over 54% of the world total (FAO 1993a). Norway has traditionally been an important supplier to the Japanese market. However, in 1995 the Norwegian mackerel catch in the North sea declined to 202 thousand mt, which represented a 22% decrease from the previous year. Recently, Norway has also exported large quantities of mackerel to Eastern European countries like Poland, Russia, and Latvia, leaving lower quantities to be exported to traditional markets such as Japan (SFI 1996). This event has contributed to recent price pressures for this commodity.

An important advantage that Norway and the United Kingdom have over the United States is the distinct characteristics that Atlantic mackerel from European waters has compared with the same species off the northeast coast of the US. European mackerel has a higher fat content than their North American counterparts(at the time that the bulk of the commercial fishery is prosecuted), as well as reaching a larger average size and having a "blunter," deeper shape. All these characteristics appeal to the Japanese market and cause them to prefer European mackerel to our own (Ross 1994). Size is very important, 600+ gram fish command twice the price of smaller fish.

4.1.7 The Current World Market for Mackerel

Strong warnings were issued in 1996 by European scientists about the potential collapse of the European Atlantic mackerel stock. Large cuts in the total allowable catch (TAC) have been recommended to restore the spawning stock biomass to safe levels. While in recent years the TAC for this stock has remained high, European mackerel stocks are currently at the lowest level ever recorded (FN 1995a and FNI 1995).

As the fishing quota for the North sea mackerel was reduced for the 1996 season, canners were actively trying to execute existing orders. Reports surfaced that "processors in Denmark and Scotland may be interested in frozen mackerel from other sources if the price is competitive" (ITN 1996).

East European and Japanese buyers have been very active. This is likely to cause prices to remain high in the near future (ITN 1996a).

The Norwegian government relaxed buying controls for pelagic catches from October 15, 1995 to January 1, 1996 (FN 1995). Those buying controls -- imposed by the Norwegian fisheries department -- force all pelagic catches landed in Norway to be sold at auctions through *Norges Sildesalgslag* (the Norwegian sales organization). This prevents Norwegians processors from buying mackerel from foreign vessels until all the Norwegian quota is taken. Buying controls were relaxed following the 20% cut in the Norwegian mackerel quota, it was expected that this move would have helped processors to secure raw material to supply important markets.

Japanese cold storage of frozen mackerel (horse mackerel and chub mackerel) was 82,406 mt as of April 30, 1996, up 20% from a year earlier (ITN 1996b). Although cold storage of frozen mackerel was up in Japan, buyers in that market were still showing strong demand for European mackerel.

A new mackerel cannery began operations in Papua New Guinea under the management of Malaysia's Kumpulan Fima group. This facility is expected to produce 36,000 mt of canned mackerel per year, 4,000 more mt than is needed to supply the domestic demand. The surplus production will be exported (ITN 1995a). The cannery is expected to operate on domestic and imported fish (FAO 1995).

4.1.8 Future Supplies of Mackerel

Prospects for the European mackerel stock look poor. Europe's western mackerel (ICES areas VI & VII) TAC for 1996 was cut by 55% (FNI 1996). In addition, further reductions to the TAC were agreed for the 1997 fishing year. The 1996 reductions were far above the European scientific recommendations. According to European scientific recommendations, large cuts in mackerel TACs were needed in 1996 to restore the spawning stock biomass to a minimum biological threshold of 2.3 million mt by 1997-1998. That means that fishing mortality in 1996 would need to be reduced by 80% compared to 1994 in one year. In other words, to achieve this biological goal, the overall western mackerel TAC in 1996 should have been reduced to 144 thousand mt compared with 762 thousand mt in 1994 (FNI 1995 and FN 1995a). In fact, the TAC's agreed upon for the European mackerel stocks decreased from 837,000 mt in 1994 to 645,000 mt in 1995 and finally to 452,000 mt in 1996. Actual landings exceeded the TAC specifications in 1994

and 1995 when European landings of Atlantic mackerel were 823,000 and 756,000 mt, respectively.

4.1.9 US Production and Exports of Mackerel

NMFS weighout data showed that in 1995, Atlantic mackerel landings increased by 81% from the 1993 level. The average value of mackerel increased over 14% for the same period.

In 1991, landings peaked due to a relatively successful internal water processing venture between Russia and the state of New Jersey, and the one-year open door into the Japanese market. That year US producers were able to ship over more than 2,800 mt of frozen mackerel to Japan at an average value of $882/mt. The following year shipments fell to only 63 mt.

Overall, US exports of fresh/chilled and frozen mackerel in 1995 were estimated at 3,296 mt, this represented a 12% increase from 1994, and a 51% increase from 1993 (Ross 1996). In 1995, US producers were able to export 2,303 mt of frozen Atlantic mackerel valued at $1.7 million ($747/mt), and 992 mt of fresh/chilled mackerel valued at $1.5 million ($1,207/mt). US exports of Atlantic mackerel continued to increase in 1996 to 6,137 mt valued at $5.3 million. US exports of all mackerel species were 17,367 mt valued at $14.2 million in 1998. US exports of all mackerel species declined to 11,747 mt in 1998.

The lack of mackerel in the North Sea area and the potential for future mackerel TAC reductions are providing opportunities for US producers to place additional exports of mackerel in the international market. Mackerel prices in the international market have increased in recent years which should help the US Atlantic mackerel industry in their attempt to sell large volumes of this product (Ross 1996). In 1995, the US exported small quantities of Atlantic mackerel to non-traditional markets such as South Korea, Mexico, and Brazil. In 1996, US exporters placed Atlantic mackerel in Latvia, the Philippines, and South Africa.

4.1.10 Trade Barriers

Japan- has started to phase in tariff reductions on 219 fisheries items entering the country. These reductions have been approved through GATT negotiations. Mackerel is one of the major fishery products subject to tariff reduction (ITN 1995b). The tariff of frozen mackerel will be reduced from a 10% base rate to a new rate of 7%. This rate will be reduced over a 5 year period beginning in 1995. The stated base rate has already had the first tariff reduction taken out. The mackerel base rate in 1995 was 10% with 0.6% reduced each year for 5 years until the rate gets to 7%. This tariff rate reduction is not “bound”, therefore, rates may increase at some future date depending on market conditions in Japan (Ross 1995). The tariff for horse mackerel remain unchanged (ITN 1995b).

The Republic of Korea’s- National Fisheries Administration has announced the liberalization of fish imports for 1995-1997. Liberalization of the following mackerel products are expected (ITN 1994):

Date	Item
July 1, 1996	Mackerel (excluding livers)

July 1, 1996	Mackerel (prepared/canned goods)
July 1, 1997	Mackerel (excluding livers and roes/fresh or chilled)

Korea has agreed to establish an import tariff rate of 10% on most fresh/frozen/dried seafood and 20% on prepared preserved food (Ross 1995).

The European Community- has a seasonal tariff on mackerel. During the EC peak season of June 16 - February 14, an unchanged 20% tariff is levied on foreign imports of mackerel (fresh/chilled fish excluding fillets). For fresh/chilled/frozen mackerel fillets and other mackerel meat there is a 15% year-round tariff (ITN 1994a and 1994b).

Taiwan- has requested membership in the World Trade Organization/GATT. US negotiators have been working to reduce existing Taiwanese barriers to various seafood products. In addition to significant reductions in key Taiwanese import tariffs, several Non-Tariff Measure (N.M.) which affect regional exporters are also to be reduced. At the present time, imports of squid, mackerel, sardines, herring, and catfish are not allowed into the country. The Taiwanese government has proposed to liberalize the NTM's over a 6-year phase-in period, except squid which will be liberalized in 1997 (Ross 1995).

Peoples Republic of China- is expected to drop import tariff rates once it becomes a member of GATT. The import tariff rate for frozen mackerel is expected to go from the base rate of 30% to the proposed rate of 15% (Ross 1995).

US- Has made concessions on 46 tariff lines. Canned mackerel is one of the major fishery products subject to tariff reduction, which has been reduced from 6 to 3% (ITN 1995c).

4.1.11 Processor Survey Results for Mackerel

Each year the Mid-Atlantic Council surveys East Coast processors to ascertain their expectations on current and future mackerel production. Totals are not directly comparable between years because the respondents (and their numbers) will differ from year to year.

Production estimates for Atlantic mackerel for 2000 and 2001 were as follows (mt):

Product/Market	2000 (10 Reporting)	2001(8Reporting)
US Food Market	2,062	1,900
US Bait Market	3,078	3,100
Foreign Export Market	12,620	21,400
TOTAL	17,760	26,400

Given the number of number of reporting units in 2001 these production estimates will likely increase due to the lower number of respondents. A number of the larger known processors failed to return the survey. One firm indicated that they were interested in establishing joint ventures for mackerel in the amount of 10,000 mt.

In order to more accurately assess processors' expectations, amounts expected to be processed in 2000 v. 2001 were compared for only those firms which provided estimates for both years. For these firms, projected needs increased 75% for 2001. As a result, the Council recommended that the status quo specification for DAP for 2000 be maintained in 2001 at 50,000 mt.

5.0 Proposed specifications (preferred alternative) for Atlantic mackerel in 2001

The preferred alternative for the proposed 2001 specifications for Atlantic mackerel are contained in Table 1 below.

TABLE 1. PROPOSED (PREFERRED ALTERNATIVE) ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 2001 (in me tons (mt))

Max OY	N/A[1]
ABC	347,000
IOY	88,000
DAH	85,000[2]
DAP	50,000
JVP[3]	20,000
TALFF	3,000

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the specifications contained in the regulations (50 part 648).

[3] The specifications for IOY, DAH, and JVP may increased by 10,000 mt each at the discretion of the Regional Administrator without further consultation with the Council.

Overfishing for Atlantic mackerel is defined to occur when the catch associated with a threshold fishing mortality rate of F_{msy} is exceeded. When SSB is greater than 890,000 mt, the overfishing limit is F_{MSY} (F=0.45), and the target F is the tenth bootstrap percentile of F_{MSY} (F=0.25). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero

at 225,000 mt SSB (1/4 B_{MSY}), and the target F decreases linearly from 0.25 at 890,000 mt SSB to zero at 450,000 mt SSB (½ B_{MSY}). Annual quotas are be specified which correspond to a target fishing mortality rate according to this control law. The yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt. The ABC recommendation is 347,000 mt (F=0.25 yield estimate of 369,000 mt - the estimated Canadian catch of 22,000 mt).

The Council recommended that the status quo specification for DAP for 2000 be maintained in 2001 at 50,000 mt (see section 4.1.11). In addition, the Council also recommended that the JVP specification be increased to 20,000 mt and TALFF be specified at 3000 mt in 2001. If the recreational allocation of 15,000 mt is summed with DAP and JVP, then DAH equals 85,000 mt. If DAH and TALFF are summed then IOY equals 88,000 mt.

The Council increased JVP in 2001 because they recognized the need for JV's to allow US harvesters to take mackerel at levels in excess of current US processing capacity. The increased JVP specification and 3,000 TALFF recommendation in 2001 are based on the fact that US mackerel production in recent years has been far lower than historical levels, in spite of increases in world demand for mackerel and recent declines in production. The Council believes that allocation of a small amount of TALFF will help stimulate JVP activity which will benefit the domestic harvest sector. Based on a review of the state of the world mackerel market and US recent production levels in recent years, the Council concluded that the specification of TALFF 3,000 mt may yield positive benefits to the fishery and to the Nation.

5.1 Environmental consequences of the proposed action (preferred alternative)

The analysis of economic impacts contained in the RIR is incorporated by reference to supplement the economic analysis provided here. The social impacts of each alternative are expected to vary in accordance with the economic impacts of each one. Based on the non-restrictive nature of these specifications and considering the extent of the fisheries as described in the IRFA, there should be little social impacts as the result of these specifications.

5.1.1 Impact of the IOY

The preferred alternative specification of IOY for 2001 is 88,000 MT. This level of exploitation will not cause a significant change in the mean biomass estimate from its present state.

Although the trend has been declining, the smoothed mean weight of the fish had ranged between 1.723 and 1.881 pounds for the period 1987 to 1990. From 1970 to 1986, the smoothed mean weight ranged between 0.348 and 1.482. These levels of IOY should not cause immediate significant changes in the size of individual fish. However, the size composition of this stock of fish is much greater than historical levels.

The effects of a continued large stock of Atlantic mackerel on other species of fish are determined primarily through prey- predator relationships (see section 3.3). The diet of Atlantic mackerel is made up primarily of crustaceans and, to a lesser extent, other fish. However, several species of fish prey on Atlantic mackerel including commercially important species such as Atlantic cod,

swordfish, and bluefin tuna. Mackerel are also an important item in the diet of endangered and threatened marine mammals.

5.1.2 Impacts of TALFF

The presence of foreign fishing and processing vessels off US shores has long been a controversial matter, usually drawing strong opinions on both sides of the issue. The following sections attempt to highlight some of the benefits and costs of foreign involvement in the US mackerel fishery. A simple numerical calculation is not feasible, as most of the positive and negative aspects cannot be quantified. Ultimately, a policy decision must be made as to which course of action is in the best interests of the US.

The 3,000 mt TALFF recommendation is based on the fact that US mackerel production in recent years has been far lower than historical levels. The Council believes that allocation of a small amount of TALFF will help stimulate JVP activity which will benefit the domestic harvest sector. However, the Council also recognizes that mackerel caught by foreign vessels in US waters enters the world market in direct competition with mackerel harvested by US vessels. In 1992 and again in 1995, the Council conducted an analysis which concluded that specification of zero TALFF will yield positive benefits to the fishery and to the Nation. Subsequent analyses in more recent quota papers indicated that the conclusion about zero TALFF has not changed. However, based on a review of the state of the world mackerel market and US recent production levels this year, the Council concluded that the specification of TALFF at 3,000 mt may yield positive benefits to the fishery and to the Nation. The TALFF specification of 3,000 mt will have no significant impact on the biological or ecological parameters of the present mackerel stock.

Assuming that the foreign caught product does not go directly into the small markets now supplied by US exporters, there is little likelihood that the additional metric tons from TALFF going into the world-wide market will reduce the price received by fishermen to the extent that the JVP operation would not be a plus in the regional accounting.

5.1.3 Impacts of JVP

The Council recommended that JVP be specified at 20,000 mt (with the provision that JVP may increased by 10,000 at the discretion of the Regional Administrator without further consultation with the Council) and TALFF be specified at 3,000 mt in 2001. The JVP specification represents an increase from 10,000 mt in 2000 and 1999, and 15,000 in 1998. The 2000 JVP specification was reduced to reflect the concern that the Council had about the negative effect that JV caught mackerel could have on the further development of the US export market. The lack of mackerel in the North Sea area and the potential for future North Sea mackerel TAC reductions may provide an opportunity for US producers to place additional exports of mackerel in the international market. Mackerel prices in the international market are increasing, which should help the US Atlantic mackerel industry in their attempt to sell large volumes of this product. Recommendations for JVP any higher than those specified (20,000 mt) could impede US competitiveness in these expanding international markets. The Council intends to proceed on a policy course which recognizes the need for JV's in the short term to allow US harvesters to take mackerel at levels in excess of current US processing capacity. However, in the longer term the Council intends to eliminate JV's as US processing and export capacity increases.

The specification of 20,000 MT of JVP will have a no effect on the biological and ecological parameters of the current stock of Atlantic mackerel.

5.1.4 Benefits of Foreign Involvement

Providing an Additional Market Outlet - The greatest benefit which foreign nations can provide in return for their involvement is the purchase of US mackerel products, both shoreside and directly from US vessels. The conditions of these purchases have been the chief stumbling block in the past. Most foreign nations have stated that they cannot afford to bring their fleets over here and purchase US product without a substantial subsidy of TALFF. US fishermen have often held little interest in participating in joint ventures at the prices which foreign nations have been willing to pay for their mackerel harvests.

Fees - The US government charges a number of fees to foreign nations for the right to conduct fishing operations in US waters. The first is a permit fee of $354 per vessel, which is charged to all vessels whether they are taking directed (TALFF) harvests or simply making over-the-side JV purchases. The level of this fee has not changed in many years.

An additional "poundage fee" is charged for every ton of directed (TALFF) harvest made by the foreign nation. It is not charged on over-the-side JV purchases from US vessels. The fee is charged in advance in the sense that a letter of credit must be presented for the entire TALFF authorization before releases will be made to foreign vessels. The US government will draw down the letter of credit as foreign harvests are made.

The poundage fee will vary depending on the species for which TALFF is issued, and may change over time. In 1989 and 1990, the fee equaled $68.43 per metric ton for Atlantic mackerel, and was lowered to $58.33 in 1991, where it remains today. Using these values, the US government would have received the following revenues:

Year	TALFF	Revenue
1989	36,823	$2,520,000
1990	8,671	$593,000
1991	5,349	$312,000

Observers would be placed on any vessel which was involved in fishing or processing operations. Finally, NMFS charges an overhead fee of approximately $150 per day to cover the expenses of some of their personnel in overseeing foreign operations.

Technology Transfer - As occurred in the development of the US squid fishery, it is likely that transfer of information and experience can occur which would assist US firms in producing mackerel products for markets with which they are unfamiliar.

Assistance in Entering Foreign Markets - While it is not in the direct interest of the key mackerel exporting nations to assist the US in entering their markets, it is conceivable that an arrangement of mutual benefit could be worked out.

Assistance in Locating Stocks - While engaged in past joint ventures for mackerel, foreign partners have been of assistance to US catcher boats in locating schools.

5.1.5 Costs of Foreign Involvement

Opposition of US Industry - Perhaps the largest negative factor related to foreign involvement in the mackerel fishery is simply that much of the domestic industry is dead set against it. At public meetings where joint venture and TALFF issues are discussed, most industry spokesmen will agree that there is still value in allowing US boats to make over-the-side sales of mackerel to foreign processing vessels, however they are vehemently opposed to any directed fishing of the foreign vessels themselves.

Filling US Markets - A long-standing charge which has been leveled against directed foreign fishing is that it displaces US harvests and sales. One known case in point is where a foreign vessel made directed harvests off the US and then proceeded down the coast to sell some of its catch in Jamaica, one of the few markets which the US has successfully entered.

Concerns of Recreational Fishermen - US recreational fishermen have been vocal opponents of the operations of foreign vessels in the mackerel fishery. Many have blamed their activities for a drop in recreational mackerel harvests. While scientists have pointed to the effects of water temperature and the timing of migrations as the primary reasons for Mid-Atlantic anglers not finding mackerel available to them in recent years, their concerns have persisted.

5.2 Alternative Actions for Atlantic mackerel in 2001

5.2.1 Alternative 1 for Atlantic mackerel: Maintain Status Quo 2000 specifications for 2001

The first alternative action considered by the Council was to maintain the status quo 2000 specifications for Atlantic mackerel for 2001 (Table 2) .

TABLE 2. ALTERNATIVE 1 (2000 STATUS QUO) TO THE PROPOSED ANNUAL SPECIFICATIONS F
ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 2
(in metric tons (mt))

Max OY	N/A[1]
ABC	347,000
IOY	75,000
DAH	75,000[2]
DAP	50,000
JVP	10,000
TALFF	0

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the formula contained in Amendment 5.

The status quo 2000 specification of JVP and TALFF in 2001 would not meet the policy objectives of the Council relative to further development of the US domestic harvest of Atlantic mackerel.

5.2.2 Alternative 2 for Atlantic mackerel: Specify ABC at long term potential catch

The second alternative action considered by the Council for Atlantic mackerel in 2001 was to specify ABC at long term potential catch. The proposed specifications under this alternative are given in Table 3 below:

TABLE 3. ALTERNATIVE 2 TO THE PROPOSED ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 2001 (in me tons (mt))

Max OY	N/A[1]
ABC	134,000
IOY	88,000
DAH	85,000[2]
DAP	50,000
JVP	20,000
TALFF	3000

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the formula contained in Amendment 5.

The Council considered that the ABC specification for Atlantic mackerel be capped at long term potential catch (LTPC). The most recent estimate of LTPC was 134,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. For example, the current adult stock was recently estimated to exceed 2.1 million mt. The specification of ABC at LTPC would effectively result in an exploitation rate of only about 6%, well below the optimal level of exploitation. The potential level of foregone yield under this alternative was considered unacceptable.

5.2.3 Alternative 3 for Atlantic mackerel: Specify JVP and TALFF at 0 mt

Another alternative the Council considered was the elimination of JVP and TALFF for 2001. The proposed specifications under this alternative are given in Table 4 below:

TABLE 4. ALTERNATIVE 3 TO THE PROPOSED ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 2001 (in me tons (mt))

Max OY	N/A[1]
ABC	347,000
IOY	65,000
DAH	65,000[2]
DAP	50,000
JVP	0
TALFF	0

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the formula contained in Amendment 5.

The Council rejected this option because they recognized the need for JV's in 2001 to allow US harvesters to take mackerel at levels in excess of current US processing capacity. However, in the future the Council intends to re-evaluate it's policy relative to JV's and TALFF as US processing and export capacity increases.

5.3 Environmental Consequences of Alternative Actions

The analysis of economic impacts contained in the RIR is incorporated by reference to supplement the economic analysis provided here. The social impacts of each alternative are expected to vary in accordance with the economic impacts of each one. Based on the non-restrictive nature of these specifications and considering the extent of the fisheries as described in the IRFA, there should be little social impacts as the result of these specifications.

5.3.1 Alternative 1 for Atlantic mackerel: Maintain Status Quo 2000 Specifications in 2001

The IOY specification for Atlantic mackerel for 2000 was 75,000 mt. The Status Quo 2000 specifications included JVP specified at 10,000 mt and TALFF specified at zero. The specifica-

tion of JVP and TALFF at these levels would have a minimal effect on the biological and ecological parameters of the current stock of Atlantic mackerel. However, these specifications would not meet the policy requirements of the Council in 2001 (i.e., expansion of the domestic harvesting sector of the Atlantic mackerel fishery).

5.3.2 Alternative 2 for Atlantic mackerel: Specify ABC at LTPC

The specification of ABC at 134,000 MT for Atlantic mackerel would have a minimal effect on the biological and ecological parameters of the current stock of Atlantic mackerel. The effects of a continued large stock of Atlantic mackerel on other species of fish are determined primarily through prey- predator relationships (see section 3.3). The diet of Atlantic mackerel is made up primarily of crustaceans and, to a lesser extent, other fish. However, several species of fish prey on Atlantic mackerel including commercially important species such as Atlantic cod, swordfish, and bluefin tuna. Mackerel are also an important item in the diet of endangered and threatened marine mammals.

5.3.3 Alternative 3 for Atlantic mackerel: Specification of Zero JVP and TALFF

Several processors commented to the Council that the specification of JVP and TALFF should be set at zero for 2001. Their stated reason for this position was that JVP and TALFF caught mackerel will compete directly with US caught and processed mackerel in the international marketplace. While the Council was sympathetic to this position, US processing capability is currently limited and is below the level of potential production by US harvesters. Thus, the Council rejected the no JVP and TALFF position for the 2001 specifications. While zero JVP and TALFF specifications would have had social and economic consequences, it would have had a minimal effect on the biological and ecological parameters of the current stock of Atlantic mackerel.

6.0 Atlantic Squids and Butterfish

The proposed specifications (preferred alternatives) for the 2001 Atlantic squid and butterfish fisheries are contained in Table 5 below.

TABLE 5. PROPOSED ANNUAL SPECIFICATIONS (PREFERRED ALTERNATIVES) FOR THE ATLANT SQUID (*ILLEX* IS STATUS QUO) AND BUTTERFISH FOR THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2001 (in metric tons (mt)).

