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25th Northeast Regional Stock Assessment Workshop (25th SAW)

Public Review Workshop

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Research Communications Unit
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A Report of the 25th Northeast Regional Stock Assessment Workshop

25th Northeast Regional Stock Assessment Workshop (25th SAW)

Public Review Workshop

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
Northeast Fisheries Science Center
Woods Hole, Massachusetts

December 1997

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OVERVIEW

Introduction

The Public Review Workshop of the 25th Northeast Regional Stock Assessment Workshop (SAW-25) was held in two sessions as part of the meetings of the New England and Mid-Atlantic Fishery Management Councils (NEFMC and MAFMC). The first session was held August 14, 1997 in Philadelphia, PA during the MAFMC meeting and the second session was held October 2, 1997 in Wakefield, MA during the NEFMC meeting.

The purpose of the Workshop was to present the assessment results and management advice on summer flounder, scup, black sea bass, and northern shrimp, peer reviewed by the Stock Assessment Review Committee at its July 21-25, 1997 meeting, to managers, fisheries representatives, and the public. Copies of the SAW-25 draft Advisory Report on Stock Status and draft Consensus Summary of Assessments had been distributed to members of each Council prior to the Workshop. Additional copies were available to the public at each session.

The SAW Chairman, Dr. Emory Anderson of the NMFS, Northeast Fisheries Science Center (NEFSC), briefly summarized the assessment results and management advice for each stock using information contained in this report and supporting information from the *25th Northeast Regional Stock Assessment Workshop (25th SAW) Stock Assessment Review Committee (SARC) Consensus Summary of Assessments*. A panel of experts comprised of Dr. William Overholtz (Chairman, SARC Coastal/Pelagic Working Group) and Dr. Mark Terceiro (NEFSC Population Dynamics Branch) assisted Dr. Anderson in the question-and-answer period at the MAFMC session. Dr. Terceiro and Mr. Dan Schick (Chairman, ASMFC Northern Shrimp Technical Committee) assisted Dr. Anderson at the NEFMC session.

Status Summaries

Summer Flounder

The stock is at a medium level of historical (1968-1996) abundance and is over-exploited. Results from VPA indicate a high fishing mortality rate (F = 1.0 or 58% exploitation) in 1996 which is above the FMP management target of 0.41 for 1996 and the overfishing definition of F_{max} = 0.24. Spawning stock biomass has increased from 5,200 mt in 1989 to 17,400 mt in 1996, the highest level since 1983. The age structure of the spawning stock has begun to expand, with 34% of the spawning stock biomass at ages 2 and older in 1996. However, under equilibrium conditions at F_{max}, about 85% of the spawning stock would be expected to be age 2 and older. The 1995 year class is about average (1982-1996), but the 1996 year class is estimated to be the smallest since the poor year class of 1988. Fishing mortality needs to be reduced to meet the FMP target F level of 0.24 in 1998. If the adjusted quota for 1997 is not exceeded, total landings in 1998 should not exceed about 6,300 mt to meet the management target. Additional measures to minimize commercial and recreational discard mortality should be considered.

Scup

The results of analyses indicate that the scup stock is over-exploited and near record-low abundance levels. This conclusion is based on a truncated age structure (less than 1% of the landed fish are older than age 5, on average), estimates of fishing mortality from exploratory VPA and previous survey catch curve analysis in excess of 1.0, and a declining trend in spawning stock biomass (SSB) as estimated by exploratory VPA and survey indices.

Results from an exploratory VPA, although generally indicative of actual trends in fishing mortality and SSB, were considered unreliable as a basis for formal catch and SSB projections because of gross inadequacies in the input data (i.e., undersampling of commercial landings, insufficient sampling of commercial discards, lack of coherence among research vessel survey indices). Fishing mortality, which has been far in excess of all biological reference points, should be substantially reduced immediately. The high exploitation rates on age 0-2 fish should be decreased to allow these fish to mature and contribute to future spawning stock biomass.

Black Sea Bass

The stock of black sea bass north of Cape Hatteras, NC is over-exploited and at a low biomass level. Estimated fishing mortality rates have continuously been in excess of 1.0 and well above F_{max} since 1984, the first year in the assessment time series. Although landings have been stable at the current level for at least fifteen years, the stock is not expected to sustain this level of mortality indefinitely. Current levels of SSB have increased due to recent pulses of recruitment, but are expected to decline.

