AMENDMENT 7 TO THE

FISHERY MANAGEMENT PLAN FOR THE

SUMMER FLOUNDER FISHERY

May 1995

Mid-Atlantic Fishery Management Council

in cooperation with the

Atlantic States Marine Fisheries Commission,

the

National Marine Fisheries Service,

the

New England Fishery Management Council,

and the

South Atlantic Fishery Management Council

Draft adopted by MAFMC: 24 May 1995
Final adopted by MAFMC: 28 June 1995
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2. SUMMARY

This Amendment 7 to the Fishery Management Plan for the Summer Flounder Fishery (FMP), prepared by the Mid-Atlantic Fishery Management Council (Council), is intended to manage the summer flounder (*Paralichthys dentatus*) fishery pursuant to the Magnuson Fishery Conservation and Management Act of 1976, as amended (MFCMA). The management unit remains unchanged and is summer flounder in US waters in the western Atlantic Ocean from the southern border of North Carolina northward to the US - Canadian border. The objectives of the FMP remain unchanged and are:

1. Reduce fishing mortality in the summer flounder fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder to increase spawning stock biomass.

3. Improve the yield from the fishery.

4. Promote compatible management regulations between State and Federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

Amendment 2 to the Summer Flounder FMP established a fishing mortality reduction strategy that set a target fishing mortality rate of 0.53 for 1993-1995 and 0.23 in 1996 and beyond. This fishing mortality rate reduction schedule was developed by the Council and ASMFC after lengthy deliberations that occurred during the development of Amendment 2. The Council and ASMFC choose this strategy as an appropriate reduction strategy that would balance effective reductions in fishing mortality with the short term economic burdens placed on the participants in the fishery.

At the time that the strategy was proposed, the Council and ASMFC believed that the reductions in fishing mortality that would occur in the first three years of the management program would allow for significant rebuilding of the summer flounder stock over this three year period. The Council and ASMFC assumed that this rebuilding would have been large enough such that the quota associated with the target F rate (0.23) in the 4th year (1996) of the management program would have been equal to or slightly less than the quota in year 3. In other words, the quota reduction in year 4 would have been minimal or non existent because of the increases in stock size that occurred in years 1 to 3 of the management program due to decreases in fishing mortality and the implementation of minimum mesh and size restrictions.

Although the stock is rebuilding, the stock has not rebuilt as fast as anticipated. Projections indicate that the quota associated with the target F of 0.23 in 1996 could be approximately 11 million pounds (5.0 MT) or about one half of the quota in 1995. Because of this sharp reduction in quota from 1995 to 1996, and the associated short term negative consequences of such a drastic change, the Council and ASMFC initiated a reexamination of the fishing mortality rate reduction schedule for summer flounder.

Amendment 7 would revise the fishing mortality rate reduction schedule for summer flounder. The Council and ASMFC have adopted the following strategy: the fishing mortality rate would be reduced from the current target (0.53) to 0.41 in 1996, 0.3 in 1997, and F_{max} in 1998 and beyond. In addition, the quota for 1996 and 1997 would not exceed 18.51 million lbs (8400 MT). Quotas could be larger than 18.51 million lbs only if the associated F was 0.23. Thus the F in 1996 and 1997 could be lower than 0.41 and 0.3, respectively, but would not exceed these values.

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4. INTRODUCTION

4.1 DEVELOPMENT OF THE PLAN

The Council first considered the development of a fishery management plan for summer flounder in late 1977. During the early discussions, the fact that a significant portion of the catch was taken from state waters was considered. As a result, on 17 March 1978 a questionnaire was sent by the Council to east coast state fishery administrators seeking comment on whether the plan should be prepared by the Council or by the states acting through the Atlantic States Marine Fisheries Commission (ASMFC).

It was decided that the initial plan would be prepared by ASMFC. The Council arranged for NMFS to make some of the Council's programmatic grant funds available to finance preparation of the ASMFC plan. New Jersey was designated as the state with lead responsibility for the plan. The State/Federal draft was adopted by the Atlantic States Marine Fisheries Commission at its annual meeting in October 1982. The original Council FMP (MAFMC 1988) was based on the ASMFC management plan. NMFS approved the original FMP on 19 September 1988.

Amendment 1 to the FMP was developed in the summer of 1990 solely to protect the 1989 and 1990 year classes by imposing a minimum net mesh size comparable to the 13" minimum fish size included in the original FMP. On 15 February 1991 the Council was notified that NMFS had approved the overfishing definition for summer flounder contained in Amendment 1, but had disapproved the minimum net mesh provision.

The Council adopted the hearing draft of Amendment 2 on 29 May 1991. The Amendment was also adopted for hearings at the May meeting of the ASMFC Interstate Fishery Management Program Policy Board. Amendment 2 was a major amendment that contained a number of management measures including a commercial moratorium, commercial quotas, and recreational limits. Amendment 2 was approved by NMFS on 6 August 1992.

Amendment 3 to the Summer Flounder FMP was developed in response to fishermen's concerns that the demarcation line for the small mesh exempted fishery bisected Hudson Canyon and was difficult to enforce. Amendment 3 revised the Northeast exempted fishery line to 72°30.0'W. In addition, Amendment 3 increased the large mesh net threshold to 200 lbs during the winter fishery, 1 November to 30 April. Furthermore, Amendment 3 stipulated that otter trawl vessels fishing from 1 May through 31 October could only retain up to 100 lbs of summer flounder before using the large mesh net. Amendment 3 was approved by the Council on 21 January 1993 and submitted to NMFS on 16 February 1993.

Amendment 4 adjusted Connecticut's commercial landings of summer flounder and revised the state-specific shares of the coastwide commercial summer flounder quota as requested by ASMFC. Amendment 5 allowed states to transfer or combine the commercial quota. Amendment 6 allowed multiple nets on board as long as they were properly stowed and changed the deadline for publishing the overall catch limits and commercial management measures to 15 October and the recreational management measures to 15 February.

4.2. PROBLEM FOR RESOLUTION

Amendment 2 to the Summer Flounder FMP established a fishing mortality reduction strategy that set a target fishing mortality rate of 0.53 for 1993-1995 and 0.23 in 1996 and beyond. This fishing mortality rate reduction schedule was developed by the Council and ASMFC after lengthy deliberations that occurred during the development of Amendment 2. The Council and ASMFC choose this strategy as an appropriate reduction strategy that would balance effective reductions in fishing mortality with the short term economic burdens placed on the participants in the fishery.

In the development of Amendment 2, numerous strategies were proposed to reduce fishing mortality on summer flounder. The Council and ASMFC were presented with the results of an age-structured population model which was used to simulate the summer flounder population under the various reduction strategies. Analysis of the adopted fishing mortality rate reduction schedule in Amendment 2 indicated that the probability of the stock recovering to a level of 20% of its Maximum Spawning Potential (MSP) in 10 years was 100%. A 20% MSP level has been used for some groundfish (e.g., cod, yellowtail, and winter flounder) and other fish species to define the minimum level at which the stock can sustain itself over an extended period of time.

At the time that the strategy was proposed, the Council and ASMFC believed that the reductions in fishing mortality that would occur in the first three years of the management program would allow for significant rebuilding of the summer flounder stock over this three year period. The Council and ASMFC assumed that this rebuilding would have been large enough such that the quota associated with the target F rate (0.23) in the 4th year (1996) of the management program would have been equal to or slightly less than the quota in year 3. In other words, the quota reduction in year 4 would have been minimal or non existent because of the increases in stock size that occurred in years 1 to 3 of the management program due to decreases in fishing mortality and the implementation of minimum mesh and size restrictions.

Unfortunately, based on the results of the latest assessment conducted in 1994, the stock has not rebuilt as fast as anticipated. Stock size in 1996 will be lower than expected as the result of lower levels of recruitment in 1993, a change in exploitation patterns with the fisheries killing more age 0 and age 1 summer flounder than expected, and higher fishing mortality rates.

Although the stock is rebuilding at a slower rate, stock size has increased from the low levels measured in 1989. The SSB estimates for 1993 increased 61% from the low level measured in 1989. Projected stock size estimates for 1994 and 1995 indicate that rebuilding is continuing with increasing stock sizes and greater numbers of fish available at the older ages.

Although the stock is rebuilding, projections indicate that the quota associated with the target F of 0.23 in 1996 could be approximately 11 million pounds (5.0 MT) or about one half of the quota in 1995. Because of this sharp reduction in quota from 1995 to 1996, and the associated short term negative consequences of such a drastic change, the Council and ASMFC initiated a reexamination of the fishing mortality rate reduction schedule for summer flounder.

Because of the amount of time and effort invested in the development of the original fishing mortality rate reduction schedule, the Council and ASMFC were very concerned about modifying the schedule. As a policy, the Council and ASMFC do not believe that long term rate reduction schedules should be changed from one year to the next. However, after careful consideration, the Council and ASMFC propose a slight modification to the rate reduction schedule that will alleviate the short term economic burden associated with a reduction to F_{max} (0.23) in 1996. This change will allow for more stable landings from one year to the next and only slow the rate of stock rebuilding slightly.

4.3. MANAGEMENT STRATEGY

Overfishing for the summer flounder is defined as fishing in excess of the F_{max} level. F_{max} is a biological reference point that corresponds to the level of fishing mortality (F) that produces the maximum yield per recruit. Based on current analysis, F_{max} is 0.23.

Amendment 2 to the Summer Flounder FMP established a fishing mortality reduction strategy that set a target fishing mortality rate of 0.53 for 1993-1995 and 0.23 in 1996 and beyond. This fishing mortality rate reduction schedule was developed by the Council and ASMFC after lengthy deliberations that occurred during the development of Amendment 2. The Council and ASMFC choose this strategy as an appropriate reduction strategy that would balance effective reductions in fishing mortality with the short term economic burdens placed on the participants in the fishery.

Amendment 7 would revise the fishing mortality rate reduction schedule for summer flounder. The Council and ASMFC have adopted the following strategy: the fishing mortality rate would be reduced from the current target (0.53) to 0.41 in 1996, 0.3 in 1997, and F_{max} in 1998 and beyond. In addition, the quota for 1996 and 1997 would not exceed 18.51 million lbs (8400 MT). Quotas could be larger than 18.51 million lbs only if the associated F was 0.23.

The quota cap of 18.51 million pounds was derived from projections that indicated that a constant quota of 18.51 million pounds for 1996, 1997 and 1998 would result in an F of 0.23 in 1998. These projections were based on the best information that was available at the time this document was prepared, the results of the 1994 summer flounder stock assessment (NEFSC 1994).

The Council and Commission are aware that if the summer flounder stock size is larger than that projected by the 1994 assessment, a cap of 18.51 million pounds could result in an associated F that is less than 0.41 and 0.3 in 1996 and 1997, respectively. Given good recruitment in 1994, 1995 and 1996 as well as the attainment of the target F in 1995, it is possible that the cap of 18.51 million pounds could result in an F of 0.23 as early as 1997. As such, this strategy would only postpone the reduction to F_{max} by one year. In addition, F's lower than 0.41 and 0.3 in 1996 and 1997, respectively, will allow for larger increases in stock biomass and faster recovery of the summer flounder stock. This "banking" of fish will insure that stock sizes will be large enough the following years to support stable quota levels even in the event of lower than expected recruitment.

4.5. MANAGEMENT OBJECTIVES

The objectives of the FMP are to:

1. Reduce fishing mortality in the summer flounder fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder to increase spawning stock biomass.

3. Improve the yield from the fishery.

4. Promote compatible management regulations between State and Federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

4.4. MANAGEMENT UNIT

The management unit is summer flounder (*Paralichthys dentatus*) in US waters in the western Atlantic Ocean from the southern border of North Carolina northward to the US-Canadian border.

5. DESCRIPTION OF THE STOCK

5.1. SPECIES DISTRIBUTION

There is no need to change this section at this time.

5.2. ABUNDANCE AND PRESENT CONDITION

There is no need to change this section at this time.

5.3. STOCK CHARACTERISTICS AND ECOLOGICAL RELATIONSHIPS

There is no need to change this section at this time.

5.4. MAXIMUM SUSTAINABLE YIELD

There is no need to change this section at this time.

5.5. PROBABLE FUTURE CONDITION

There is no need to change this section at this time.

6. DESCRIPTION OF HABITAT

6.1. DISTRIBUTION OF THE SPECIES, HABITAT REQUIREMENTS, AND HABITAT OF SUMMER FLOUNDER

There is no need to change this section at this time.

6.2. HABITAT CONDITION

There is no need to change this section at this time.

6.3. GENERAL CAUSES OF POLLUTION AND HABITAT DEGRADATION

There is no need to change this section at this time.

6.4. PROGRAMS TO PROTECT, RESTORE, PRESERVE, AND ENHANCE THE HABITAT OF THE STOCKS FROM DESTRUCTION AND DEGRADATION

There is no need to change this section at this time.

6.5. HABITAT PRESERVATION, PROTECTION AND RESTORATION RECOMMENDATIONS

There is no need to change this section at this time.

6.6. HABITAT RESEARCH NEEDS

There is no need to change this section at this time.

7. DESCRIPTION OF FISHING ACTIVITIES

7.1. DOMESTIC COMMERCIAL FISHERY

There is no need to change this section at this time.

7.2. DOMESTIC RECREATIONAL FISHERY

There is no need to change this section at this time.

7.3. FOREIGN FISHING ACTIVITIES

There is no need to change this section at this time.

8. ECONOMIC CHARACTERISTICS OF THE FISHERY

8.1. COMMERCIAL FISHERY

There is no need to change this section at this time.

8.2. RECREATIONAL FISHERY

There is no need to change this section at this time.

8.3. INTERNATIONAL TRADE

There is no need to change this section at this time.

9. FISHERY MANAGEMENT PROGRAM

9.1. MEASURES TO ATTAIN MANAGEMENT OBJECTIVES

9.1.1. Specification of OY, DAH, DAP, JVP, TALFF, Overfishing Definition, and Fishing Mortality Rate Reduction Strategy

Section 303(a)(3) of the MFCMA requires that FMPs assess and specify the OY from the fishery and include a

summary of the information utilized in making such specification. The OY is to be based on MSY, or on MSY as it may be adjusted for social, economic, or ecological reasons. The most important limitation on the specification of OY is that the choice of OY and the conservation and management measures proposed to achieve it must prevent overfishing. MSY (section 5.4) has not been specified for summer flounder.

The OY is all summer flounder harvested pursuant to this FMP. The OY cannot be specified as a quantity because it will change as the fishing mortality rate target varies and is dependent on the level of recruitment.

The Council has concluded that US vessels have the capacity to, and will, harvest the OY on an annual basis, so DAH equals OY. The Council has also concluded that US fish processors, on an annual basis, will process that portion of the OY that will be harvested by US commercial fishing vessels, so DAP equals DAH and JVP equals zero. Since US fishing vessels have the capacity and intent to harvest the entire OY, there is no portion of the OY that can be made available for foreign fishing, so TALFF also equals zero.

Overfishing for the summer flounder is defined as fishing in excess of the F_{max} level. F_{max} is a biological reference point that corresponds to the level of fishing mortality (F) that produces the maximum yield per recruit. Based on current analysis, F_{max} is 0.23.

Amendment 2 to the Summer Flounder FMP established a fishing mortality reduction strategy that set a target fishing mortality rate of 0.53 for 1993-1995 and 0.23 in 1996 and beyond. This fishing mortality rate reduction schedule was developed by the Council and ASMFC after lengthy deliberations that occurred during the development of Amendment 2. The Council and ASMFC choose this strategy as an appropriate reduction strategy that would balance effective reductions in fishing mortality with the short term economic burdens placed on the participants in the fishery.

Amendment 7 would revise the fishing mortality rate reduction schedule for summer flounder. The Council and ASMFC have adopted the following strategy: the fishing mortality rate would be reduced from the current target (0.53) to 0.41 in 1996, 0.3 in 1997, and F_{max} in 1998 and beyond. In addition, the quota for 1996 and 1997 would not exceed 18.51 million lbs (8400 MT). Quotas could be larger than 18.51 million lbs only if the associated F was 0.23. Thus the F in 1996 and 1997 could be lower than 0.41 and 0.3, respectively, but would not exceed these values.

9.1.2. Specification of Adopted Management Measures (This section is unchanged from the current FMP.)

9.1.3. Specification and Sources of Pertinent Fishery Data (This section is unchanged from the current FMP.)

9.2. ANALYSIS OF BENEFICIAL AND ADVERSE IMPACTS OF ADOPTED MANAGEMENT MEASURES

9.2.1. The FMP Relative to the National Standards

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

9.2.1.1. Conservation and management measures shall prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery.

MSY (section 5.4) has not been specified for summer flounder. The OY is all summer flounder harvested pursuant to this FMP.

Overfishing in the Summer Flounder FMP is defined as fishing in excess of the F_{max} level. F_{max} is a biological reference point that corresponds to the level of fishing mortality (F) that produces the maximum yield per recruit. Based on current resource condition, F_{max} is 0.23. That overfishing definition was approved by NMFS in Amendment 1 to the FMP.

This amendment would revise the fishing mortality rate reduction schedule for summer flounder. The revised schedule would continue to reduce fishing mortality but would extend the reduction to F_{max} over a two year period. The Council's schedule to reduce overfishing is presented in section 9.1.1.

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

This FMP is based on the best and most recent scientific information available. Future summer flounder research should be devoted toward both data collection and analysis in order to evaluate the effectiveness of this FMP. This species should be reviewed annually by the NEFSC Stock Assessment Workshop process.

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

The FMP's management unit is summer flounder throughout their range on the Atlantic coast from Maine through North Carolina, including the EEZ, territorial sea, and internal waters. This specification is considered to be consistent with National Standard 3.

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

This amendment does not modify the regulations implemented as the result of Amendment 2 and the other amendments to the Summer Flounder FMP. Those regulations were found to be consistent with National Standard 4.

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

The management regime implemented by the amendments to the Summer Flounder FMP are intended to allow the fishery to operate at the lowest possible cost (e.g., fishing effort, administration, and enforcement) given the FMP's objectives. The objectives focus on the issue of administrative and enforcement costs by encouraging compatibility between Federal and State regulations since a substantial portion of the fishery occurs in State waters. The FMP places no restrictions on processing, or marketing and no unnecessary restrictions on the use of efficient techniques of harvesting.

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

This amendment does not modify the regulations implemented as the result of Amendment 2 and the other amendments to the Summer Flounder FMP. Those regulations were found to be consistent with National Standard 6.