Specifications	Squid		Butterfish
	Loligo	Illex	
Max OY[1]	26,000	24,000	16,000
ABC	17,000	24,000	7,200
IOY	17,000	24,000	5,900
DAH	17,000	24,000	5,897
DAP	17,000	24,000	5,897
JVP	0	0	0
TALFF	0	0	3[2]

[1] Maximum OY as stated in the FMP.
2 Bycatch TALFF as specified in current regulations (0.08% of mackerel TALFF).

6.1 Atlantic Squids

6.1.1 Description of the Fisheries

The short-finned squid (Illex illecebrosus) and long-finned squid (Loligo pealei) are found throughout the North Atlantic. They are found in commercial quantities along North America from Newfoundland to Cape Hatteras. Both species undergo seasonal migrations into shelf waters off Newfoundland and Nova Scotia, and onto the continental shelf edge off southern New England and the Mid-Atlantic in spring and summer. Illex grow to a maximum length of about 35 cm (14 inches, dorsal mantle length) and live about 12 months. Loligo reach lengths of over 16 inches, dorsal mantle length, and ages of about one year. However, most individuals taken in commercial catches are 3-8 inches long.

Domestic fishing effort occurs while the Illex are concentrated in large schools along the continental shelf. Virtually all (99%) of the directed fishery landings are during June-September with 98.6% from the area south of Delaware Bay. Illex move off the continental shelf in winter and spawning may occur offshore and to the south of Cape Hatteras. Domestic landings for Loligo are now generally distributed through the year.

6.1.2 Status of the Stocks (Report of the Twenty-ninth Northeast Regional Stock Assessment Workshop)

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 significantly revised. The most significant 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}.

The most recent assessment of the Loligo stock (SAW 29) concluded that the stock was approaching an overfished condition and that overfishing was occurring (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 is greater than F_{max} and stock biomass was among the lowest in the assessment time series (1987-1998). Recent survey indices of recruitment were well below average.

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. The current regulations still specify Max OY as the yield associated F_{max} or 26,000 mt. 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 the most recent assessment demonstrated that the stock could be rebuilt in a relatively short period of time, even at fishing mortality rates approaching F_{msy}. 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 (increase to 15,000 mt by Inseason Action) .

Management advice from SAW 29 made special note of the fact that yield from this fishery should be distributed throughout the fishing year. Given that the current permitted fleet historically demonstrated the ability to land Loligo in excess of the quota specified for 2000, the Council recommended that the annual quota be sub-divided into three quota period or trimesters in 2000. The quota was allocated to each period based on the proportion of landings occurring in each trimester from 1994-1998. Based on the seasonal distribution of landings during this time period, the quota for January-April was 5,460 mt (42% of the total), the quota for May-August is 2,340 mt (18% of the total), and the quota for September-December is 5200 mt (40% of the total). The directed fishery during the first two trimester periods was to be closed when 90% of the amount allocated to the period was landed and then a trip limit of 2,500 pounds was to remain in effect until the quota period ended. Any underages from trimesters one and two were to be applied to the next trimester and overages were to be deducted from trimester three. The directed fishery will be closed in the third trimester when 95% of the annual quota has been taken. The intent of the Council is for the fishery to operate at the 2,500 trip limit level for the remainder of the third quota period.

The most recent survey data for *Loligo* squid indicate that abundance of this species has increased significantly since the most recent assessment was conducted (i.e, SAW-29). Estimates of biomass based on NEFSC fall 1999 and spring 2000 survey indices for *Loligo* indicate that the stock is currently at or near B_{msy}. In fact, 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 will be at or near B_{msy} in 2001, the Council recommended that the 2001 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).
As noted above, the 2000 quota was allocated among three four month trimesters in an attempt to ensure that landings and fishing mortality were distributed throughout the fishing year. During Quota Period I in 2000, the directed fishery was closed on March 25, 2000. During Quota Period II, the directed fishery was closed on July 2, 2000. In addition, the quota for each period was exceeded, causing the dislocation of quota from the Quota Period III. As a result of these premature closures and overages, the Council recommends that the 2001 quota of 17,000 mt be allocated as follows. The annual quota will be allocated to quarterly quota periods based on the quarterly seasonal distribution of landings during the period 1994-1998. Based on this criteria, the 2001 quota allocations among quarters will be as follows: Quarter 1: 5,649.1 mt (33.23%), Quarter 2: 2,993.7 mt, (17.61%),Quarter 3: 2,941 mt (17.3 %),Quarter 4: 5,416.2 mt (31.86 %). In addition, the Council recommends for Quarters 1 through 3, that the directed fishery be closed when 80% of the quarter's allocation has been taken and that vessels be restricted a 2,500 pound trip limit for the remainder of the quarter. In addition, the Council recommends that quarterly overages be deducted as follows: an overage in quarter 1 will be deducted from quarter 3 and an overage in quarter 2 will be deducted from quarter 4. When 95% of the total annual quota has been taken (i.e,

16,150 mt) the trip limit will be reduced to 2,500 pounds and will in remain in effect for the rest of the fishing year.

As noted above, 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 overfishing definition for *Illex* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Illex* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{MSY} is exceeded. Annual quotas will be specified which correspond to a target fishing mortality rate of 75% of F_{MSY}. 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 most recent assessment of the *Illex* stock (SAW 29) concluded that the stock is not in an overfished condition and that overfishing is 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.

Since data limitations did not allow an update of yield estimates at the threshold and target fishing mortality rates, the Council recommends that the specification of MAX OY and ABC be specified at 24,000 mt (yield associated with F_{msy} and the 2000 status quo). Under this option, the directed fishery for Illex would remain open until 95% of ABC is taken. When 95% of ABC is taken, the directed fishery will be closed and a 5,000 pound trip limit will remain in effect for the remainder of the fishing year.

6.1.3 Ecology of the stocks

Ecological relationships were discussed in length in the original Fishery Management Plan for the Squid Fishery of the Northwest Atlantic Ocean. These are summarized below.

6.1.3.1 Prey and Predator Relationships

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".

Bluefish, sea ravens, spiny dogfish, and the Atlantic angel shark are known to be major predators of the longfin squid. The fourspot flounder, witch flounder, roughtail stingray, and the white hake are also known to prey on Loligo. In many cases, squid remains in the stomach of fish are only identified as "squid" with no reference to the species. It is likely that some of these animals are Loligo and there are at least 42 other species of "squid"-eating fish in addition to those identified above. Food habits of squid are difficult to quantify because the squid do not swallow their prey whole. They are known to prey on other squid, fish, and crustaceans such as krill.

6.1.4 Economic and Social Environment

Unlike Atlantic mackerel, the squid fisheries do not have a recreational component. However, Illex squid is a popular form of bait for several recreational fisheries. Impacts to the abundance, availability, and demand for Illex will cause indirect but real costs and benefits to the recreational sector depending upon the effects of these parameters on the price of Illex.

Increased ability to export domestic squid has caused an expansion of U.S. processing and harvesting of squids. Amendment 5 eliminated the possibility of JV or TALFF for both species of squid since both fisheries are fully utilized by the US fishing fleet. The annual quotas specified for 2001 set the annual harvest of both squid species at levels which will prevent overfishing. Based on the modeling results and subsequent recommendations of SAW-29, allowing the domestic fishery to develop and expand any further could be deleterious to both the stock and the fishery.

6.1.5 Other Management Actions: Adjustment of Trip Limit Language

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish FMP established a trip limit of 2,500 pounds when 95% of the annual quota has been taken. The intent of the Council in establishing a trip limit of 2,500 pounds was to restrict landings to this amount on a per trip basis. The Council did not anticipate vessels landing more than one trip per day. A major concern of the Council was the unanticipated practice of vessels making multiple trips in a single day in 2000. This practice occurred during the second trimester when large concentrations of *Loligo* squid were located relatively close to shore. Due to their close proximity to landing facilities, vessels were landing as many as five trips of 2,500 pounds in a single day. This result was that the second trimester quota was exceeded by a considerable amount (by about 40% as of July 15, 2000). To rectify this situation, the Council recommends that additional language be added in the 2001 annual specifications that prohibits vessels from landing more than the trip limit specified during any single day. A day is to be defined as a 24 hour period beginning at 0001 hrs and ending at 2400 hrs on the same calendar date. This specification of a trip limit will apply to *Loligo* as well as the other species managed under this FMP (i.e., *Illex*, butterfish, and Atlantic mackerel).

6.2 Environmental consequences of the proposed action (preferred alternatives)

The analysis of economic impacts contained in the RIR is incorporated by reference to supplement the economic analysis provided here. The social impacts of each alternative are expected to vary in accordance with the economic impacts of each one. Based on the non-restrictive nature of these specifications and considering the extent of the fisheries as described in the IRFA, there should be little social impacts as the result of these specifications.

6.2.1 Impact of the IOY

The proposed action (preferred alternatives) for *Loligo* and *Illex* squid are summarized in Table 5. The proposed IOY specifications for the 2001 squid fisheries are 24,000 MT for *Illex* and 17,000 MT for *Loligo*. Recent increases in the domestic harvest of these species reflect enhanced economic opportunities for *Illex* and *Loligo* in the world market.

The removal of 24,000 MT of *Illex* and 17,000 MT of Loligo will have no significant effect on the abundance of these stocks. The Max OY of 24,000 MT for *Illex* is a conservative estimate of optimum yield based the recommendations of SAW-29. The Max OY of 26,000 MT of *Loligo* equals the MSY proxy for the fishery based on the assumption that *Loligo* live only one year from SAW-21.

6.2.2 Impact of Other Management Actions: Adjustment of Trip Limit Specification

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish FMP established a trip limit of 2,500 pounds when 95% of the annual quota has been taken. The intent of the Council in establishing a trip limit of 2,500 pounds was to restrict landings to this amount on a per trip basis. The Council did not anticipate vessels landing more than one trip per day. A major concern of the Council was the unanticipated practice of vessels making multiple trips in a single day in 2000. This practice occurred during the second trimester when large concentrations of *Loligo* squid were located relatively close to shore. Due to their close proximity to landing facilities, vessels were landing as many as five trips of 2,500 pounds in a single day. This result was that the second trimester quota was exceeded by a considerable amount (by about 40% as of July 15, 2000). To rectify this situation, the Council recommends that additional language be added in the 2001 annual specifications that would modify the landing limits in the Atlantic mackerel, squid and butterfish fisheries to prohibit multiple landings in a single calendar day. This modification is intended to allow landings of fish caught incidentally while targeting other species, but to discourage directed fishing after the directed fisheries for these species are closed. While there have been no reports of vessels in the Atlantic mackerel or butterfish fisheries making multiple landings per day under landing limits, this has become a concern in the *Loligo* fishery. In addition, the Council recommended redefining the incidental allowance as a possession limit, rather than a landing limit, to enhance at-sea enforcement. These changes will help to ensure that the *Loligo* quota for a given quarter, as well as the overall annual *Loligo* quota, are not exceeded.

Most reported multiple daily landings of Loligo squid occurred off Long Island, NY during the summer of 2000, primarily near Shinnecock Inlet. Therefore, vessel trip report (VTR) data is not available to quantitatively access the number of vessels landing multiple trips under the 2,500 lb (1,134 kg) incidental catch allowance for Loligo squid, or how many trips would be lost from a regulatory change prohibiting the activity. Best available information shows that approximately 60 different vessels made more than one landing per day of Loligo squid at least once during July and August 2000. Therefore, assuming these sixty vessels forego 10 trips of 2,500 lb (1,134 kg), then 3 million lb (1,360,800 kg) of Loligo squid would be conserved. However, if these landings create overages to that periods quota allocation they would be deducted from subsequent quota periods or years, then the overall conservation savings would remain unchanged. In conclusion, the
conservation result of this modification to the landing limits is either positive or neutral.

6.3 Alternative Actions

The following alternative actions for the squid specifications were considered in this environmental analysis as follows:

Alternatives 1 (2000 Status Quo) and 2 for *Loligo* squid are given below.

TABLE 6. ALTERNATIVE ANNUAL SPECIFICATIONS FOR THE LOLIGO SQUID FOR THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2001 (in metric tons (mt)).

Specifications	Loligo Squid	
	Alt. 1	Alt. 2
Max OY[1]	26,000	24,000
ABC	13,000	11,700
IOY	13,000	11,700
DAH	13,000	11,700
DAP	13,000	11,700
JVP	0	0
TALFF	0	0

[1] Maximum OY as stated in the FMP.

Alternatives 1 and 2 (1999 status quo) for *Illex* squid are given below:

TABLE 7. ALTERNATIVE ANNUAL SPECIFICATIONS FOR THE *ILLEX* SQUID FOR THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2001 (in metric tons (mt)).

Specifications	Illex Squid	
	Alt. 1	Alt. 2
Max OY[1]	30,000	24,000
ABC	30,000	19,000
IOY	30,000	19,000
DAH	30,000	19,000
DAP	30,000	19,000
JVP	0	0
TALFF	0	0

[1] Maximum OY as stated in the FMP.

6.4 Environmental consequences of the Alternative Actions

The analysis of economic impacts contained in the RIR is incorporated by reference to supplement the economic analysis provided here. The social impacts of each alternative are expected to vary in accordance with the economic impacts of each one. Based on the non-restrictive nature of these specifications and considering the extent of the fisheries as described in the IRFA, there should be little social impacts as the result of these specifications.

6.4.1 Alternative 1 for Loligo: Maintain 2000 Specifications in 2001 (status quo)

The FMP defines overfishing for *Loligo* as occurring when the catch associated with a threshold 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}. Max OY is specified as the catch associated with a F_{MAX}. In addition, the biomass target is specified to equal B_{MSY}.

The most recent stock assessment for *Loligo* (the 29th Northeast Regional Stock Assessment Workshop, August 1999 (SAW-29)) concluded that the stock was approaching an overfished condition and that overfishing was occurring. More recently, NMFS' Report to Congress: Status of Fisheries of the United States (October 1999) determined that the *Loligo* stock was overfished at the time the report was written. A production model indicated that current biomass was less than B_{MSY}, and near the biomass threshold of 50 percent B_{MSY}. There was a high probability that F exceeded F_{MSY} in 1998. The average F from the winter fishery (October to March) over the last 5 years averaged 180 percent of F_{MSY}, and F from the summer fishery equaled F_{MSY}. In addition, indices of recruitment were well below average.

The Magnuson-Stevens Fishery Conservation and Management Act required the Council to take remedial action for 2000 to rebuild the stock to a level that will produce MSY (B_{MSY}) given the status determination that *Loligo* was overfished. The control rule in the FMP specifies that the target F must be reduced to zero if biomass falls below 50 percent of B_{MSY}. The target F increases linearly to 75 percent of F_{MSY} as biomass increases to B_{MSY}. However, projections made in SAW-29 indicate that the *Loligo* control rule appears to be overly conservative. The projections presented demonstrate that the stock could be rebuilt in a relatively short period of time, even at F values approaching F_{MSY}. Projections indicated that the *Loligo* biomass could be rebuilt to levels approximating B_{MSY} in 3 to 5 years if F is reduced to 90 percent of F_{MSY}. The yield associated with this F (90 percent of F_{MSY}) in 2000, assuming status quo F in 1999, was estimated to be 13,000 mt based on projections from SAW-29. The establishment of 4-month periods spread F out over the year and was expected to protect spawners. The current regulations still specify Max OY as the yield associated with $F_{MAX,}$ or 26,000 mt.

In determining the specification of ABC for the year 2000, the Council considered the SAW-29 projections. Based on these analyses, the Council chose to specify ABC as the yield associated with 90 percent of $F_{MSY,}$ or 13,000 mt. However, recent stock assessment data indicate that the Loligo stock has increased in size and is currently at or near B_{msy}. As a result, maintaining ABC at 13,000 in 2001 would cause unnecessary reductions in yield and loss of revenue to the fishery.

6.4.2 Alternative 2 for Loligo: MAX OY of 26,000 mt and ABC, IOY, DAH, DAP of 11,700 mt

In determining the specification of ABC for the year 2001, the Council considered the recommendations of SAW-29. Based on these analyses, the Council would have chosen to specify ABC as the yield associated with 75 percent of $F_{MSY,}$ or 11,700 mt. However, recent stock assessment data indicate that the *Loligo* stock has increased in size and is currently at or near B_{msy}. As a result, specifying ABC at 11,700 in 2001 would cause unnecessary reductions in yield and loss of revenue to the fishery.

6.4.3 Alternative 1 for Illex: 30,000 MT of ABC, IOY, DAH, DAP

The specifications of 30,000 mt for Max OY, ABC, IOY, DAH and DAP for the *Illex* fishery may cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for Illex using recently developed information on the age and growth of *Illex* using daily statolith growth increments. These findings indicate that Illex is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a

result the biological reference points for *Illex* were re-estimated in SAW-21. The Council recently developed Amendments 6 and 8 to the FMP which incorporated the recommendations of SAW-21 in the development of a new definition of overfishing for *Illex* and also recommended that overfishing be defined to occur when fishing mortality exceeds F_{msy}. The current estimate of yield at F_{msy} equals 24,000 mt. If ABC, IOY, DAH and DAP were all specified at a level above that associated with the overfishing threshold (F_{msy}), then the Council would not be implementing the FMP according to the most recent Amendment . In addition, SAW-21 advised that catches in excess of 24,000 mt may only be attainable in years of high abundance.

6.4.4 Alternative 2 for Illex: Max OY at 24,000 MT and ABC, IOY, DAH, DAP of 19,000 mt (1999 Status Quo)

The specifications of 24,000 mt for Max OY and , ABC, IOY, DAH and DAP of 19,000 mt for the *Illex* fishery would not be expected to cause a significant change in the abundance of the resource or the all size index. The Council recently developed Amendments 6 and 8 to the FMP which incorporated the recommendations of SAW- 21 in the development of a new definition of overfishing for *Illex* and also recommended that overfishing be defined to occur when fishing mortality exceeds F_{msy}. The current estimate of yield at F_{msy} equals 24,000 mt.

7.0 Butterfish

The proposed specifications (preferred alternative) for the 2001 Atlantic butterfish fishery are contained in Table 5. The 2001 quota specifications for butterfish remain the same as those specified in 2000, with the exception of a specification of a bycatch TALFF which is computed as 0.08% of the TALFF specified for Atlantic mackerel.

7.1 Description of the Fisheries

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962. Reported landings averaged about 3,000 mt from 1920-1962. 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.

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 3631 mt

and 2031 mt in 1994 and 1995 , respectively. NMFS weighout data indicate that US butterfish landings increased to 3489 mt in 1996 (valued at $5.1 million) and then decreased to 2,797 mt (valued at $4.7 million) in 1997.

7.2 Status of the Stocks (Report of the Seventeenth Northeast Regional Stock Assessment Workshop)

The SAW 17 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 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 recommended that data be collected that would allow discard levels to be reliably estimated.

7.3 Proposed action (preferred alternative) for butterfish in 2001

The proposed specifications (preferred alternative) for the 2001 Atlantic butterfish fishery are contained in Table 3. The 2001 quota specifications for butterfish remain the same as those specified in 2000, with the exception of a specification of a bycatch TALFF which is computed as 0.08% of the TALFF specified for Atlantic mackerel.

7.4 Environmental consequences of the proposed action

No new assessment information exists since SAW-17. Based on the recommendations of SAW-17, ABC should not exceed 7,200 mt. In addition, the Council chose a risk averse approach by setting DAP and DAH at 5,897 mt. This level was chosen because considerable uncertainty exists about the level of discards in the directed fishery. The IOY of 5,900 mt consists of DAH set at 5897 mt and 3 mt specified as bycatch TALFF. The IOY of 5,900 mt was set to allow for discards such that the ABC of 7,200 mt should not be exceeded.

As noted above, TALFF is 3 mt since TALFF for Atlantic mackerel is specified at 3,000 mt (there is a bycatch TALFF specification necessary for butterfish equal to 0.08% of the mackerel TALFF). The foreign mackerel trawl fishery was known to accidentally kill pilot whales, common dolphin, offshore bottlenose dolphin, Atlantic white-sided dolphin, and grampus in their trawling operations. The domestic component of this fishery also takes marine mammals. The June 1991 Draft Legislative Environmental Impact Statement for the Proposed Regime to Govern Interactions Between Marine Mammals and Commercial Fishing Operations determined that the number of marine mammals taken in these fisheries were low in comparison to likely abundance levels. Under the current Marine Mammal Exemption Program, the foreign mackerel trawl fishery is listed as a Category I fishery and the domestic mackerel trawl fishery is listed as a Category II fishery. Fishermen participating in these fisheries must register for the Exemption Program, keep daily logs of fishing activities and marine mammal interactions, and the foreign fishery must take observers when requested.

7.5 Alternative Actions

The three alternative actions for the butterfish specifications which were considered in this environmental analysis are given below.

TABLE 8. ALTERNATIVE ANNUAL SPECIFICATIONS FOR THE BUTTERFISH FOR THE FISHING YE JANUARY 1 THROUGH DECEMBER 31, 2001 (in metric tons (mt)).

Specifications	Butterfish		
	Alt. 1	Alt. 2	Alt 3.
Max OY[1]	16,000	16,000	16,000
ABC	7,200	16,000	10,000
IOY	5,900	16,000	10,000
DAH	5,900	16,000	10,000
DAP	5,900	16,000	10,000
JVP	0	0	0
TALFF	0	0	0

[1] Maximum OY as stated in the FMP.

7.6 Environmental consequences of the alternative actions

The analysis of economic impacts contained in the RIR is incorporated by reference to supplement the economic analysis provided here. The social impacts of each alternative are expected to vary in accordance with the economic impacts of each one. Based on the non-restrictive nature of these specifications and considering the extent of the fisheries as described in the IRFA, there should be little social impacts as the result of these specifications.

7.6.1 Maintain the 2000 status quo in 2001

As noted above, TALFF is 3 mt in the preferred alternative since TALFF for Atlantic mackerel is specified at 3,000 mt (there is a bycatch TALFF specification necessary for butterfish equal to 0.08% of the mackerel TALFF). If the status 2000 quo for TALFF (i.e., TALFF equal to zero) were maintained in 2001, the specifications would be in violation of current regulations. In addition, foreign fishing vessels would be required to discard all the butterfish taken. Since discard mortality of discarded butterfish is expected to approach 100%, this would represent economic waste with no measurable biological benefit.

7.6.2 Specify DAH and OY at MAX OY (16,000 mt)

The most recent stock assessment advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish higher than these levels would be deleterious to the stock and the fishery.

7.6.3 Specify DAH and OY at 10,000 mt (1995 specification)

As noted above, the most recent stock assessment for butterfish advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish as high as 10,000 mt would be deleterious to the stock and the fishery.

8.0 Effect on endangered and marine mammals

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish Fishery Management Plan pursuant to Section 7 of the Endangered Species Act of 1973, as amended, concluded that the fishery and management activities regulated by the FMP would have no significant adverse affect on any threatened or endangered species. The final specifications do not include measures that change the basis for that determination. The relationships among the final specifications and various existing applicable laws and policies are fully described is section 9.3 of Amendment 5. Section 9.3.3.1 of Amendment 5 addressed marine mammals and endangered species. The specifications proposed here are based upon the new definitions of overfishing adopted in Amendment 8. Since the new definitions of overfishing are more conservative than previous Amendments and will result in lower annual quotas relative to previous specifications, the possible interactions with and

negative effects on marine mammals should be less than in those analyzed in Amendment 5. By reducing the chance of overfishing of these species, the chances that their populations will be reduced due to fishing will be greatly diminished. This should have a positive effect on marine predators, including whales and dolphins, which depend, in part, on these species as prey. The overall effect on marine mammals should be positive relative to the current specifications.