Results from an exploratory VPA, although generally indicative of actual trends in fishing mortality and SSB, were considered unreliable as a basis for formal catch and SSB projections because of gross inadequacies in the input data (i.e., undersampling of commercial landings, insufficient sampling of commercial discards, lack of coherence among research vessel survey indices).

Some benefits to the stock may accrue from increased mesh size requirements in the summer flounder and scup fisheries, uniform 9-in minimum sizes for recreational and commercial landings, and trap/pot mesh and escape vent requirements. However, fishing mortality should be substantially reduced immediately, both on adults and on young fish (mainly females to allow them to mature and change sex to contribute to future SSB).

Northern Shrimp

The stock is at a below-average level of biomass and fishing mortality increased nearly three-fold from 1994 to 0.9 in 1996, a level similar to those associated with a stock collapse in the mid-1970s. Landings declined by about 30% from the 1996 to 1997 fishing seasons, with abundance of recruited shrimp at the end of the 1996 season the lowest since the early 1980s.

Fishing mortality should be reduced substantially to lower the risk of further stock decline. Managers are advised to establish target fishing levels and overfishing reference points (based on stock and recruitment considerations) for this stock.

Conclusions of the SAW Steering Committee

The SAW Steering Committee met twice during the SAW-25 cycle. A teleconference was held September 5, 1997 to 1) briefly recap the SAW-24 and SAW-25 meetings and reports, 2) adopt the agenda for SAW-26, 3) consider data inadequacies and implications for future assessments, 4) discuss the tentative agenda for SAW-27, and 5) review the status of the SAW issue paper and a proposed Atlantic Stock Assessment Review Process. A meeting was held November 3, 1997 at NEFMC headquarters in Saugus, MA to 1) review the status of documentation for SAW-24 and SAW-25, 2) approve terms of reference for SAW-26, 3) discuss the joint USA/Canada stock assessment process for transboundary resources, 4) review the tentative agenda for SAW-27, 5) discuss future SAW policy relative to reviewing assessments and producing advice, and 6) consider several other policy issues. A summary of these meetings is presented in the **Conclusions of the SAW Steering Committee** section of this report.

ADVISORY REPORT ON STOCK STATUS

The *Advisory Report on Stock Status* is an important product of the Northeast Regional Stock Assessment Workshop process. It summarizes the technical information contained in the *Stock Assessment Review Committee (SARC) Consensus Summary of Assessments* and is intended to serve as scientific advice for fishery managers on resource status.

An important aspect of scientific advice on fishery resources is the determination of whether a stock is currently over-, fully-, or under-exploited. As these categories specifically refer to the act of fishing, they are best thought of in terms of exploitation rates relative to the Councils' overfishing and maximum sustainable yield (MSY) definitions. The exploitation rate is simply the proportion of the stock alive at the beginning of the year that is caught during the year. When that proportion exceeds the amount defined by the overfishing definition, it is considered to be over-exploited. The fishery resource is considered to be under-exploited if the exploitation rate is substantially below the level that is needed to produce MSY.

Another important factor for classifying the status of a resource is the current stock level, for example, spawning stock biomass (SSB). It is possible that a stock that is not currently overfished in terms of present exploitation rates is still at a low biomass level due to heavy exploitation in the past, or as a result of other factors such as unfavorable environmental conditions. In this case, future recruitment to the stock is very important and the probability of improvement is increased greatly by increasing the SSB. Conversely, fishing down a stock that is at a high level should generally increase the long-term sustainable yield. Therefore, where possible, stocks under review are classified as having high, medium, or low biomass compared to historic levels. The figure below describes this classification and indicates the appropriate management advice for each classification.