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

The management regime was developed to be compatible with and reinforce the management efforts of the States and ASMFC. The provisions of this Amendment have already been adopted by the ASMFC.

9.2.2. Cost/Benefit Analysis

9.2.2.1. Landings and Spawning Stock Biomass Associated with the Alternative Fishing Mortality Rate Reduction Schedules

Amendment 7 would revise the fishing mortality rate reduction schedule for summer flounder. This schedule would continue to reduce F from current levels to F_{max} but would extend the reduction to F_{max} by two years. The fishing mortality rate would be reduced from the current target (0.53) to 0.41 in 1996, 0.3 in 1997, and F_{max} in 1998 and beyond. In addition, the quota for 1996 and 1997 could not exceed 18.5 million lbs (8400 MT). Quotas could be

larger than 18.5 million lbs only if the F associated with the higher quota was 0.23. Thus the F in 1996 and 1997 could be lower than 0.41 and 0.3, respectively, but would not exceed these values.

In evaluating the fishing mortality rate reduction schedule for summer flounder, the Council and ASMFC were presented with a total of six options that would establish the fishing mortality rates for summer flounder for the years 1996 to 2000 (Table 1). An analysis was conducted of each alternative to determine the impact of the various F strategies on landings (quotas) and spawning stock biomass (SSB) for 1996 - 2000. Specifically, deterministic projections of landings (quotas) and SSB were made for each alternative based on the results of the latest stock assessment for summer flounder (NEFSC 1994), assuming a constant recruitment of 32.2 million fish for all years, and assuming landings for 1994 and 1995 were 26.7 and 22.5 million pounds, respectively.

The following summarizes the results of that analysis for each alternative. Note that options 1 through 4 and 5A are the nonpreferred alternatives for purposes of public hearings. Option 1 (the current plan) is the fishing mortality rate reduction schedule currently in place and option 5B is the Council's and ASMFC's preferred alternative. Also note that estimates of landings and SSB in the various options are based on current stock assessment information and other critical assumptions. Estimates of landings and SSB will change with the input of new assessment information.

Option 1

This is the fishing mortality rate reduction schedule that is currently in place as the result of the implementation of Amendment 2. That schedule would require a reduction to F_{max} (0.23) in 1996. This reduction could reduce landings by more than 50% in 1996 with landings increasing each year, reaching the 1995 level by 1998 (Table 2). SSB would increase each year, from 51.8 million pounds in 1996 to 117.7 million pounds in 2000 (Table 3).

Option 2

This alternative would reduce the fishing mortality rate to 0.38 in 1996 and to 0.23 in 1997 and thereafter. The target F in 1996 is halfway between the current target F of 0.53 and F_{max} (0.23). Relative to the current plan, this alternative would allow for higher landings in 1996 (17.2 million lbs). In addition, SSB would increase each year but would be slightly lower, ranging from 47 million lbs in 1996 to 114 million pounds in 2000.

Option 3

This option would postpone the reduction to F_{max} for another year. Under this alternative, the target F for 1996 would be 0.53 and F would be reduced to 0.23 in 1997 and beyond. Landings in 1996 would be similar to the 1995 landings. However, landings would decline sharply in 1997 to 13.2 million pounds. SSB would increase each year and reach an estimated 110 million lbs by 2000.

Option 4

Option 4 would postpone the reduction to F_{max} for two years. The 1995 target (0.53) would be maintained for 1996 with a reduction to 0.38 in 1997 and 0.23 in 1998 and beyond. Relative to the current plan, this option would provide the largest increase in near term landings but also cause a greater reduction in future landings and in SSB. However, SSB would continue to increase each year reaching an estimated 105 million lbs by 2000.

Options 5A and 5B

These options are identical for purposes of this analysis. Both would establish a fishing mortality rate reduction schedule that would set F at 0.41 in 1996, 0.3 in 1997 and 0.23 in 1998 and beyond. The steady reduction in mortality rates that would be implemented by these alternatives could allow for harvest stability; landings would remain at 18.5 million lbs for each year 1996-1998. As with the other alternatives, SSB would increase each year from 46 million lbs in 1996 to 110 million lbs in 2000.

Option 5A would establish the fishing mortality rate reduction schedule without any additional criteria. Quotas would be set each year based on the target F and stock size estimates from the latest assessment. Larger or smaller stock size estimates than those projected for 1996 and 1997 would result in higher or lower quotas.

Option 5B is the Council's and ASMFC's preferred alternative. It differs from option 5A in that it would also require that the quota for 1996 and 1997 not exceed 18.51 million lbs. Quotas could be larger than 18.51 million lbs only if the F associated with the higher quota was 0.23. Thus, the F in 1996 and 1997 could be lower than 0.41 and 0.3, respectively, but would not exceed these values. Option 5B is more conservative than 5A and could allow for stock rebuilding at a faster rate.

Summary

In general, the total landings for all years (1996 to 2000) is nearly identical for all the alternatives. The difference between the options is in how the landings are allocated over the 5 year time period. A postponement in the reduction to F_{max} (i.e., F greater than 0.23 in 1996 and 1997) will result in an increase in near term landings at the expense of future landings. In addition, some alternatives allow for a more stable landings pattern (Fig. 1). Option 1 results in the largest variability in landings from one year the next with a 50% decline from 1995 to 1996 followed by a 50% increase from 1996 to 1997. Conversely, option 5A and 5B produce the most stable landings pattern with landings ranging from 18.5 to 26.7 million pounds over the period.

Stable landings from one year to the next are more desirable from both a management and industry perspective. Drastic reductions in the quota from one year to the next would lead to increased levels of noncompliance by both commercial and recreational fishermen. Underreporting and high grading, as well as landings in excess of recreational possession limits, would increase as fishermen attempted to maintain levels of income or personal satisfaction. In addition, a more stable landings pattern would allow fishermen, processors, party/charter boat operators, equipment and bait suppliers, and others affected by summer flounder regulations to make business decisions that extend for more than one year into the future.

Although landing patterns differ for each of the options, the trend in SSB remains the same (Fig. 2). Based on the projections, SSB increases each year under each option. However, at higher F's, the rate of increase is slowed. Relative to the existing plan (option 1), option 4 is the least conservative option resulting in SSB estimates that are 11% to 25% lower each year. The preferred alternative would produce SSB estimates that are only 7% to 15% different in any one year.

In evaluating the effects of the fishing mortality rate reduction schedules on the stock, the question becomes one of risk versus yield. Specifically, is there a significant increase in risk to the stability of the stock caused by increasing landings in 1996 and 1997 to achieve higher target F's? In other words, relative to the current plan, how much greater is the chance of recruitment failure if SSB estimates are lower in any one year?

Based on VPA results, there is a near linear relationship between summer flounder SSB and recruitment suggesting that as SSB is increased, recruitment levels should also increase (Fig. 3). Lower recruitment from 1983 to 1993 was associated with SSB estimates that ranged from 11 to 33 million pounds. The SSB estimates that exceeded 33 million pounds were associated with higher recruitment events. Because SSB estimates for all the alternatives would exceed 42 million pounds in 1996, the chance of recruitment failure should be minimal for all options.

In the event that recruitment failure did occur, as the result of unfavorable environmental conditions, the numerous young-of-year surveys that are conducted along the coast would measure the poor recruitment event. Quotas would be set for only one year before a poor year class became apparent and stock size estimates were recalculated. Thus, even under the most liberal option, the chance of stock collapse is almost nonexistent.

Finally, it is important to note that SSB estimates have an associated variability resulting from the uncertainty of the data input into the VPA. The coefficient of variation associated with the 1993 SSB estimate was 25% based on bootstrap results (NEFSC 1994). Assuming this CV applied to each year of the projections results for the fishing mortality rate reduction strategy associated with the current plan (option 1), a range of SSB estimates can be derived for each year (Fig. 4). These ranges encompass the projected SSB results for all the other alternatives in each year. Thus, the differences in SSB between option 1 and the other alternatives are statistically insignificant.

The Council and Commission believe that option 5B represents the best balance between yield and risk to the stock. This alternative allows for more stable landings over the next 5 years with minimal effects on projected stock biomass. Although it slows the rate of rebuilding, the risks of recruitment failure and/or stock collapse are minimal.

9.2.2.2. Economic evaluation of fishing mortality rate reduction strategies

Commercial Fishery

Present values were estimated from the various catch projections estimated for the six fishing mortality rate reduction strategies. Note that the results associated with option 5 apply to both options 5A and 5B and option 1 is the fishing mortality rate reduction strategy identified in the current plan. The estimation of present values allowed for an evaluation of relative economic impacts of the various F strategies on the commercial fishery.

Present value refers to the present value of a sum of money to be received in the future. This concept is useful when comparing money generated at different points in time. In order to find the present value of a future sum of money, the future sum of money is discounted back to the present to find its current or present value. This process is known as discounting. The future sum of money is discounted because a sum of money to be received in the future has a lower present value due to the time difference.

Changes in Landings

The first step in this analysis was to estimate the changes in yearly landings from 1996 to 2000 associated with each alternative. Table 4 shows the 1995 commercial quota (about 15 million pounds) and the projected commercials landings from 1996 to 2000. The projections in commercial landings represent 60% of the total quota for those years. Table 5 shows the projected yearly percentage changes in landings in the commercial sector. (For example, commercial landings for option 1 are projected to decrease by 56% from 1995 to 1996, and to increase by 50% from 1996 to 1997.)

Changes in Prices

As a general rule, restrictions in supply holding everything else constant usually imply that prices will increase. In order to estimate the changes in summer flounder prices associated with changes in supply a price-quantity equation was estimated. This was necessary because a demand equation for summer flounder has not yet been estimated. A price-quantity or price flexibility coefficient shows the statistical relationship between changes in summer flounder landings and exvessel prices. The statistical relationship was estimated by regressing exvessel prices (dependent variable) on summer flounder landings, landings of substitutes and a time trend. (Since the primary concern is to forecast prices, it was rationalized that it was impossible to also forecast values for imports, consumers' income, and prices of substitutes.) The time trend was specified in order to capture the effects of all components which were correlated with time during 1972-1993, including changes in the population size and their income, changes in tastes and preferences, prices of substitutes, and other variables that affect aggregate demand. Landings of substitutes were represented by yellowtail flounder and winter flounder landed throughout the Northeast region.

The price model was estimated with data on total annual landings of summer flounder during the period 1972-1993. The price-quantity equation was specified in log-log form, and the price flexibility coefficient provides a direct estimate of the percentage change in prices given a 1% change in landings. The statistical results for the regression analysis are presented in Table 6. Based on the price-quantity relationship employed in this analysis, the price flexibility coefficient for summer flounder was estimated to be -0.2941. The result shows that a 10% decline in landings of summer flounder would potentially increase average annual exvessel price by approximately 3 percent.

Table 7 shows estimated percentage changes in exvessel price associated with changes in commercial landings from 1996 - 2000. Table 8 shows the expected exvessel price ($/lb) for summer flounder taking into consideration the estimated percentage price changes calculated in Table 7. (The average exvessel price for summer flounder in 1995 is $1.57/lb.)

Changes in Revenues

Table 9, shows the stream of revenues associated with the projected landings from 1996 - 2000. These revenues were estimated by multiplying the projected exvessel prices (Table 8) by the projected commercial landings (Table 4). The present value of the stream of revenues (Table 11) was determined by multiplying the projected stream of revenues (Table 9) by a discount factor (Table 10). The discount factor was calculated as $1/(1+i)^t$. Where i is the interest rate and t is the year. Typically, constant-dollar analyses of proposed investment and regulations should

report present value and other outcomes determined using a real discount rate of 7 percent (NMFS 1994). In this analysis, an interest rate of 10% was employed to account for the fact that exvessel prices in the price-quantity equation were specified in nominal terms (not adjusted).

Table 12 provides the sum of present value for each option from 1996 - 2000. The present values provided in Table 12 were calculated on the assumption that the revenues occur as lump-sums at year-end. When revenues occur in a steady stream, applying a mid-year discount factor is more appropriate. Table 13 shows the sum of the mid-year present revenues.

Summary

Option 4 provided the highest present value with 81.8 million dollars, followed by option 5 ($80.1 million), option 2 ($76.8), option 3 ($76.8 million), and option 1($68.7 million) (Table 13).

It is important to note that the manner in which landings are distributed throughout time would affect the final results of the analysis. For instance, options 1 and 2 are projected to have very similar total landings for the 1996 - 2000 period (Table 4). However, the sum of present value for option 2 is higher than that for option 1 (Table 13). This is mainly a direct implication of how landings are distributed through time and its effects on prices.

A number of individual comparisons can be made among the various options analyzed in this paper. As a general rule, the options with the greatest change in landings from year to year (Table 4), also show the larger fluctuations in the projected stream of revenues from year to year (Table 9). This is particularly the case for options 1 and 3. Options 4 and 5 on the other hand show smaller fluctuations in changes in landings and projected stream of revenues from year to year (Tables 4 and 9).

Each option can be summarized from Table 9 as follows. Option 1, shows a significant decrease in revenues in 1996 and 1997 and a slight reduction in 1998 from the 1995 projection. Option 2, on the other hand, has a significantly higher revenue for 1996 than option 1, and in most cases, for the rest of the period, revenues are similar to those in option 1. Option 3, allows for a relatively stable stream of revenues with the exception of 1997, which shows a significant reduction from the 1995 projection. Option 4, with the exception of 1998 shows a stable stream of revenues. Option 5 allows for a stable stream of revenues for the entire 1996 - 2000 period.

Sensitivity Analysis

As a general rule, a discount rate for a lower interest rate would tend to put more weight on the revenues generated towards the latter years of a stream of revenues than the discount rate for a higher interest rate. A sensitivity analysis was conducted in order to access the potential effects of alternative interest rates on the overall present value for the various options analyzed. Table 14, shows the mid-year sum of present value associated with two additional discount factors (5% and 7%). Neither discount factor altered the previous ranking obtained in the results section.

Limitations

There are several limitations to the analysis conducted in this section. The present values derived in the analysis represent industry revenues. The incorporation of changes on the cost side and consumer surplus would yield a more realistic total economic value for the fishery. However, the lack of information on fishing costs creates difficulty when assessing the net effect of the proposed options on the fishery. The lack of a demand equation for summer flounder does not allow for the incorporation of consumer surplus in the analysis.

In addition, projected prices were specified in nominal terms. This implies that future real prices may be lower due to other factors such as inflation. Also, respecification of the variable accounting for summer flounder substitutes in the price quantity model, could yield more realistic results.

Finally, it is assumed that the results provided above are not affected by other factors significant in the price determination of this analysis. However, it is possible that fluctuations in landings and prices of other fisheries, such as the groundfish fishery, would affect prices in the summer flounder fishery.

Conclusions

Since all options will have relatively similar long-term stock biomass recovery results, then the option that provides the larger degree of stability to the fishery is likely to provide the most desirable socio-economic environment and overall return to the nation. Instability in the fishery in this case can be a consequence of wide fluctuations in landings, which ultimately affect cost of production, prices and the overall market stability. The results provided in this analysis greatly rely on the validity of the price-quantity model specified above, and the accuracy of projected landings. Nevertheless, the results can be used to make a relative comparison of the various options.

Recreational Fishery

Recreational fishing contributes to the general well being of participants by affording them opportunities for relaxation, experiencing nature, and socializing with friends. The potential to catch and ultimately consume fish is an integral part of the recreational experience, though studies have shown that non-catch related aspects of the experience are often as highly regarded by anglers as the number and size of fish caught. Since equipment purchase and travel related expenditures by marine recreational anglers have a profound affect on local economies, the status of recreational fisheries is as important to fishery managers as the status of commercial fisheries.

Economic Impact of the Recreational Fishery

In 1985, Mid-Atlantic region direct sales related to marine recreational fishing for all species amounted to over $1.0 billion (SFI 1988a). These sales and services required 17 thousand person-years of labor and generated wages of $213.8 million. Adjusting these expenditures to account for species preferences, angling for summer flounder was estimated to be the second most popular recreational fishing activity for the Mid-Atlantic region in 1985 (SFI 1988b). In the North and South Atlantic regions, summer flounder impacts were not specifically enumerated due to the greater relative popularity and abundance of other species.

The Sport Fishing Institute estimated that 10% to 15% of the $1.05 billion in retail sales directly related to Mid-Atlantic marine recreational fishing in 1985 could be attributed to summer flounder, making it second only to bluefish in importance to anglers. The estimates disaggregate the regional economic impacts to summer flounder based on the percent of total trips where summer flounder were reported as the target species. The minimum estimate uses the target percent as given. The maximum estimate assumes that those individuals, who did not identify a target species, have the same distribution of species preferences as those who did express a preference. Estimates of the economic activity associated with recreational fishing for summer flounder on the Atlantic Coast in 1985 are: $110.1 to $152.8 million in retail sales; 1,795 to 2,494 person- years of employment; and $22.4 to $31.1 million in wages and salaries.

Value of Summer Flounder to Anglers

Clearly, the economic impacts associated with Atlantic coast recreational fishing for summer flounder are significant. Estimates of aggregate economic value are not currently available, however. The value of recreational fishing can be divided into actual expenditures and a non-monetary benefit associated with satisfaction (consumer surplus). Combined, these two values divide the area under a demand or willingness- to-pay curve up to the point of the quantity of trips taken at given levels of costs, catch rates, etc.

A demand curve for recreational fishing trips for summer flounder is not available. The demand for recreational fishing trips would be determined by travel expenditures, catch rates, costs of equipment and supplies, accessibility of fishing sites, social experience, weather and a variety of other factors affecting angler enjoyment. A decrease in the catch rate or retention rate *ceteris paribus* (holding all other factors constant; e.g weather, travel costs, etc.) would move the demand curve to the left. On the other hand, an increase in the catch or retention rate *ceteris paribus* would shift the demand curve to the right. Each move will have an associated decrease, increase in angler expenditures and total benefits, respectively.

The above estimate of total expenditures made fishing for summer flounder is useful for economic impact analysis, but it is impossible to estimate the total value (willingness to pay) of summer flounder without an estimate of the marginal value per trip. The determination of marginal value requires a demand curve for recreational fishing. In the case of summer flounder, as with many recreationally sought species, an aggregate demand curve is not available.

It is important to note that the average cost of a summer flounder trip or fishing day is not equivalent to the marginal value of a recreationally caught summer flounder. Attributes of a recreational fishing day other than catching fish are valued by anglers, so all expenditures are not dependent on summer flounder catch. The marginal value of summer flounder catch must be estimated, and as with any normal good, marginal value declines with increasing quantity.