The foreign mackerel trawl fishery was known to accidentally kill pilot whales, common dolphin, offshore bottlenose dolphin, Atlantic white-sided dolphin, and grampus in their trawling operations. The domestic component of this fishery also takes marine mammals. The June 1991 Draft Legislative Environmental Impact Statement for the Proposed Regime to Govern Interactions Between Marine Mammals and Commercial Fishing Operations determined that the number of marine mammals taken in these fisheries were low in comparison to likely abundance levels. Under the current Marine Mammal Exemption Program, the foreign mackerel trawl fishery is listed as a Category I fishery and the domestic mackerel trawl fishery is listed as a Category II fishery. Fishermen participating in these fisheries must register for the Exemption Program, keep daily logs of fishing activities and marine mammal interactions, and the foreign fishery must take observers when requested.

9.0 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. 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 determined that the 2001 quota specifications for Atlantic mackerel, squid and butterfish will have no more than minimal adverse impact upon the listed EFH.

10.0 Coastal Zone Management Act

The Council has determined that this action is consistent to the maximum extent practicable with the approved coastal zone management programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. This determination was submitted on September 27, 2000, for review by the responsible state agencies under section 307 of the Coastal Zone Management Act.

11.0 List of agencies and persons consulted in formulating the proposed action

The proposed quota was submitted to the National Marine Fisheries Service (NMFS) by the Mid-Atlantic Fishery Management Council.

12.0 Finding of no significant impact

For the reasons discussed above, it is hereby determined that neither approval and implementation of the proposed action nor the alternative would affect significantly the quality of the human environment, and that the preparation of an environmental impact statement for these 2001 specifications for Atlantic mackerel, *Loligo, Illex,* and butterfish is not required by section 101(2)(c) of the National Environmental Policy Act nor its implementing regulations.

_____ _____

Assistant Administrator for Fisheries, NOAA Date

REGULATORY IMPACT REVIEW AND INITIAL REGULATORY FLEXIBILITY ANALYSIS FOR THE 2001 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH

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.

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

1.1. 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. METHODOLOGY AND FRAMEWORK FOR ANALYSIS

The basic approach adopted in this RIR is an assessment of management measures from the standpoint of determining the resulting changes in costs and benefits to society. The effects of actions were analyzed by employing quantitative approaches to the extent possible. Otherwise, qualitative analyses were conducted.

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 CS represents net benefits to consumers. When the information necessary to plot the supply and demand curves for a particular commodity is available, consumer surplus is represented by the area that is below the demand curve and above the market clearing price where the two curves intersect. 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.

3. IMPACTS OF PROPOSED ALTERNATIVES

3.1. Proposed Action

Regulations implementing the Fishery Management Plan for the Atlantic Mackerel, Squid, and Butterfish Fisheries (FMP) prepared by the Council appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish a notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP. No reserves are permitted under the FMP for any of these species. Procedures for determining the initial annual amounts are found in §648.21. The term IOY is used in this fishery to reinforce the fact that the Regional Administrator may alter this specification up to the ABC if economic and social conditions warrant an increase. Therefore, this specification is no different than OY or optimum yield.

3.1.1 Atlantic Mackerel

The proposed 2001 specifications for Atlantic mackerel are contained in Table 1 below.

TABLE 1. PROPOSED ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 2001 (in metric tons (mt))

Max OY	N/A[1]
ABC	347,000
IOY	88,000
DAH	85,000[2]
DAP	50,000
JVP	20,000[3]
TALFF	3,000

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the specifications contained in the regulations (50 CFR part 648)

[3] The specifications for IOY, DAH, and JVP may increased by 10,000 mt each at the discretion of the Regional Administrator without further consultation with the Council. .

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

There is a chance that domestic harvest of Atlantic mackerel could also increase due to the proposed increase in JVP specification. In addition, the intent of the Council in specifying TALFF at 3,000 mt was to stimulate JVP activity. If this policy is successful, then domestic landings would increase.

Prices

Given the likelihood that the proposed measures for Atlantic mackerel will result in small changes in mackerel landings and that mackerel 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.

Consumer Surplus

Assuming Atlantic mackerel prices will not be affected under the scenario constructed above, there will be no corresponding change in consumer surplus associated with these fisheries.

Harvest Costs

No changes to harvest costs are expected as a result of the proposed measures.

Producer surplus

Assuming Atlantic mackerel prices will not be affected under the scenario constructed above, there will be no corresponding change in producer surplus associated with these fisheries.

Enforcement Costs

The proposed measures are not expected to change enforcement costs.

Distributive Effects

There are no changes to the quota allocation process for Atlantic mackerel. As such, no distributional effects are identified for this fishery.

Impacts of TALFF

The presence of foreign fishing and processing vessels off US shores has long been a controversial matter, usually drawing strong opinions on both sides of the issue. The following sections attempt to highlight some of the benefits and costs of foreign involvement in the US mackerel fishery. A simple numerical calculation is not feasible, as most of the positive and negative

aspects cannot be quantified. Ultimately, a policy decision must be made as to which course of action is in the best interests of the US.

The 3,000 TALFF recommendation is based on the fact that US mackerel production in recent years has been far lower than historical levels. The Council believes that allocation of a small amount of TALFF will help stimulate JVP activity which will benefit the domestic harvest sector. However, the Council also recognizes that mackerel caught by foreign vessels in US waters enters the world market in direct competition with mackerel harvested by US vessels. In 1992 and again in 1995, the Council conducted an analysis which concluded that specification of zero TALFF will yield positive benefits to the fishery and to the Nation. Subsequent analyses in more recent quota papers indicated that the conclusion about zero TALFF has not changed. However, based on a review of the state of the world mackerel market and US recent production levels this year, the Council concluded that the specification of TALFF 3,000 mt may yield positive benefits to the fishery and to the Nation.

Assuming that the foreign caught product does not go directly into the small markets now supplied by US exporters, there is little likelihood that the additional metric tons from TALFF going into the world-wide market will reduce the price received by fishermen to the extent that the JVP operation would not be a plus in the regional accounting.

Summary of Impacts

In the case of the Atlantic mackerel specifications, the 2001 specification of IOY (88,000 mt) far exceeds landings of the species for the period 1996-1999 (average=13,918 mt). The IOY specification far exceeds recent harvest in the fishery and the specification of ABC is an order of magnitude greater than recent landings. Therefore, the final 2001 quota specifications for the Atlantic mackerel fishery represent no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act. As a result, the final specifications for Atlantic mackerel will have no negative impacts on businesses involved in the commercial harvest Atlantic mackerel.

3.1.2. Atlantic Squids and Butterfish

The proposed specifications for the 2001 Atlantic squid and butterfish fisheries are contained in Table 2 below.

TABLE 2. PROPOSED ANNUAL SPECIFICATIONS FOR THE ATLANTIC SQUID AND BUTTERFISH F THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2001 (in metric tons (mt)).

Specifications	Squid		Butterfish
	Loligo	*Illex*	
Max OY[1]	26,000	24,000	16,000
ABC	17,000	24,000	7,200
IOY	17,000	24,000	5,900
DAH	17,000	24,000	5,897
DAP	17,000	24,000	5,897
JVP	0	0	0
TALFF	0	0	3

[1] Maximum OY as stated in the FMP.

The proposed specifications for the 2001 squid fisheries are 24,000 MT for *Illex* and 17,000 MT for *Loligo* . Recent increases in the domestic harvest of these species reflect enhanced economic opportunities emanating from the shortage of supply of *Loligo* in the world market.

The Max OY of 24,000 MT for *Illex* is based upon the recommendation of SAW-29. The Max OY of 26,000 MT of *Loligo* equals the MSY for the fishery based on the assumption that *Loligo* live only one year from SAW-21 and SAW-29. The proposed 2001 specification of IOY for butterfish will have no effect on the fisheries for this species relative to 1999 specification of IOY because it remains unchanged. The 2001 specification of 24,000 mt for ABC and IOY for *Illex* represent an increase from 22,800 mt in 1999 and maintains the 2000 specification . The increase in these specifications in 2000 and 2001 reflect the findings of SAW-29 which indicated that *Illex* landings of 24,000 mt will have a positive impact on the US fisheries for *Illex* by allowing a slightly higher level of landings while preventing overfishing of the stock. The proposed specifications for *Loligo* will have a positive effect on the *Loligo* fisheries since the fisheries were constrained to 13,000 mt (increase to 15,000 mt by Inseason Action) in 2000. This constraint in 2000 was necessary because SAW-29 concluded that the *Loligo* stock was approaching an overfished condition and that overfishing was occurring at that time. The reduction in the 2000 specifications ended overfishing and the stock has grown to level believed to be at of near the B_{MSY} level. Thus, the

short term reduction in specifications for *Loligo* in 2000 has yielded long term benefits to both the stock and the fishery since the specifications can now be increased to the yield associated with 75% of F_{msy} at the B_{msy} level.

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

Under the proposed alternatives for these species, only the *Loligo* fishery is expected to experience a significant change in landings due to the proposed specifications for 2001. *Loligo* landings are expected to increase in 2001, provided that the stock remains at or near the B_{msy} level.

Prices

It is possible that given the increase in *Loligo* landings, price for this species may decrease holding all other factors equal. The price of *Illex* and butterfish is expected to remain unchanged.

Consumer Surplus

Assuming *Illex* and butterfish prices will not be affected under the scenario constructed above, there will be no corresponding change in consumer surplus associated with these fisheries. However, given the potential decrease in *Loligo* prices, consumer surplus associated with this fishery may increase.

Harvest Costs

No changes to harvest costs are expected as a result of the proposed measures.

Producer surplus

Assuming *Illex* and butterfish prices will not be affected under the scenario constructed above, there will be no corresponding change in producer surplus associated with these fisheries. However, given the potential decrease in *Loligo* prices, producer surplus associated with this fishery may decrease.

Enforcement Costs

The proposed measures are not expected to change enforcement costs.

Distributive Effects

There are no changes to the quota allocation process for *Illex* and butterfish. As such, no distributional effects are identified for these fisheries. In the case of *Loligo*, the specification of

quarterly allocations should result in a more equitable distribution of the annual quota in time and space.

Summary of Impacts

Summary of Impacts

In the case of *Loligo*, because the species was designated as overfished, the Council was required under the Sustainable Fisheries Act to implement a stock rebuilding strategy in 2000 which would allow the *Loligo* stock to rebuild to levels which will support MSY in ten years or less. Stock projections from SAW-29 indicated that the stock would rebuild relatively quickly to the B_{msy} level in three to five years if fishing mortality was reduced below F_{msy}. As a result, the Council chose to specify ABC for 2000 at 90% of F_{msy} or 13,000 mt (increase to 15,000 mt by Inseason Action). This specification represented a reduction from the 21,000 mt ABC specified in 1999. However, the specification represented only an 20% reduction in landings relative to the average landings for the four year base period of 1996-1999. The 2000 ABC specification for *Loligo*, therefore, was likely to result in a reduction in revenue greater than 5% for vessels engaged in the directed fishery for *Loligo* relative to landings in recent years. However, the proposed specification of ABC for 2001 will result in an increase in catch and revenue in the *Loligo* fishery relative to both the average 1996-1999 *Loligo* landings and 2000 specifications (i.e, if the status quo were maintained).

For the purpose of this analysis, the effects of the proposed ABC specification for *Loligo* are assessed relative to the average landings for the period 1996-1999. The increases in revenue to the fishery would have been greater compared to the 2000 specification of 13,000 mt (increase to 15,000 mt by Inseason Action). As noted above, the potential changes in revenues for the 2001 *Loligo* ABC specification were evaluated in relative to average landings for the period 1996-1999. During the period 1996-1999, *Loligo* landings averaged 16,348 mt valued (on average) at $27.4 million. The proposed ABC specification for *Loligo* in 2001 is 17,000 mt or an increase of 652 mt relative to the 1996-1999 landings. Increases in gross revenues to vessels are expected to be about $1.1 million compared to 1996-1999 average landings, assuming no increase in the price of *Loligo* in 2001. During the period 1996-1999, 475 vessels landed 16,348 mt of *Loligo* (on average) based on unpublished NMFS Dealer Reports. Based on these years, gross revenues for vessels engaged in the directed *Loligo* fishery are expected to increase, on average, by about $2,316 per vessel in 2001 or about 4% of their revenue derived from *Loligo* fishing. Revenue increases would be less if the price of *Loligo* were to decrease as a result of the increased supply of the product on world markets.

Of the 475 vessels which reported landing *Loligo* during the period 1996-1999, 130 vessels were expected to experience a reduction in total gross revenues (all species combined) between 5 and 10% as a result of the 20% reduction in the *Loligo* quota in 2000. This represents 27.3% of the vessels which landed *Loligo* during the period 1996-1999. The remaining vessels (345 or 72.7%) were expected to experience a reduction in total gross revenues (all species combined) of less than 5% as a result of the 20% reduction in the Loligo quota in 2000. It was concluded that the reduction in the *Loligo* quota in 2000 represented a significant economic impact on small entities under the Regulatory Flexibility Act. In contrast, a surplus exists between the 2001 quota specifica-

tion of 17,000 mt and landings in both the average landings of 16,348 mt during the period 1996-1999 and the projected landings of 16,690 mt in 2000. Therefore, the 2001 *Loligo* ABC specification does not represent a significant economic impact under the Regulatory Flexibility Act.

From 1996-1999, *Illex* landings averaged 15,167 mt valued (on average) at $7.2 million. The proposed ABC specification for *Illex* in 2001 is 24,000 mt. Hence, there exists a surplus between the 2001 ABC specification and what has been landed in recent years. Therefore, it is correct to assume for the 2001 *Illex* fishery that the ABC specification will represent no constraint on vessels in the *Illex* fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

From 1996-1999, butterfish landings averaged 2,592 mt valued (on average) at $3.8 million. The proposed ABC specification for butterfish in 2001 is 7,200 mt. Hence, there exists a surplus between the 2001 ABC specification and what has been landed in recent years. Therefore, it is correct to assume for the 2001 butterfish fishery that the ABC specification will represent no constraint on vessels in the butterfish fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

3.1.2.1 Other Management Actions: Adjustment of Trip Limit Language

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish FMP established a trip limit of 2,500 pounds when 95% of the annual quota has been taken. The intent of the Council in establishing a trip limit of 2,500 pounds was to restrict landings to this amount on a per trip basis. The Council did not anticipate vessels landing more than one trip per day. A major concern of the Council was the unanticipated practice of vessels making multiple trips in a single day in 2000. This practice occurred during the second trimester when large concentrations of *Loligo* squid were located relatively close to shore. Due to their close proximity to landing facilities, vessels were landing as many as five trips of 2,500 pounds in a single day. The result was that the second trimester quota was exceeded by a considerable amount (by about 40% as of July 15, 2000). To rectify this situation, the Council recommends that additional language be added in the 2001 annual specifications that prohibits vessels from landing more than the trip limit specified during any single day. A day is to be defined as a 24 hour period beginning at 0001 hrs and ending at 2400 hrs on the same calendar date. This specification of a trip limit will apply to *Loligo* as well as the other species managed under this FMP (i.e., *Illex*, butterfish, and Atlantic mackerel).

Landings

Only the *Loligo* fishery is expected to affected by the proposed change in the specification of a trip limit for 2001. However, the measure is not expected to result in a significant change landings of Loligo in 2001. While the measure should result in lower landings during periods when the directed fishery is closed, this should be more than offset by the increase in the annual quota for 2001.

Prices

It is possible that given the increase in *Loligo* landings, price for this species may decrease holding all other factors equal. However, this change would likely result from the proposed increase in the quota rather than the specification of one trip limit per calendar day.

Consumer Surplus

Given the potential decrease in *Loligo* prices, consumer surplus associated with this fishery may increase. However, this change would likely result from the proposed increase in the quota rather than the specification of one trip limit per calendar day.

Harvest Costs

No changes to harvest costs are expected as a result of the proposed measure.

Producer surplus

Given the potential decrease in *Loligo* prices, producer surplus associated with this fishery may decrease. However, this change would likely result from the proposed increase in the quota rather than the specification of one trip limit per calendar day.

Enforcement Costs

The proposed measure is not expected to change enforcement costs.

Distributive Effects

In the case of *Loligo*, the specification of one trip limit per calendar day is expected to impact smaller vessels which tend to operate relatively close to shore. However, industry advisors reported that the larger vessels were engage din the practice of landing making multiple trips per day in 2000. Therefore, a portion of the offshore sector of the Loligo fleet would also be affected.

Summary of Impacts

The proposed adjustment of Loligo squid trip limits from 2,500 lb (1,134kg) per trip to 2,500 lb (1,134 kg) per trip per calendar day is expected to affect approximately 60 vessels that have reportedly made multiple landings in a single day. Most reported multiple daily landings of Loligo squid in 2000 occurred during late summer. Due to the recentness of the activity, it is not possible to determine exactly how widespread the practice of making multiple landings in a single day is, or exactly how many trips would be lost from a regulatory change prohibiting the activity. Therefore, an overall assessment of economic impacts is not possible. While it is likely that the specification of one landing per calendar day would affect smaller vessels operating closer to shore to a greater degree than larger offshore vessels, some larger vessels would also be impacted, as they reportedly engaged in the activity as well. Assuming an average ex-vessel price of $0.50/lb (0.5 kg), a reduction in revenues per vessel ranging from $1,250.00/day (one foregone landing of 2,500 lb (1,134 kg)) - $5000.00/day (four foregone landings of 2,500 lb (1,134 kg)) could occur for certain vessels, primarily during late summer when Loligo squid are available in nearshore areas.

The prohibition of multiple daily landings under the trip limit would reduce the occurrence of quota overages, which result in quota deductions in subsequent quota periods. Short-term economic losses from this measure could be offset by quota that would be available in subsequent periods. There is information that Loligo squid prices often increase in the autumn and winter seasons, as compared to the summer season when most multiple daily landings occurred in 2000. If higher autumn and winter prices do occur and landings are redirected from the summer season to autumn and winter because of this proposed measure, then there could be an overall revenue increase. However, some of the approximately 60 vessels that made multiple daily *Loligo* landings during the summer may not be the same vessels that benefit from increased quotas in the autumn, due to limited range of smaller vessels, inclement weather, or employment in other fisheries. So, foregone *Loligo* squid catches from this measure may not always be recouped in subsequent quota periods by the same vessels.

3.2 Alternatives to the Proposed Action

3.2.1 Alternatives to the Proposed Action for Atlantic mackerel in 2001

3.2.1.1 Maintain the 2000 quota specifications for Atlantic mackerel in 2001

The Status Quo 2000 specification of JVP and TALFF in 2001 would not meet the policy objectives of the Council relative to further development of the US domestic harvest of Atlantic mackerel.

3.2.1.2 Specify ABC for Atlantic mackerel at long term potential catch

The Council had proposed in Amendment 5 that the ABC specification be capped at long term potential catch (LTPC). The most recent estimate of LTPC was 150,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. For example, the current adult stock was recently estimated to exceed 2.1 million mt. The specification of ABC at LTPC would effectively result in an exploitation rate of only about 6%, well below the optimal level of exploitation. The level of foregone yield under this alternative was considered unacceptable.

3.2.1.3 Specify JVP at 0 mt for Atlantic mackerel

Another alternative the Council considered was the elimination of JVP for 2001. The Council rejected this option because they recognized the need for JV's in 2001 to allow US harvesters to take mackerel at levels in excess of current US processing capacity. However, in the future the Council intends to eliminate JV's as US processing and export capacity increases.

3.2.1.4 Impacts of the Alternatives to the Proposed Action for Atlantic mackerel

The first alternative action for Atlantic mackerel considered by the Council was to maintain the 2000 specifications for Atlantic mackerel for 2001. The Status Quo 2000 specification of JVP and TALFF in 2001 would not meet the policy objectives of the Council relative to further development of the US domestic harvest of Atlantic mackerel. Therefore, this alternative was rejected. This option would not have changed the specification of ABC, however. The 2000 specification of ABC

far exceeds landings of the species for the period 1996-1998 (average=15,452 mt) and is an order of magnitude greater than recent landings. Therefore, this alternative to the proposed 2001 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The second alternative action for Atlantic mackerel considered by the Council was to specify ABC at long term potential catch (LTPC). The most recent estimate of LTPC was 150,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. This option would not have changed the specification of IOY, however. The 2001 specification of IOY (88,000 mt) far exceeds landings of the species for the period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC at 150,000 mt is an order of magnitude greater than recent landings. Therefore, this alternative to the proposed 2001 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The third alternative the Council considered for Atlantic mackerel was the elimination of JVP for 2001. The Council rejected this option because they recognized the need for JV's in 2001 to allow US harvesters to take mackerel at levels in excess of current US processing capacity. This option would have changed the specification of IOY to 58,000 mt. However, the specification of IOY at 58,000 mt far exceeds landings of the species for the period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC at 347,000 mt is an order of magnitude greater than recent landings. Therefore, this alternative to the proposed 2001 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

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

None of the alternatives considered for Atlantic mackerel would be expected to affect landings of the species.

Prices

Given the likelihood that the alternatives considered for Atlantic mackerel would not result in changes in mackerel landings and the fact that mackerel prices are a function of numerous factors including world supply and demand, it is assumed that there would be no change in the price for this species under any of the alternatives considered.

Consumer Surplus

Assuming Atlantic mackerel prices will not be affected under the alternatives described above, there would be no corresponding change in consumer surplus associated with these alternatives.

Harvest Costs

No changes to harvest costs would be expected as a result of the alternatives considered.

Producer surplus

Assuming Atlantic mackerel prices will not be affected under the alternatives considered, there would be no corresponding change in producer surplus associated with these alternatives.

Enforcement Costs

The alternatives considered would not be expected to change enforcement costs.

Distributive Effects

There were no changes to the quota allocation process for Atlantic mackerel associated with the alternatives considered. As such, no distributional effects were identified for these alternatives.

Summary of Impacts

The alternatives quota specifications considered for the Atlantic mackerel fishery for 2001 would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under the alternatives considered.

3.2.2 Alternatives to the Proposed Action for *Loligo* in 2001

3.2.2.1 For *Loligo* specify Max OY at 26,000 mt and ABC, IOY, DAH and DAP at 13,000 mt

The specifications of 26,000 mt for Max OY and ABC, and IOY, DAH and DAP at 13,000 for the Loligo fishery would not cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for Loligo using recently developed information on the age and growth of Loligo using daily statolith growth increments. These findings indicate that Loligo is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a result, real-time assessment/management system will be needed to attain full exploitation of the stocks while, at the same time, ensuring that adequate levels of spawning stock are maintained. Amendment 6 to the FMP established a new definition of overfishing for *Loligo* (F_{max}) and also recommended that annual quotas be specified at a target fishing mortality rate of F_{50}.

3.2.2.2 For *Loligo* specify Max OY at 26,000 mt and ABC, IOY, DAH and DAP at 11,700 mt

The specifications of 26,000 mt for Max OY and ABC, and IOY, DAH and DAP at 11,700 for the Loligo fishery would not cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for Loligo using recently developed information on the age and growth of Loligo using daily statolith growth increments. These findings indicate that Loligo is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a result, real-time assessment/management system will be needed to attain full exploitation of the stocks while, at the same time, ensuring that adequate levels of spawning stock are maintained. Amendment 6 to the FMP established a new definition of overfishing for *Loligo* (F_{max}) and also recommended that annual quotas be specified at a target fishing mortality rate of F_{50}.

3.2.3 Alternatives to the Proposed Action for *Illex* in 2001

3.2.3.1 For Illex specify Max OY, ABC, IOY, DAH, DAP at 30,000 mt

The specifications of 30,000 mt for Max OY, ABC, IOY, DAH and DAP for the Illex fishery may cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for Illex using recently developed information on the age and growth of Illex using daily statolith growth increments. These findings indicate that Illex is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a result the biological reference points for Illex were re-estimated in SAW-21. The Council recently developed Amendments 6 and 8 to the FMP which incorporated the recommendations of SAW-21 in the development of a new definition of overfishing for Illex and also recommended that overfishing be defined to occur when fishing mortality exceeds F_{msy}. The current estimate of yield at F_{msy} equals 24,000 mt. If ABC, IOY, DAH and DAP were all specified at a level above that associated with the overfishing threshold (F_{msy}), then the Council would not be implementing the FMP according to the most recent Amendment . In addition, SAW-21 advised that catches in excess of 24,000 mt may only be attainable in years of high abundance.