EXPLOITATION STATUS \ STOCK LEVEL	LOW	MEDIUM	HIGH
OVER EXPLOITED	REDUCE EXPLOITATION, REBUILD STOCK	REDUCE EXPLOITATION, BROADEN AGE DISTRIBUTION	REDUCE EXPLOITATION, INCREASE YIELD PER RECRUIT
FULLY EXPLOITED	REDUCE EXPLOITATION, REBUILD STOCK LEVEL	MAINTAIN EXPLOITATION RATE AND YIELD	MAINTAIN EXPLOITATION RATE AND YIELD
UNDER EXPLOITED	MAINTAIN LOW EXPLOITATION WHILE STOCK REBUILDS	INCREASE EXPLOITATION SLOWLY	INCREASE EXPLOITATION, REDUCE STOCK LEVEL

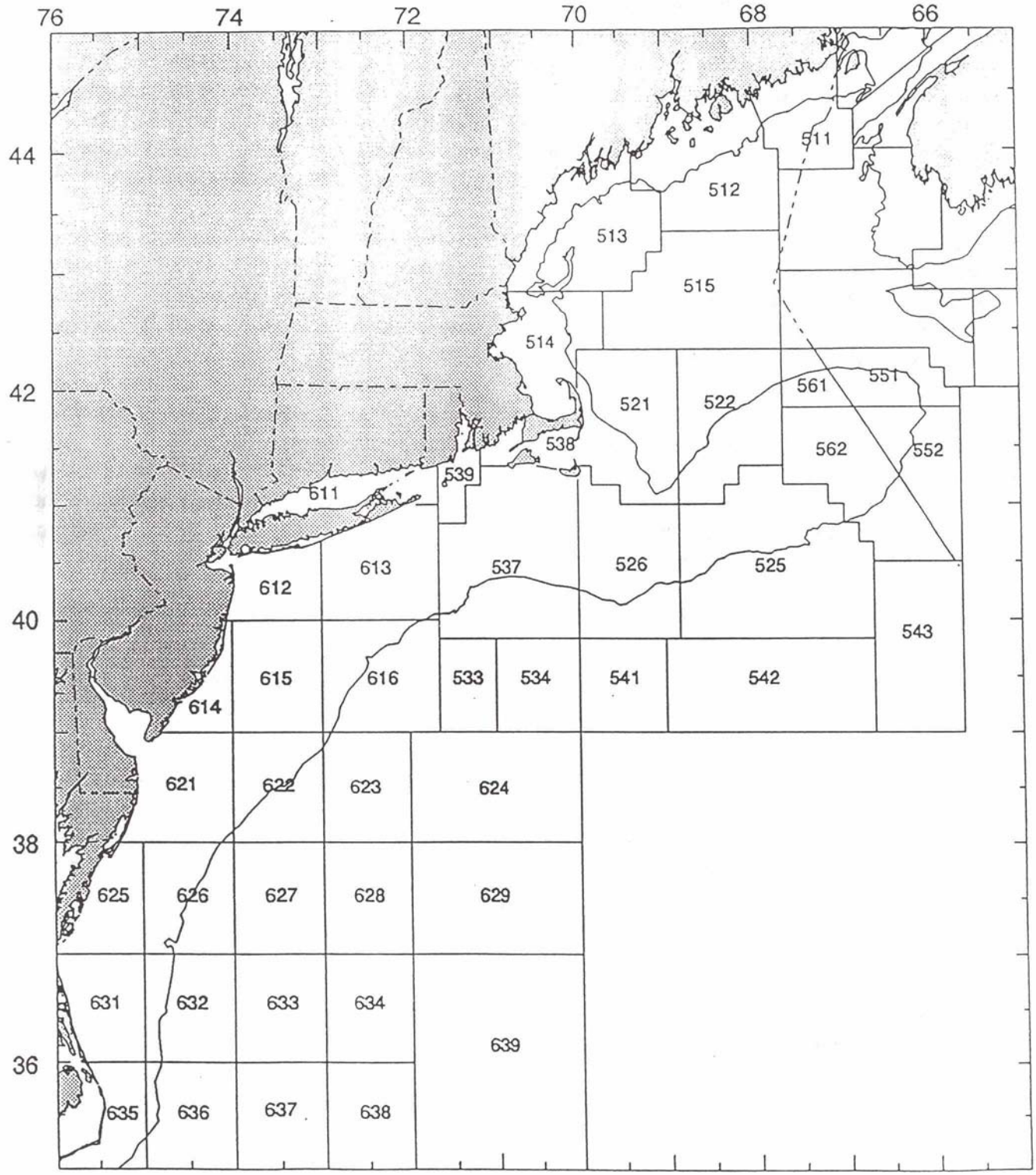


Figure 1. Statistical areas used for catch monitoring in offshore fisheries in the Northeast United States.