Addressing the economic value associated with marine recreational fishing when developing fishery management plans is important. Ideally the value that anglers are willing to pay for the recreational opportunity that they enjoy should be considered when evaluating plans that affect both the recreational and the commercial fishery.

A survey of the charter and party boat industry conducted by the Mid-Atlantic Council in 1990, indicated that summer flounder ranked as one of the most desirable or sought species in 1989 (MAFMC 1991). However, the same report indicated that summer flounder ranked fourth from the bottom of charter boat success ranking, and for party boats, summer flounder ranked as the fish anglers were least successful in catching.

The National Marine Fisheries Service recognizes the importance of the proper valuation of fish stock resources by commercial and recreational fisheries. Currently, a survey is being conducted to collect socio-economic data on the people who participate in marine recreational fishing in the Northeast region, which will in turn be employed to estimate statistical models of the demand for marine recreational fishing for eight important recreational species (bluefish, striped bass, summer flounder, Atlantic cod, black sea bass, tautog, scup, and weakfish) (R. Roe pers. comm.).

Economic implications

Recreational harvest limits associated with each of the projected quotas were calculated for each year (Table 15). The fishing mortality rate reduction options resulting in large decreases in landings from the 1995 harvest limit will require more restrictive bag limits, seasonal closures and/or minimum size limits (individually or combined) than options that result in smaller decreases in landings from the 1995 harvest limit. The options that provide relatively stable landings throughout the recovery period will allow for more consistent and stable management measures. The overall economic effect of individual or combined changes in bag limits, seasonal closures and/or minimum size limits can not be evaluated at the time. However, it is expected that less restrictive management measures will have a relatively smaller impact on anglers than more restrictive measures, thus, providing a relatively smaller negative effect on the industry. In addition, fishing mortality rate reduction schedules that allow for more stable harvest limits from year to year will allow for the implementation of regulations that remain relatively consistent from one year to the next. This consistency will reduce confusion on the part of participants and increase compliance with management measures.

9.2.2.3. Prices to consumers

National Marine Fishery Service weighout data for 1993 indicate a coastwide (North Carolina-New York) average exvessel price of $1.58 per pound for summer flounder, ranging from $1.10 per pound for small flounder to $2.41 for jumbo sized flounder.

It is expected that the reduction in landings and value attributable to this amendment in its early years will not significantly increase overall exvessel summer flounder prices. To the extent that the supply of summer flounder is increased in future years by the reduction in mortality, higher average harvest weight, and stock stability, the price of summer flounder should stay steady or decrease (holding everything else constant).

The preferred option presented in this amendment is not expected to create wide fluctuations in landings from one year to another. Wide fluctuations in landings can create market instability. If there are shortfalls in the marketplace as the result of controls in landings, within limits, these will likely be met through imports. Flatfish imports into the US in 1994 were about 8% higher than in 1993. U.S. imports of flatfish in 1994 totaled 39,337,081 pounds, valued at $68,323,000, for an average of $1.74/lb (USDC 1994a).

9.2.2.4. Redistribution of costs

The proposed option in this amendment provides the fishery with the least possible amount of landings fluctuations from one year to the next. It is not anticipated that the proposed management measures will redistribute costs

between users or from one level of government to another.

9.2.2.5. Fishery impact statement

Clearly, there will be some impacts from the adopted plan. However, if overfishing is to be eliminated, fishing mortality must be reduced. It is expected that the proposed option will reduce fishing mortality reduction and allow for stock recovery while minimizing costs to the fishing industry.

The adopted fishing mortality rate reduction strategy is considered the most reasonable option available at this time. The proposed strategy is expected to provide for stock rebuilding while minimizing the burden for participants in the fisheries.

9.3. RELATION OF RECOMMENDED MEASURES TO EXISTING APPLICABLE LAWS AND POLICIES (This section is unchanged from the current FMP.)

9.3.1. FMPs

This FMP is related to other plans to the extent that all fisheries of the northwest Atlantic are part of the same general geophysical, biological, social, and economic setting. US fishermen often are active in more than a single fishery. Thus regulations implemented to govern harvesting of one species or a group of related species may impact on other fisheries by causing transfers of fishing effort.

Many fisheries of the northwest Atlantic result in significant nontargeted species fishing mortality. Therefore, each FMP must consider the impact of nontargeted species fishing mortality on other stocks and as a result of other fisheries.

9.3.2. Treaties or international agreements

No treaties or international agreements, other than GIFAs entered into pursuant to the MFCMA, relate to this fishery.

9.3.3. Federal law and policies

9.3.3.1. Marine Mammals and Endangered Species

Numerous species of marine mammals and sea turtles occur in the northwest Atlantic Ocean. The most recent comprehensive survey in this region was done from 1979-1982 by the Cetacean and Turtle Assessment Program (CETAP), at the University of Rhode Island (University of Rhode Island 1982), under contract to the Minerals Management Service (MMS), Department of the Interior. The following is a summary of the information gathered in that study, which covered the area from Cape Sable, Nova Scotia, to Cape Hatteras, North Carolina, from the coastline to 5 nautical miles seaward of the 1000 fathom isobath.

Four hundred and seventy one large whale sightings, 1547 small whale sightings and 1172 sea turtles were encountered in the surveys (Table 16). The "estimated minimum population number" for each mammal and turtle in the area, as well as those species currently included under the Endangered Species Act, were also tabulated.

CETAP concluded that both large and small cetaceans were widely distributed throughout the study area in all four seasons, and grouped the 13 most commonly seen species into three categories, based on geographical distribution. The first group contained only the harbor porpoise, which is distributed only over the shelf and throughout the Gulf of Maine, Cape Cod, and Georges Bank, but probably not southwest of Nantucket. The second group contained the most frequently encountered baleen whales (fin, humpback, minke, and right whales) and the white-sided dolphin. These were found in the same areas as the harbor porpoise, and also occasionally over the shelf at least to Cape Hatteras or out to the shelf edge. The third group indicated a "strong tendency for association with the shelf edge" and included the grampus, striped, spotted, saddleback, and bottlenose dolphins, and the sperm and pilot whales. While it is unlikely that incidental take of marine mammals would occur in the summer flounder fishery, the Marine Mammal Exemption Program requires that any lethal takes of marine mammals in this fishery be reported to the National Marine Fisheries Service (508-281-9254) within 10 days of the vessel's return to dock. Unreported takes are subject to the prohibitions of the Marine Mammal Protection Act.

Loggerhead turtles were found throughout the study area, but appeared to migrate north to about Massachusetts in summer and south in winter. Leatherbacks appeared to have had a more northerly distribution. CETAP hypothesized a northward migration of both species in the Gulf Stream with a southward return in continental shelf waters nearer to shore. Both species usually were found over the shoreward half of the slope and in depths less than 200 feet. The northwest Atlantic may be important for sea turtle feeding or migrations, but the nesting areas for these species generally are in the South Atlantic and Gulf of Mexico.

Pound nets in Maryland and Virginia take between 2 and 4% of the commercial summer flounder landings of these states. An investigation of the causes of sea turtle (loggerhead and some Ridley) mortality in Chesapeake Bay indicated pound nets accounted for about 19% of the deaths (Musick *et al.* 1985). Other identifiable causes accounted for 11% of the mortalities with the cause of death undetermined for the remaining 70%.

The winter trawl fishery for summer flounder, which takes place principally off the coast of North Carolina may contribute to the mortality of loggerhead sea turtles (classified as "threatened") and Kemp's Ridley sea turtles (classified as "endangered"). Studies at the Virginia Institute of Marine Science (VIMS) (Musick *et al.* 1985, Bellmund *et* al. 1987, Lutcavage and Musick 1985) have shown that large juveniles of these two sea turtles use Chesapeake Bay as a foraging area during the summer. Both species emigrate from the Bay with the onset of northeast storms and falling water temperatures, usually in October. These turtles then migrate south along the coast to the vicinity of Cape Hatteras, North Carolina. Migration south of the Cape usually occurs in early December. The winter trawl fishery usually operates from early October to April in North Carolina waters. Thus, there is a potential for incidental capture of sea turtles in the fishery during some years when the flounder and turtle migrations overlap. This is confirmed by sea turtle stranding data, which shows distinct peaks in strandings of turtles in northern North Carolina in the fall and early winter of some years.

This problem may become acute when climatic conditions result in concentration of turtles and fish in the same area at the same time. These conditions apparently are met when temperatures are cool in October but then remain moderate into mid-December and result in a concentration of turtles between Oregon Inlet and Cape Hatteras, North Carolina. In most years sea turtles leave Chesapeake Bay and filter through the area a few weeks before the summer flounder fishery becomes concentrated. Efforts are currently under way (by VIMS and the US Fish and Wildlife Service refuges at Back Bay, Virginia, and Pea Island, North Carolina) to more closely monitor these mortalities due to trawls. Fishermen are encouraged to carefully release turtles captured incidentally and to attempt resuscitation of unconscious turtles as recommended in the 1981 *Federal Register* (pages 43976 and 43977).

Information regarding the level of turtle mortalities in Virginia and North Carolina comes from stranding data. This circumstantial evidence suggested that flounder trawls were the cause of the mortalities, thus requiring a formal consultation under Section 7 of the Endangered Species Act of 1973 (ESA), as amended. This consultation was conducted by the National Marine Fisheries Service in 1988. The resultant 1988 Biological Opinion indicated that the observed levels and infrequent nature of these events would not jeopardize any sea turtle populations. An Incidental Take Statement was given that allowed the capture of up to 1 dead and 10 live Kemp's Ridleys with certain handling and reporting requirements.

Between 26 November and 7 December 1990, 54 sea turtles, including at least 8 endangered Kemp's Ridleys, stranded on North Carolina beaches (North Carolina officials estimate that 53 loggerhead, 1 Kemps Ridley, and 1 hawksbill were killed in the fall/winter 1991 fishery through 18 December). The North Carolina Division of Marine Fisheries closed State waters to summer flounder bottom trawling from Cape Hatteras Light to Ocracoke Inlet on 7 December 1990. Twenty one additional sea turtles stranded before the end of December. The total mortality included 56 loggerheads, 9 Kemp's Ridleys, 6 green turtles, and 4 unidentified sea turtles. During the closure period, in conjunction with the NMFS Pascagoula Laboratory, a Turtle Excluder Device (TED) was developed for use on summer flounder bottom trawlers. Experimental tows conducted during this time indicated that about 0.12 sea turtles were taken per hour for each net towed off Ocracoke in December, 1990 (Table 5). On 26 December 1990, waters were opened to trawlers pulling TEDs until early January, at which time turtles were no longer encountered in North Carolina waters and fishing without TEDs was allowed.

Because of the above new information, consultation under Section 7 of the Endangered Species Act was reinitiated. Evaluation of the sea turtle and fishery distribution data (Figures 5 and 6), trawl data collected off North Carolina in December, 1990, and January, 1991, (Table 17) and stranding data (Figure 7), indicated that the conflict between sea turtles and the fishery occurs annually in the late fall/winter summer flounder fishery in North Carolina. The

Draft Biological Opinion resulting from the reinitiated consultation concluded that continued unrestricted operation of this fishery would be likely jeopardize the continued existence of the endangered Kemp's ridley sea turtle population. Implementation of the reasonable and prudent alternatives discussed above is necessary to allow activities conducted under the Summer Flounder FMP to continue in compliance with the Endangered Species Act.

To be consistent with the Biological Opinion issued for this FMP (Amendment 2), fishermen conducting activities regulated under this management plan must comply with any regulations published by NMFS implementing sea turtle conservation measures including mandatory limited tow times, observer coverage, and the use of Turtle Excluder Devices in bottom trawls participating in the winter fishery for summer flounder in waters from Cape Charles, Virginia, to the southern border of North Carolina. This issue is also addressed directly in section 9.1.2.5 of this FMP.

Shortnose sturgeon (*Acipenser brevirostrum*) is an additional endangered species that may be caught incidentally in the summer flounder fishery. Sturgeon will be included in the Incidental Take Statement of the pending Biological Opinion.

The range of summer flounder and the above mentioned marine mammals and endangered species overlap and there always exists a potential for an incidental kill. Except in unique situations, such accidental catches should have a negligible impact on marine mammal or abundances of endangered species, and the Councils do not believe that implementation of this FMP will have any adverse impact upon these populations.

Commercial and recreational fisheries lose thousands of pounds of fishing gear annually. Incidences of entanglement in and ingestion of this gear is common among sea turtles and marine mammals, and may result directly or indirectly in some deaths.

The most recent ESA Section 7 Consultation (19 October 1993) states, with regard to the sea turtle conservation measures thus far implemented, "Regardless of the quota established, therefore, these measures should minimize the incidental take of sea turtles in this fishery" (Roe pers. comm.). It further states "In summary, current fishing practices under the Summer Flounder FMP do not affect sea turtles in any manner not already considered in the formal consultations conducted for this FMP."

9.3.3.2. Marine Sanctuaries

National marine sanctuaries are allowed to be established under the National Marine Sanctuaries Act of 1973. Currently there are 11 designated marine sanctuaries (Figure 8) that create a system that protects over 14,000 square miles (National Marine Sanctuary Program 1993).

There are two designated national marine sanctuaries in the area covered by the FMP: the *Monitor* National Marine Sanctuary off North Carolina, and the Stellwagen Bank National Marine Sanctuary off Massachusetts. There are currently five additional proposed sanctuaries, but only one, the Norfolk Canyon is on the east coast.

The *Monitor* National Marine Sanctuary was designated on 30 January 1975, under Title III of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). Implementing regulations (15 CFR 924) prohibit deploying any equipment in the Sanctuary, fishing activities which involve "anchoring in any manner, stopping, remaining, or drifting without power at any time" (924.3 (a)), and "trawling" (924.3 (h)). The Sanctuary is clearly designated on all National Ocean Service (NOS) charts by the caption "protected area." This minimizes the potential for damage to the Sanctuary by fishing operations. Correspondence for this sanctuary should be addressed to: *Monitor* NMS, NOAA, Building 1519, Fort Eustis, VA 23604.

NOAA/NOS issued a proposed rule on 8 February 1991 (56 FR 5282) proposing designation under MPRSA of the Stellwagen Bank National Marine Sanctuary, in Federal waters between Cape Cod and Cape Ann, Massachusetts. On 4 November 1992, the Sanctuary was Congressionally designated. Implementing regulations (15 CFR 940) will become effective following Congressional review. Commercial fishing is not specifically regulated by Stellwagen Bank regulations. Correspondence for this sanctuary should be addressed to: Stellwagen Bank NMS, 14 Union Street, Plymouth, MA. 02360.

Details on sanctuary regulations may be obtained from the Chief, Sanctuaries and Reserves Division (SSMC4) Office of Ocean and Coastal Resource Management, NOAA, 1305 East-West Highway, Silver Spring, MD 20910.

9.3.3.3. Indian treaty fishing rights

No Indian treaty fishing rights are known to exist in the fishery.

9.3.3.4. Oil, Gas, Mineral, and Deep Water Port Development

While Outer Continental Shelf (OCS) development plans may involve areas overlapping those contemplated for offshore fishery management, no major conflicts have been identified to date. The Councils, through involvement in the Intergovernmental Planning Program of the MMS, monitor OCS activities and have opportunity to comment and to advise MMS of the Councils' activities. Certainly, the potential for conflict exists if communication between interests is not maintained or appreciation of each other's efforts is lacking. Potential conflicts include, from a fishery management position: (1) exclusion areas, (2) adverse impacts to sensitive biologically important areas, (3) oil contamination, (4) substrate hazards to conventional fishing gear, and (5) competition for crews and harbor space. The Councils are unaware of pending deep water port plans which would directly impact offshore fishery management goals in the areas under consideration, and are unaware of potential effects of offshore FMPs upon future development of deep water port facilities.

Approximately 70% of the commercial fishery occurs in the EEZ. While the fishery varies among the states and targets on the concentrations of fish as they move inshore in the spring and offshore in the fall, the offshore winter fishery targets on large concentrations of fish that are overwintering along the shelf edge. Offshore (depths up to 500 ft.) areas (section 5.1), where overwintering occurs, and where spawning occurs in the spring, are areas where significant potential conflicts between this resource and offshore energy resources may occur.

Certain types of deep water port development (for example, in Delaware Bay) would impact summer flounder nursery areas.

9.3.3.5. Vessel Safety

Section 303(a)(6) of the MFCMA requires that FMPs consider access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safety of vessels. The proposed management measures of this FMP do not limit the times or places when or where vessels may fish. Therefore, the Council has concluded that the proposed FMP will not impact or effect the safety of vessels fishing in this fishery.

9.3.4. State, Local, and Other Applicable Law and Policies

9.3.4.1. State management activities

State regulations for summer flounder are summarized in Table 18.

9.3.4.2. Impact of Federal regulations on State management activities

The management measures of this Amendment are identical to those proposed by ASMFC for the coastal States.

9.3.4.3. Coastal Zone Management Program Consistency

The CZM Act of 1972, as amended, provides measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals.

The Council must determine whether the FMP will affect a State's coastal zone. If it will, the FMP must be evaluated relative to the State's approved CZM program to determine whether it is consistent to the maximum extent practicable. The States have 45 days in which to agree or disagree with the Councils' evaluation. If a State fails to respond within 45 days, the State's agreement may be presumed. If a State disagrees, the issue may be resolved through negotiation or, if that fails, by the Secretary.

The FMP was reviewed relative to CZM programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Letters were sent to all of the States listed. The letters to all of the States except New Hampshire and Pennsylvania stated that the Council concluded that the FMP would affect the State's coastal zone and was consistent to the maximum extent practicable with the State's CZM program as understood by the Council. For New Hampshire, the evaluation was that the FMP might affect the coastal zone and was consistent. For Pennsylvania, the evaluation was that the FMP would not affect the coastal zone. The letters were mailed to the States along with a copy of the hearing draft of the FMP. Rhode Island, Pennsylvania, and New Hampshire have concurred with the Council's opinion.

9.4. COUNCIL REVIEW AND MONITORING OF THE FMP (This section is unchanged from the current FMP.)

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Table 1. Fishing mortality rate reduction options.

Option	1994	1995	1996	1997	1998	1999	2000
1	0.77	0.64	0.23	0.23	0.23	0.23	0.23
2	0.77	0.64	0.38	0.23	0.23	0.23	0.23
3	0.77	0.64	0.53	0.23	0.23	0.23	0.23
4	0.77	0.64	0.53	0.38	0.23	0.23	0.23
5A/B	0.77	0.64	0.41	0.30	0.23	0.23	0.23

Table 2. Summer flounder landings ('000,000 Lbs) associated with various fishing mortality reduction options.