3.2.3.2 For Illex, Max OY at 24,000 MT and ABC, IOY, DAH, DAP of 19,000 mt (1999 Status Quo)

The specifications of 24,000 mt for Max OY, and ABC, IOY, DAH and DAP at 19,000 mt for the Illex fishery would not cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for Illex using recently developed information on the age and growth of Illex using daily statolith growth increments. These findings indicate that Illex is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a result the biological reference points for Illex were re-estimated in SAW-21. The Council recently developed Amendments 6 and 8 to the FMP which incorporated the recommendations of SAW- 21 in the development of a new definition of overfishing for *Illex* and also recommended that overfishing be defined to occur when fishing mortality exceeds F_{msy}. The current estimate of yield at F_{msy} equals 24,000 mt. Specification of ABC at 19,000 would result in foregone yield.

3.2.4 Alternatives to the Proposed Action for butterfish in 2001

3.2.4.1 Maintain the 2000 status quo in 2001

As noted above, TALFF is 3 mt in the preferred alternative since TALFF for Atlantic mackerel is specified at 3,000 mt (there is a bycatch TALFF specification necessary for butterfish equal to 0.08% of the mackerel TALFF). If the status 2000 quo for TALFF (i.e., TALFF equal to zero) were maintained in 2001, the specifications would be in violation of current regulations. In addition, foreign fishing vessels would be required to discard all the butterfish taken. Since discard mortality of discarded butterfish is expected to approach 100%, this would represent economic waste with no measurable biological benefit.

3.2.4.2 Specify DAH and OY at MAX OY (16,000 mt)

The most recent stock assessment advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish higher than these levels would be deleterious to the stock and the fishery.

3.2.4.3 Specify DAH and OY at 10,000 mt (1995 specification)

As noted above, the most recent stock assessment for butterfish advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish as high as 10,000 mt would be deleterious to the stock and the fishery.

3.2.5 Impacts of Alternative Measures for *Loligo*, *Illex* and Butterfish

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

Under the proposed alternative measures for these species, only the *Loligo* fishery is expected to experience a significant change in landings due to the specifications for the alternative measures proposed in 2001. *Loligo* landings would be expected to decrease in 2001 under either alternative. Due to the anticipated decrease in landings, the Council would expect total revenues to decrease under alternatives 1 and 2 for the *Loligo* fishery by $5.61 million and $7.8 million, respectively. Furthermore, the Council would expect revenue changes per vessel for the *Loligo* fishery to decrease under alternatives 1 and 2 by $11,813 and $16,400, respectively.

Prices

Given the likelihood that the alternative measures for Illex and butterfish would not affect landings, it is assumed that there will not be a change in the price for these species. However, it is possible

that given the substantial decrease in *Loligo* landings under either alternative, the price for this species could increase, holding all other factors equal.

Consumer Surplus

Assuming *Illex* and butterfish prices will not be affected under the scenario constructed above, there will be no corresponding change in consumer surplus associated with these fisheries under the alternative measures considered. However, given the potential increase in *Loligo* prices, consumer surplus associated with this fishery may decrease.

Harvest Costs

No changes to harvest costs are expected as a result of the proposed alternative measures.
Producer surplus

Assuming *Illex* and butterfish prices will not be affected under the scenario constructed above, there will be no corresponding change in producer surplus associated with these fisheries under the alternative measures considered. However, given the potential increase in *Loligo* prices under alternative measures one and two, producer surplus associated with this fishery may increase.

Enforcement Costs

The alternative measures considered are not expected to change enforcement costs.

Distributive Effects

There are no changes to the quota allocation process for *Loligo, Illex* and butterfish under the alternatives considered. As such, no distributional effects are identified for these fisheries.

4. DETERMINATIONS OF A SIGNIFICANT REGULATORY ACTION

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 was estimated at $42.3 million in 1999. 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 actions are necessary to maintain the harvest of squid and butterfish 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 actions 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 actions do 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.

5. REVIEW OF IMPACTS RELATIVE TO THE REGULATORY FLEXIBILITY ACT

5.1. Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to minimize the adverse impacts from burdensome regulations and record keeping requirements on small businesses, small organizations, and small government entities. The category of small entities likely to be affected by the final plan is that of commercial Atlantic mackerel, squid and butterfish fishermen. The impact of the proposed actions on the fishing industry and the economy as a whole are discussed above. The following discussion of impacts centers specifically on the effects of the proposed actions on the mentioned small businesses entities.

5.2. Determination of Significant 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 $2.0 and $3.0 million, respectively. According to NMFS permit file data (8 September 1999) 1980 commercial vessels were holding Atlantic mackerel permits, 425 vessels were holding *Loligo*/butterfish moratorium permits, 77 vessels possessed *Illex* permits, 1527 vessels held incidental catch permits and 604 vessels held party/charter permits. There was a total of 2737 distinct vessels holding one or more of the permits described above. All of these vessels readily fall within the definition of small business.

According to guidelines on regulatory analysis of fishery management actions, a "substantial number" of small entities is more than 20 percent of those small entities engaged in the fishery (NMFS 1994). Since the proposed action will directly and indirectly affect most of these vessels, the "substantial number" criterion will be met.

Economic impacts on small business entities are considered to be "significant" if the proposed action would result in any of the following: a) a reduction in annual gross revenues by more than 5 percent; b) an increase in total costs of production by more than 5 percent as a result of an increase in compliance costs; c) an increase in compliance costs as a percent of sales for small entities at least 10 percent higher than compliance costs as a percent of sales for large entities; d) capital costs of compliance represent a significant portion of capital available to small entities, considering internal cash flow and external financing capabilities; or, e) as a "rule of thumb," 2 percent of small businesses entities being forced to cease business operations (NMFS 1994).

5.2.1 Proposed Management Measures

The analyses under economic impacts for each of the proposed management measures analyzed in this section do not show that any business will be forced to cease operations. The implementation of the quota specifications will allow the squid, mackerel, and butterfish fisheries to operate at

sustainable levels, thereby increasing revenues and profits to the industry in the long term relative to an unregulated fishery. In the case of the Atlantic mackerel fisheries, the 2001 specifications should allow for the orderly development of this underutilized species in a controlled manned. For Atlantic mackerel, *Illex* squid, and butterfish, gross revenues are not expected to change as a consequence of the final actions. In the case of butterfish and *Illex*, the specifications for IOY remain unchanged relative to the 2000 specifications. In the case of Atlantic mackerel and *Loligo*, the 2001 specifications represent an increase in the specification of IOY and ABC, respectively relative to 2000. For Atlantic mackerel, *Illex*, and butterfish there exists a surplus between the 2001 ABC specification and what has been landed in recent years. Therefore it is correct to assume that the ABC specifications will 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 *Loligo*, because the species was designated as overfished, the Council was required under the Sustainable Fisheries Act to implement a stock rebuilding strategy in 2000 which would allow the *Loligo* stock to rebuild to levels which will support MSY in ten years or less. Stock projections from SAW-29 indicated that the stock would rebuild relatively quickly to the B_{msy} level in three to five years if fishing mortality was reduced below F_{msy}. As a result, the Council chose to specify ABC for 2000 at 90% of F_{msy} or 13,000 mt (increase to 15,000 mt by Inseason Action). This specification represented a reduction from the 21,000 mt ABC specified in 1999. However, the specification represented only an 20% reduction in landings relative to the average landings for the four year base period of 1996-1999. The 2000 ABC specification for *Loligo*, therefore, was likely to result in a reduction in revenue greater than 5% for vessels engaged in the directed fishery for *Loligo* relative to landings in recent years. However, the proposed specification of ABC for 2001 will result in an increase in catch and revenue in the *Loligo* fishery relative to both the average 1996-1999 *Loligo* landings and 2000 specifications (i.e, if the status quo were maintained).

For the purpose of this analysis, the effects of the proposed ABC specification for *Loligo* are assessed relative to the average landings for the period 1996-1999. The increases in revenue to the fishery would have been greater compared to the 2000 specification of 13,000 mt (increase to 15,000 mt by Inseason Action). As noted above, the potential changes in revenues for the 2001 *Loligo* ABC specification were evaluated relative to average landings for the period 1996-1999. During the period 1996-1999, *Loligo* landings averaged 16,348 mt valued (on average) at $27.4 million. The proposed ABC specification for *Loligo* in 2001 is 17,000 mt or an increase of 652 mt relative to the 1996-1999 landings. Increases in gross revenues to vessels are expected to be about $1.1 million compared to 1996-1999 average landings, assuming no increase in the price of *Loligo* in 2001. During the period 1996-1999, 475 vessels landed 16,348 mt of *Loligo* (on average) based on unpublished NMFS Dealer Reports. Based on these years, gross revenues for vessels engaged in the directed *Loligo* fishery are expected to increase, on average, by about $2,316 per vessel in 2001 or about 4% of their revenue derived from *Loligo* fishing. Revenue increases would be less if the price of *Loligo* were to decrease as a result of the increased supply of the product on world markets.

Of the 475 vessels which reported landing *Loligo* during the period 1996-1999, 130 vessels were expected to experience a reduction in total gross revenues (all species combined) between 5 and

10% as a result of the 20% reduction in the *Loligo* quota in 2000. This represents 27.3% of the vessels which landed *Loligo* during the period 1996-1999. The remaining vessels (345 or 72.7%) were expected to experience a reduction in total gross revenues (all species combined) of less than 5% as a result of the 18% reduction in the Loligo quota in 2000. It was concluded that the reduction in the *Loligo* quota in 2000 represented a significant economic impact on small entities under the Regulatory Flexibility Act. In contrast, a surplus exists between the 2001 quota specification of 17,000 mt and landings in both the average landings of 16,348 mt during the period 1996-1999 and the projected landings of 16,690 mt in 2000. Therefore, the 2001 *Loligo* ABC specification does not represent a significant economic impact under the Regulatory Flexibility Act.

As noted above, 130 vessels (on average) were expected to experience a reduction of total gross revenues of greater than 5% due to the 13,000 mt *Loligo* quota in 2000 (increase to 15,000 mt by Inseason Action). The size distribution of all vessels (in terms of length and gross registered tonnage) which landed *Loligo* during the 1997 is presented in Table 4. Of the 443 vessels that reported landing *Loligo* in 1997, vessel attributes for vessel length and gross registered tonnage were available for 392 vessels from unpublished NMFS permit file data. In terms of length, about 70% of those vessels were less than 75 ft in length, while the remaining vessels (30%) were greater than 75 ft. A comparison of the length distribution of vessels affected by the final quota of 13,000 mt (increase to 15,000 mt by Inseason Action) in 2000 (i.e., those vessels expected to experience a reduction in total gross revenues (all species combined) of greater than 5 %) indicated that the impact of the quota reduction appeared to be equal across all length and tonnage classes. That is, a comparison of the frequency distributions of length and ton class for the total pool of vessels which landed Loligo and those affected by the 2000 quota indicated that there were no disproportionate effects by vessel size class. For example, 19.4% of all vessels which landed Loligo in 1997 were 25-49 ft in length while 18.9% of the affected vessels in 2000 were in this length class. This comparison yields similar conclusions across all length and ton classes of vessels in the fishery. Since revenues are expected to increase in 2001 relative to both the base years of 1996-1999 and the 2000 specification, the 2001 *Loligo* ABC specification does not represent a significant economic impact under the Regulatory Flexibility Act. It follows, therefore, that there will not be any disproportionate effects by vessel size class.

It was concluded that overall, there were no differential effects by size class of vessel due to the 13,000 mt quota for *Loligo* in 2000 (increase to 15,000 mt by Inseason Action). However, management advice from SAW 29 made special note of the fact that yield from this fishery should be distributed throughout the fishing year. Given that the current permitted fleet historically has demonstrated the ability to land Loligo in excess of the 13,000 quota for 2000 (increase to 15,000 mt by Inseason Action), the Council recommended that the annual quota be sub-divided into three quota period or trimesters in 2000. The quota was allocated to each period based on the proportion of landings occurring in each trimester from 1994-1998. Based on the seasonal distribution of landings during this time period, the quota for January-April was 5,460 mt (42% of the total), the quota for May-August was 2,340 mt (18% of the total), and the quota for September-December was 5200 mt (40% of the total). The directed fishery during the first two trimester periods was closed when 90% of the amount allocated to the period was landed and then a trip limit of 2,500 pounds remained in effect until the quota period ends. Any underages from trimesters one and two were to be applied to the next trimester and overages were deducted from

trimester three. The directed fishery was closed in the third trimester when 95% of the annual quota was taken.

As noted above, the 2000 quota was allocated among three four month trimesters in an attempt to ensure that landings and fishing mortality were distributed throughout the fishing year. During Quota Period I in 2000, the directed fishery was closed on March 25, 2000. During Quota Period II, the directed fishery was closed on July 2, 2000. In addition, the quota for each period was exceeded, causing the dislocation of quota from the Quota Period III. As a result of these premature closures and overages, the Council recommends that the 2001 quota of 17,000 mt be allocated as follows. The annual quota will be allocated to quarterly quota periods based on the quarterly seasonal distribution of landings during the period 1994-1998. Based on this criteria, the 2001 quota allocations among quarters will be as follows: Quarter 1: 5,649.1 mt (33.23%), Quarter 2: 2,993.7 mt, (17.61%),Quarter 3: 2,941 mt (17.3 %),Quarter 4: 5,416.2 mt (31.86 %). In addition, the Council recommends for Quarters 1 through 3, that the directed fishery be closed when 80% of the quarter's allocation has been taken and that vessels be restricted a 2,500 pound trip limit for the remainder of the quarter. In addition, the Council recommends that quarterly overages be deducted as follows: an overage in quarter 1 will be deducted from quarter 3 and an overage in quarter 2 will be deducted from quarter 4. When 95% of the total annual quota has been taken (i.e, 16,150 mt) the trip limit will be reduced to 2,500 pounds and will in remain in effect for the rest of the fishing year. It is expected that the trip limits are more likely to affect larger vessels which operate offshore to a greater degree than small inshore vessels. The trip limit trigger is necessary, however, to ensure that the quota allocation for a given trimester period is not exceeded, as well as the overall annual quota.

An additional concern of the Council was the unanticipated practice of vessels making multiple trips in a single day in 2000. This practice occurred during the second trimester when large concentrations of *Loligo* squid were located relatively close to shore. Due to their close proximity to landing facilities, vessels were landing as many as five trips of 2,500 pounds in a single day. This result was that the second trimester quota was exceeded by a considerable amount (by about 40% as of July 15, 2000). To rectify this situation, the Council recommends that additional language be added in the 2001 annual specifications that prohibits vessels from landing more than the trip limit specified during any single day. A day is to be defined as a 24 hour period beginning at 0001 hrs and ending at 2400 hrs on the same calendar date. This specification of a trip limit will apply to *Loligo* as well as the other species managed under this FMP (i.e., *Illex*, butterfish, and Atlantic mackerel).

It is expected that the trip limit specification of one trip per day is more likely to affect smaller vessels which operate closer to shore to a greater degree than larger offshore vessels. The trip limit language of one trip per day is necessary, however, to ensure that the quota allocation for a given trimester period is not exceeded, as well as the overall annual quota. The proposed adjustment of Loligo squid trip limits from 2,500 lb (1,134kg) per trip to 2,500 lb (1,134 kg) per trip per calendar day is expected to affect approximately 60 vessels that have reportedly made multiple landings in a single day. Most reported multiple daily landings of Loligo squid in 2000 occurred during late summer. Due to the recentness of the activity, it is not possible to determine exactly how widespread the practice of making multiple landings in a single day is, or exactly how many trips would be lost from a regulatory change prohibiting the activity. Therefore, an overall assessment of economic impacts is not possible. While it is likely that the specification of one

landing per calendar day would affect smaller vessels operating closer to shore to a greater degree than larger offshore vessels, some larger vessels would also be impacted, as they reportedly engaged in the activity as well.

Descriptive data for vessels which landed Loligo in 1997 relative to home port state, principal port of landing state and vessel owner's state of residence are given in Tables 6-8. In addition, Tables 6-8 provide a relative comparison of the same data for vessels expected to be affected by the 13,000 mt quota for *Loligo* in 2000 (increase to 15,000 mt by Inseason Action). Overall, New York appeared to be the most heavily impacted state. For example, in terms of principal port of landing, vessels landing in New York ports accounted for 21.5% of all vessels landing *Loligo* in 1997. However, vessels landing in New York ports are expected to account for 37.8% of vessels affected by the 13,000 mt quota for Loligo in 2000 (increase to 15,000 mt by Inseason Action). The distribution of vessels expected to be impacted by the quota of 13,000 mt by state, county and home port is given in Table 9. Since revenues are expected to increase in 2001 relative to both the average landings during 1996-1999 and the 2000 specification, the 2001 *Loligo* ABC specification does not represent a significant economic impact under the Regulatory Flexibility Act. It follows, therefore, that there will not be any disproportionate effects by area.

From 1996-1999, *Illex* landings averaged 15,167 mt valued (on average) at $7.2 million. The proposed ABC specification for *Illex* in 2001 is 24,000 mt. Hence, there exists a surplus between the 2001 ABC specification and what has been landed in recent years. As noted earlier, it is correct to assume for the 2001 *Illex* fishery that the ABC specification will represent no constraint on vessels in the *Illex* fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

From 1996-1999, butterfish landings averaged 2,592 mt valued (on average) at $3.8 million. The proposed ABC specification for butterfish in 2001 is 7,200 mt. Hence, there exists a surplus between the 2001 ABC specification and what has been landed in recent years. As noted earlier, it is correct to assume for the 2001 butterfish fishery that the ABC specification will represent no constraint on vessels in the butterfish fishery 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 Atlantic mackerel specifications, the 2001 specification of IOY (88,000 mt) far exceeds landings of the species for the period 1996-1999 (average=13,918 mt). The IOY specification far exceeds recent harvest in the fishery and the specification of ABC is an order of magnitude greater than recent landings. As noted earlier, the final 2001 quota specifications for the Atlantic mackerel fishery represent no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

5.2.2 Alternative Management Measures

5.2.2.1 Atlantic mackerel

The first alternative action for Atlantic mackerel considered by the Council was to maintain the 2000 specifications for Atlantic mackerel for 2001. The Status Quo 2000 specification of JVP and

TALFF in 2001 would not meet the policy objectives of the Council relative to further development of the US domestic harvest of Atlantic mackerel. Therefore, this alternative was rejected. This option would not have changed the specification of ABC, however. The 2000 specification of ABC far exceeds landings of the species for the period 1996-1998 (average=15,452 mt) and is an order of magnitude greater than recent landings. As noted earlier, this alternative to the proposed 2001 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The second alternative action for Atlantic mackerel considered by the Council was to specify ABC at long term potential catch (LTPC). The most recent estimate of LTPC was 150,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. This option would not have changed the specification of IOY, however. The 2001 specification of IOY (88,000 mt) far exceeds landings of the species for the period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC at 150,000 mt is an order of magnitude greater than recent landings. A noted earlier, this alternative to the proposed 2001 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The third alternative the Council considered for Atlantic mackerel was the elimination of JVP for 2001. The Council rejected this option because they recognized the need for JV's in 2001 to allow US harvesters to take mackerel at levels in excess of current US processing capacity. This option would have changed the specification of IOY to 58,000 mt. However, the specification of IOY at 58,000 mt far exceeds landings of the species for the period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC at 347,000 mt is an order of magnitude greater than recent landings. As noted earlier, this alternative to the proposed 2001 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

5.2.2.2 *Loligo* and *Illex* squid

5.2.2.2.1 Alternatives to the Proposed Action for *Loligo* in 2001

The first alternative considered for *Loligo* in 2001 was to specify Max OY at 26,000 mt and ABC, and IOY, DAH and DAP at 13,000. The analysis of economic impacts of this alternative was discussed in section 5.3.1 above. The second alternative considered for *Loligo* in 2001 was to specify Max OY at 26,000 mt and ABC, and IOY, DAH and DAP at 11,700. At this level, the Council would be specifying ABC for 2001 at 75% of F_{msy} or 11,700 mt. This specification represents a reduction from the 21,000 mt ABC specified in 1999. However, the specification represents only a 28% reduction in landings relative to the average landings for the years 1996-1999. The ABC specification for *Loligo* under this alternative, therefore, would likely result in a reduction in revenue greater than 5% for vessels engaged in the directed fishery for *Loligo* relative to landings in recent years.

The potential changes in revenues for the 2001 *Loligo* ABC specification were evaluated in this analysis relative to base years of 1996-1999. As noted earlier, gross revenues are expected to decrease as a consequence of this alternative since this ABC specification is less than what has been landed in those years. During the period 1996-1999, *Loligo* landings averaged 16,348 mt valued (on average) at $27.4 million. The proposed ABC specification for *Loligo* under this alternative would be 11,700 mt or a reduction of 4,648 mt relative to the 1996-1999 landings. Reductions in gross revenues to vessels is expected to be about $7.8 million, assuming no increase in the price of *Loligo* in 2001. During 1996-1999, 475 vessels landed 16,348 mt of *Loligo* (on average) based on unpublished NMFS Dealer Reports. Based on this year, gross revenues for vessels engaged in the directed *Loligo* fishery are expected to lose, on average, about $16,400 per vessel in 2001 or about 28% of their revenue derived from *Loligo* fishing. Revenue losses would be less if the price of *Loligo* were to increase as a result of decreased supply of the product on world markets. Of the 475 vessels which reported landing *Loligo* during 1996-199, 173 vessels would be expected to experience a reduction in total gross revenues (all species combined) greater than 5 % as a result of the 28% reduction in the Loligo quota in 2001 under this alternative. This represents 36% of the vessels which landed Loligo during 1996-1999. The remaining vessels (302 or 64%) would experience a reduction in total gross revenues (all species combined) of less than 5% as a result of a 28% reduction in the *Loligo* quota in 2001. It can be concluded that the proposed reduction in the *Loligo* quota in 2001 under this alternative represents a significant economic impact on small entities under the Regulatory Flexibility Act.

As noted above, 173 vessels are expected to experience a reduction of total gross revenues of greater than 5% due to the alternative quota of 11,700 mt for *Loligo* in 2001. The size distribution of all vessels (in terms of length and gross registered tonnage) which landed *Loligo* in 1997 is presented in Table 5. Of the 443 vessels that reported landing *Loligo* in 1997, vessel attributes for vessel length and gross registered tonnage are available for 392 vessels from unpublished NMFS permit file data. In terms of length, about 70% of those vessels were less than 75 ft in length, while the remaining vessels (30%) were greater than 75 ft. A comparison of the length distribution of vessels affected by the proposed quota of 11,700 mt (i.e., those vessels expected to experience a reduction in total gross revenues (all species combined) of greater than 5 %) indicates that the impact of the proposed quota reduction appears to be equal across all length and tonnage classes. That is, a comparison of the frequency distributions of length and ton class for the total pool of vessels which landed *Loligo* in 1997 and those affected indicates that there are no disproportionate effects by vessel size class. For example, 19.4% of all vessels which landed *Loligo* in 1997 were 25-49 ft in length while 17.5% of the affected vessels were in this length class. This comparison yields similar conclusions across all length and ton classes of vessels in the fishery.

Descriptive data for vessels which landed *Loligo* in 1997 relative to home port state, principal port of landing state and vessel owner's state of residence are given in Tables 6-8. In addition, Tables 6-8 provide a relative comparison of the same data for vessels expected to be affected by the alternative quota of 11,700 mt for *Loligo* in 2001. Overall, New York appears to be the most heavily impacted state. For example, in terms of principal port of landing, vessels landing in New York ports accounted for 21.5% of all vessels landing *Loligo* in 1997. However, vessels landing in New York ports are expected to account for 32.9% of vessels affected by the proposed 11,700 mt

quota for Loligo in 2000. The distribution of vessels expected to be impacted by the alternative quota of 11,700 mt by state, county and home port is given in Table 10.