GLOSSARY OF TERMS

Biological reference points: These are specific values for the variables that describe the state of a fishery system and are used to evaluate its status. Reference points are most often specified in terms of fishing mortality rate and/or spawning stock biomass. The reference points may indicate 1) a desired state of the fishery, such as a fishing mortality rate that will achieve a high level of sustainable yield, or 2) a state of the fishery that should be avoided, such as a high fishing mortality rate which risks a stock collapse and long-term loss of potential yield. The former type of reference points are referred to as "target reference points" and the latter are referred to as "limit reference points" or "thresholds". Some common examples of reference points are $F_{0.1}$, F_{max}, and F_{msy}, which are defined later in this glossary.

Exploitation pattern: The fishing mortality on each age (or group of adjacent ages) of a stock relative to the highest mortality on any age. The exploitation pattern is expressed as a series (or vector) of values ranging from 0.0 to 1.0. The pattern is referred to as "flat-topped" when the values for all the oldest ages are about 1.0, and "dome-shaped" when the values for some intermediate ages are about 1.0 and those for the oldest ages are significantly lower. This pattern often varies by type of fishing gear, area, and seasonal distribution of fishing, and the growth and migration of the fish. The pattern can be changed by modifications to fishing gear, for example, increasing mesh or hook size, or by changing the proportion of harvest by gear type.

Mortality rates: Populations of animals decline exponentially. This means that the number of animals that die in an "instant" is at all times proportional to the number present. The decline is defined by survival curves such as:

$$N_{t+1} = N_t e^{-Z}$$

where N_t is the number of animals in the population at time t and N_{t+1} is the number present in the next time period; **Z** is the **total instantaneous mortality rate** which can be separated into deaths due to fishing (**fishing mortality or F**) and deaths due to all other causes (**natural mortality or M**) and e is the base of the natural logarithm (2.71828). To better understand the concept of an instantaneous mortality rate, consider the following example. Suppose the instantaneous total mortality rate is 2 (i.e., Z = 2) and we want to know how many animals out of an initial population of 1 million fish will be alive at the end of one year. If the year is apportioned into 365 days (that is, the 'instant' of time is one day), then 2/365 or 0.548% of the population will die each day. On the first day of the year, 5,480 fish will die (1,000,000 x 0.00548), leaving 994,520 alive. On day 2, another 5,450 fish die (994,520 x 0.00548) leaving 989,070 alive. At the end of the year, 134,593 fish [$1{,}000{,}000 \times (1 - 0.00548)^{365}$] remain alive. If we had instead selected a smaller 'instant' of time, say an hour, 0.0228% of the population would have died by the end of the first time interval (an hour), leaving 135,304 fish alive at the end of the year [$1{,}000{,}000 \times (1 - 0.00228)^{8760}$]. As the instant of time becomes shorter and shorter, the exact answer to the number of animals surviving is given by the survival curve mentioned above, or, in this example:

$$N_{t+1} = 1{,}000{,}000e^{-2} = 135{,}335 \text{ fish}$$

Exploitation rate: The proportion of a population alive at the beginning of the year that is caught during the year. That is, if 1 million fish were alive on January 1 and 200,000 were caught during the year, the exploitation rate is 0.20 (200,000 ÷ 1,000,000) or 20%.

F_{MAX}: The rate of fishing mortality which produces the maximum level of yield per recruit. This is the point beyond which growth overfishing begins.

$F_{0.1}$: The fishing mortality rate where the increase in yield per recruit for an increase in a unit of effort is only 10% of the yield per recruit produced by the first unit of effort on the unexploited stock (i.e., the slope of the yield-per-recruit curve for the $F_{0.1}$ rate is only one-tenth the slope of the curve at its origin).

Yield per recruit (Y/R or YPR): The average expected yield in weight from a single recruit. Y/R is calculated assuming that F is constant over the life span of a year class. The calculated value is also dependent on the exploitation pattern, rate of growth, and natural mortality rate, all of which are also assumed to be constant.

Table 1. Percentage of stock (in numbers) caught annually (i.e., exploitation rate) under different fishing (F) mortality rates and the natural (M) mortality rates for the species considered in this report.