Option	1994	1995	1996	1997	1998	1999	2000
1	26.7	22.5	11.0	16.5	21.4	25.6	28.9
2	26.7	22.5	17.2	14.8	19.8	24.3	27.8
3	26.7	22.5	22.7	13.2	18.3	23.1	26.9
4	26.7	22.5	22.7	20.7	16.3	21.2	25.4
5A/B	26.7	22.5	18.5	18.5	18.5	23.1	26.7

Source: M. Terceiro pers. comm.

Table 3. Summer flounder spawning stock biomass ('000,000 Lbs) associated with various fishing mortality reduction options.

Option	1994	1995	1996	1997	1998	1999	2000
1	31.7	35.9	51.8	71.9	89.7	105.6	117.7
2	31.7	35.9	47.0	65.5	83.8	100.5	113.8
3	31.7	35.9	42.5	60.0	78.5	96.1	110.2
4	31.7	35.9	42.5	54.2	71.2	89.3	104.7
5A/B	31.7	35.9	45.9	61.3	78.7	95.9	110.0

Source: M. Terceiro pers. comm.

Table 4. Summer flounder commercial quota ('000 lbs) associated with each option, 1995-2000.

Options	Year 1995	1996	1997	1998	1999	2000
1	14960.4	6613.9	9920.8	12830.9	15344.2	17328.3
2	14960.4	10317.6	8862.6	11905.0	14550.5	16667.0
3	14960.4	13624.6	7936.6	10979.0	13889.1	16137.8
4	14960.4	13624.6	12434.1	9788.5	12698.6	15211.9
5A/B	14960.4	11111.3	11111.3	11111.3	13889.1	16005.6

Source: M. Terceiro pers. comm.

Table 5. Projected percentage changes in summer flounder landings associated with each option, 1996 - 2000.

Options	Year 1996	1997	1998	1999	2000
1	-55.8	50.0	29.3	19.6	12.9
2	-31.0	-14.1	34.3	22.2	14.5
3	-8.9	-41.7	38.3	26.5	16.2
4	-8.9	-8.7	-21.3	29.7	19.8
5A/B	-25.7	0	0	25.0	15.2

Table 6. Regression estimates of exvessel price-quantity equation for summer flounder.

Exvessel Price	Intercept	Q-sf	T-trend	Q-subs	N	R^2	F-Value
ATL	-0.023 (-0.1)	-0.294 (-6.5)	0.641 (10.3)	-0.217 (-2.4)	22	0.94	87.5

Source: S. Edwards pers. comm.
The regression equation was specified in log-log form.
t statistics are reported in parenthesis.

ATL = prices and landings at ports in the Mid-Atlantic;
Q-sf = the amount in pounds of summer flounder landed in the Mid-Atlantic region;
T-trend = time trend, specified as an instrument to capture the effects of all components which were correlated with time during 1972-1993, including changes in the population size and their income, changes in tastes and preferences, and prices of substitutes;
Q-subs = the amount in pounds of winter flounder and yellowtail flounder landed throughout the Northeast.

Table 7. Estimated percentage changes in exvessel price (increase/decrease), 1996 - 2000.

Options	1996	1997	1998	1999	2000
			Year		
1	16.4	-14.7	-8.6	-5.8	-3.8
2	9.1	4.1	-10.1	-6.5	-4.3
3	2.6	12.3	-11.3	-7.8	-4.8
4	2.6	2.6	6.3	-8.7	-5.8
5A/B	7.6	0	0	-7.4	-4.5

Note: Percentage changes in exvessel price were determined by multiplying the price flexibility coefficient for summer flounder (-0.2941) times the estimated percentage changes in landings (Table 5).

Table 8. Expected exvessel price for summer flounder ($/lb), 1996 - 2000.

Options	1995	1996	1997	1998	1999	2000
			Year			
1	1.57	1.82764	1.55885	1.42435	1.34229	1.29124
2	1.57	1.71331	1.78438	1.60421	1.49935	1.43520
3	1.57	1.61123	1.80909	1.60511	1.47997	1.40949
4	1.57	1.61123	1.65265	1.75607	1.60251	1.50922
5A/B	1.57	1.68881	1.68881	1.68881	1.56463	1.49450

Note: These prices were calculated by adding or subtracting the estimated annual percentage changes in exvessel prices estimated in Table 7. The average price for the base year (1995) is $1.57/lb.

Table 9. Stream of revenues ('000 $) associated with each option 1996-2000.

Options	1995	1996	1997	1998	1999	2000
			Year			
1	23487.8	12087.8	15465.1	18275.7	20596.3	22375.0
2	23487.8	17677.3	15814.2	19098.0	21816.3	23920.5
3	23487.8	21952.4	14358.1	17622.5	20555.4	22746.1
4	23487.8	21952.4	20549.1	17189.4	20349.7	22958.1
5A/B	23487.8	18764.9	18764.9	18764.9	21731.3	23920.3

Note: The 1995 revenues were estimated by multiplying the 1995 summer flounder quota by by the current average exvessel price for summer flounder ($1.57/lb - all categories).

Table 10. Discount factors for a discount rate of 10 percent.

Year		Discount factor for 10%
1	(1996)	0.909091
2	(1997)	0.826446
3	(1998)	0.751315
4	(1999)	0.683013
5	(2000)	0.620921

Note: the discount factor is calculated as 1/(1+i)^t. Where i is the interest rate and t is the year.

Table 11. Present value of the stream of revenues ('000 $) associated with each option, 1996-2000.

	Year				
Options	1996	1997	1998	1999	2000
1	10988.9	12781.0	13730.8	14067.6	13893.1
2	16070.3	13069.6	14348.6	14900.8	14852.7
3	19956.7	11866.2	13240.0	14039.6	14123.5
4	19956.7	16982.7	12914.6	13899.1	14255.2
5A/B	17059.0	15508.2	14098.4	14842.8	14852.6

Note: The present value of the stream of revenues was derived by multiplying the stream of revenues in Table 9 by the appropriate discount factor in Table 10.

Table 12. The sum of the present value associated with the various options.

Options	('000 $)
1	65461.4
2	73242.1
3	73226.1
4	78008.3
5A/B	76361.0

Table 13. The mid-year sum of the present value associated with the various options.

Options	('000 $)
1	68655.9
2	76816.3
3	76799.5
4	81815.1
5A/B	80087.4

Note: The sum of the present value associated with the various options given in Table 12 were converted to a mid-year discounting basis by multiplying them by 1.0488 (the square root of 1.10).

Table 14. Sensitivity analysis of the mid-year sum of the present value ('000$) associated with the various options for discount factors for 5 and 7 percent interest rates.

Options	5% I.R.	7% I.R.
1	79501.90	74872.90
2	88484.90	83507.40
3	87980.00	83213.50
4	93473.80	88508.00
5A/B	92003.00	86923.10

Table 15. Summer flounder recreational harvest limit ('000,000 lbs) associated with each option, 1994-2000.

	Year						
Options	1994	1995	1996	1997	1998	1999	2000
1	10.7	7.8	4.4	6.6	8.6	10.2	11.5
2	10.7	7.8	6.9	5.9	7.9	9.7	11.1
3	10.7	7.8	9.1	5.3	7.3	9.3	10.8
4	10.7	7.8	9.1	8.3	6.5	8.5	10.1
5A/B	10.7	7.8	7.4	7.4	7.4	9.3	10.7

Table 16. Cetaceans and Turtles Found in Survey Area

Scientific name	Common name	Est. Minimum Number in Study Area	Threatened	Endangered
LARGE WHALES				
Balaenoptera physalus	fin whale	1,102	X	
Megaptera novaeangliae	humpback whale	684	X	
Balaenoptera acutorostrata	minke whale	162		
Physeter catodon	sperm whale	300		X
Eubalaena glacialis	right whale	29		X
Balaenoptera borealis	sei whale	109		X
Orcinus orca	killer whale	unk		
SMALL WHALES				
Tursiops truncatus	bottlenose dolphin	6,254		
Globicephala spp.	pilot whales	11,448		
Lagenorhynchus acutus	Atl. white-sided dolphin	24,287		
Phocoena phocoena	harbor porpoise	2,946		
Grampus griseus	grampus (Risso's) dolphin	10,220		
Delphinus delphis	saddleback dolphin	17,606		
Stenella spp.	spotted dolphin	22,376		
Stenella coeruleoalba	striped dolphin	unk		
Lagenorhynchus albirostris	white-beaked dolphin	unk		
Ziphius cavirostris	Cuvier's beaked dolphin	unk		
Stenella longirostris	spinner dolphin	unk		
Steno bredanensis	rough-toothed dolphin	unk		
Delphinapteras leucas	beluga	unk		
Mesoplodon spp.	beaked whales	unk		
TURTLES				
Caretta caretta	logggerhead turtle	4,017	X	
Dermochelys coriacea	leatherback turtle	636		X
Lepidochelys kempi	Kemp's ridley turtle	unk		X
Chelonia mydas	green turtle	unk	X	

Source: University of Rhode Island 1982.

Table 17. Overview of State Laws for Summer Flounder, Maine to North Carolina. (Note that this table is only a summary of state regulations and are current as of July 1995. Fishermen should contact state agencies to obtain a complete copy of regulations applicable to summer flounder in their state.)

Maine

Size limits:	13" minimum size limit for both commercial and recreational fisheries. It is also illegal to possess groundfish (including summer flounder) aboard any vessel rigged for groundfishing that has its head or tail removed and is less than the legal size limit.
Possession limit:	none
Gear restrictions:	6.0" minimum mesh size for trawls, Scottish seines, bottom tending sink gillnets and mid-water trawls. Regulations exist regarding the placement of stop seines and fish weirs. Additional gear/season restrictions for specific locations are detailed in Department regulations.
Area closures:	Groundfish (summer flounder) spawning closure in Booth Bay and Sheepscot Bay from May 1 to June 30.
Seasons:	See above.
Licenses:	A Commercial license is required for the harvest, transport, and sale of fish that are not for personal use: $33 for individual, resident operators; $89 for resident operator with crew; $334 for nonresident operator and crew. No license is required for fish taken with hook and line for personal use. There is no recreational license, except for Atlantic salmon.
Other:	Nonresidents are required by law to report all groundfish (summer flounder) catches.

New Hampshire

Size limits:	14" minimum size limit for recreational fisheries.
Possession limit:	Daily recreational possession limit (6 fish per day as of 6/25/95).
Gear restrictions:	Summer flounder may be taken by angling only (no commercial fishing for summer flounder permitted).
Seasons:	Recreational season from May 15 to September 30 (as of 6/25/95).
Licenses:	No sport fishing license.

Massachusetts

Size limits:	14" minimum size limit for both commercial and recreational fisheries.
Possession limit:	Daily recreational possession limit (8 fish per day as of 6/25/95).
Gear restrictions:	Minimum mesh sizes for mobile trawl gear: * North of Cape Cod: - 6.0" required year round. Permitted small mesh exemptions are allowed for underutilized species (e.g., dogfish and ocean pout) with no bycatch of regulated species. * South of Cape Cod: 6.0" required year round for any vessel possessing 100 lbs or more

of any flounders in combination; 4.5" required June 1 - Oct. 31 (Scup fishery) for any vessel possessing no more than 100 lbs of any flounders in combination; and no minimum required April 23 - May 31 (squid season).

* East of Cape Cod: 6.0" required year round.

Sink gillnets may not exceed 2,400 feet; mesh size of gillnets must be greater than 6" stretched measure.

Quota: Commercial quota allocated by season and trip limit as follows: the quota shall be split with 30% being allocated for the period January 1 through May 31 (winter/spring) and 70% being allocated for the period June 1 through December 31 (summer/fall).

For the period January 1- May 31 it is unlawful for commercial fishermen to land or possess , during a 24 hour day , more than

1. 5000 lbs of summer flounder until notice that 50% of the winter/spring seasonal allocation has been reached ; and
2. 100 lbs of summer flounder after notice that 50% of the winter/spring seasonal allocation has been reached.

For the period June 1- December 31 it is unlawful for commercial fishermen to land or possess more than 500 lbs of summer flounder until notice that 100% of the summer/fall quota has been reached.

It is unlawful for commercial fishermen to land summer flounder from 8:00 P.M. through 6:00 A.M.

Commercial fishermen must keep summer flounder separate from rest of catch.

The Director may adjust the quota annually to correspond to the share allocated to Massachusetts. In addition, the Director may adjust the trip limits to account for state quota transfers or to prevent overages in the seasonal quota.

Area closures: All waters closed to night trawling. Buzzards Bay is closed to trawling year round. State waters within 3 miles from Nauset Light around Monomoy west to Succonessett Point, Mashpee are closed to trawling from May 1 - Oct. 31. In Vineyard sound, waters off Mashpee to Cutthunk closed out to 1/4 miles during April 23- October 31. Closure off Falmouth extended to ½ mile during June - October 31. All waters south of Cape Cod banned to gillnetting April 1 - Nov. 15. (See Mass. regulations for additional closures.)

Seasons: See above for commercial fisheries. Recreational season from May 15 to October 31(as of 6/25/95).

Licenses: Commercial fishing licenses: Vessel licenses range from $130 to $260, depending on length; license for individuals = $65 each. There is no sport license for fish caught for personal use. A license to sell fish caught with hook and line is $35, and applies to any individual selling fish. A special permit is required of all commercial fishermen taking or landing summer flounder. Dealers may not purchase summer flounder without written authorization from the Director.
All commercial summer flounder permit and dealer permit holders are required to report summer flounder landings to the Director.

Rhode Island

Size limits: 14" minimum size limit for both commercial and recreational fisheries.

Possession limit: Daily recreational possession limit (6 fish per day as of 6/25/95).

Gear restrictions: Trawling is prohibited in the upper portion of Narragansett Bay from Nov 1 - July 1; 5" cod end minimum mesh size in a portion of central Narragansett Bay from Nov 1 - Feb 28. Numerous specific gillnet regulations by geographic location and season; trap and fyke net regulations regarding leaders, distance from shore, distance between traps, etc.

Quota: Commercial quota allocated by season and trip (possession) limits.

Area closures: Numerous restrictions on the location of traps off the Island of Rhode Island, the Sakonnet River, and in Narragansett Bay. Cannot set, haul, and/or maintain a seine within 0.5 mile of the seaward entrance of several ponds/rivers; significant portion of the State is closed to various forms of netting.

Seasons: Recreational season from May 15 to September 30 (as of 6/25/95).

Licenses: Multipurpose commercial licenses allow for harvest and sale of fish: $300 , with additional fees for specific gear types. There is no sport license to fish for personal use. Vessels may only transfer summer flounder to dealers who possess a valid Rhode Island Dealer's License. No person may land summer flounder between the hours of 8:00 P.M. and 6:00 A.M. It is illegal for anyone to land summer flounder in Rhode Island more than once in a calendar day. Dealers must notify the RI Div of Enforcement if more than 300 lbs of summer flounder are to transferred . Dealer reporting of all transfers of summer flounder required weekly.

Connecticut

Size limits: 14" minimum size limit for both commercial and recreational fisheries.

Possession limit: Daily recreational possession limit (6 fish per day as 6/25/95).

Gear restrictions: Cod end minimum mesh size of 5.5" in trawls from Nov 15 - June 30, 4" from July 1 - Nov 14 with an exemption to the mesh requirement from May 15 - July 31 if less than 100 lbs of winter or summer flounder are possessed . Gillnet minimum mesh size 3"; Pound, trap, fyke, and weir minimum mesh: 2".

Area closures: Fish traps and pound nets may not be set in an area off the mouth of the Connecticut River; pound nets must be set at least one mile apart; trawling is prohibited within an "inshore trawl line;" numerous specific areas are closed to trawl and/or other forms of net gear.

Seasons: None except as noted above.

Licenses: Moratorium on issuance of new commercial fishing licenses effective June 1, 1995 through Dec 1, 1997. Commercial fishing licenses are issued by gear type with fees typically ranging from $50 - $225. Fishermen licensed between January 1, 1980 and June 1, 1995 may renew their licenses, but are prohibited from purchasing a different license for a new gear type. Marine sport fishing with hook and line, seine (less than 30 ft.), two eel pots or spear does not require a license (sale prohibited). All other gears require a commercial license.

New York

Size limits: 14" minimum size limit for both commercial and recreational fisheries.

Possession limit: Daily recreational possession limit (6 fish per day as of 6/25/95).

Gear restrictions:	5.5 " diamond or 6" square minimum mesh size for trawl codends.
Quota:	Commercial quota allocated by season. Seasons are January - April, May - June, July - October and November - December with variable trip limits adjusted to keep season open.
Area closures:	There are numerous specific locations where trawl and/or other net gear are restricted.
Seasons:	Recreational season from May 1 to October 31 (as of 6/25/95).
Licenses:	A Commercial license is required for the harvest and sale of fish: Resident: $100, Nonresident: $1,000. (The nonresident harvest license may only be purchased in January.) A nonresident license which allows landing only: $250. There is no sport license for fish caught for personal use. A commercial permit is required to fish for or land summer flounder.

New Jersey

Size limits:	13" minimum size for commercial fishery, 14" minimum size for recreational fishery.
Possession limit:	Daily recreational possession limit (8 fish per day as of 6/25/95).
Gear restrictions:	Trawls fishing for summer flounder must have a 5.5" minimum diamond mesh or 6.0" square mesh in cod end of otter trawl if in a directed fishery (defined as in possession of more than 100 pounds of summer flounder).
Quota:	Commercial quota allocated by season.
Area closures:	Trawling and purse seining are prohibited within two miles of the coast; gillnetting is limited to the Atlantic Ocean and Delaware Bay.
Seasons:	Gillnets cannot be fished from Dec 16 - Feb 1.
Licenses:	Commercial gears are licensed, with fees dependent on the gear type. There is no sport fishing license for hook and line gear, and no license is required to sell hook and line caught fish.