5.2.2.2.2 Alternatives to the Proposed Action for *Illex* in 2001

The alternative specifications considered for *Illex* for 2001 were 30,000 mt for Max OY, ABC, IOY, DAH and DAP and 30,000 mt for Max OY and 19,000 for ABC, IOY, DAH and DAP . These specifications far exceed recent harvest in the fishery. Therefore, these alternatives to the proposed 2001 quota specifications for the *Illex* fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

5.2.2.2.3 Alternatives to the Proposed Action for butterfish in 2001

The first alternative considered for butterfish was to specify DAH and OY at MAX OY (16,000 mt). The most recent stock assessment advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish higher than these levels would be deleterious to the stock and the fishery. These specifications far exceed recent harvest in the fishery. Therefore, this alternative to the proposed 2001 quota specifications for the butterfish fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The second alternative considered for butterfish was to the 1995 specifications for butterfish in 2001. As noted above, the most recent stock assessment for butterfish advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish as high as 10,000 mt would be deleterious to the stock and the fishery. These specifications far exceed recent harvest in the fishery. Therefore, this alternative to the proposed 2001 quota specifications for the butterfish fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

5.3. Explanation of Why The Action is Being Considered

Regulations implementing the Fishery Management Plan for the Atlantic Mackerel, Squid, and Butterfish Fisheries (FMP) prepared by the Council appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish a notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP.

5.4. Objectives and Legal Basis for the Rule

Refer to the section on Management Objectives of the Amendment document (section 4.3). The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) as amended through October 11, 1996 provides the legal basis for the rule.

5.5. Demographic Analysis

In order to identify the ports important to fisheries managed by the Mid-Atlantic Council and to identify the fisheries relatively important to those ports, the Council retained Dr. Bonnie J. McCay of Rutgers University to prepare a background document (McCay *et al*. 1993). This research covered ports from Chatham, Massachusetts, to Wanchese, North Carolina. McCay *et al.*1993 and was largely based on two data sources, 1992 NMFS landing statistics and information about the ports obtained from interviews with key informants. The quality of the port descriptions, therefore, partially depends on the information supplied by the informants. More recently, McCay and Cierei (2000) provided updated port descriptions for the states from New York to North Carolina based on 1998 landings and personal interviews. The port descriptions that follow for Massachusetts to Connecticut were taken from McCay *et al*. 1993. The port descriptions for the states from New York to North Carolina were condensed from McCay and Cierei (2000). Since the port descriptions provided here are brief summaries of the material contained in McCay *et al*. (1993) and McCay and Cierei (2000), readers requiring more detailed information are encouraged to obtain the original reports.

For purposes of orientation, Barnstable County, MA includes all of Cape Cod, including the fishing port of Chatham. New Bedford is located in Bristol County, MA. The port of Newport is located in Newport County, RI. Galilee is located in Washington County, RI. Stonington is located in New London County, CT. Greenport, Shinnecock/Hampton Bays, and Montauk are located in Suffolk County, NY. Freeport is located in Nassau County, NY. Brooklyn is located in Kings County, NY. Ocean City is located in Worcester County, MD. Virginia has a system whereby certain cities exist apart from counties. Within the scope of this analysis, Hampton, Norfolk, Newport News and Virginia Beach all fall into this category. Wanchese is located in Dare County, NC.

Chatham, Massachusetts

The total landed value of fish in Chatham in 1992 was around $11 million. Groundfish and shellfish --bay scallops, quahogs, and mussels-- comprise the majority of the landed value for Chatham, accounting for over 80% of the landed value. *Loligo* accounted for 2.38% of landed value in 1992, harvested by pound-nets (65%) and fish pots (37%).

Atlantic mackerel accounted for 0.45%, caught by fish pots (77%), draggers (5%), and sink gill nets (4.6%). Pound nets and fish pots or traps accounted for only 4.6% of the total landed value of species in Chatham in 1992. However, *Loligo* accounted for 31% of the fish pot value and 86% of the pound net revenue. Atlantic mackerel accounted for 12% of the fish pot value and 3% of the pound net revenue. Butterfish accounted for 0.33% of the fish pot value and 0.20% of the pound net revenue.

New Bedford, Massachusetts

The squids, mackerel, and butterfish are not important to New Bedford. *Loligo* squid made up 0.05% of the total landed value for New Bedford in 1992. The other species covered by this FMP accounted for less than 0.01%.

Loligo is caught during the spring months of April and May by inshore boats in Nantucket Sound, and more boats are now fishing for *Loligo* offshore, reported a New Bedford port agent. Even into late fall, he said, boats are targeting squid offshore. New Bedford's *Loligo* fleet are those that summer flounder during the summer. They target squid during the spring and fall when they are not going for summer flounder. The port agent reported that some of the small boats offload at sea to freezer boats from Rhode Island.

Newport, Rhode Island

Within Newport, there are three commercial fishing packing and distributing businesses. One mainly deals with draggers, gillnetters, and some scallopers, and brings in a great deal of groundfish. Another is a lobster house, but they also handle the trappers. There is also a trap company located in Newport. Species caught in traps are discussed below. The dealer that handles mostly draggers packs and distributes the majority of species of important to this study. The trap company also deals with these species but not in as large of quantities.

Approximately 15 large draggers were tied up at the fish house that deals with draggers during a recent visit (1992) to Newport. The fish house owner, the local port agent, and fishermen spoken with on this day said that having 15 boats in port at the same time was unusual, and had to do with a storm moving through the area. Most of the boats that offload at the Newport fish house are not from Newport. They are from other ports such as New Bedford, various Long Island ports, Cape May, and Pt. Judith. These boats are going primarily for squid at the time of our visit, which was in December. This particular fish house owner does not own any of the boats that offload at his dock.

The fishermen who make up the crews in Newport are not necessarily from Newport, but some local people from the area do work on the boats. Some crew members come from Point Judith, New Jersey, New York, and New Bedford. Typically, the owners of the boats do not work the boats. Often the owners used to fish but do not anymore. As with almost all of the ports, crews are paid on the share system.

The total value of landings in Newport for 1992 was $14.5 million. Lobster ranked first, accounting for 44% of landed value. *Loligo* ranked sixth.

Other Washington County Communities, RI (including Quonset Point)

The value of the landings at Other Washington County communities including Quonset Point in 1992 was around $20 million.

Other Washington County including Quonset Point includes both traditional and innovative fisheries. Processing facilities for squid in the region have resulted in the dominance of both *Loligo* and *Illex* squid in terms of landed value, but lobster and bay quahogging and oystering remain important, as well as other inshore activities such as eel potting, trapping striped bass, and

an unusual spear fishery for tautog (blackfish). There is some handlining for bluefin tuna and trolling for inshore species such as striped bass and summer flounder as well as yellowfin tuna.

Atlantic mackerel, butterfish, scup, summer flounder, and angler are among the top ten species landed by value, and they figure importantly in the catch of the otter trawl vessels. The gillnet fishery for cod and tautog includes a small amount of angler and Atlantic mackerel. The fish pots are predominantly for scup, but some black sea bass, summer flounder, bluefish, and *Loligo* squid are caught in them too.

Virtually all of the angler, butterfish, weakfish, Atlantic mackerel, and squid landed here are brought in by draggers.

A major fishing location in Washington County is located at Quonset Point, an abandoned Navy Base which houses several isolated industrial developments, including a major offloading facility for car imports. As for commercial fishing, Quonset Point is port to five factory trawlers, two of which are from Rhode Island and three from Portland, Maine. The five trawlers range in length from 117 ft. to 155 ft., and they can hold 4 to 5 hundred thousand lbs. of frozen product per trip. This contrasts with wet boats which have a 150,00 thousand lb. capacity. The Rhode Island boats are owned by the president of a service and sales facility located at Quonset Point. The other three boats are owned by a man from Portland, Maine.

The service and sales facility located at Quonset Point started out with one boat about seven to eight years ago. The two boats owned by the president of the facility at Quonset Point were built specifically as freezer boats. These boats take one to two week trips. The three boats from Maine are converted supply boats and they may stay out as long as thirty days on some trips.

On occasion, the freezer trawlers engage in joint ventures with American boats. The smaller boats will fish and offload onto the freezer boats. The freezer boats have also in the past participated in joint ventures with Russian, Dutch and Polish boats.

The freezer boats target *Loligo* squid, *Illex* squid, butterfish, mackerel, whiting and sometimes scup. They may target herring but not normally.

The *Illex* squid season lasts from June to October, and the freezer boats average 12 day trips when they are working *Illex*. November to May is the *Loligo* season, and the trawlers average 30 days out while they are targeting *Loligo*. Mackerel is caught from December to April.

The freezer trawlers do not have any significant landings of butterfish. Butterfish is available year round, but they are only desirable from December to February because of their fat content.

The Quonset Point boats will fish from North Carolina up to the Canadian border although they rarely go that far north. They fish for *Illex* up to 600 ft (100 fathoms) off the coast of New Jersey. *Loligo* fishing is mostly done around Hudson Canyon and Block Canyon.

The fish is packaged on the boats in plastic bags and placed in aluminum trays. Fiberboard boxes are also used. The boxes hold approximately 27 to 28 pounds of fish and one boat can hold approximately 13,000 boxes, or 360,000 pounds of fish.

The freezer trawlers are at sea 280 days per year. October and May are the slow months. During this time, the crew works on boat maintenance and painting.

In 1992, the average cost of operating one of these boats for two years was $2,200,000, which covered fuel, maintenance, repairs and nets.

The Rhode Island boats have from 9 to 11 crew members plus a captain and all of these crew are from the local area. The service and sales facility at Quonset Point employs twenty-two persons apart from the crews. This number includes office personnel and `lumpers' who unload the boats.

Crew size increases during the *Loligo* squid season. During *Loligo* season the crew sorts the squid into six sizes and also sorts through the bycatch. *Illex* squid catches are much cleaner and do not require sorting through bycatch.

The crews are full-time workers and are paid on a share system. Individuals can make from $40,000 to $60,000 annually. Fuel costs comes off the top of the boat's catch. The boat takes about 52 or 58 percent and the crew takes about 42 or 48 percent. Food comes from the crew share.

Point Judith, RI

Point Judith is almost exclusively a fishing community, having a core group of fishermen who fish full-time. During the summers, the streets are filled with tourists coming or going on the Block Island ferry. Yet there is little for tourists to do in Point Judith. The town does not have the condominiums, shops, and hotels that other ports such as Chatham, Newport, and Montauk have. Only one hotel stands out in Point Judith, the Dutch Inn, which is circa 1960. The few restaurants, shops, and tourist venues, such as fudge shops, are enough to take care of the summer onslaught of ferry passengers and the year round working population centered around commercial fishing.

The total value of fish landed in Point Judith in 1992 was $36.5 million. The top ten species by percent landed value in 1992 were lobster, *Loligo* squid (15%), angler, summer flounder, scup, butterfish (4%), winter flounder, yellowtail, and cod. Mackerel accounted for 1%.

Point Judith has a large fleet of trawlers, gillnetters, and lobster boats. While estimates vary, approximately 200 commercial boats dock in Point Judith, including 80 trawlers, 30 gillnetters, and 100 or so lobster boats.

One informant described Point Judith boats as diverse in their annual round and approach to the fisheries, as opposed to New Bedford boats which only go after groundfish. Point Judith boats which are not diverse are the freezer boats which only target fish for frozen markets -- the squids, butterfish, and mackerel. The diverse approach to fisheries combined with full-time experienced fishermen means the fishermen are fishing year round even if they may switch fisheries and boats during the year.

Stonington, Connecticut

The Long Island sound and its estuaries and rivers are the major foci of Connecticut fisheries. There is a small traditional haul seine fishery for alewives and other fishes (unspecified, for "industrial" uses). Dip-nets are used for blue crabs (and a few alewives). Drift gillnets are used for menhaden, bluefish, weakfish, black sea bass, alewife, Atlantic mackerel, and other species. There is a specialized drift gillnet fishery for American shad. Quahogs (hard clams) are very important, and over 70% of Connecticut's landed value comes from oysters cultivated in Long Island Sound. Second to oysters are lobsters, most of which are caught inshore in the sound. Third in value is a mixed species otter trawl fishery, most of which is based in the port of Stonington.

Stonington is the primary port in Connecticut. The main fishing fleet is out of Stonington. Stonington is the only off-shore port with a fleet consisting of trawlers, lobster boats, and ocean scallopers. People are mostly going for groundfish such as cod, haddock, and flounder.

Atlantic mackerel is seldom targeted because there is no market for it in Stonington. Atlantic mackerel accounts for 0.01% of the landed value of species and these are caught primarily by drift gillnets. One vessel specializes in *Loligo* squid. Other vessels will target squid when they appear in large numbers. *Illex* squid is seldom targeted because the market is limited since the *Illex* squid spoils rapidly. There is a market for butterfish but no vessel is specialized in catching it.

The major species of fish caught in Stonington are flounder, summer flounder, squid, whiting, and some codfish during the winter months. Over the past five years (1988-1993), the fishermen have caught an increasing number of monkfish. The three large scallop boats have landed the majority of the monkfish.

In the past, summer flounder was the most important species caught by fishermen in Stonington. However, squid is increasing in importance as a result of the summer flounder quotas. During the summer of 1993, one boat attempted to specialize in dogfish but he discontinued this.

Freeport, NY

According to NMFS weighout data (Tables NY-FP1, 2), Freeport and neighboring Point Lookout (included in the Freeport port code) are almost entirely dependent on otter trawl landings (over 89% poundage, 87% value), and the major species are loligo squid and silver hake, with smaller amounts of scup, weakfish, bluefish, butterfish, summer flounder, other flounders, Atlantic mackerel. Gill-nets are used for bluefish, angler, and other species, and there are small handline, pot, pound-net and bay shellfisheries associated with these ports.

Table NY-FP1: Landings by Gear, Freeport, NY, 1998

GEAR TYPE, Freeport, NY	Lbs. %	Value %
Common seine, haul seine	0.3%	0.1%
Gill net, sink, other	7.0%	6.1%
Handline, other	2.5%	3.8%
Pot/trap, lobster, insh nk	0.6%	2.8%

Pot/trap, lobster, offsh nk	0.0%	0.0%
Pots + traps, blue crab	0.0%	0.0%
Pots + traps, conch	0.0%	0.0%
Pots + traps, fish	0.1%	0.1%
Pound net, fish	0.2%	0.2%
Rakes, other	0.2%	0.0%
Tongs & grabs, clam	0.0%	0.0%
Trawl, otter, bottom, fish	89.3%	86.8%

Total landings, rounded 1998: 1,865,800 lbs
Total value, rounded 1998: $1,504,800 dollars
Note: 0.0 = >0.0% but <0.06%

Table NY-FP2: Landings by Major Species, Freeport, NY, 1998

Bluefish	4.6%	2.1%
Butterfish	2.8%	2.6%
Flounder, summer	2.8%	7.9%
Flounder, yellowtail	4.0%	2.3%
Hake, silver	27.4%	16.2%
Mackerel, Atlantic	2.5%	0.8%
Scup	4.4%	8.8%
Squid (loligo)	37.3%	39.3%
Weakfish, squeteague	2.7%	2.8%
Lobster	0.6%	2.8%
Sea bass, black	0.8%	1.9%

Number of species: 62

Other species of MAFMC interest by percentage total value 1998: Tilefish (0.1), and Illex squid (0.0). Surf clams are also landed here but are reported as "Other New York."

Other Nassau County

Other Nassau County landings came to about 595,000 pounds, worth about 4 million dollars, in 1998. Over 93% of the landings were of hard clams (quahogs), soft clams, and oysters, taken in the rich "Oyster Bays" of this county. Gill nets, handlines, and lobster pots were also used for striped bass and other species.

Greenport and Mattituck, N.Y.

Although Greenport and Mattituck are very dissimilar ports, we combine landings information from them to protect confidentiality.

Otter trawl landings are by far the most important, over 95%, and the classic Mid-Atlantic complement of species is found, led by silver hake and loligo squid, but including butterfish, summer and winter flounder, scup, striped bass, angler, and other species. There is also pound-net fishing, haul-seining, gill-netting, handlining, pelagic longlining, lobster and conch pot fishing, and raking for clams and dredging for bay scallops. Tables NY-GP1, 2 provide weighout data for Greenport combined with nearby Mattituck.

Over 90% of the weighout landings attributed to Mattituck came from otter trawl fishing, and the full complement of Mid-Atlantic species were major landings (=>2% value in 1998: bluefish (25%), butterfish (12%), summer flounder (14.5%), scup (4.4%), dogfish 3.1%), lobster and striped bass were also significant, among the 37 species landed. Total landings in 1998 were less than 275,000 pounds. But recall that "Other New York" includes lobster and other landings which probably came from places like Mattituck.

Table NY-GP1: Landings by Gear Type, Mattituck and Greenport, NY, 1998

GEAR TYPE	LBS %	VALUE %
Common seine, haul seine	0.0%	0.0%
Gill net, sink	1.5%	1.4%
Handline	1.1%	2.9%
Longline, pelagic	0.0%	0.1%
Pots + traps, conch	0.0%	0.0%
Pound net, fish	1.8%	3.0%
Trawl, otter, bottom, fish	95.6%	92.5%

Total landings, rounded 1998: 7,831,400 lbs
Total value, rounded 1998: $4,140,500 dollars
Note: Not including "Other New York" landings; here as elsewhere "0.0%" means more than 0 but less than 0.05%

Table NY-GP2: Landings by Major Species, Mattituck and Greenport, NY, 1998

MAJOR SPECIES >2%	LBS %	VALUE %
Bluefish	4.2%	3.1%
Butterfish	1.6%	1.9%
Flounder, summer	1.1%	5.1%
Flounder, winter	2.9%	1.2%
Hake, Red	2.3%	1.5%
Hake, silver	63.3%	46.1%
Scup	0.8%	2.6%
Squid (loligo)	21.6%	27.2%
Bass, striped	0.6%	3.0%

Number of species: 62

Other species of MAFMC interest by percentage value 1998: Atlantic Mackerel (0.1), Black Sea Bass (0.9), dogfish, other (0.1), Dogfish, Smooth (0.0), Tilefish (0.3), and Illex Squid (0.0).

"Other Suffolk" and Amagansett, NY

The NMFS data are collected for the port of Amagansett and well as unspecified "Other Suffolk" fishing. "Other Suffolk" probably includes landings from the fishermen at Orient/Orient Point, Shelter and Fisher Islands, Southold, Cutchogue, and many other smaller places in Suffolk County on both the north and the south forks of eastern Long Island including Mount Sinai.

Bay clamming (for hard clams, or quahogs) is the major fishery, representing over 71% of the area's value in 1998. Lobstering is next, 14% of the value. Other important shellfisheries are for oysters, soft clams, horseshoe crabs, blue crabs, and green crabs. Harvesting bay scallops is an important fishery for all east end ports, but landings vary widely from one year to the next. There is tremendous diversity in gears used, bespeaking the mixed bay, sound, and ocean nature of these fisheries. They include handlines, longlines, harpoons, seines, otter trawls, gillnets, pound nets, pots for fish, eels, conch, crabs, and lobster, fyke-nets, cast nets, diving gear, crab and oyster dredges, shovels, rakes, tongs, patent tongs, and "by hand".

Montauk, NY

Montauk, the largest fishing port in New York, is situated near the eastern tip of the South Fork of Long Island. Otter-trawls and longlines are the principal gear-types, in terms of pounds landed and value (Table NY-M1). Loligo squid and silver hake are the two most important fin-fish caught in 1998, but tilefish also stand out, and swordfish and tuna landings are important as well. Montauk is the leading tilefish port in the U.S., but this fishery has declined greatly. For the past two years (1998-1999) some of the Montauk-based tilefish boats have been unloading their catches in

Rhode Island. Nonetheless, tilefish accounted for 21% of the value of landings in this port in 1998 (Table NY-M2). The number of species landed at Montauk is staggering: 90. 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.

Table NY-M1: Landings by Gear Type, Montauk, NY, 1998

GEAR TYPE	LBS %	VALUE %
Box trap	0.0%	0.0%
Common seine, haul seine	0.0%	0.0%
Gill net, sink	1.2%	1.3%
Handline, other	3.0%	6.6%
Longline, bottom	11.4%	20.9%
Longline, pelagic	3.1%	8.7%
Pot/trap, lobster, insh nk	0.4%	1.3%
Pot/trap, lobster, offsh nk	0.1%	0.4%
Pots + traps, conch	0.0%	0.0%
Pots + traps, fish	0.1%	0.3%
Pound net, fish	0.6%	0.6%
Spears	0.0%	0.0%
Trawl, otter, bottom, fish	80.1%	59.9%

Total landings, rounded 1998: 12,035,700 lbs
Total value, rounded 12,108,800 dollars; 0.0% = <0.06 % rounded

Table NY-M2: Landings by Major Species, Montauk, NY, 1998

MAJOR SPECIES >2%	LBS %	VALUE %
Bass, striped		5.2%
Bluefish	2.1%	0.8%
Butterfish	3.2%	2.0%
Dogfish, nk	2.4%	0.4%
Flounder, summer	2.8%	6.9%
Flounder, winter	3.8%	5.1%
Hake, red	3.2%	1.1%
Hake, silver	31.2%	15.7%
Scup	1.8%	3.6%
Squid (loligo)	24.2%	19.8%
Swordfish	1.0%	3.4%
Tilefish	11.5%	21.2%

Number of species: 90

Other species of MAFMC interest by percentage 1998 value: Atlantic Mackerel (0.3), Black Sea Bass (1.3), Dogfish, NK (0.0), Smooth Dogfish (0.0), and Illex squid (0.0).

Shinnecock/Hampton Bays, NY

Shinnecock/Hampton Bays is second only to Montauk as a commercial fishing center in New York. The offshore fishing industry in this part of Long Island is concentrated to the west of Shinnecock Inlet, on a barrier island that is just to the south of Hampton Bays. "Shinnecock," as it is known, is part of the town of Southampton. There is a large county-owned dock that is run by the town, where most commercial boats tie-up. The pack-out facilities and their associated docks are on private land, including two private unloading docks and one belonging to the Shinnecock Fishermen's Cooperative. The rest of the land to the east and west of the inlet is a county park. The NMFS codes for this fishery are for Shinnecock and Hampton Bays. We have combined them for this analysis because both refer to the same place (bluefin tuna and other large pelagic landings are collected using the Shinnecock port code, the rest using Hampton Bays).

This is primarily a dragger fishing port, otter trawl landings making up 84% of the poundage and 74% of the value in 1998 (Tables NY-HB1,2). Silver hake (whiting) and Loligo squid made up over 70% of these landings; 66 other species were landed by draggers, including bluefish, butterfish, red hake, and summer flounder. Gill-nets are second in importance, accounting for 12% of the value of landings in 1998. They too had diverse landings, totalling 39 species, led by bluefish (31% of lbs.), angler (28%), and skates (23%).