F	Summer flounder Scup Black sea bass M = 0.20	Northern shrimp M = 0.25
0.1	9	8
0.2	16	16
0.3	24	23
0.4	30	29
0.5	36	35
0.6	41	40
0.7	46	45
0.8	51	50
0.9	55	53
1.0	58	57
1.1	62	60
1.2	65	63
1.3	67	66
1.4	70	69
1.5	72	71
1.6	74	73
1.7	76	75
1.8	78	77
1.9	79	78
2.0	81	80

A. SUMMER FLOUNDER ADVISORY REPORT

State of Stock: The stock is at a medium level of historical (1968-1996) abundance and is over-exploited. The fishing mortality rate is high and was estimated to be 1.0 (58% exploitation) in 1996 (Figure A1). The 1996 estimate of fishing mortality is above the FMP management target (F_{tgt} = 0.41 in 1996) and overfishing definition (F_{max} = 0.24). There is an 80% chance that the 1996 F was between 0.8 and 1.2 (Figure A6). Spawning stock biomass (age 0 and older) has increased from 5,200 mt in 1989 to 17,400 mt in 1996, the highest level since 1983. There is an 80% chance that the 1996 spawning stock biomass was between 15,000 mt and 21,000 mt (Figure A5). The age structure of the spawning stock has begun to expand, with 34% of the biomass at ages 2 and older in 1996, although under equilibrium conditions at F_{max} about 85% of the spawning stock biomass would be expected to be ages 2 and older. The 1995 year class is about average (1982-1996), but the 1996 year class is estimated to be the smallest since the poor year class of 1988 (Figure A2).

Management Advice: Fishing mortality needs to be reduced to meet the FMP target F level of 0.24 in 1998. If the adjusted quota for 1997 is not exceeded, the total allowable landings (TAL) in 1998 should be no more than 6,300 mt to meet the management target. Additional measures to minimize commercial and recreational discard mortality should also be considered.

Forecasts for 1997-1999: Stochastic projections incorporate uncertainty in 1997 stock sizes due to survey variability and assume that no dramatic increase in discarding will occur. Three sets of projections starting with different levels of exploitation in 1997 were performed. The first projection set assumes the adjusted 1997 quota of 7,162 mt will be landed, and estimates a median (50% probability) F = 0.40 and a median spawning stock biomass of 25,200 mt, with a 95% probability that the target F for 1997 (i.e., F = 0.30) will be exceeded. Landings of 6,300 mt and discards of 600 mt in 1998 provide a median F = 0.24 and a median spawning stock biomass level of 36,100 mt in 1998 (Figure A4). Landings of 9,200 mt and discards of 600 mt in 1999 provide a median F = 0.24 and a median spawning stock biomass level of 47,700 mt in 1999.

The second set of projections assumes the 1997 landings will exceed the adjusted quota by about the same degree as in 1996 (25%), providing landings of 9,000 mt. The second projection set estimates a median F = 0.53 and a median spawning stock biomass of 23,600 mt, with a 99% probability that the target F for 1997 will be exceeded. Landings of 5,800 mt and discards of 600 mt in 1998 provide a median F = 0.24 and a median spawning stock biomass level of 34,200 mt in 1998. Landings of 8,700 mt and discards of 600 mt in 1999 provide a median F = 0.24 and a median spawning stock biomass level of 45,800 mt in 1999.

The third set of projections assumes the 1997 fishing mortality rate will be the same as in 1996 (F = 1.0), providing landings of 14,300 mt and a median spawning stock biomass of 18,900 mt, with a 100% probability that the target F for 1997 will be exceeded. Landings of 4,300 mt and discards of 600 mt in 1998 provide a median F = 0.24 and a median spawning stock biomass level of 28,700 mt in 1998. Landings of 7,200 mt and discards of 600 mt in 1999 provide a median F = 0.24 and a median spawning stock biomass level of 40,500 mt in 1999.

Forecast Tables:

1997 Landings = 7,162 mt

Forecast medians (50% probability level) (landings, discards, and SSB in '000 mt)

	1997				1998				1999			
Option	F	Land.	Disc.	SSB	F	Land.	Disc.	SSB	F	Land.	Disc.	SSB
1	**0.40**	**7.2**	**0.6**	**25.2**	**0.24**	**6.3**	**0.6**	**36.1**	**0.24**	**9.2**	**0.6**	**47.7**
2	0.40	7.2	0.6	25.2	0.34	8.4	0.8	34.4	0.24	8.6	0.6	45.5
3	0.40	7.2	0.6	25.2	0.37	9.0	0.9	33.9	0.26	9.0	0.7	44.5
4	0.40	7.2	0.6	25.2	0.65	14.4	1.5	29.1	0.57	14.4	1.3	33.1