Delaware

Size limits:	13" minimum size for commercial fishery, 14" minimum size for recreational fishery.
Possession limit:	Daily recreational possession limit (8 fish per day as of 6/25/95).
Gear restrictions:	Trawls, purse seines, power operated seines, and runaround gillnets are prohibited. A single gillnet cannot exceed 200 yards in length; a series of connected gillnets cannot exceed 500 yards; a fyke net cannot exceed 72" in diameter; fish traps may not exceed 125 cubic ft and must have an escape panel. There is a moratorium on issuance of new commercial (> 200 ft) gillnet permits until the number of fishermen falls below 30.
Area closures:	Areas within a 0.5 mile sector at the mouths of all major tributaries to the Delaware River and Bay are closed to all fixed gears; numerous specific areas closed to commercial fishing.
Seasons:	Licensed commercial food fishermen with valid gillnet permits may possess summer flounder from January 1 to May 23.
Licenses:	Commercial food fishing license is required for the harvest and sale of fish: Residents:

$150; Nonresidents: $1,500. Additional fees are levied for the use of specific gear types. There is no sport license for fish caught for personal use.

Quota: It is unlawful for any commercial fishermen to sell summer flounder after the quota allocated to Delaware has been reached and the State has been closed by the Regional Director, NMFS Northeast Region.

Maryland

Size limits: 13" minimum size for commercial fishery, 14" minimum size for recreational fishery.

Possession limit: Daily recreational possession limit (8 fish per day as of 6/25/95).

Gear restrictions: Trawls prohibited within one mile of the coastline, and in Chesapeake Bay. Use of monofilament gillnets prohibited, except in coastal bays and the Atlantic Ocean; several specific gillnet restrictions exist for Chesapeake Bay; minimum mesh sizes for pound nets, haul seines, and fyke nets are 1.5"; purse seines prohibited. A minimum mesh size of 5.5" diamond or 6.0" square in the cod end of a trawl net is required.

Quota: Commercial quota allocated by season.

Area closures: There are numerous specific locations where trawl, gill, seine and/or other net gear are restricted.

Seasons: Commercial- January 1 until quota is met. Recreational open year round.

Licenses: Recreational: Chesapeake Sportfishing License

Resident - $7.00
Non-resident - $12.00

No recreational license is required in Maryland's Coastal Bays or Atlantic Ocean

Commercial purposes: Resident/Non-resident

To catch for sale, hook&line - $37.50
To catch for sale, all other gear - $100.00
To buy, process, pack, resell, market or otherwise deal in fish - $150.00

Note: commercial license applications for sale filed prior to March 31, 1994, required a mandatory two-year waiting period. License applications filed after that time have an indefinite waiting period.

Virginia

Size limits: 13" minimum size for commercial fishery , 14" minimum size for recreational fishery.

Possession limit: Daily recreational possession limit (8 fish per day as of 6/25/95).

Gear restrictions: Trawls and encircling gillnets are prohibited in Virginia waters. Minimum mesh sizes: pound nets: 2"; haul seines over 200 yards: 3"; gill nets = 2-7/8".

Quota: Commercial quota allocated by quarter.

Area closures: All waters closed to trawling. Numerous area closures specific to gear types and species but unrelated to summer flounder.

Licenses: Virginia instituted a commercial fisherman's license, limited/delayed entry to the commercial fishery, mandatory reporting of commercial catch, recreational and charter boat saltwater fishing licenses in 1993. Purchase of a commercial fishing license is a prerequisite to buying the required commercial gear licenses.

North Carolina

Size limits: 14" recreational minimum size limit for Atlantic Ocean, 13" minimum size for all other commercial and recreational fisheries.

Possession limit: Daily recreational possession limit (8 fish per day as of 6/25/95).

Gear restrictions: The Fisheries Director, through proclamation authority, can establish mesh requirements for the ocean summer flounder fishery from October 1 - April 30. North Carolina proclamations contain the same rule as the Federal rule :

TRAWL TAILBAGS

a. Trawls may not be used or possessed on the deck of a vessel unless the trawls have a codend mesh greater than 5.5" diamond or 6" square mesh (stretched) applied throughout the codend for at least 75 continuous meshes forward of the terminus of the net or the terminal one third portion of a net for codends less than 75 meshes.

b. Codend liners of any mesh size or double hung codends may not be used or possessed on the deck of a fishing vessel.

TURTLE EXCLUDER DEVICES (TEDS)

It is unlawful to trawl (except with fly nets) without a NMFS approved TED having a 4" bar maximum spacing with a minimum escape opening of 35" in horizontal taut length by 12" in vertical taut height installed in the trawl.

Unlawful to use trawl nets in internal waters to take finfish except that incidental to crab or shrimp trawling, 500 lbs of finfish are allowed December 1 through February 28 and 1,000 pounds, March 1 through November 30. Purse seines are prohibited except for menhaden and Atlantic thread herring; no net may be towed by more than one vessel except in long haul (seine) fishing operations.

Area closures: Numerous specific gear restrictions by geographic area. Trawls are prohibited within one half mile of the beach between the Virginia line and Oregon Inlet and in the Albemare sound and tributaries. Trawling is prohibited in designated nursery areas.

Seasons: Ports can be opened and closed to landing of summer flounder to comply with quota management requirements; size and bag limits are established by proclamation.

Licenses: A Commercial license is required to use commercial gear with fees dependent on vessel length (nonresidents have an additional $200 surcharge or whatever that state charges a North Carolina vessel, whichever is greater). An endorsement to sell on the vessel license or on the individual, if a vessel is not used, is required to sell fish. An inland sport fishing license is necessary for some portions of tidal waters.

Sources: All personal communications: ME - Honey, NH - Nelson, MA - McKiernan, RI - Sisson, CT - Simpson, NY - Mason, NJ - Scarlett, DE - Cole, MD - Casey, VA - Grignano , and NC - Spitsbergen/Monaghan.

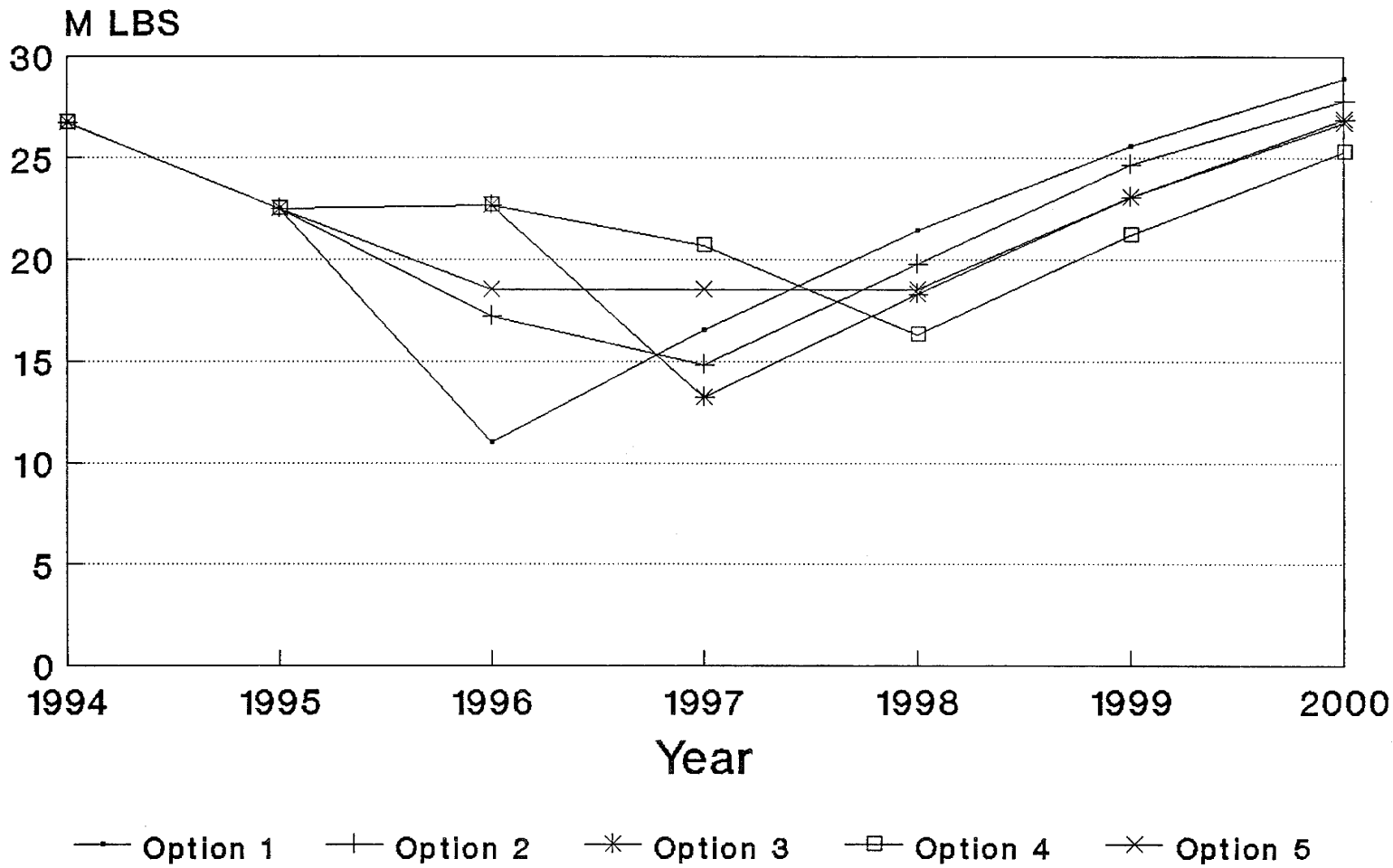


Figure 1. Summer flounder quota associated with each of the fishing mortality rate reduction options.

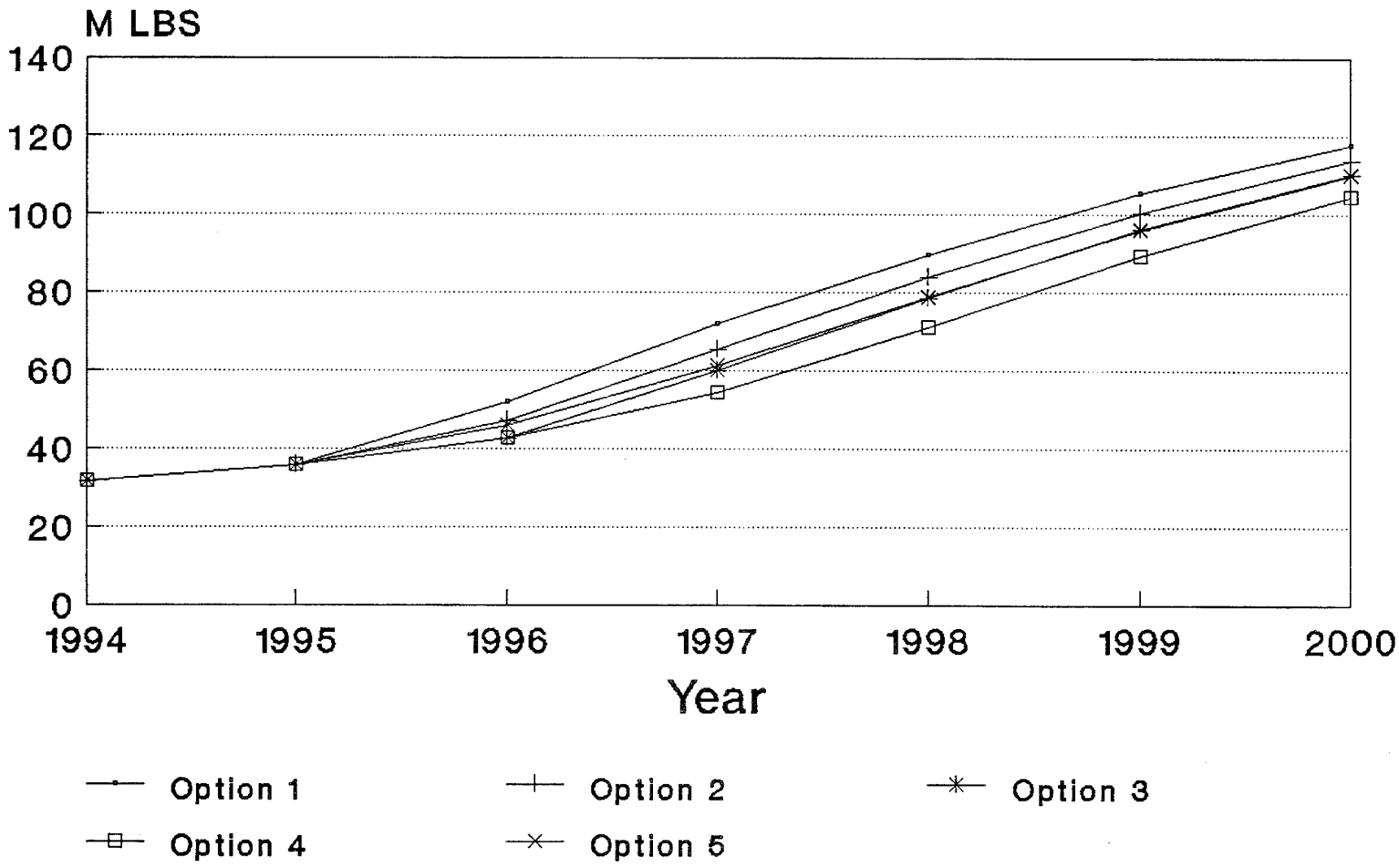


Figure 2. Summer flounder spawning stock biomass associated with each of the fishing mortality rate reduction options.

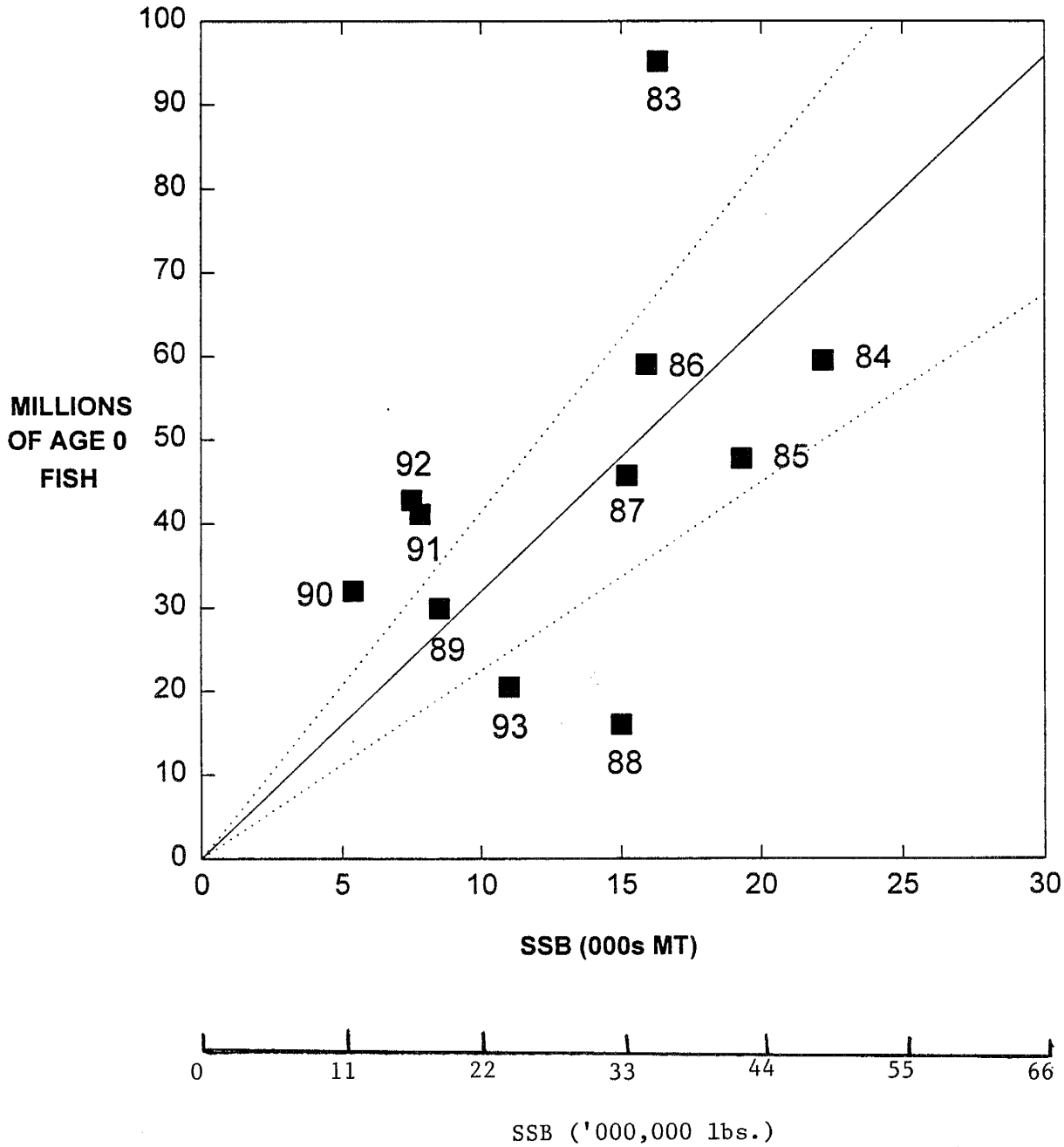
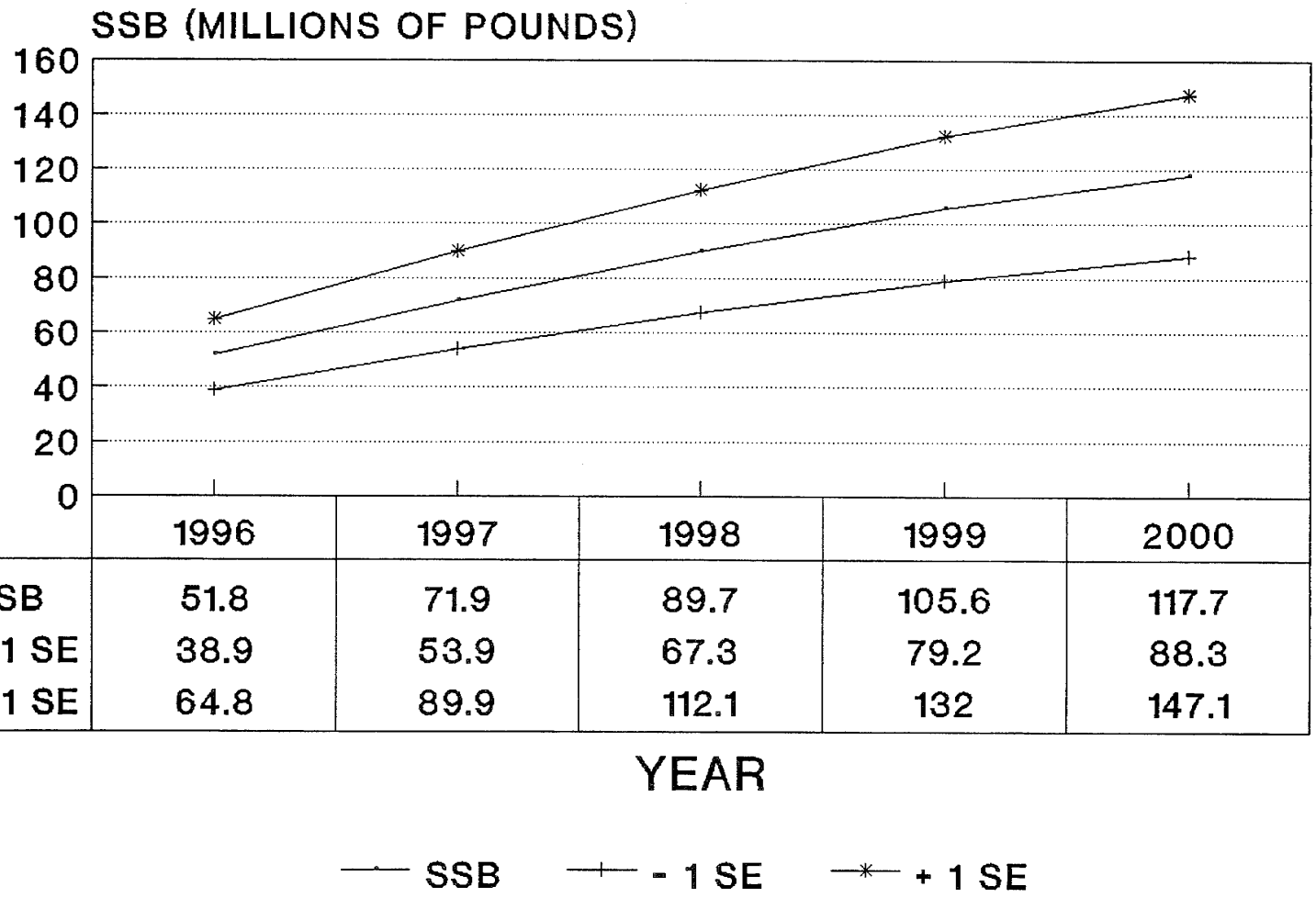


Figure 3. SSB - Recruit data for 1983-93 year classes of summer flounder (NEFSC 1994).