"Table

NY-HB1: Landings by Gear, Hampton Bays and Shinnecock, N.Y., 1998

GEAR TYPE:	LBS. %	VALUE %
Longline, Bottom	2.9	7.3
Handline	0.1	0.4
Longline, Pelagic	0.3	1.1
Otter Trawl, Bottom	84.3	74.2
Seines, Common and Haul	0.1	0.1
Gillnet, Sink	10.8	11.8
Pound Net, Fish	1.0	1.3
Pots/Traps, Fish	0.1	0.1
Pots/Traps, Eel	0.0	0.0
Pots/Traps, Conch	0.0	0.0
Pots/Traps, Lobster, Off-shore	0.0	0.0
Pots/Traps, Lobster, In-shore	0.1	0.3
Shovels	0.0	0.1
By Hand	0.0	0.0
Rakes	0.0	0.0
Pots/Traps, Crab	0.0	0.0
Fyke-Net, Fish	0.0	0.0
Unknown	0.4	3.3

Total Landings by Weight, 1998: 13,143,401 lbs.
Total Landings by Value, 1998: $9,676,293

Table NY-HB2: Landings by Major Species, Shinnecock/Hampton Bays, NY, 1998

MAJOR SPECIES (>2%)	LBS. %	VALUE %
Angler	3.8	8.3
Bluefish	5.2	3.0
Winter Flounder	1.1	2.2
Summer Flounder	2.1	6.8
Yellowtail Flounder	0.9	2.0
Scup	1.5	3.4
Weakfish	2.5	2.1
Dogfish, NK	7.3	1.5
Skates	3.2	1.4
Tilefish	3.0	7.6
Silver Hake	37.5	23.1
Quahog	0.3	2.9
Loligo Squid	22.9	26.9

Total Number: 93

Other species of MAFMC interest, by percentage value, 1998: Butterfish (1.6), Atlantic Mackerel (0.3), Black Sea Bass (0.9), Smooth Dogfish (0.0), Spiny Dogfish (0.0), and Illex Squid (0.0).

Brooklyn

Commercial fish landings in New York City's boroughs have declined markedly over the years. Today landings in Brooklyn were reported in 1998 as less than 30,000 pounds, from otter-trawls (77%), sink gill nets (16%) and handlines. The principal species, out of 17 landed, were butterfish, bluefish, weakfish, and loligo squid. Sports fishing at Sheepshead Bay and other sites, have become more important than commercial fishing.

Columbia, Duchess, Queens, Greene, Rockland, Ulster, Westchester Counties

NMFS has "other" categories for counties where marine and estuarine fishes are landed. Those for Nassau and Suffolk are treated separately above. We lumped the others together; they largely represent estuarine and riverine fisheries. Most of these fisheries are the riverine ones for American shad (85% of pounds, 94% of value). Small amounts of menhaden, blue back herring, winter flounder, weakfish, scup and other species (totalling 10) were reported. The key gear types were drift and sink gill nets, both used for shad. Other gear types, with minor catches, were otter trawls, fyke nets, handlines, and fish pots/traps. The catches in 1998 were very small, totalling less than 200,000 lbs. or $230,000.

Belford, NJ

The fishing port of Belford is on a tidal creek leading out to Raritan Bay and the New York Bays. Its fishery is oriented both to the bay and to the Atlantic Ocean, which is reached by going out around Sandy Hook, a few miles from Belford. Belford and neighboring Port Monmouth were once a large industrial fishing and processing center for menhaden, but the menhaden factory closed in 1982. Menhaden are still caught with small purse-seine boats and pound-nets, primarily for the bait market, and in 1998 they accounted for over 2/3rd of the landings in Belford (Table NJ-B1) Today Belford's fisheries are small-scale and owner-operated; most of the finfish are handled through a fishermen's cooperative, which sells wholesale but also runs a small retail store and restaurant. Lobsters are sold in other ways, including through a local lobster pound. Otter trawl finfishing is the most important activity, accounting for 50% of the landed value in 1998 (Table NJ-B1). It is a multi-species fishery: 42 species were landed in 1998. Major species caught by otter trawlers landing in Belford, by landed value, were summer flounder, Loligo squid, silver hake, winter flounder, spiny dogfish and skates. Lobster pot fishing is third only to purse seining and dragging; it accounted for 17% of landed value in 1998.

In recent years surf clam and ocean quahog vessels have been offloading at Belford, but in 1998 they accounted for less than 4% of the landed value (in contrast to 1992, when ocean quahogs accounted for over 30% of landed value). Crab dredging, in Raritan Bay, is of equal value. The last of New Jersey's pound-nets are in Raritan and Sandy Hook Bays; they accounted for 3.9% of Belford's total landed value in 1998. Some of that was from menhaden but 27 other species were also landed from the pound-nets, notably bluefish, weakfish, summer flounder, and butterfish; small amounts of tuna, skates, shad, tautog. Other fishing techniques used include crab and fish pots, handlining, and diving.

Table NJ-B1: Landings by Gear Type, Belford, NJ, 1998

GEAR TYPE, BELFORD, NJ	Lbs. %	Value %
Diving Gear	0.0	0.0
Dredge, SCOQ	2.7	3.8
Dredge, Crab	2.3	6.1
Hand Line	0.0	0.1
Pots/Traps, Lobster, Off-shore	2.0	17.1
Pots/Traps, Blue Crab	0.0	0.0
Pots/Traps, Fish	0.0	0.2
Pound Nets	3.8	3.9
Purse Seine, Menhaden	65.1	18.6
Trawl, Otter, Bottom, Fish	23.9	50.1
Unknown	0.0	0.1

Note: “0.0" means more than 0 but less than 0.05. The figures for landings from which these percentages are derived are not given because they are confidential.

Other Monmouth County Ports

Highlands (at the mouth of two large tidal rivers coming out into Sandy Hook Bay with access to the Atlantic Ocean) and Neptune (in combination with neighboring municipalities which surround the tidal basin known as Shark River) are primarily small lobstering ports, sequestered within summer resort communities. Data for these ports are confidential. Highlands is also the site of bay clam depuration plants, which serve baymen who clam under state permits in Raritan and Sandy Hook Bays and the Navesink River. A small amount of handlining for finfish and potting for rock crab supplements lobstering. Atlantic Highlands is a center for recreational charter and party boat fishing.

Crabbing constitutes most of the landings for the rest of Monmouth County. The winter dredge fishery for blue crabs in Raritan Bay and its tributaries is significant. Clamming is also important. It takes place in the Sandy Hook and Raritan Bays and tidal rivers and is largely dependent on a "depuration" process, located in Highlands, as well as some "relaying" of clams to cleaner waters in south Jersey. Crabbers and clammers, like those involved in other fisheries, live in and around Belford, Highlands, and various municipalities along the shore of Raritan Bay.

Point Pleasant, NJ

The commercial fisheries of Point Pleasant are third in New Jersey to those of the Cape May-Wildwood area and Atlantic City (Table NJ-1). The weigh-out data include some bayman fisheries (i.e. "by hand" and crab dredge gears), but this is primarily an ocean fishing port, with a long history involving ocean pound-nets and fisheries focusing on the offshore 'canyons' of the region. The fishing port is actually Point Pleasant Beach, a borough within the larger town of Point Pleasant. Like so many ports of the Mid-Atlantic region, it 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. This is a highly developed coastal region. Currently there is a wholesale finfish packing dock at Point Pleasant, a fishermen's cooperative. Another dock is primarily used for offloading surf clams and ocean quahogs although finfish may be handled there as well.

The fisheries are very diverse, the classic situation in the Mid-Atlantic. 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 (Table NJ-PP1). But sea scallop dredging is very important, as are surf clamming/ocean quahogging and offshore lobstering. Landings by major species for Point Pleasant are confidential but one can generalize that the most valuable species, in 1998, 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 in 1998, followed by Loligo squid, a major focus of the local dragger fishery in the last decade, 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 fishery from the 1970s through the 1980s; its availability and abundance have since declined. In terms of pounds landed, menhaden (purse-seined) and surf clams 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. Table NJ-PP1 gives landings by gear type.

Table NJ-PP1: Landings by Gear Type, Point Pleasant, NJ, 1998

GEAR TYPE, POINT PLEASANT, NJ:	Lbs. %	Value %
By Hand	0.0	0.0
	0.0	0.0
Dredge, Sea Scallop	1.2	10.4
Dredge, SCOQ	51.4	49.9
Gill Net, Drift	1.0	0.7
Gill Net, Sink	11.0	13.5
Hand Line	0.1	0.1
Longline, Pelagic	0.1	0.2
Pots/Traps, Lobster Offshore	0.6	3.5
Pots/Traps, Fish	0.0	0.0
Purse Seine, Menhaden	20.9	3.7
Trawl, Otter, Bottom, Fish	13.6	17.7
Troll Line	0.0	0.0
Troll Line, Tuna	0.0	0.0
Unknown	0.2	0.3

Total Landings, rounded, 1998: 31,916,900 lbs.
Total Value, rounded, 1998: $16,715,400 dollars

Point Pleasant Beach, NJ

The town of Point Pleasant (pop. 18,177, 1990) is located at the mouth of the Manasquan Inlet at the northern border of Ocean County. The town's economy is geared toward the summer tourist and recreational business. However, it is more than a "beach town", and has a large resident population. It is close to a larger township, called Brick or Bricktown (pop. 66,473, 1990), and across the Manasquan River from Manasquan (5,369, 1990) and Brielle (4,406). The fisheries are concentrated in an area known as Point Pleasant Beach, along a sandy strip which includes restaurants, a fisherman's supply store, small marinas, charter and party boat docks, and two commercial fishing docks.

One of the Cape May seafood businesses has two fishing properties in Point Pleasant, one of which is now used for offloading and trucking surf clams and ocean quahogs. (Each of these docks had been used for finfish until about 10 years ago). From 6 to 10 boats land clams here, according to company personnel interviewed in Cape May. There are 15 crew at the docks and about 50 on the boats. There is also a new (2000) seafood processing plant, initially shucking surf clams. One existed here two decades ago, part of the early surf clam industry.

A fishermen's cooperative owns two other 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 store. The cooperative mostly depends on its fourteen or so members, who have older, wooden-hulled vessels, 45-65' in length. They are geared 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 crew members are not often related to the captain or owner. Some members of this cooperative and some crew members have been ethnic minorities (Spanish, Portuguese, Chinese, and others). A few women have crewed on these boats. The boats are all owner-operated. They tend to fish in areas of Hudson Canyon called "the Mudhole" or "the Gully." The Mudhole is closer and has a dredged channel, but poor landings, especially of silver hake ("whiting") have forced most to move north into the Gully, where silver hake seem to be more plentiful. The average trip to the Mudhole is one to three days, but for the Gully can last a week.

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 now account for over 50% of the landed value of Point Pleasant trawlers. At first it was a by-catch while silver hake fishing in the Gully. Now it is targeted by some 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 local processors. 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, particularly in Cape May.

Summer flounder has long been a mainstay of this fishery, especially in the Mudhole in September and October, as well as other times in New Jersey and New York waters. Because of sharp quota restrictions, it is now a derby-like fishery. It is marketed in the fresh fish markets of New York and Philadelphia, in local restaurants and fish stores, and in the coop's own retail store.

At one time a few trawlers targeted scup (also called porgies), partially because doing so took pressure off a supply-burdened whiting market. (There was also a significant offshore summer flounder fishery in the winter months, for a few boats). Today no vessels target scup but may encounter large schools in the winter. Marketing is similar. Spiny dogfish have emerged as a very important fishery for the draggers and even more so for a gill-net fleet, both local and visiting, which has grown in recent years. Gill-netters have used "runaround" nets for species such as bluefish, Spanish mackerel, little tuna, scup, and weakfish, although this gear did not appear in the 1998 NMFS data. They use drift and sink nets for dogfish, angler, bluefish, weakfish, and other species. Angler, or monkfish, are particularly important. In 1998 local fishermen using sink gill nets caught almost 17 million pounds of monkfish as well as over 8 million pounds of spiny dogfish.

Barnegat Light (Long Beach Island), NJ

The fishing port of Long Beach Island is mostly located in the small bayside municipality of Barnegat Light, on this long, densely-developed barrier island on the central New Jersey coast. The commercial fishery has been undergoing a transition from over 20 years of specializing in offshore, deep-water and distant-water longlining. That tradition remains in the importance of bottom and pelagic longline gear (18% of total landed value) and of species such as tilefish, swordfish, and tunas (including big eye, yellowtail, blackfin, and skipjack in 1998) (Table NJ-LBI). (Handlines are also used for big eye tuna as well as for bluefish and other species; troll lines for yellowfin tuna). However, the physical perils of the inlet has kept this a relatively small-boat longliner fleet, and natural and regulatory changes in the species sought have forced people to look for alternatives. An alternative developed over the past decade is sea scalloping and the attendant by-catch of angler. Another is for expansion of the species sought with bottom and pelagic longlines, including sharks and dogfish among others. In 1998 the pelagic longline gear of Long Beach Island caught fully 23 different species, and bottom gear caught 17 species.

Whether transitional adaptation or old stand-by, the gill-net fisheries of Long Beach Island are the most substantial, representing 76% of poundage and 45% of landed value in 1998 (Table NJ-LBI1). The number of species involved is equally impressive: 61 for the drift gill-nets, including mackerel, dogfish, flounders, tunas, weakfish, shad, sharks; 23 for the sink gill-nets. In contrast, otter trawl dragging is minor and only 10 species were landed. Spiny dogfish are a recent focus, representing over one-third of the total landings in 1998.

Table NJ-LBI1: Landings by Gear Type, Long Beach Island, NJ, 1998

GEAR TYPE: LONG BEACH ISLAND, NJ	LBS. (%)	VALUE (%)
Dredge, Sea Scallop	5.7	28.6
Gill Net, Drift	64.0	34.9
Gill Net, sink	11.8	9.8
Handline	0.1	0.1
Longline, Bottom	7.0	6.1
Longline, Pelagic	11.2	19.9
Rakes	0.0	0.2
Otter Trawl	0.2	0.3
Troll Line, Tuna	0.0	0.0
Unknown	0.0	0.0

Total Landings, rounded, 1998: 10,032,800 lbs.
Total Value, rounded, 1998: $10,194,400 dollars

Other Ocean County, NJ

Ocean County, New Jersey, covers a large region, ranging from Point Pleasant Beach in the north to Long Beach Island and beyond to the south. The "Other Ocean" category encompasses the bayman fisheries in this region, which is made up of barrier islands and a large complex known as Barnegat Bay. It also includes some offshore fisheries from places other than Long Beach Island and Point Pleasant. The bayman fisheries are, as always, for blue crabs and for hard clams (quahogs). Pots are the major way blue crabs are caught; clams are caught with rakes, tongs and "By hand". Fyke nets are minor, for flounders and eels (they are increasingly restricted by regulation). NMFS 1998 weighout data on substantial longline and drift gill-net fisheries and on angler, scallop, tilefish, and bluefin tuna refer to offshore fisheries comparable to and probably associated with those of Long Beach Island.

Atlantic City and Other Atlantic County, N.J.

Atlantic City is better known for casino gambling and its boardwalk than for its status as a fishing port. The fishing port is on the backbay side of the city and is almost entirely given over to surf clam and ocean quahog dredge fishing (Table NJ-AC1). Atlantic City has long been a favored port for this fishery because of ready access to dense beds of clams off the central coast of New Jersey. Ocean quahogging has moved to more northern ports, especially New Bedford, Massachusetts, in recent years; it represented only 11% of the value of Atlantic City's landings in 1998. Other fisheries in Atlantic City are minor. Gears include sink gill-nets, and handlines, and bluefish, black sea bass, weakfish, jonah crab, lobster, and conch predominate.

Table NJ-AC1: Landings by Gear Type, Atlantic City, NJ, 1998

GEAR TYPE: ATLANTIC CITY, NJ	LBS. (%)	VALUE (%)
Dredge, SCOQ	99.9	99.7
Gill Net, Sink	0.0	0.0
Handline	0.0	0.0
Pots & Traps, Conch	0.0	0.0
Pots & Traps, Fish	0.1	0.2

Total Landings, rounded, 1998: 37,338,500 lbs.
Total Value, rounded, 1998: $17,867,000 dollars

Atlantic County, like the other coastal New Jersey counties, has numerous small-scale bay and estuary fisheries as well. By far the most important for this county is the hard clam (quahog) fishery (34% of the landings, 70% of the value for "other Atlantic" in 1998), using rakes, tongs, and "by hand" techniques such as treading. Some of this takes place through clam aquaculture. The other significant species is the blue crab, harvested with pots and dredges (50.5% landings, 25% value). Haul seines, fyke nets, gill nets, handlines, eel pots, and turtle traps are also used for white perch, menhaden, American shad, and many other bay and tidal river species.

Cape May, NJ

Cape May is New Jersey's largest commercial fishing port in terms of landings and value. When combined with neighboring Wildwood (the fishing port is often referred to as "Cape May/Wildwood"), its landings exceeded 93 million lbs., worth over $29 million in 1998.

Draggers, or vessels using bottom otter trawls, account for 69% of Cape May's landings and 70% of its value (Table NJ-CM1). Most are used for a wide variety of finfish species (56). Some are also used for scallops; 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 (Table NJ-CM2). 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 (4% landed value in 1998). Scup is another dragger-caught species of historic importance in Cape May; in 1998 it represented 6% of landed value. 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.

Although sea scallop management measures have reduced opportunities for many Cape May fishermen, scalloping remains important. In addition to scalloping with otter trawls, scallop dredges are used, accounting for 15% of the total value of Cape May's landings in 1998. Angler (monkfish) are caught with scallop dredges as well as gill-nets, otter trawls, and scallop otter trawls (1.8% of landed value). Dogfish catches are now relatively small (0.3% of total landings in 1998).

Table NJ-CM1: Landings by Gear Type, Cape May, NJ, 1998

GEAR TYPE: CAPE MAY, NJ	LBS. (%)	VALUE (%)
Handline	0.0	0.0
Longline, Pelagic	0.0	0.3
Otter Trawl, Fish	68.9	61.9
Otter Trawl, Scallop	0.5	7.7
Troll Line, Tuna	0.0	0.0
Gill Net, Sink	0.2	0.5
Gill Net, Drift	0.1	0.1
Purse Seine, Other	0.0	0.0
Purse Seine, Menhaden	23.9	6.7
Dredge, Scallop	0.9	15.4
Menhaden Trawl	3.4	0.6
Pots & Traps, fish	0.1	0.7
Pots & Traps, Conch	0.1	0.4
Pots & Traps, Lobster Off-shore	0.2	2.6
Dredge, Crab	0.1	0.3
Dredge, SCOQ	1.4	2.9
Unknown	0.0	0.0

Total Landings, rounded, 1998: 87,244,700 lbs.
Total Value, rounded, 1998: $25,757,200 dollars

Table NJ-CM2: Landings by Major Species, Cape May, NJ, 1998

MAJOR SPECIES: CAPE MAY, NJ	LBS. (%)	VALUE (%)
Atlantic Herring	2.9	1.0
Summer Flounder	0.9	3.9
Lobster	0.2	2.5
Atlantic Mackerel	20.9	8.2
Menhaden	24.1	6.8
Sea Scallop	1.1	21.9
Scup	1.7	6.1
Squid, Illex	34.1	16.9
Squid, Loligo	8.3	22.0
Surf Clam	1.4	2.9
Black Sea Bass	0.4	2.2

Number of Species: 69

Other species of MAFMC interest, by percentage of total value, 1998: Bluefish (0.2), Butterfish (0.5), Smooth dogfish (0.0), Spiny dogfish (0.1), Tilefish (0.0).

Wildwood, NJ

The fishing port of Wildwood is connected to a very popular tourist beach community. Resident and migratory draggers and clam boats are found in Wildwood. The largest landings come from surf clams and ocean quahogs, both harvested offshore with hydraulic dredges. A processing factory is in Wildwood. The otter trawl fleet accounts for 7% of Wildwood's landings, bringing in summer flounder, Loligo squid, butterfish, Atlantic croaker, black sea bass, weakfish, and other species (Table NJ-WW1). Wildwood also has a small pot fishery, including offshore lobster, conch, and fish pots (6% of value). The fish pots are used mainly for black sea bass. Gill-netting is done for weakfish, black sea bass, and other species. Wildwood also had some pelagic longline landings in 1998, notably swordfish and yellowfin tuna. Other species of Mid-Atlantic Fishery Management Council interest landed in 1998, in small quantities (less than 2% landed value) were bluefish, butterfish, Atlantic mackerel, scup, and dogfish.

Table NJ-WW1: Landings by Gear Type, Wildwood, NJ, 1998

GEAR TYPE: WILDWOOD, NJ	LBS. (%)	VALUE (%)
Crab Dredge	0.4	0.5
Surf Clam/Ocean Quahog Dredge	86.5	79.0
Gill Net, Drift	1.9	0.8
Gill Net, Sink	0.5	0.4
Handline	0.1	0.1
Longline, Pelagic	0.9	3.9
Pots & Traps, Offshore Lobster	0.8	1.7
Pots & Traps, Conch	0.5	2.0
Pots & Traps, Fish	1.1	2.8
Otter Trawl	7.2	8.6
Unknown	0.0	0.1

Total Landings, rounded, 1998: 6,193,40
Total Value, rounded, 1998: $3,492,900 dollars

Sea Isle City, NJ

Sea Isle City is north of Wildwood, one of the small fishing ports of the coast that is dependent on a dynamic and often problematic inlet for access to the sea. The fishery here is small. In 1998 fewer than 750,000 pounds, and $1.2 million dollars, were reported in the weighout data. There is a small offshore longliner fishery for tunas (mostly big eye, albacore and yellowfin) and swordfish. Otter trawl fishing includes spiny dogfish, skates, angler, and fluke but only 4% of the landed value. More significant are pot fisheries for offshore lobster (6% of value), conch (12%), and fish (12%, mostly black sea bass). Gill-netting represents 12% of the value, particularly for angler (monkfish). We did not visit Sea Isle City for this report but can report that it is primarily a summer beach town.

Other Cape May County

In the creeks and bays along the Atlantic coast of Cape May and around the cape to the Delaware Bay side are numerous small fisheries, coded as "other Cape May." These are the classic baymen or watermen fisheries, based on crustaceans and shellfish: blue crabs and hard clams dominate (66% and 23.5% of landed value, respectively). Horseshoe crabs are also harvested (12% of the 1998 poundage although only 1.6% of the value). There is a small gill-net fishery for species such as weakfish, American shad, and numerous other estuarine and anadromous species. Very small amounts of bluefish, butterfish, and summer flounder were landed in 1998. This fishery is very similar to and intertwined with the "Other Cumberland County" fishery discussed below.

Table NJ-OCM1: Landings by Gear Type, Other Cape May, 1998

GEAR TYPE: OTHER CAPE MAY, NJ	LBS. (%)	VALUE (%)
By Hand	17.9	23.6
By Hand, Oyster	0.1	0.8
Dredge, Crab	1.1	0.7
Gill Net, Drift	2.6	0.6
Gill Net, sink	0.0	0.0
Handline	0.5	0.5
Longline, Pelagic	0.3	0.3
Pots & Traps, Crab	74.8	65.3
Pots & Traps, Eel	2.2	4.0
Pots & Traps, Fish	0.0	0.0
Rakes	0.4	1.5

Total Landings, rounded, 1998: 1,190,800 lbs.
Total Value, rounded, 1998: $3,492,900 dollars

"Other Cumberland,"NJ

The two big fisheries for this region, the center of New Jersey's Delaware Bay fisheries, are for oysters and blue crabs (Tables NJ-CC1, CC2). 1998 was one of the few years in the past decade when oysters were harvested, due to problems with oyster diseases (there is no harvest in 2000 due to the disease ‘dermo’). Oysters were taken with dredges, and represented 48% of the landed value. Blue crabs are caught with dredges and pots, and represented 46% of the value in 1998. Both horseshoe crabs and menhaden are also taken in large quantities (4.8% and 11.6% of poundage, respectively), and are the focus of controversy in this area due to their alleged roles for migratory birds and as bait for other fishes.