	1996	1997	1998	1999	2000
SSB	51.8	71.9	89.7	105.6	117.7
- 1 SE	38.9	53.9	67.3	79.2	88.3
+ 1 SE	64.8	89.9	112.1	132	147.1

Figure 4. Spawning stock biomass (SSB) associated with option 1 of the fishing mortality rate reduction strategy for summer flounder.

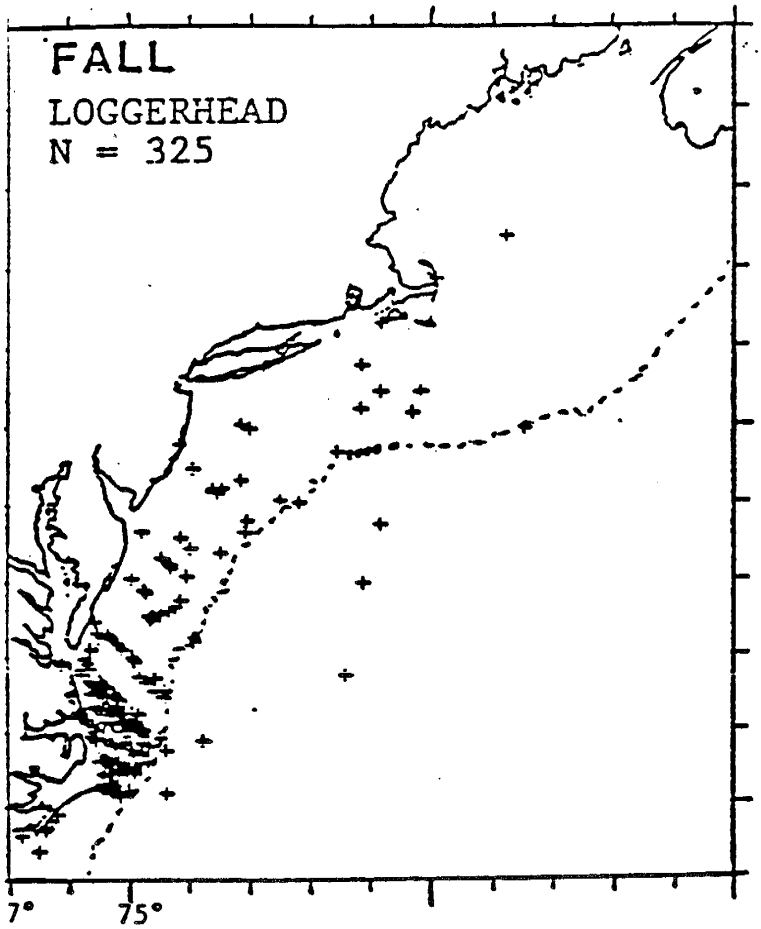


FIGURE 5 : Fall (Sept.22-Dec.21) distribution of loggerhead sea turtles. From CeTAP, 1982.

FIGURE 6 : Fishing grounds of North Carolina winter (Oct.-Jan.) trawl fishery. From Ross, 1991.

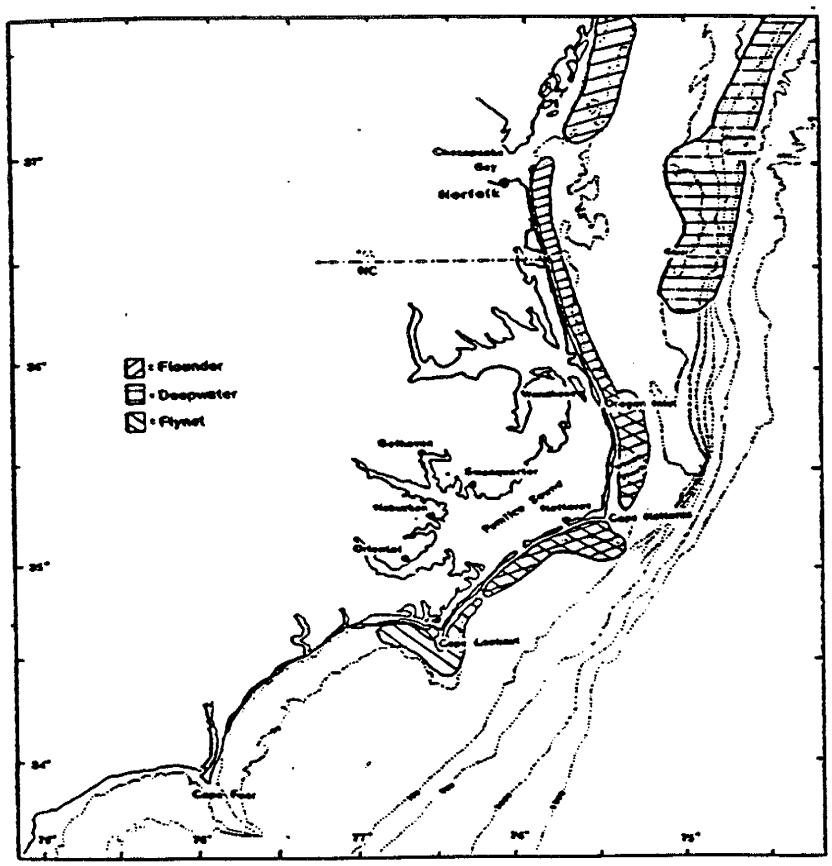
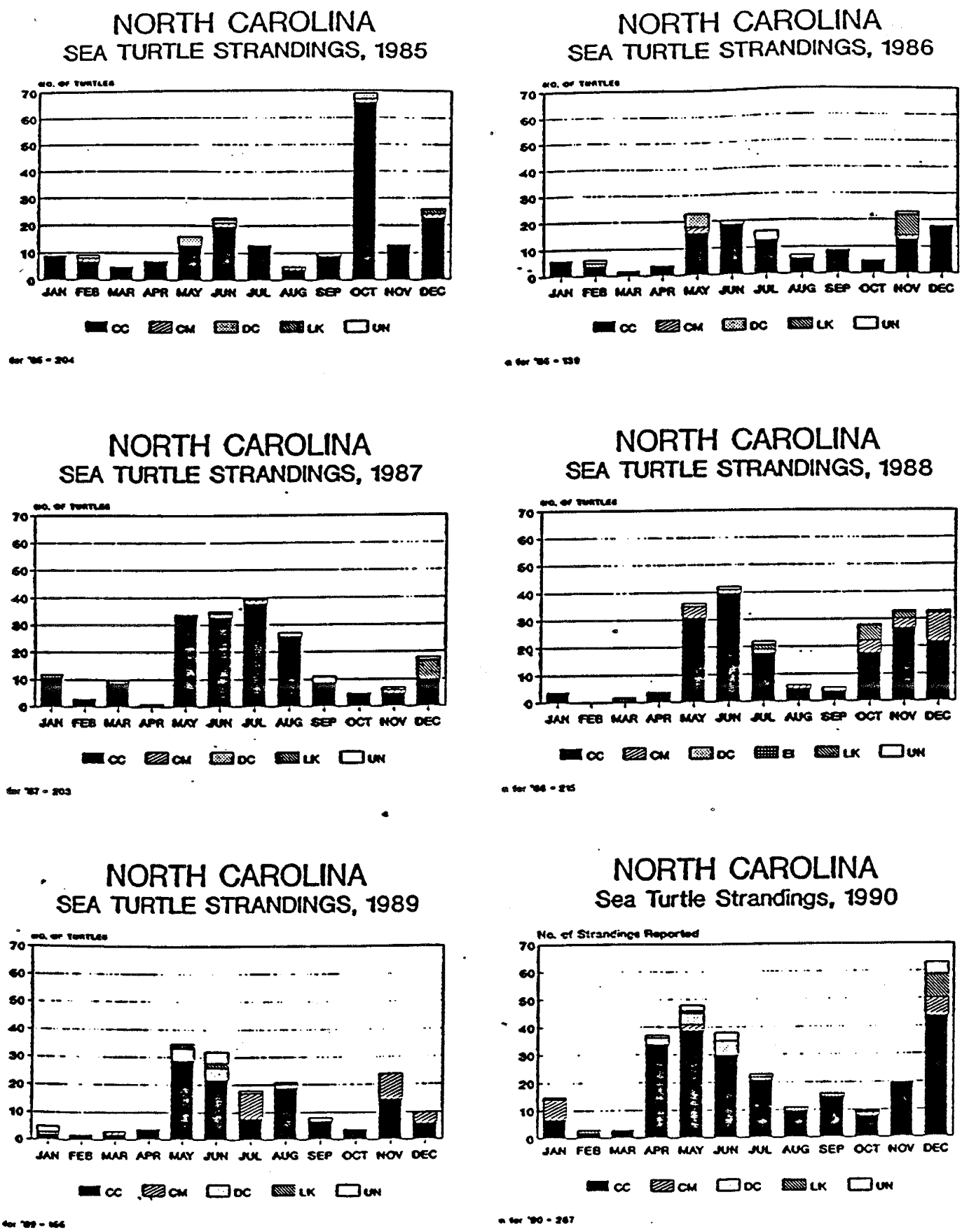


Figure 7:
From NMFS, SEFC. STSSN Database



CC=Caretta caretta CM=Chelonia mydas DC=Dermochelys coriacea EI=Eretmochelys imbricata LK=Lepidochelys kempi UN=Unidentified

National Marine Sanctuary Program

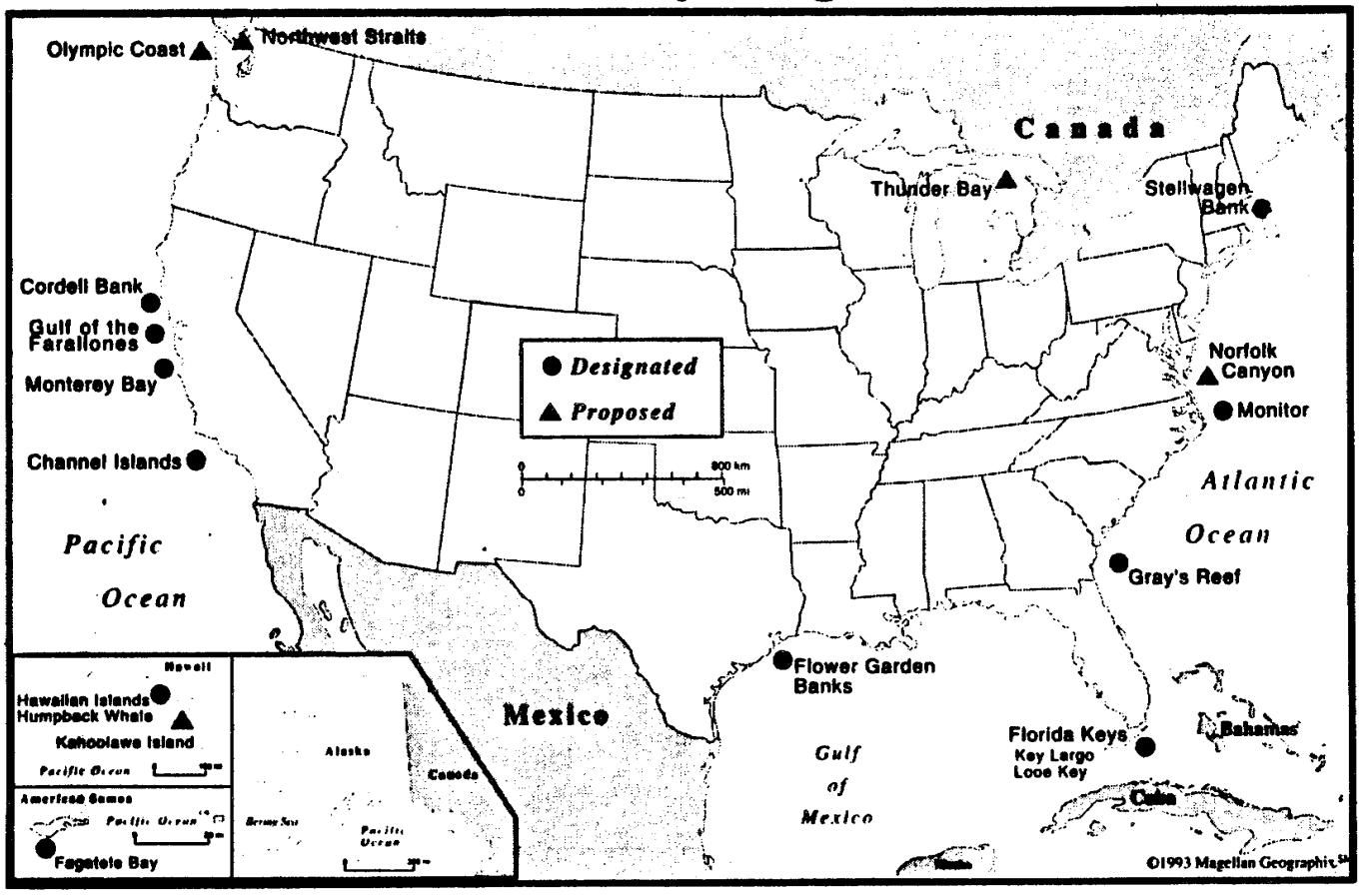


Figure 8. Designated and Proposed National Marine Sanctuaries.

Source: National Marine Sanctuary Program 1993.

APPENDIX 1. REGULATORY IMPACT REVIEW

1. INTRODUCTION

1.1. Purpose

Executive Order 12866, "Regulatory Planning and Review", was signed on September 30, 1993, and established guidelines for promulgating new regulations and reviewing existing regulations. While the executive order covers a variety of regulatory policy considerations, the benefits and costs of regulatory actions are a prominent concern. Section 1 of the order deals with the regulatory philosophy and principles that are to guide agency development of regulations. The regulatory philosophy stresses that, in deciding whether and how to regulate, agencies should assess all costs and benefits of all regulatory alternatives. In choosing among regulatory approaches, the philosophy is to choose those approaches that maximize net benefits to society.

The regulatory principles in E.O. 12866 emphasize careful identification of the problem to be addressed. The agency is to identify and assess alternatives to direct regulation, including economic incentives, such as user fees or marketable permits, to encourage the desired behavior. When an agency determines that a regulation is the best available method of achieving the regulatory objective, it shall design its regulations in the most cost-effective manner to achieve the regulatory objective. Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation.

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. 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 of the items in the regulatory philosophy and principles of E.O. 12866.

Executive Order 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

> (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
>
> (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
>
> (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
>
> (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

A regulatory program is "economically significant" if it is likely to result in the effects described in item (1) above.

The RIR is designed to provide information to determine whether the proposed regulation is likely to be "economically significant."

The document also contains an analysis of the impacts of the Plan relative to the Regulatory Flexibility Act and the Paperwork Reduction Act of 1980.

1.2. Description of User Groups

The fishery is described in Sections 7 and 8 of Amendment 2.

1.3. Problems Addressed by Amendment 7

The problems to be addressed are discussed in Section 4.2 of Amendment 7.

1.4. Management Objectives

The objectives of Amendment 7 are to:

1. Reduce fishing mortality in the summer flounder fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder to increase spawning stock biomass.

3. Improve the yield from the fishery.

4. Promote compatible management regulations between State and Federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

1.5. Provisions of Amendment 7

The impacts of options are presented in Section 9.1 of Amendment 7.

2. REGULATORY IMPACT ANALYSIS

The impacts of options are presented in Section 9.2 of Amendment 7.

3. DISCUSSION OF THE BENEFITS AND COSTS OF THE AMENDMENT

E.O. 12866 requires that a benefit-cost analysis of all proposed regulations be performed.

3.1 Costs

Management costs are discussed in section 9.2 of Amendment 7.

3.2. Benefits

Benefits are discussed in section 9.2 of Amendment 7.

3.3. Benefit - Cost Conclusion

Benefits and costs are discussed in section 9.2 of Amendment 7.