Table NJ-CC1: Landings by Gear Type, Cumberland County, NJ, 1998

Cumberland County Landings by Gear Type	Percent Lbs.	Percent Value
Handline	0.9	0.6
Gill-net, Sink	2.6	0.9
Gill-net, Drift	5.3	1.4
Pots/Traps, Eels	0.8	1.3
By Hand	11.6	1.4
Dredge, Oyster	15.8	48.0
Dredge, Crab	2.4	1.5
Pots/Traps, Blue Crab	60.6	45.0

Total Landings, rounded, 1998: 4,444,900 lbs.
Total Value, rounded, 1998: $5,573,300

Table NJ-OCM2: Landings by Major Species, Pounds and Value, Other Cumberland County, NJ, 1998

Cumberland County, Major Species, 1998	Percent Lbs.	Percent Value
Menhaden	4.6	0.5
Weakfish	2.6	1.5
Blue Crab	62.9	46.4
Horseshoe Crab	11.6	1.4
Oysters	15.8	48

Total Species: 19, including MAFMC-managed Bluefish (0.0% value, 1998), Butterfish (0.0), and Summer Flounder (0.0).

Other New Jersey

Surprisingly, some commercial fishing is reported from the heavily urbanized, industrialized areas of northeastern New Jersey. There is a substantial amount of squid, both *Illex* and *Loligo*, as well as some summer flounder landed in (and trucked into) heavily urbanized Essex County, the site of a packing and processing company. Crab pot fishing is found with small landings in urbanized Bergen and Middlesex Counties. At the other side of the state, commercial fishing extends upbay and upriver from Cumberland County, into rural Salem and Hunterdon counties. Hunterdon is the site of one of the last of the river shad seine fisheries (and an annual shad festival). Salem is the home of small-scale waterman fisheries which involve gill-netting for shad, weakfish and other species, harvesting eels and snapper turtles.

Ocean City, MD (West Ocean City)

Ocean City, on the Atlantic Coast, is the only major port in Maryland engaged in the inshore and EEZ ocean fisheries. It accounts for 18.1% of the pounds landed and only 9.5% of the value landed in 1998 (Table MD1).

The major commercial fishing gears used for landings in Ocean City in 1998 (Table MD-OC1) were:
--gill-netting, heavily dependent on angler and spiny dogfish, but engaged in a very diversified fishery;
--surf clam and ocean quahogging, with small by-catches of angler and scallops;
--bottom dragging with otter trawls, a highly diversified fishery, with strong foci on summer flounder and loligo squid, but also landing 48 other species.

In terms of value, other gear types also emerge as important, namely fish traps and pelagic longlining. Traps are also used for lobster and conch.

Table MD-OC1: Landings by Gear Type, Ocean City, MD 1998

GEAR TYPE: OCEAN CITY, MD	*Lbs. %*	*Value %*
By hand	0.0	0.0
Dredge, SCOQ	56.3	55.8
Gill net, sink	28.1	13.7
Handline	0.0	0.0
Harpoon	0.0	0.0
Longline, pelagic	2.1	11.1
Pots, Lobster Offshore	0.1	0.7
Pots/Traps, Conch	0.9	1.4
Pots/Traps, Fish	2.9	7.4
Otter Trawl, Bottom, Fish	9.5	9.9
Unknown	0.0	0

Total Landings, rounded, 1998: 11,073,123 lbs. (of state total)
Total Value, rounded, 1998: $6,356,802 (of state total)

The major species caught commercially in Ocean City (Table MD-OC2), ranked by 1998 landed value, are:

-surf clams and ocean quahogs
--black sea bass caught mostly with fish traps but also gillnets and draggers;
--angler, caught primarily with sink gillnets but also by the draggers and the clam boats;
--spiny dogfish, caught primarily by the gillnet fleet and also by draggers.
--summer flounder, mostly a dragger fishery
--swordfish, among the species caught with pelagic longlines from this port (tunas are also caught, and big eye and yellowfin tuna each represented over 2% of the total landed value in 1998).

Other species of significance (using the criterion of at least 2% of poundage or value) are:

-- Atlantic croaker and Atlantic mackerel, each caught by draggers and gill-netters
-- striped bass, also caught by draggers and gill-netters
-- lobster, an offshore pot fishery.

Table MD-OC2: Major Species, Landed, Ocean City, MD, 1998

Major Species: Ocean City, MD	Lbs (%)	Value (%)
Dogfish, Spiny	21.6	5.6
Angler	3.8	6.0
Clam, Surf	**	**
Quahog, Ocean	**	**
Sea Bass, Black	2.8	7.1
Flounder, Summer	1.6	5.0
Swordfish	0.7	4.5
Tuna, Big Eye	0.5	2.7
Tuna, Yellowfin	0.5	2.3

Total Species Landed: 69

Note: ** indicates confidential data because fewer than 3 federally permitted dealers involved. Other species landed of MAFMC relevance (by % value): Bluefish (0.3%), Butterfish (**), Atlantic Mackerel (0.5%), Scup (**), Tilefish (**), Loligo Squid (0.8%), Illex Squid (**).

Chesapeake Bay

Virtually all of the other fishing activity in Maryland centers on the Chesapeake Bay and its tributaries. It is based in numerous small and dispersed landing areas, and focuses on the classic bay fisheries with blue crabs and oysters taking the lead (Table MD-OM1). This is the home of the Chesapeake Bay "watermen." For all ports in Maryland excluding Ocean City, blue crabs represented 71.5% of the value and oysters 12.6% of the value. The only other sizeable fishery in 1998 was for striped bass (5.9% of the value), thanks to the recovery of that species after a long moratorium. True to the tradition of watermen and baymen in the Mid-Atlantic, the diversity of species caught is extremely high: 57 species, ranging from terrapin and snapper turtles, crappies, carp, bullheads, and alewives, to name a few of the brackish water and anadromous species, to soft clams, horseshoe crabs, eels, lobsters, sturgeons, sunfishes, and sharks.

Table MD-OM1: Major Species, Other Maryland Ports, 1998

MAJOR SPECIES (>2%): MARYLAND OTHER THAN OCEAN CITY	Lbs (%)	Value (%)
Bass, Striped	5.6	5.9
Crabs, Blue	61.6	71.5
Croaker, Atlantic	2.4	0.7
Menhaden	8.9	0.7
Oysters	4.9	12.6
Gizzard Shad	3.5	0.9
White Perch	2.9	1.5
Soft Clam	0.4	2.1
Catfish	4.7	1.6

Total Species Landed: 57
Total Landings, 1998: 50,094,300 lbs.
Total Value, 1998: $60,832,500

Species Relevant to MAFMC according to value in 1998: Bluefish (0.1%), Butterfish (0.0%), Summer Flounder (0.2%), Atlantic Mackerel (0.0%), Scup (0.0%), Black Sea Bass (0.0%, Smooth Dogfish (0.0%), Spiny Dogfish (0.0%).

Virginia Beach, VA/ Lynnhaven

Most of the commercial fishing activity in Virginia Beach occurs in the Lynhaven section, along Long Creek, which empties into Lynhaven Bay and eventually Chesapeake Bay.Two active federally permitted dealers in this port also operate as packing houses for two out-or-town dealers. In the past, there also was significant activity at Rudee Inlet on the Atlantic side of the city, but now there are only 3 or 4 commercial boats that work out of there.

The commercial fishery at Virginia Beach/Lynhaven is inlet-dependent and pressured by competition for waterfront from tourist-related development and recreational boaters and fishers. The major gear type used as reported to the NMFS is the sink gill-net, used to catch a large number of species including bluefish, striped bass, Atlantic croaker, summer flounder, shad, dogfish, weakfish and spot (Table VA-VB1). Drift and stake gill nets are also used, the latter for spiny dogfish and bluefish among other species. This is also a center of pot fishing, for blue crabs, eels, conchs (whelks) and fish. The fish catches were mainly black sea bass and tautog. Handlines accounted for 9% of the landed value in 1998, mostly from black sea bass and summer flounder catches, but also striped bass, tautog, tilefish, tunas, and others. Pound nets accounted for 3.3% of the value in 1998; species included striped bass, bluefish, butterfish, Atlantic croaker, summer flounder, Spanish mackerel, spot, and weakfish.

Table VA-VB1: Landings by Gear Type, Virginia Beach/Lynhaven, 1998

GEAR TYPE: VIRGINIA BEACH/LYNHAVEN	LBS. (%)	VALUE (%)
By Hand	0.0	0.0
Common Seine, Haul Seine	0.7	0.7
Dredge, conch	0.3	0.9
Dredge, Crab	0.8	1.0
Gill Net, Drift	1.3	1.0
Gill Net, Sink	70.1	43.3
Gill Net, Stake	0.2	0.1
Handline	2.0	9.2
Pots & Traps, Blue Crab	12.9	18.3
Pots & Traps, Conch	3.7	14.1
Pots & Traps, Eel	0.1	0.2
Pots & Traps, Fish	2.8	7.8
Pound Net	5.1	3.3
Tongs & Grabs, Clam, Patent	0.0	0.0

Total Landings, rounded, 1998: 7,812,000 lbs.
Total Value, rounded, 1998: $4,272,800 dollars

Note: "0.0" means some activity but less than .06%

By species blue crab represented the highest value (19%). Next was black sea bass, which comprised 16% of 1998 landed value, mostly from handlining and fish pots (Table VA-VB2). Gillnetting for dogfish is another very important fishery. Atlantic croaker and striped bass are significant catches from the gill-net, handline, and pound-net fisheries, as is spot. Channeled whelk, caught in conch pots, made up 11% of value. The total number of species, though, is as always in this region very large: 65.

Table VA-VB22: Landings by Major Species, Virginia Beach/Lynhaven, 1998

MAJOR SPECIES: VIRGINIA BEACH/LYNHAVEN	LBS. (%)	VALUE (%)
Striped Bass	4.4	11.0
Blue Crab	13.7	19.1
Atlantic Croaker	**	**
Spiny Dogfish	**	**
Black Sea Bass	4.2	15.6
Spot	14.1	8.8
Channeled Whelk	2.8	11.2
Conch	1.4	5.3
Other Fish, Industrial	2.2	0.3

Number of Species: 65

Note: ** indicates confidential data due to small number of businesses involved.

Other species of MAFMC interest by percentage value, 1998: Bluefish (0.7), Butterfish (0.7), Summer Flounder (0.3), Atlantic Mackerel (**), Scup (**), Dogfish, Other (0.3), Dogfish, Smooth (**), Tilefish (**), Loligo Squid (**).

Newport News, VA

Sea scalloping is the principal fishery of Newport News, accounting for 72% of landed value in 1998. Scallopers use both dredges and bottom otter trawls (Table VA-NN1). Another fishery is finfish dragging (8.2% of value, 24.5% of landings) for a large variety of species. Summer flounder, angler, and black sea bass are landed in significant quantities (Table VA-NN2). Small scale inshore and bay fisheries are part of the waterman complex. They include clamming (hard clams or quahogs) and oystering using dredges, patent tongs, tongs and rakes; drift and sink gill-netting; pot-fishing and dredging for crabs (blue crabs were 28% of landings, 7% of value) and oysters; pot fishing for conch and eels and seining.

Table VA-NN1: Landings by Gear Type, Newport News, VA, 1998

GEAR TYPES, NEWPORT NEWS	LBS. (%)	VALUE (%)
Common Seine, Haul Seine	0.0	0.0
Dredge, Clam	0.0	0.0
Dredge, Crab	1.4	0.4
Dredge, Oyster	0.0	0.0
Dredge, Sea Scallop	32.9	59.7
Gill Net, Drift	0.0	0.0
Gill Net, Sink	1.0	0.3
Handline	0.0	0.0
Pots/Traps, Blue Crab	26.4	7.1
Pots/Traps, Conch	0.0	0.0
Pots/Traps, Eel	0.1	0.0
Tongs/Grabs, Oyster	0.5	0.6
Tongs/Grabs, Clam	2.4	6.0
Otter Trawl, Bottom, Fish	26.4	10.3
Otter Trawl, Bottom, Other	0.0	0.0
Otter Trawl, Bottom, Scallop	8.7	15.5

Total Landings, rounded, 1998: 5,742,500 lbs.
Total Value, rounded, 1998: $15,945,700 dollars

Table VA-NN2: Landings by Major Species, Newport News, VA, 1998

MAJOR SPECIES: NEWPORT NEWS, VA	LBS. (%)	VALUE (%)
Crab, Blue	27.7	7.3
Flounder, Summer	19.8	8.6
Quahog	2.4	6.1
Scallop, Sea	34.4	72.1
Sea Bass, Black	2.4	0.9
Angler	7.0	3.0

Number of Species: 59

Other species of MAFMC interest, by percentage value 1998: Bluefish (0.2), Butterfish (0.0), Scup (0.0), Smooth Dogfish (0.0), Tilefish (0.0), Loligo Squid (0.4).

Norfolk, VA

The commercial fishery of Norfolk, VA today is actually typical of the more rural waterman communities. Only a few fish houses are left to buy from local fishers; other docks and wholesalers have closed down, and one wholesaler has changed to a retail store and restaurant. The fishery is a small inshore and bay fishery. Principal gears used are crab

pots (55% of value), crab dredges (10%), clam patent tongs and rakes (4%), handlines (10%) and sink gill-nets (12%). Other gears are haul seines, conch dredges, and eel and fish pots. Striped bass (10% of value) are caught with gill-nets, handlines and seines, as are Atlantic croaker (4% of value) and other estuarine and anadromous species. The small black sea bass fishery here (2.2% of value) is carried out with handlines, as is the summer flounder fishery (2.1%). Blue crabs make up two-thirds of the value of Norfolk's catch (64%); hard clams or quahogs account for 4%, and conch 4% as well.

Hampton and Seaford, VA

For purposes of discussing fishery landings and preserving confidentiality, we have combined weighout data for Hampton (within the Metropolitan Statistical Area depicted above) and Seaford (within York County, census and employment data for which are offered below). Gear-type data (Table VA-H1) show that sea-scalloping with dredges is the single-most important fishery by value; otter-trawl dragging for finfish is highest for poundage. Some draggers are also used for scalloping. Gill-netting, crab potting and dredging, seining, and tonging for clams are other techniques used in these two ports (Seaford is almost entirely devoted to scalloping, but scalloping is also important in Hampton).

Like Newport News, Hampton and Seaford are important sea scalloping ports near the mouth of Chesapeake Bay. Scallops accounted for 69% of landed value in 1998. In Hampton, a significant portion of the scallops are caught with otter trawls rather than scallop dredges. The sea scallop fleet of Seaford relies entirely on dredges and accounts for virtually all of the landings and landed value there. Besides scallops these dredge-equipped vessels caught large amounts of angler as well as a small amount of summer flounder.

Finfish dragging is also important in Hampton. Species diversity is extremely high. The otter trawl fleet of Hampton takes Illex and Loligo squid, black sea bass (a substantial amount is also caught with handlines); Atlantic mackerel; Atlantic croaker (a large portion was caught by haul seines as well as pound nets and sink gill nets); and angler (although most was landed by scallop dredges and scallop otter trawls). A small amount of pelagic longlining is also done from Hampton, for black tip, mako shortfin and thresher sharks and tuna (big eye, yellowfin, albacore)

The inshore and bay fisheries of Hampton include the pound-net and seine fisheries for Atlantic croaker, gill-netting and handlining, blue crabs, (caught with dredges, pots, and scrapes) and hard clams or quahogs (harvested with patent tongs and crabs). We have combined the weighout data for Hampton and Seaford to preserve the confidentiality of data for fisheries with few businesses involved. Species diversity in the landings at Hampton and Seaford is extremely high, 79 in 1998 (Table VA-H2). 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.

Table VA-H1: Landings by Gear Type, Hampton and Seaford, VA, 1998

GEAR TYPE: HAMPTON & SEAFORD	LBS (%)	VALUE (%)
Common Seine, Haul Seine	4.6	0.7
Dredge, Crab	1.6	0.8
Dredge, Scallop, Sea	16.6	57.2
Gill Net, Drift	0.7	0.2
Gill Net, Sink	8.2	2.1
Handline	0.3	0.2
Longline, Pelagic	0.1	0.1
Pots & Traps, Blue Crab	9.2	3.9
Pots & Traps, conch	0.0	0.0
Pots & Traps, Eel	0.0	0.0
Pots & Traps, fish	0.0	0.0
Scrapes	0.0	0.0
Tongs & Grabs, Clam, Patent	0.7	3.4
Otter Trawl, Bottom, Fish	53.5	16.5
Otter Trawl, Bottom, Scallop	4.4	14.7
Otter Trawl, Bottom, Shrimp	0.0	0.0
Pound Nets	0.0	0.0

Total Landings, rounded, 1998: 9,089,500 lbs.
Total Value, rounded, 1998: $13,311,000 dollars

Table VA-H2: Major Species Landed, Hampton and Seaford, VA, 1998

MAJOR SPECIES: HAMPTON & SEAFORD	LBS (%)	VALUE (%)
Angler	3.6	3.1
Crab, Blue	10.8	4.7
Croaker, Atlantic	13.2	2.1
Flounder, Summer	11.1	9.4
Mackerel, Atlantic	**	**
Scallop, Sea	17.3	68.8
Sea Bass, Black	2.9	2.6
Squid, Illex	**	**
Squid, Loligo	3.2	0.9
Other Fish, Industrial	2.1	0.1
Striped Bass	4.8	1.1
Herring, NK	**	**
Herring, Atlantic	**	**
Quahog	1.3	4.2

Number of Species: 79

Note: ** indicates confidential data due to small number of businesses involved.

Other species of MAFMC interest, by percentage value, 1998: Bluefish (0.4), Butterfish (0.1), Scup (0.1), Spiny Dogfish (0.0), Tilefish (0.0).

Northampton County, VA

Northampton County is at the southernmost tip of the Delmarva peninsula. Among its fishing ports are Oyster, inside the barrier islands of the Atlantic coast, and Cape Charles, at the entrance to the Chesapeake Bay, but most of the landings come from smaller sites coded as "Other Northampton" in NMFS weighout data. The fisheries are inshore and estuarine, dominated by blue crabs, Atlantic croaker, hard clams, and horseshoe crabs (Table VA-N2). Weakfish/squeteague and striped bass are among the 45 other species landed commercially in this area of Virginia.

Reflecting the importance of blue-crabs, the most important single gear-type is the blue crab pot (Table VA-N1). Pots are also used for conch, eel, and fish (the 1998 catches of the fish pots were Atlantic croaker and northern puffer, the latter a most unusual specialty). Dredges are used for hard clams, conch, horseshoe crabs, and blue crabs. Scrapes are used for crabs and eels; clams are harvested with patent tongs and "by hand."

Pound-nets are also important, both for crab and for fish. The fish pound nets catch Atlantic croakers, striped bass, summer flounder, weakfish and others, totaling 32 species. Otter trawl and "unknown" constitute the next largest gear types, totaling 8% of value; both were almost entirely horseshoe crab harvests in 1998. Gill-nets are used for a large variety of species; drift gill nets for 30 species, including striped bass, Atlantic croaker, and spot; sink

gill nets for 25 species, including American shad and weakfish. The NMFS dealer weighout data used for landings do not completely reflect the active, inshore fishery of Virginia, which is recorded by the State of Virginia. On the other hand, they do indicate the variety of techniques and fisheries.

Table VA-N1: Landings by Gear Type, Northampton County, VA, 1998

GEAR TYPE: NORTHAMPTON CO., VA	LBS (%)	VALUE (%)
By Hand	0.3	2.3
By Hand, Oyster	0.0	0.0
Common, Haul Seine	0.0	0.0
Dredge, Clam	0.3	3.4
Dredge, Conch	0.1	0.3
Dredge, Crab	6.4	7.9
Dredge, Other	0.3	0.1
Gill Net, Drift	6.1	4.9
Gill Net, Sink	4.7	4.4
Gill Net, Stake	0.1	0.1
Handline	0.2	0.4
Pots & Traps, Blue Crab	28.7	33.6
Pots & Traps, Conch	0.4	1.6
Pots & Traps, Eel	0.0	0.0
Pots & Traps, Fish	0.1	0.2
Pound Net, Crabs	0.2	0.6
Pound Net, Fish	24.0	14.7
Scrapes	0.0	0.1
Tongs & Grabs, Clam, Patent	0.0	0.3
Otter Trawl, Bottom, Fish	16.7	13.9
“Unknown” (Horseshoe Crab)	11.4	11.1

Total Landings, rounded, 1998: 8,468,400 lbs.
Total Value, rounded, 1998: $5,001,400 dollars

Note: "0.0" indicates some activity but less than 0.06%

Table VA-N2: Landings by Major Species, Northampton County, VA, 1998

MAJOR SPECIES: NORTHAMPTON CO., VA	LBS. (%)	VALUE (%)
Bass, Striped	1.3	3.1
Crab, Blue	34.9	41.2
Crab, Horseshoe	28.2	25.2
Croaker, Atlantic	21.4	13.1
Quahog	0.5	2.9
Spot	2.4	1.4
Conch	0.8	2.9
Clams, Bloodarc	0.2	2.9
Weakfish	5.1	2.5

Number of Species: 49

Other species of MAFMC interest, by percentage value 1998: Bluefish (0.6), Butterfi sh (0.1).

Accomack County and Chincoteague, VA

The visiting otter trawl fishery accounts for almost half of Chincoteague's 1998 landed value; summer flounder predominates in this fishery and is the leading species for landed value (39%). Like other Mid-Atlantic otter trawl fleets, this one is highly diverse, landing 19 species in 1998, led by summer flounder, black sea bass, and Loligo squid. There is a small drift gill-net fishery for striped bass, Atlantic croaker and other species and a large sink gill-net fishery (27% of Chincoteague's value), mainly for angler, but also spiny dogfish, Atlantic mackerel, and other species. Angler was almost as valuable as fluke in 1998. Some handlining and longlining for tunas and sharks takes place, and in1998 16% of the value came from fish pots, mainly black sea bass. Less than 5% of Chincoteague's fishing activity, in terms of value, came from clamming, crabbing and other estuarine and bay fisheries, which otherwise predominate in the Virginia and Maryland region.

Table VA-AC1 shows 1998 landings and value, broken down by percentage for gear type and major species, combining Chincoteague's landings with those of the many small waterman fisheries of Accomack County, as well as the port of Wachapreague. Seventy-two species were landed in 1998, primarily blue crabs. Crabs are caught with dredges, pots, scrapes, and trot-lines. There is also oystering and hard-clamming. Angler and summer flounder, mainly from Chincoteague's gill-net and otter trawl fisheries, account for 2.2% and 3.8% of the county's total value. Striped bass, Atlantic croaker, and conch are other important species.

The major gear types are crab pots (52.2% of value) and conch and fish pots (4.9%); crab scrapes and dredges. Also important are gillnets (19.8% of value); otter trawls; and "by hand" referring to treading, hand rakes, and other techniques used to harvest hard clams, oysters and horseshoe crabs.

Table VA-CH1: Landings by Gear Type, Accomack County, VA, 1998

GEAR TYPE: CHINCOTEAGUE & OTHER ACCOMACK CO, VA	LBS. %	VALUE %
By Hand	0.5	2.4
By Hand, Oyster	0.0	0.0
Dredge, clam	0.1	0.5
Gill Net, Drift	15.0	7.9
Gill Net, Sink	19.5	11.8
Gill Net, Stake	0.1	0.1
Handline	0.0	0.1
Longline Pelagic	0.0	0.0
Pots & Traps, Blue Crab	45.9	52.2
Pots & Traps, Conch	1.5	3.1
Pots & Traps, Fish	1.2	1.8
Rakes, Other	0.0	0.1
Trawl, Otter, Bottom, Fish	3.3	4.4
Cast Nets	0.1	0.1
Seines	0.7	0.3
Dredge, Conch	1.9	1.5
Dredge, Crab	4.4	4.3
Dredge, Oyster	0.1	0.3
Pots & Traps, Eel	0.0	0.0
Pound Net, Crab	0.1	0.3
Pound Net, Fish	3.2	0.8
Scrapes	2.1	7.3
Tongs & Grabs, Patent	0.1	0.7
Trot Line	0.1	0.1

Total Landings, rounded, 1998: 11,077,100 lbs.
Total Value, rounded, 1998: $8,485,000 dollars

Table VA-AC2: Landings by Major Species, Accomack County, VA, 1998

MAJOR SPECIES: ACCOMACK CO, VA	LBS. (%)	VALUE(-%)
Crab, Blue	52.2	63.9
Flounder, Summer	2.4	3.8
Angler	**	**
Bass, Striped	1.5	2.7
Croaker, Atlantic	**	**
Dogfish, Spiny	**	**
Quahog	0.6	3.4
Horseshoe Crab	2.5	1.5
Conch	1.6	3.3
Menhaden	2.8	0.3
Spot	8.2	4.1

Number of Species: 72

Note: ** indicates confidential data due to the small number of businesses involved.