4. OTHER E.O. 12866 REQUIREMENTS

The FMP should not have an annual effect of $100 million or more. The exvessel value of summer flounder landings has increased from about $16 million in the early 1980's to a peak $41 million in 1988. Exvessel value dropped to $28 million in 1989, due to a nearly 15 million pound decline in landings, but a rise in average price to $1.56 per pound helped to temper the effect on revenues to harvesters. In 1993, the exvessel value of summer flounder landings was nearly $23 million (USDC 1994b). The Sport Fishing Institute estimated that 10% to 15% of the $1.05 billion in retail sales directly related to Mid-Atlantic marine recreational fishing in 1985 could be attributed to summer flounder, making it second only to bluefish in importance to anglers. Amendment 7 is intended to allow the summer flounder resource to rebuild, thereby assuring larger catches in the future.

The FMP is not expected to lead to an increase in costs or prices to consumers (section 9.2.2.4 of Amendment 7).

Cost and benefit data are presented and analyzed in section 9.2.2 of Amendment 7.

The FMP should not have significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of US based enterprises to compete with foreign based enterprises in domestic or export markets.

MAJOR RULE DETERMINATION

The analysis described above shows that if the evaluated management measures were to be enacted, they would not constitute a "major rule" under the criteria described in E.O. 12866.

5. IMPACTS OF THE PLAN RELATIVE TO THE REGULATORY FLEXIBILITY ACT

5.1. Regulatory Flexibility Analysis

5.1.1. Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to minimize the adverse impacts from burdensome regulations and record keeping requirements on small businesses, small organizations, and small government entities. The category of small entities likely to be affected by the proposed plan is that of commercial summer flounder fishermen, charter/headboats, processor and wholesalers. The impacts of the proposed action on the fishing industry and the economy as a whole were discussed in section 9.2 of the Amendment. The following discussion of impacts centers specifically on the effects of the proposed action on the mentioned small businesses entities.

5.1.2. Determination of significant economic impact on a substantial number of small entities

According to guidelines on regulatory analysis of fishery management actions, a "substantial number" of small entries is more than 20 percent of those small entries engaged in the fishery (NMFS 1994). The Small Business Administration (SBA) defines a small business in the commercial fishing activity as a firm with receipts of up to $2.0 million annually. National Marine Fisheries Service permit file indicate that as of June 5 1994, there were 1,098 firms holding summer flounder commercial permits, and 128 party/charter firms holding recreational permits. The majority of the vessels in the summer flounder fishery may readily qualify as small entities according to the SBA criteria. Given that he proposed action will affect many of these vessels, the "substantial number" criteria 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).

5.1.2.1. Options (Management measures)

The options or management measures evaluated are described in section 9.2.2 of Amendment 7.

Option 5B is the preferred option. This option provides the best balance between yield to the fishery and risk to the stock. This option provides the industry with the least drastic reductions in the quota from one year to the next (drastic fluctuations in landings can affect cost of production, prices and market stability). This option is expected to allow the stock to recover without closing the fishery or affecting the economy or social structure of the participants in a detrimental manner.

Because 5B would allow for an increase in commercial and recreational landings relative to status quo fishing mortality reduction strategy (option 1), no significant impacts will occur on small business entities.

5.1.2.2. Conclusions

The preceding Regulatory Flexibility Analysis indicate that the proposed regulation in this amendment would have no adverse effect on small business entities.

6. PAPERWORK REDUCTION ACT OF 1980

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. Amendment 7 will not change the paperwork burden of the FMP.

7. IMPACTS OF THE PLAN RELATIVE TO FEDERALISM

The FMP does not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order 12612.

APPENDIX 2. SUMMER FLOUNDER FMP AMENDMENT 7 ENVIRONMENTAL ASSESSMENT

1. INTRODUCTION

The FMP was based on a management plan drafted by the State/Federal Summer Flounder Management Program pursuant to a contract between the New Jersey Division of Fish, Game, and Wildlife and NMFS. The State/Federal draft was adopted by the Atlantic States Marine Fisheries Commission (ASMFC) at its annual meeting in October 1982. The Council adopted the FMP on 16 April 1988 and NMFS approved it 19 September 1988. Amendment 1 was intended to impose a minimum net mesh regulation and define overfishing. NMFS approved the overfishing definition but disapproved the minimum net mesh provision. Amendment 2 included management measures to reduce overfishing and enable the stock to rebuild. Amendment 3 revised the Northeast exempted fisheries program and increased the large mesh threshold to 200 lbs during the winter fishery, 1 November to 30 April. Amendment 4 modified the state-specific shares which allocated the coastwide quota to the States. Amendment 5 allowed for the transfer or combination of the commercial summer flounder quota between States. Amendment 6 allowed multiple nets on board under certain circumstances. Amendment 7 addresses the problem discussed in Section 4.2 of the Amendment.

2. PURPOSE OF AND NEED FOR ACTION

The problem to be addressed in Amendment 7 are set forth in section 4.2 of the Amendment.

3. MANAGEMENT OBJECTIVES

The objectives of the FMP are to:

1. Reduce fishing mortality in the summer flounder fishery to assure that overfishing does not occur.

2. Reduce fishing mortality on immature summer flounder to increase spawning stock biomass.

3. Improve the yield from the fishery.

4. Promote compatible management regulations between State and Federal jurisdictions.

5. Promote uniform and effective enforcement of regulations.

6. Minimize regulations to achieve the management objectives stated above.

4. MANAGEMENT UNIT

The management unit is summer flounder (*Paralichthys dentatus*) in US waters in the western Atlantic Ocean from the southern border of North Carolina northward to the US-Canadian border.

5. ALTERNATIVES

The options considered by the Council for Amendment 7 are presented in section 9.1 and evaluated in section 9.2 of the Amendment.

6. ENVIRONMENTAL IMPACTS

The impacts of options are presented in Section 9.2 of Amendment.

7. MANAGEMENT COSTS

The impacts of options are presented in Section 9.2 of Amendment.

8. TRADEOFFS BETWEEN THE BENEFICIAL AND ADVERSE IMPACTS OF THE AMENDMENT

The impacts of options are presented in Section 9.2 of Amendment.

9. EFFECT ON ENDANGERED SPECIES AND ON THE COASTAL ZONE

Activities conducted under the Summer Flounder Fishery Management Plan were considered for their impacts on endangered species in 1988, pursuant to Section 7 of the Endangered Species Act, as amended. The resultant Biological Opinion, (2 August 1988) concluded that threatened loggerhead (*Caretta caretta*) and endangered Kemp's ridley (*Lepidochelys kempi)* sea turtles were taken in the summer flounder trawl fishery off North Carolina and southern Virginia in some years, as indicated by intermittent sea turtle stranding events. However, due to the infrequency of these events, it was concluded that the continued existence of turtle populations was not jeopardized by fishing activities.

Between November 26 and December 7, 1990, 54 sea turtles, including at least 8 endangered Kemp's ridleys, stranded on North Carolina beaches. The North Carolina Division of Marine Fisheries closed state waters to summer flounder bottom trawling from Cape Hatteras Light to Ocracoke Inlet on December 7, 1990. Twenty one additional sea turtles stranded before the end of December. The total mortality included 56 loggerheads, 9 Kemp's ridleys, 6 green turtles, and 4 unidentified sea turtles. During the closure period a Turtle Excluder Device (TED) was developed, in conjunction with the NMFS Pascagoula Lab, for use on summer flounder bottom trawlers. Experimental tows conducted without TEDs during this time indicated that about .14 sea turtles were taken per hour for each net towed off Ocracoke in December, 1990. On December 26, 1990, waters were opened to trawlers pulling TEDs until early January, at which time turtles were no longer encountered in North Carolina waters and fishing without TEDs was allowed.

Because of the above information, fishing activities managed under the FMP were reconsidered for impacts on endangered species. Evaluation of the sea turtle and fishery distribution data, trawl data collected off North Carolina in November and December, 1990 and stranding data indicated that the conflict between turtles and the summer flounder fishery occurs annually in the winter in North Carolina. The Biological Opinion resulting from the reinitiated consultation concluded that continued unrestricted operation of this fishery would jeopardize the endangered Kemp's ridley sea turtle population. Reasonable and prudent alternatives, including mandatory sea sampler coverage, limited tow times or use of turtle excluder devices (TEDs), were determined to be necessary to allow fishing to continue in a manner that would sufficiently reduce the level of take of sea turtles.

The Council was notified of this situation by NMFS in late August 1991. Management proposals were drafted and hearings held 30 September and 1 and 2 October in North Carolina and Virginia. These proposals have been incorporated in the final version of Amendment 2 (section 9.1.2.5). They were also implemented by NMFS emergency action effective 2 December 1991.

The FMP was reviewed relative to CZM programs of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Letters were sent to all of the States listed above. The letters to all of the States except New Hampshire and Pennsylvania stated that the Council concluded that Amendment 7 would affect the State's coastal zone and was consistent to the maximum extent practicable with the State's CZM program as understood by the Council. For New Hampshire, the evaluation was that Amendment 7 might affect the coastal zone and was consistent. For Pennsylvania, the evaluation was that Amendment 7 would not affect the coastal zone. Rhode Island, Pennsylvania, and New Hampshire have concurred with the Council's opinion.

10. EFFECTS ON FLOOD PLAINS OR WETLANDS

The adopted management measures or their alternatives will not adversely affect flood plains or wetlands, and trails and rivers listed or eligible for listing on the National Trails and Nationwide Inventory of Rivers.

11. LIST OF AGENCIES AND PERSONS CONSULTED IN FORMULATING THE PROPOSED ACTION

In preparing the Amendment, the Council consulted with the Atlantic States Marine Fisheries Commission (ASMFC), NMFS, the New England Fishery Management Council, the South Atlantic Fishery Management Council, the Fish and Wildlife Service, the Department of State, and the States of New York, New Jersey, Pennsylvania, Delaware,

Maryland, and Virginia through their membership on the Council. In addition to the States that are members of this Council, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, and North Carolina were also consulted through the Coastal Zone Management Program consistency process.

12. LIST OF PREPARERS OF ENVIRONMENTAL ASSESSMENT AND PLAN AMENDMENT

The Amendment was prepared by a team of fishery managers and scientists with special expertise in the summer flounder resource including:

Mid-Atlantic Council Demersal Fisheries Committee - Mid- Atlantic Council members Richard Cole (Chair, DE), Jack Travelstead (VA), Rob Winkel (NJ), W. Peter Jensen (MD), Gordon Colvin (NY), James Gilford (MD), Alan Weiss (PA), Robert Hamilton (NY), and Jack Dunnigan (ASMFC); South Atlantic Council members Dennis Spitsbergen and Gerald Schill; and New England Council member James McCauley.

ASMFC Summer Flounder Management Board - Ernest Beckwith (CT), David Borden (RI), Wayne Brewer (NY), A. C. Carpenter (Potomac River Fisheries Comm.), Phil Coates (MA), Rick Cole (DE), Gordon Colvin (NY), Tom Fote (NJ), Tom McCloy (NJ), James Geiger (USFWS), William Jensen (MD), Sen. Owen Johnson (NY), Charles Lesser (DE), Harry Mears (NMFS), William Pruitt (VA), & Bruce Freeman (NC).

Summer Flounder Monitoring Committee - David Keifer (Chair, MAFMC), Phil Harring (NEFMC), Gregg Waugh (SAFMC), Hannah Goodale (NMFS NERO), Mark Terceiro (NMFS NEFC), John Merriner (NMFS SEFC), George LaPonte (ASMFC), Dick Sisson (RI), Rick Monaghan (NC), Chet Zawacki (NY), David Pierce (MA), Bruce Halgren (NJ), Herb Austin (VIMS), and Dr. Wilson Laney (USFWS).

Mid-Atlantic Council Summer Flounder Advisors - Randy Gant (NY), Robert Jackson, Jr. (MD), Paul Mumford (MD), Gordon Roman (NY), Gary Dickerson (NJ), Charles Amory (VA), Charlie Wertz (NY), Wil Laaksonen (VA), and A. F. Evans (DE).

MAFMC staff - David R. Keifer, Christopher M. Moore, Thomas B. Hoff, Richard Seagraves, Jose L. Montenez, and Clayton E. Heaton.

13. FINDINGS OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

For the reasons discussed above, it is hereby determined that neither approval and implementation of the proposed action nor the alternatives would affect significantly the quality of the human environment, and that the preparation of an environmental impact statement on the Amendment is not required by Section 102(2)(c) of the National Environmental Policy Act nor its implementing regulations.

_____ _____

Assistant Administrator for Fisheries, NOAA Date

APPENDIX 3. REGULATIONS

PART 625 – SUMMER FLOUNDER FISHERY

1. The authority citation for Part 625 continues to read as follows:

AUTHORITY: 16 U.S.C. 1801 *et seq.*

2. Section 625.20, paragraph (a), is revised to read as follows:

§625.20 Catch quotas and other restrictions.

(a) *Annual review.* The Summer Flounder Monitoring Committee will review the following data on or before August 15th of each year to determine the allowable levels of fishing and other restrictions necessary to result in a fishing mortality of 0.53 in 1993 through 1995, and a fishing mortality rate of 0.41 in 1996, 0.30 in 1997, and, 0.23 in 1998 and thereafter, except that the allowable levels of fishing in 1996 and 1997 may not exceed 18.5 million pounds unless such a higher quota would result in a fishing mortality rate of 0.23 or less:

* * * * *

APPENDIX 4. SUMMER FLOUNDER FMP AMENDMENT 7 PUBLIC HEARINGS

19 June 1995 - Days Inn, Virginia Beach, VA

Hearing Officer Jack Travelstead opened the hearing at 7:05 P.M. Jim Douglas (VMRC) and LTCMDR Bryant (USCG) were present. Eight members of the public were present.

Mr. Keifer presented Amendment 7.

Jeff Eutsler (F/V *Tony and Jan*) recommended that the Council require a 5.5" mesh throughout the entire flounder net, not just in the cod end. He believes this would enhance stock rebuilding by allowing small flounder to escape and live. He prefers option 5A in Amendment 7.

David Martin (Martin Fish Co., Inc.) prefers option 5A.

Sam Martin(Atlantic Catch, Inc.) prefers option 5A. Also prefers the 5.5" mesh throughout the entire net.

Jeff Deem supported option 5A.

David Boyd supported option 1 because he believes the recreational fishery cannot catch its share of the quota under the current rules. Rebuilding the resource as rapidly as possible will enhance the recreational fishery sooner than delaying the rebuilding.

The hearing was closed at 7:35 P.M.

21 June 1995 - Holiday Inn, Toms River, NJ

Hearing Officer Gary Caputi opened the hearing at 7:15 P.M. Rob Winkle (NJ Division of Fish, Game & Wildlife) was also present. Twenty-five members of the public were present.

Mr. Keifer presented Amendment 7.

George Packer asked if the mortality rates include unreported, illegal landings. He indicated that nothing less than an 8 fish possession limit would be acceptable to party boats.

Tom Buban asked where the assessments come from.

Brock Dalton questioned the results of the Council's 1989 charter and party boat survey which found that summer flounder were a desired species, but fishermen were not terribly successful in catching them. He stated the lack of success was due to the regulations.

Arnold Katz indicated he did not like the management system.

Martin Haines (United Boatmen) does not want possession limits. While 8 fish are better than 6, the fishermen on party and charter boats catch under the limit, but want a higher number to shoot for. He does not like the year long open season and supports the 14" minimum fish size limit. Believes there is cheating because of a lack of enforcement.

Fred Westphalen (Fish Hawks Club of NJ) supports the 8 fish possession limit.

Charles Bergman (Axelsson and Johnson) supports option 5. He believes that sharp increases and decreases in the quotas and limits hurt all parts of the industry.

Gary Dickerson believes the 3 million pounds granted by the Court to the commercial fishery must be taken into account before any changes are made in the management regime. Option 1 is the only one acceptable. He believes that commercial fishermen overfish during the winter fishery. There is no need for the possession limit since fishermen cannot catch that many fish. The 1993 year class has been lost.

Recreational landings in one year can be used to set overall quotas for the following year. The Council should focus on the true spirit of Amendment 2.

Ray Bogan supported option 5B. The possession limit is critical to the party boat industry.

Frances Puskas (NJMFC) supported option 5B. The Council should update the numbers more often. People are being put out of business unnecessarily. There is an adversarial relationship between the user groups.

Tom Buban said he cannot live with a lower possession limit than they have now. Amendment 7 should not move forward.

Hal Hagaman (United Boatmen) indicated that party boat operators cannot live with fewer than 8 fish. The data need to be updated.

Tom Buban favored a closed season.

George Packere stated no commercial fishermen were at the hearing. He said they do not follow the regulations.

Tom Fote stated the possession limit should be 10 fish. He said the Council is too conservative.

Charles Bergman stated that Amendment 7 must go through.

Gary Busch recommended that the fishing mortality target be extended over time.

Nils Stolpe favored option 5.

The hearing was closed at 8:10 P.M.

21 June 1995 - Holiday Inn, Ronkonkoma, NY

The hearing was opened at 7:43 pm by Council Vice-Chairman Tony DiLernia. Other members of the Mid-Atlantic Council present included John Mason and Robert Hamilton. Also in attendance was Chet Zawacki of the NYDEC and approximately 45 members of the public.

Mr. Seagraves presented Amendment 7 to the summer flounder FMP.

Dave Aripotch, F/V Cory and Leah, was in favor of Option 5b. He questioned when the quota would be increased in the future. He stated that there is currently a good year class of fluke and this should be taken into consideration. He feels that fishing power is still increasing due to increases in vessel HP. He is in favor of raising the mesh size, feels the mesh provision is working. He feels the industry can't afford another cut in the quota in 1996. He also feels that the long term fishing mortality target rates are unrealistic.

Capt. Thomas Paladino, Headboat Elsie K. Princess, submitted written comments in support of Option 5b. He spoke in behalf of the party and charter boats operating from the ports of Sheepshead Bay, Gerristen Beach, Point Lookout, Freeport, Captree, City Island, Huntington and Greenport Long Island. His statement was strongly in support of Option 5b (see Attachment 1).

Thomas Marconi, Sheepshead Bay party boat Captain, stated that the rod and reel fishermen have done more than their share to conserve the summer flounder resource. Fluke is the heartbeat of his business. He feels he can't afford another reduction. He strongly supports Option 5b of Amendment 7.

Ed Laske, Dixie 2 - Captree, supported option 5b of Amendment 7.

Patricia Buser, representing Captree Star - Captree, was in agreement with the statement of Capt. Paladino, and strongly supports Option 5 of amendment 7.

Patrick Gillen, Capt. Gillen II which carries 150 passengers, stated that he was in agreement with Capt. Paladino's statement and that he supports Option 5b of Amendment 7.

Rudy Hanfner, Capt. Rudy - Captree, agreed 100% with Capt. Paladino's position and he strongly supports Option 5b of Amendment 7.

Ralph Green, Miss Babylon - Captree, supports the statement made by Capt. Paladino and Option 5b of Amendment 7.

George Bartenback, Capt. Rod and the Captree Boatmen, supported the position of Capt. Paladino and strongly urged the Council to adopt Option 5b of Amendment 7.

Nicholas Manzari, Island Princess, stated that fluke fishing represents the bulk of his business. Without fluke he would quickly go out of business. He favored Option 5b and supported the statement made bu Capt. Paladino.

John McCormick, Capt. Lou fleet and Starstream II, totally supported the statement made by Capt. Paladino and fully supported Option 5b of Amendment 7.

Walter Specht, Spechtron Fishing Corp. And Miss Point Lookout V, was totally in support of the position presented by Capt. Paladino. He was in favor of Option 5b.

Paul Risi, M/V Capt. Gillen III, supported the position presented by Capt. Paladino. He was favored of Option 5b.

James Schneider, Capt. James - Huntington, agreed with Capt. Paladino. He stated that his business can't survive with less than a 6 fish bag limit. He also favors an increase in the mesh size. He recommended that the Council listen to the fishermen and not the politicians.

Steve Kearney, Super-Hawk and Marie III - Pt. Lookout, agreed with the position of Capt. Paladino. He supported Option 5b.

James Evensen, White Eagle III, concurred with the position of Capt. Paladino. He supports Option 5b.

Dennis Kanyuk, Party boats Super hawk and Marie III and representing the Freeport Fish Alliance, supported the position of Capt. Paladino and favors Option 5b.

George Richford, Pastime Services, was in agreement with the position of Capt. Paladino. He supported Option 5b.

Michael Barnett, Codfather Charters, supported the position of Capt. Paladino and Option 5b.

David Brennan, North Fork Captains Association, representing 14 headboat owner/operators, was fully in support of the position of Capt. Paladino. He strongly favored Option 5b.

John Smith, Capt. Lou Fleet, was in total agreement with Capt. Paladino and strongly supported Option 5b.

Richard Johnson, outdoor writer was strongly in favor of Option 5b,. He feels that the Council needs to get the States in line. He submitted a written statement (see attachment 2).

Mark Malacoff, NY Seagrant, questioned whether the NMFS would approve Amendment 7 as written. He noted that Andy Rosenberg was critical of the Amendment at the last Council meeting.

George Scott supported Option 5b.

Dave Aripotch voiced concerns that the Council was moving too fast. He stated that fluke are extremely important to the fisheries of Long Island and that actions taken by the Council will have serious consequences for the fishermen of Long Island.

Bob Hamilton recognized the importance of fluke to the fisheries of Long Island. He stated that the Council's first obligation is to insure that the fluke stock is fully rebuilt. The major goal of the Council is to conserve the fluke stock for the long term.

The hearing was closed at 8:38 pm.

ATTACHMENT 1

COMMENTS OF CAPTAIN THOMAS PALADINO
REPRESENTING PARTY AND CHARTER BOATS OF NEW YORK, REGARDING
AMENDMENT 7 TO THE SUMMER FLOUNDER FISHERY MANAGEMENT PLAN

Gentlemen my name is Thomas Paladino and I am the captain of the 82 Ft. headboat the Elsie K Princess operating daily from Gerritsen Beach, Brooklyn New York. Since 1953 the Elsie K Fleet has been a family owned and operated business exclusively targeting Summer Flounder. I am speaking on behalf of the party and charter boats operating from the ports of Sheepshead Bay, Gerritsen Beach, Point Lookout, Freeport, Captree, City Island, Huntington and Greenport Long Island. The captains of these ports have requested that I present to you their views regarding the proposed amendment to the Summer Flounder Fishery Management Plan. My comments are a consensus opinion of the working group which met and reviewed the proposed amendment in preparation for the presentation of these comments.

These captains understand what contributes to the success of the recreational fishing experience and what is desired by the fishing public they service. The success of a head or charterboat is determined by the owner and captain's ability to safely and economically deliver to the public what they want. Successful captains are accurate barometers of the public's views and desires

The public wants the opportunity to catch fish. What often drives fishermen is the expectation of a good days catch. An exceptional day of fishing can often motivate a fisherman for years. Reducing recreational bag limits to levels that discourage rather than encourage recreational fishing is contrary to the intent of fishery management plans. Therefore we cannot support alternative one which proposes to do nothing and have the 1996 mortality rate reduced to F0.23 which we belive would have an associated recreational bag limit of less than six fish per person per day.

In simple terms we are convinced that a recreational bag limit of less than six will discourage the public and result in fishermen believing management has failed them. Party and charterboat businesses will fail and the general public will have even less opportunities for access to our marine resources. During the summer of 1991 when amendment two to the Summer Flounder Plan was debated we concluded that six fish per person was the lowest bag limit we could support. We thought a lower bag limit would speed recovery but we had to balance the stock recovery rate with what the public and our businesses could withstand. We hoped the Council was right and that the stock recovery anticipated in '93, '94 and '95 would mitigate a '96 reduction in the bag limit. Even when the scientific estimates indicated that the bag limit could go to 10 fish per person in '94 we encouraged the council to not to exceed eight and "bank" the balance for 1996. We have been consistent in our philosophy all along that is "Do what you have

to do to encourage recovery but do not drop the bag limit below six."
That advice has not changed and so we belive the Council's preferred alternative, alternative 5B, is the proper direction the Council should proceed. We understand the risk associated with delayed recovery but we belive a delay of only two years is a minimal risk when compared with the associated benefit of maintaining the six fish bag limit. We are particularly convinced when one considers the SSB levels associated with alternative 5B is 45.9 million pounds and the Council's hearing document states that SSB's exceeding 33 million pounds are typically associated with high recruitment events.

Alternative 5B will have another benefit to the fishery and that is one of stability. Continually adjusting the bag limit on a yearly basis in a rollercoaster fashion simply confuses the public and discourages compliance. We belive the stability to the bag limit alternative 5B represents will encourage compliance by anglers and facilitate the recreational community's contribution to the recovery of the stock. We as businessmen will be able to make rational business decisions in advance based on a steady bag limit and the public will benefit from our ability to plan in advance.

We are disappointed the Council lost the law suit which awarded the commercial sector an additional three million pounds, those fish were part of our insurance policy for 1996. We are disappointed the '93 year class was weak but we see evidence of a strong '94 year class. We hoped we could go to the F0.23 level in '96 but now we see we can not and so we support alternative 5B to amendment 7. A fishery management plan should be an evolving document which responds to changes in stock size and the fishery while at the same time effecting recovery. The Council's preferred alternative does just that and we encourage the Mid-Atlantic Council to pass it. Our future depends on your action. Please do not disappoint us!!

Thank you for the opportunity to address you today.

"THE FISHING LINE"

RJ Productions
24 Troy Ave.
E. Atlantic Beach, NY 11561
516-889-6895

FLUKE HEARING ON 6/21/95

My name is Rich Johnson and I'm an outdoor writer and columnist for several papers and magazines on Long Island including the Fisherman magazine, a licensed fishing guide and the host of an hour long fishing show called "The Fishing Line" on WGBB 1240 AM every Saturday afternoon at 5 pm. I am speaking here tonight on behalf of my personal opinions and that of my radio show.

It is my belief that while the mortality rate of the summer flounder may indeed need to be curtailed over the next few years, this curtailment and reduction should not have to come from the recreational fishermen or party and charter boat captains.

In the business I'm in, I am in constant and close contact with the captains in the industry. I have long been on record as a firm supporter of these gentlemen while at the same time still looking out for the resource.

There are two main concerns that I would like to voice. One, the difference in the fish allotted to recreational anglers between the states.

Currently, the state of New Jersey is at eight per man and New York is 6 per angler. If a reduction in mortality is to come about, it should start with the reduction of two fish from New Jersey to equal that of the empire state.

This reduction of two fish is a start and would allow the New York party and charter boat anglers as well as the private sector to remain at six fish.

Secondly, the around the clock dragging operations by commercial boats is out of hand. They are allotted a quota of 1,000 pounds per trip from what I'm led to believe. What they are doing is around the clock dragging with unloading of their cargo at different fish markets in different inlets. They can unload at Jones Inlet, then make a drag and while they head east, unload through Fire Island Inlet etc.

There should be someone or some system to preclude this form happening. By the time the figures are factored in and they realize that they have gone over the year's quota, probably sometime later in the year, it will be to late.

So what then, a subtraction of tonnage from next year's quota. The same scenario will repeat itself and round we go as do the draggers, round the clock. It is with these beliefs, that I vote to keep the state of New York at six summer flounder per person and find another way to reduce the mortality rate of the resource

Signed,

Rich Johnson

C.F. BROCKENAUER
42 WHELAN AVE
CROTON-ON-HUDSON
NY 10520

WESTCHESTER N.Y.

MR. DAVID R. KEIFER,
EXEC. DIR.,
MID-ATLANTIC FISHERY MANAGEMENT
COUNCIL,
ROOM 2115, FED. BLDG.

MID-ATLANTIC FISHERY COUNCIL

Mr. Keifer: 6-14-95

I strongly support Amendment 7 to the Summer Flounder Plan. If it results in a large decrease in my recreational bag limit — so be it. The flounder biomass must not be further reduced, but — please make sure the Commercial money does not create an unequal playing field.

Sincerely,
Carl F. Brockenauer

June 22, 1995
Til Purnell, Founder
Save Wetlands And Bays
R.D. 6, Box 98
Millsboro, Delaware 19966

Mr. David R. Kelfer, Executive Director
Mid-Atlantic Fishery Management Council
Room 2115 Federal Building
300 South New Street
Dover, Delaware 19904-6790

Dear Mr. Kelfer,

I am writing on behalf of Save Wetlands And Bays (SWAB) to express our opposition to the Mid-Atlantic Fishery Management Council (MAFMC) consideration of adopting Amendment 7 (A7) into the Summer Flounder Fish Management Plan (FMP) and urge the MAFMC to stay with Amendment 2 (A2) of this FMP.

By the MAFMC own admittance the Summer Flounder stock has not rebuilt as fast as anticipated which should be more then enough reason to stay with A2. Our concern is that A7 appears to allow for a short term economic boom which may lead to to a long term economic and ecological bust.

SWAB urges the MAFMC to stay with A2 which calls for a fishing mortality rate of 0.23 in 1998 and to abandon any more thoughts on adopting A7 which would not reach that goal until much later. The long term direct, secondary,and cumulative effects of adopting A7 may have more drastic consequences, both ecologically and economically, than the short term impacts of not adopting it.

Thanking you in advance for your cooperation in this matter.

Respectfully,

Til Purnell

Til Purnell

Timothy P. O'Connor
Conservation Chair
Delaware Chapter
Sierra Club
203 North Layton Ave.
Wyoming, DE 19934

David R. Keifer
Executive Director
Mid-Atlantic Fishery Management Council
300 South New Street
Dover, DE 19904-6790

Dear Mr. Keifer,

I am writing to you on behalf of the Delaware Chapter of the Sierra Club concerning the proposed changes to the Fishery Management Plan for the Summer Flounder Fishery and more to the point the proposed changes to this plan as seen in Amendment 7. First, we are deeply distressed that Amendment 7 proposes to change a five year plan to a seven year management plan. The Sierra Club feels that this sets a dangerous precedent in that it will allow the commercial fishing industry to attack and alter future fishery management plans as they see fit. This can not and should not be allowed-stick with the original plan until the summer flounder stocks have fully recovered.

Next, this plan was designed to reduce the rate of mortality of the summer flounder and to rebuild the stock for future generations. Clearly, this is the goal of any management plan that seeks to restore a population of any species to its previous levels. At present the population of the summer flounder is in worse shape than expected especially since 1993 was a bad year for these fish. Because council has only achieved an F of 0.8 with a target of F 0.53 the logic to delay an F of .23 till 1997 does not make since. It is quite clear from the wording in Amendment 7 that the stocks will be in worse than anticipated shape in 1996 which means that there should be a lowering of the mortality from the directed fisheries not an increase as recommended in Amendment 7. The Sierra Club supports the goals of Amendment 2 with a fishing mortality rate of 0.53 for 1993-1995 and 0.23 in 1996 and beyond. We do not support the proposed changes as cited in Amendment 7.

Mr. Keifer, the Sierra Club has a long and proud tradition working with fisherman and the fishing industry. We have sided very

heavily with the salmon fisherman of the Northwest in their great struggle to open up the once great salmon runs of the past that are now blocked by hydro-electric dams. On the East Coast we want to also work with NMFS and the fishing industry but only to the end that all fisheries are restored. The Delaware Chapter of the Sierra Club believes in the importants of commercial fishing and the livelihood that it provides to these people. When we fight for the future of the flounder stocks we are fighting for the future of fishing. So in the interest of both the summer flounder and the future of the commercial fishing industry we strongly urge you to abandon Amendment 7 to Summer Flounder FMP!!!!

Sincerely,

Timothy P. O'Connor

APPENDIX 5. ABBREVIATIONS AND DEFINITIONS OF TERMS

Act (MFCMA) - the Magnuson Fishery Conservation and Management Act of 1976, as amended, 16 USC 1801 et seq.

Adjusted dollars - dollars standardized to a base year based on the Consumer Price Index.

ASMFC (Commission) - Atlantic States Marine Fisheries Commission.

CFR - Code of Federal Regulations.

Charter or party boat - any vessel which carries passengers for hire to engage in fishing.

Committee - the Summer Flounder FMP Review and Monitoring Committee. The Committee is made up of staff representatives of the Mid-Atlantic, New England, and South Atlantic Fishery Management Councils, the Commission, the Northeast Regional Office of NMFS, the Northeast Fisheries Center, and the Southeast Fisheries Center. The MAFMC Executive Director or his designee chairs the Committee.

Council (MAFMC) - the Mid-Atlantic Fishery Management Council.

CPI - Consumer Price Index; a comparative ratio of a certain group of goods across time.

CPUE - catch per unit of effort.

Domestic Annual Harvest (DAH) - the capacity of US fishermen, both commercial and recreational, to harvest and their intent to use that capacity.

Domestic Annual Processing (DAP) - the capacity of US processors to process, including freezing, and their intent to use that capacity.

Exclusive Economic Zone (EEZ) - the zone contiguous to the territorial sea of the US, the inner boundary of which is a line coterminous with the seaward boundary of each of the coastal States and the outer boundary of which is a line drawn in such a manner that each point on it is 200 nautical miles from the baseline from which the territorial sea is measured.

Fishing for summer flounder - any activity, other than scientific research vessel activity, which involves: (a) the catching, taking, or harvesting of 100 pounds of summer flounder or more per trip; (b) any other activity which can reasonably be expected to result in the catching, taking, or harvesting of 100 pounds of summer flounder or more per trip; or (c) any operations at sea in support of, or in preparation for, any activity described in paragraphs (a) or (b) of this definition.

Fishing mortality rate - the part of the total mortality rate (which also includes natural mortality) applying to a fish population that is caused by man's harvesting. Fishing mortality is usually expressed as an instantaneous rate (F), and can range from 0 for no fishing to very high values such as 1.5 or 2.0. The corresponding annual fishing mortality rate (A) is easily computed but not frequently used. Values of A that would correspond to the F values of 1.5 and 2.0 would be 78% and 86%, meaning that there would be only 22% and 14% of the fish alive (without any natural mortality) at the end of the year that were alive at the beginning of the year. Fishing mortality rates are estimated using a variety of techniques, depending on the available data for a species or stock.

$F_{0.1}$ - the rate of fishing mortality for a given method of fishing at which the increase in yield per recruit for a small increase in fishing mortality results in only 10% increase in yield per recruit for the same increase in fishing mortality from a virgin fishery.

F_{max} - a calculated instantaneous fishing mortality rate that is defined as "the rate of fishing mortality for a given method of fishing that maximizes the harvest in weight taken from a single year class of fish over its entire life span".

FMP - fishery management plan.

FR - *Federal Register.*

GRT - gross registered ton.

ICES gauge - International Council for the Exploration of the Seas (ICES) longitudinal mesh gauge set a 4 kg pressure; as used in mesh selectivity studies.

Internal waters - marine waters landward of the territorial sea.

M (natural mortality) - instantaneous rate of death attributable to all causes except fishing.

MSY - maximum sustainable yield. The largest average catch of yield that can continuously be taken from a stock under existing environmental conditions, while maintaining the stock size.

MRFSS - Marine Recreational Fishery Statistics Surveys, 1979 - 1988.

NEFSC - the Northeast Fisheries Science Center of the NMFS.

NMFS - the National Marine Fisheries Service of NOAA.

NOAA - the National Oceanic and Atmospheric Administration of the US Dept. of Commerce.

OY - Optimum Yield.

Regional Director (RD) - the Regional Director, Northeast Region, NMFS.

Recruitment - the addition of fish to the fishable population due to migration or to growth. Recruits are usually fish from one year class that have just grown large enough to be retained by the fishing gear.

Secretary - the Secretary of Commerce, or his designee.

Serial spawners - species which have egg batches that are continuously matured and shed during a protracted spawning season.

Spawning stock biomass per recruit (SSB/R) - measures the average or expected contribution of any one young fish to the spawning stock biomass over it lifetime. A useful reference point is the level of SSB/R that would be obtained if there were no fishing. This is a maximum value for SSB/R which can be compared to levels of SSB/R calculated for different fishing levels.

State waters - internal waters and the Territorial Sea.

Stock assessment - the biological assessment of the status of the resources. This analysis provides the official estimates of stock size, spawning stock size, fishing mortalities, recruitment, and other parameters used in this Plan. The data from these assessments shall constitute the "best scientific information currently available" as required by the Act.

Summer flounder - the species *Paralichthys dentatus.*

Territorial Sea - marine waters from the shoreline to 3 miles seaward.

Take - to catch and retain on board either in the hold lose or in boxes. It does not include fish from the most recent tow on deck and not yet sorted.

TL - total length.

Total Allowable Level of Foreign Fishing (TALFF) - that portion of the Optimum Yield made available for foreign fishing.

USDC - US Department of Commerce.

Year-class - the fish spawned or hatched in a given year.

Yield per recruit - the theoretical yield that would be obtained from a group of fish of one age if they were harvested according to a certain exploitation pattern over the life span of the fish. From this type of analysis, certain critical fishing mortality rates are estimated that are used as biological reference points for management, such as F_{max} and $F_{0.1}$.

Z - instantaneous rate of total mortality; the ratio of numbers of deaths per unit of time to population abundance during that time.