Other Species of MAFMC interest, by percentage value, 1998: Bluefish (0.5), Butterfish (0.1), Atlantic Mackerel (0.1), Scup (0.0), Black Sea Bass (1.7), Tilefish (**), Loligo Squid (**).

Carteret County, NC (includes fishing centers of Morehead City, Beaufort, Bettie, Harker's Island, Davis, Stacy, Sea Level, Atlantic, Cedar Island)

Carteret County has the largest fishery in terms of poundage and second largest in terms of value in North Carolina (Table NC1). Total 1998 landings were over 80 million lbs, but value was little more than 21 million lbs., largely due to the low value of species such as menhaden and thread herring caught by purse-seining. Other important fisheries were crab-potting, shrimp trawling, fluke trawling, hard-clamming, and the use of pound-nets, sink gill nets, longlines, and other gears for a large variety of finfishes (the total number of species landed was 69) (Tables NC-CC1, 2).

Table NC-CC1: Landings by Gear Type, Carteret County, North Carolina, 1998

GEAR TYPE	LBS. %	VALUE %
Beach seine	0.0%	0.0%
By hand	0.1%	2.0%
Cast net	0.1%	0.0%
Channel net	0.1%	0.5%
Clam dredge (hydraulic)	0.0%	0.7%
Clam trawl, kicking	0.1%	2.2%
Common seine	0.0%	0.0%
Crab pot	6.0%	13.4%
Crab trawl	0.6%	1.4%
Fish pot	0.0%	0.2%
Flounder trawl	2.4%	9.1%
Flynet	0.6%	0.7%
Gigs	0.0%	0.1%
Gill net (drift)	0.1%	0.1%
Gill net (runaround)	0.5%	1.1%
Gill net set (float)	0.4%	1.1%
Gill net set (sink)	3.7%	5.4%
Haul seine	1.7%	2.9%
Longline bottom	0.0%	0.1%
Longline surface	0.1%	0.9%
Other (including conf.)	78.7%	22.8%
Oyster dredge	0.0%	0.1%
Peeler pot	0.0%	0.1%
Pound net	1.0%	5.5%
Purse seine	0.0%	0.0%
Rakes bull	0.0%	0.5%
Rakes hand	0.2%	3.8%
Rod-n-reel	0.8%	5.0%
Scallop dredge (bay)	0.1%	1.1%
Scallop dredge (sea)	0.0%	0.0%
Scallop scoop	0.0%	0.0%
Scallop trawl	0.0%	0.0%
Shrimp trawl	2.4%	16.7%
Skimmer trawl	0.1%	1.1%
Swipe net	0.0%	0.0%
Tongs, hand	0.0%	0.8%
Trolling	0.1%	0.4%

Total landings, rounded, 1998: 80,417,400 lbs.
Total value, rounded, 1998: 21,332,100 dollars

Table NC-CC2: Landings by Major Species, Carteret County, NC, 1998

MAJOR SPECIES >2%	LBS. %	VALUE %
Unclassified shrimp	1.9%	16.7%
Crabs, blue, hard	7.1%	15.4%
Croaker, Atlantic	2.7%	3.0%
Flounders, fluke	2.0%	14.0%
Other (including conf.)	78.7%	22.8%
Spot	1.5%	2.4%
Weakfish (seatrout, grey)	1.6%	2.8%
Clam, hard (meats)	0.4%	9.2%
Groupers	0.2%	1.9%

Number of species: 69

Pamlico County, NC

Pamlico County (pop. 11,372, 1990) had impressive total landings in 1998 of over 10 million pounds, worth over 9 million dollars. Important fishing centers include Bayboro, Vandemere, Hobucken and Oriental. Fishing takes place in the sounds and tidal rivers as well as coastal marine waters. Crab-potting, shrimp trawling, and flounder trawling are the major fisheries. Blue crabs accounted for 62% of the value in 1998, shrimp 13%, and fluke 19%. Fluke were caught mainly in trawls ("flounder trawls") but also in crab pots, crab trawls, drift or runaround gill-nets, set gill nets (float and sink), haul seines, pound nets, shrimp trawls, and swipe nets. Like other Mid-Atlantic areas, this is a very diversified fishing region, 46 species being landed by 19 different techniques or gears (Tables NC-PC1, 2).

Table NC-PC1: Landings by Gear Type, Pamlico County, NC, 1998

GEAR TYPE	LBS. %	VALUE %
By hand	0.0%	0.0%
Crab pot	72.0%	57.2%
Crab trawl	7.3%	5.5%
Eel pot	0.0%	0.0%
Flounder trawl	8.5%	16.6%
Flynet	0.0%	0.0%
Gill net (drift)	0.0%	0.0%
Gill net (runaround)	2.7%	1.7%
Gill net set (float)	2.5%	3.2%
Gill net set (sink)	0.5%	0.4%
Haul seine	0.0%	0.0%
Other (including conf.)	1.1%	1.4%
Oyster dredge	0.1%	0.3%
Peeler pot	0.0%	0.0%
Pound net	0.0%	0.0%
Rod-n-reel	0.0%	0.0%
Scallop trawl	0.0%	0.3%
Shrimp trawl	5.3%	13.5%
Swipe net	0.0%	0.0%

Total landings, 1998, rounded: 10,502,300 lbs.
Total value, 1998, rounded: 9,271,800dollars

Table NC-PC2: Landings by Major Species, Pamlico County, NC, 1998

MAJOR SPECIES >2%	LBS. %	VALUE %
Unclassified shrimp	4.9%	13.1%
Crabs, blue, hard	78.5%	60.1%
Flounders, fluke	9.4%	19.3%
Mullets	3.0%	1.6%
Crabs, blue, peeler	0.9%	2.1%

Number of species: 46

Beaufort County, NC

Beaufort County (pop. 42,283, 1990) is an important fishing county, accounting for over 10 million lbs. and 8 million dollars in 1998 (Tables NC-BC1,2). Bellhaven is the principal fishing port. Blue crabs, caught with pots, trawls, trotlines, and other methods, comprise almost all of the landings and value. Fluke made up over 3% of the value. Shrimp is also important although not shown below because of confidentiality.

Table NC-BC1: Landings by Gear-Type, Beaufort County, NC, 1998

GEAR TYPE	LBS. %	VALUE %
Crab pot	85.6%	82.9%
Crab trawl	10.0%	10.0%
Eel pot	0.1%	0.2%
Fish pot	0.0%	0.0%
Flounder trawl	0.0%	0.0%
Fyke net	0.0%	0.0%
Gigs	0.0%	0.0%
Gill net (runaround)	0.0%	0.0%
Gill net set (float)	1.4%	1.1%
Gill net set (sink)	1.2%	1.9%
Other (including conf.)	1.5%	3.7%
Oyster dredge	0.0%	0.0%
Peeler pot	0.0%	0.0%
Pound net	0.0%	0.0%
Rod-n-reel	0.0%	0.0%
Shrimp trawl	0.1%	0.1%
Trolling	0.0%	0.0%
Trotline	0.0%	0.0%

Total landings, rounded, 1998: 10,147,000 lbs.
Total value, rounded,1998: 8,035,100 dollars

Table NC-BC2: Landings by Major Species, Beaufort County, NC, 1998

MAJOR SPECIES >2%	LBS. %	VALUE %
Crabs, blue, hard	94.4%	89.8%
Flounders, fluke	1.4%	3.1%
Other (including conf.)	1.5%	3.7%

Number of species: 38

Hyde County, NC

Hyde County (pop. 5,411 in 1990) although small in population (reportedly there is only one traffic light in the county) is the third largest fishing county of North Carolina, with total landings over 16 million lbs. and value over 10 million dollars in 1998 (Tables NC-HC1,2). Fishing centers include Swan Quarter, Engelhard and Ocracoke. Blue crabs and fluke are

the two most important species in terms of value; dogfish, and Atlantic croaker are also significant, and 56 other species are caught. Gears used are the full array of estuarine and inshore techniques, particularly crab pots and trawls, sink and float set gill nets, shrimp trawls, pound nets, and flounder trawls.

Table NC-HC1: Landings by Gear Type, Hyde County, NC, 1998

GEAR TYPE	LBS. %	VALUE %
By hand	0.0%	0.0%
Cast net	0.0%	0.0%
Crab pot	63.0%	58.4%
Crab trawl	4.4%	3.8%
Fish pot	0.0%	0.0%
Flounders trawl	1.9%	5.0%
Fly net	0.3%	0.6%
Gill net (runaround)	0.4%	0.3%
Gill net set (float)	2.2%	2.9%
Gill net set (sink)	17.8%	12.5%
Haul seine	0.0%	0.0%
Longline bottom	0.0%	0.0%
Longline shark	0.0%	0.0%
Other (including conf.)	5.7%	3.2%
Oyster dredge	0.1%	0.9%
Peeler pot	0.0%	0.0%
Pound net	1.5%	3.6%
Rakes bull	0.0%	0.0%
Rakes hand	0.0%	0.0%
Rod-n-reel	0.0%	0.0%
Shrimp trawl	2.5%	8.5%
Swipe net	0.0%	0.0%
Tongs, hand	0.0%	0.0%
Trolling	0.2%	0.4%

Total landings, rounded, 1998: 16,079,800 lbs.
Total value, rounded,1998: 10,921,600 dollars

Table NC-HC2: Landings by Major Species, Hyde County, NC, 1998

MAJOR SPECIES >2%	LBS. %	VALUE %
Unclassified shrimp	2.3%	8.2%
Crabs, blue, hard	66.2%	58.5%
Croaker, Atlantic	8.3%	4.1%
Flounder, fluke	5.9%	16.0%
Other (including conf.)	5.7%	3.2%
Sharks, dogfish	3.8%	0.8%

Number of species: 62

Dare County, NC

Dare County (pop. 22,746, 1990) saw over 36.6 million pounds and 23.5 million dollars from fish and shellfish (and turtle) landings in 1998, the second highest county in the state in terms of pounds and first in terms of dollars (Tables NC-DC1,2). 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 range from estuarine fisheries (crab-pots, pound-nets, turtle pots, fyke nets, etc.) to offshore longlining.

Table NC-DC1: Landings by Gear Type, Dare County, NC, 1998

GEAR TYPE	LBS. %	VALUE %
Beach seine	1.5%	1.3%
By hand	0.0%	0.0%
Cast net	0.1%	0.0%
Crab pot	30.6%	33.0%
Crab trawl	0.6%	0.5%
Eel pot	0.0%	0.1%
Fish pot	0.1%	0.2%
Flounder trawl	3.3%	7.5%
Flynet	13.2%	7.7%
Fyke net	0.0%	0.0%
Gigs	0.0%	0.0%
Gill net (runaround)	1.0%	1.0%
Gill net set (float)	0.7%	0.8%
Gill net set (sink)	36.4%	22.5%
Haul seine	0.7%	0.5%
Longline bottom	0.0%	0.0%
Longline shark	1.5%	0.8%
Longline surface	2.7%	5.8%
Other (including conf.)	0.6%	0.4%
Oyster dredge	0.0%	0.0%
Peeler pot	1.1%	5.6%
Pound net	2.1%	3.4%
Rakes bull	0.0%	0.0%
Rakes hand	0.0%	0.0%
Rod-n-reel	0.6%	1.4%
Shrimp trawl	0.4%	1.2%
Trolling	2.8%	6.1%
Turtle pot	0.0%	0.0%

Total landings, rounded, 1998: 36,625,800 lbs.
Total value, rounded, 1998: 23,511,500 dollars

Table NC-DC2: Landings by Major Species, Dare County, NC, 1998

MAJOR SPECIES >2%	LBS. %	VALUE %
Anglerfish (goosefish)	1.8%	1.9%
Bluefish	6.4%	2.6%
Crabs, blue, hard	30.1%	27.8%
Croaker, Atlantic	18.9%	9.4%
Flounders, fluke	5.2%	15.0%
Mackerel, king	2.0%	4.7%
Sharks	2.7%	1.4%
Sharks, dogfish	10.9%	2.3%
Squid	2.4%	2.0%
Tuna	2.6%	5.2%
Weakfish (seatrout, grey)	4.7%	3.9%
Crabs, blue peeler	0.7%	2.2%
Crabs, blue, soft	1.6%	9.2%

Number of species: 69

Other North Carolina Counties:

Commercial fishing is important in many other North Carolina counties as well. Following are profiles of counties for which landings were reported in 1998, in rough geographical order, from southwest to northeast. Counties where landings were very small in 1998 are signified by full indentations and italics. Population figures for 1997 are from Diaby (1999:35), based on the July 1997 estimate from the Office of State Planning, Office of the Governor. Estimates of fishing income were derived from various sources described in Diaby (1999: 35).

Brunswick, Pender, and related Inland Counties

Brunswick County (pop. 65,200, 1997), at the southwestern end of the coast, has a diversified estuarine and inshore fishery, which yielded almost 3 million lbs and over 4.8 million dollars in 1998 (Tables NC-BC1,2). Shrimp trawls and rod-n-reel account for most of the landings by value; shellfish techniques ("by hand, bull rakes, hand rakes, hand tongs"), crab pots, trolling, and other techniques are also found. The major species by value was shrimp (48%); it was followed by a fairly even representation of porgies, snappers, groupers, hard clams, oysters, spot, triggerfish, and swordfish. In 1990 89 white men and 36 black men, plus 12 white women, claimed the occupation of fisher, and 23 white men were captains and other officers on the census. According to Diaby (1999: 35), there were 688 ETS issued in 1997, and the average fishing income that year was $11,572, compared with an average annual wage per worker of $23,860.

Pender County (pop. 37,208, 1997), up the Cape Fear River from Wilmington, is the site of estuarine and ocean fisheries, amounting to about $770,000 worth, for 535,000 lbs. in 1998. 19 gear types were used that year, ranging from shrimp trawls and four different

kinds of gill-nets to a variety of shell-fishing techniques and small scale nets (butterfly net, cast net, channel net). Shrimp, clams, crabs, and oysters were major. Fluke made up 2.1% of value and porgies 3.2% of value. Other ocean fishes are king mackerel, spot, snappers, and groupers. In 1990 66 white males declared fishing as their occupation. Diaby (1999: 35) reports 239 ETS issued in 1997, with average fishing income of $8,599 compared with an average annual wage of $19,329.

Bladen County, up the Cape Fear River, was the site of a gill-net fishery, plus a little oystering, haul-seining and crab potting in 1998. Species caught included crabs, spot, shad, croaker, and other bay and estuarine species. The 1990 census showed 8 black men as fishers. Robeson County, far inland up the same river, had a few landings in 1998 as well.

Columbus County, between Brunswick and Bladen Counties and on the Cape Fear River, had a small fishery, mainly oysters but also small amounts of spot, shad, fluke, bluefish, and crabs. It was valued at less than $70,000 in 1998. Techniques include crab pots, gill nets, gigs, and "by hand." The 1990 census showed no fishers as occupational types.

Refer to the sections on description of fishing activities (section 7), economic characteristics of the fishery (section 8), and the fishery impact statement (section 9.2.6) of Amendment 5 to the Atlantic mackerel squid and butterfish FMP.

5.6. Cost Analysis

Refer to the section on Regulatory Impact Analysis.

5.7. Competitive Effects Analysis

There are no large businesses involved in the industry, therefore, there are no disproportional small versus large business effects. There are no disproportional costs of compliance among the affected small entities.

5.8. Identification of Overlapping Regulations

The final action does not create regulations that conflict with any state regulations or other federal laws.

6. PAPER WORK REDUCTION ACT OF 1995

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

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

7. IMPACTS OF THE PLAN RELATIVE TO FEDERALISM

The 2001 specifications do not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order 12612.

Table 3 . Summary of impacts of proposed and alternative specifications for 2001 for Atlantic mackerel, Loligo and Illex squid and butterfish.

Species	Option	Total No. Vessels	Total Revenue Change ($ millions)	Revenue Change/ vessel ($)	No. vessels w/revenue re-duced by > 5%
Loligo	Proposed	475	+1.1	+2,315	0
Loligo	Alt. 1	475	-5.61	-11,813	130
Loligo	Alt. 2	475	-7.8	-16,400	173
Illex	Proposed	77	0	0	0
Illex	Alt. 1	77	0	0	0
Illex	Alt. 2	77	0	0	0
butterfish	Proposed	443	0	0	0
butterfish	Alt. 1	443	0	0	0
butterfish	Alt. 2	443	0	0	0
A. mackerel	Proposed	1980	0	0	0
A. mackerel	Alt. 1	1980	0	0	0
A. mackerel	Alt. 2	1980	0	0	0
A. mackerel	Alt. 3	1980	0	0	0

Table 4. Comparison of the size distribution of all vessels which landed *Loligo* in 1997 and those expected to have total gross revenues reduced by >5% as a result of the alternative 1 quota (13,000 mt) for *Loligo* in 2001.

	Vessels that landed *Loligo* in 1997		Affected Vessels[1]	
length (ft)	# vessels	% vessels	# vessels	% vessels
25 - 49	76	19.4	21	18.9
50 - 74	197	50.3	53	47.7
75 - 99	111	28.3	35	31.5
100 - 124	8	2.0	2	1.8
total	392	100	111	100

ton class	# vessels	% vessels	# vessels	% vessels
1	3	0.8	1	0.9
2	118	30.1	34	29.7
3	203	51.8	64	57.4
4	68	17.3	12	10.8
total	392	100	111	100

[1] Vessels with revenues reduced by >5%
[2] TC 1= <5 GRT; TC 2= 5 - 50 GRT; TC 3= 51 - 150- GRT; TC 4= >150 GRT
Source: unpublished NMFS permit file data.

Table 5. Comparisons of the size distribution of all vessels which landed *Loligo* in 1997 and those expected to have total gross revenues reduced by >5% as a result of the alternative 2 quota (11,700 mt) for *Loligo* in 2001.

	Vessels that landed *Loligo* in 1997		Affected Vessels[1]	
length (ft)	# vessels	% vessels	# vessels	% vessels
25 - 49	76	19.4	26	17.5
50 - 74	197	50.3	74	49.7
75 - 99	111	28.3	46	30.9
100 - 124	8	2.0	3	2.0
total	392	100	149	100.00

ton class	# vessels	% vessels	# vessels	% vessels
1	3	0.8	1	0.7
2	118	30.1	41	27.5
3	203	51.8	81	54.4
4	68	17.3	26	17.5
total	392	100	149	100.00

[1] Vessels with revenues reduced by >5%
[2] TC 1= <5GRT; TC 2= 5 - 50 GRT; TC 3= 51 - 150 GRT; TC 4= >150 GRT
Source: unpublished NMFS permit file data.

Table 6. Distribution of vessels by home port state which landed *Loligo* in 1997 v. those affected by the alternative 1 quota of 13,000 mt and alternative 2 quota of 11,700 mt for *Loligo* in 2001.

	All vessels landing *Loligo in 1997*		Alternative 1 Quota (13,000 mt)		Alternative 2 Quota (11,700 mt)	
Home Port State	# vessels	% vessels	# vessels	% vessels	# vessels	% vessels
MA	100	25.6	23	20.7	31	20.8
MD	4	1.0	0	0.0	0	0.0
NC	32	8.2	0	0.0	0	0.0
NJ	45	11.5	14	12.6	21	14.1
NY	99	25.3	46	41.4	57	38.2
PA	16	4.1	8	7.2	10	6.7
RI	55	14.1	16	14.4	25	16.8
VA	28	7.2	0	0.0	0	0.0
other	12	3.0	4	3.6	5	3.4
Total	391	100.0	111	100.0	149	100.0

Source: unpublished NMFS permit file data.

Table 7. Distribution of vessels by principal port landing state which landed *Loligo* in 1997 v. those vessels affected by the alternative 1 quota of 13,000 mt and alternative 2 quota of 11,700 mt for *Loligo* in 2001.

	All vessels landing *Loligo* in 1997		Alternative 1 Quota (13,000 mt)		Alternative 2 Quota (11,700 mt)	
Principal Port State	# vessels	% vessels	# vessels	% vessels	# vessels	% vessels
CT	7	1.8	3	2.7	4	2.7
MA	76	19.4	16	14.4	23	15.4
MD	6	1.5	0	0.0	0	0.0
ME	3	0.8	0	0.0	0	0.0
NC	41	10.5	0	0.0	0	0.0
NJ	67	17.1	25	22.5	36	24.2
NY	84	21.5	42	37.8	49	32.9
RI	88	22.5	25	22.5	37	24.8
VA	19	4.9	0	0.0	0	0.0
Total	391	100	111	100.0	149	100.0

Source: unpublished NMFS permit file data.

Table 8. Distribution of vessels by vessel owner's state which landed *Loligo* in 1997 v. those vessels affected by the alternative 1 quota of 13,000 mt and the alternative 2 quota of 11,700 mt for *Loligo* in 2001.

	All vessels landing *Loligo* in 1997		Alternative 1 Quota (13,000 mt)		Alternative 2 Quota (11,700 mt)	
Owner's State	# vessels	% vessels	# vessels	%vessels	# vessels	% vessels
CT	5	1.3	0	0.0	3	2.0
DE	3	0.8	0	0.0	0	0.0
MA	71	18.2	15	13.5	21	14.1
MD	5	1.3	0	0.0	0	0.0
ME	4	1.0	0	0.0	0	0.0
NC	43	11.0	0	0.0	0	0.0
NJ	71	18.2	25	22.5	37	24.8
NY	85	21.7	43	38.7	49	32.9
RI	84	21.5	25	22.5	37	24.8
VA	19	4.9	0	0.0	0	0.0
Other	1	0.2	3	2.7	2	1.3
Total	391	100	111	100.0	149	100.0

Source: unpublished NMFS permit file data.

Table 9. Distribution of affected vessels by state, county and home port from 1997 NMFS permit file data for 13,000 mt *Loligo* quota in 2001.

State	County	Home port	Number of Vessels
Massachusetts	Barnstable	Chatham	4
		Harwichport	3
		Other	2
	Bristol	New Bedford	3
	Suffolk	Boston	11
New Jersey	Cape May	Cape May	10
	Ocean	Point Pleasant	3
New York	New York	New York	34
	Suffolk	Montauk	3
		Shinnecock	3
		Other	2
Pennsylvania	Philadelphia	Philadelphia	8
Rhode Island	Washington	Point Judith	11
	Providence	Other	2

Table 10. Distribution of affected vessels by state, county and home port from 1997 NMFS permit file data for 11,700 mt *Loligo* quota in 2001.

State	County	Home port	Number of Vessels
Massachusetts	Barnstable	Chatham	4
		Harwichport	3
		Other	2
	Bristol	New Bedford	16
	Suffolk	Boston	12
New Jersey	Cape May	Cape May	12
	Ocean	Point Pleasant	5
New York	New York	New York	44
	Suffolk	Montauk	3
		Shinnecock	3
		Other	3
		Greenport	3
Pennsylvania	Philadelphia	Philadelphia	10
Rhode Island	Washington	Point Judith	15
		Wakefield	3
		Other	5