1997 Landings = 9,000 mt

Forecast medians (50% probability level) (landings, discards, and SSB in '000 mt)

	1997				1998				1999			
Option	F	Land.	Disc.	SSB	F	Land.	Disc.	SSB	F	Land.	Disc.	SSB
1	**0.53**	**9.0**	**0.8**	**23.6**	**0.24**	**5.8**	**0.6**	**34.2**	**0.24**	**8.7**	**0.6**	**45.8**
2	0.53	9.0	0.8	23.6	0.34	8.4	0.9	32.0	0.24	7.9	0.6	43.1
3	0.53	9.0	0.8	23.6	0.37	9.0	1.0	31.5	0.26	9.0	0.7	41.5
4	0.53	9.0	0.8	23.6	0.65	14.4	1.7	26.7	0.57	14.4	1.5	30.2

1997 F = 1.00

Forecast medians (50% probability level) (landings, discards, and SSB in '000 mt)

	1997				1998				1999			
Option	F	Land.	Disc.	SSB	F	Land.	Disc.	SSB	F	Land.	Disc.	SSB
1	**1.00**	**14.3**	**1.4**	**18.8**	**0.24**	**4.3**	**0.6**	**28.7**	**0.24**	**7.2**	**0.6**	**40.5**
2	1.00	14.3	1.4	18.8	0.34	8.4	1.2	25.1	0.24	6.0	0.6	36.2
3	1.00	14.3	1.4	18.8	0.37	9.0	1.2	24.6	0.26	9.0	0.9	32.9
4	1.00	14.3	1.4	18.8	0.65	14.4	2.1	20.5	0.57	14.4	2.1	22.1

Medium-term projections: Medium-term (10-year) projections (assuming landings of 7,162 mt in 1997) at F = 0.24 and assuming current stock productivity levels (median recruitment of 41 million fish at age 1) indicate median landings of 18,500-19,400 mt during 2004-2006, with median spawning stock biomass of 81,200-84,400 mt (Figure A7). Landings of 8,400 mt in 1998 and fishing mortality at F = 0.24 during the 1999-2006 period provide median landings of 16,400-17,300 mt during 2004-2006, with a median spawning biomass of 80,700-84,200 mt. Landings of 9,000 mt during 1998-2000 and fishing mortality at F = 0.24 during the 2001-2006 period provide median landings of 18,600-19,400 mt during 2004-2006, with a median spawning biomass of 81,600-84,500 mt. Landings of 14,400 mt during the 1998-2006 period provide a fishing mortality rate meeting the target of F_{max} = 0.24 by 2005, with a median spawning stock biomass of 72,800 mt.

Because the effects of density dependence, future environmental conditions, and stock age structure on the stock-recruitment relationship at higher stock sizes are unknown, these projected levels of spawning stock biomass and landings should be viewed with caution.

Catch and Status Table (weights in '000 mt, recruitment in millions, arithmetic means): Summer Flounder

Year	1989	1990	1991	1992	1993	1994	1995	1996	Max[2]	Min[2]	Mean[2]
Commercial landings	8.1	4.2	6.2	7.6	5.7	6.6	7.0	5.8	17.1	4.2	9.7
Commercial discards	0.7	1.2	1.1	0.7	0.8	0.9	0.3	0.5	1.2	0.3	0.8
Recreational landings	1.4	2.3	3.6	3.2	3.5	4.1	2.5	4.7	12.7	1.4	5.4
Recreational discards	0.1	0.6	1.1	0.9	1.8	1.4	1.8	1.6	1.8	0.1	1.1
Catch used in assessment	10.4	8.3	12.0	12.3	11.9	13.0	11.6	12.6	27.0	8.3	16.6
Spawning stock biomass[1]	5.2	7.5	5.8	7.3	9.3	12.4	17.3	17.4	18.9	5.2	12.4
Recruitment (age 0)	28.2	32.3	30.2	35.2	34.4	40.7	46.6	23.4	82.7	13.1	43.0
F (ages 2-4)	1.8	1.2	1.7	2.1	1.2	1.2	1.1	1.0	2.1	1.0	1.4
Exploitation rate	78%	65%	76%	85%	65%	65%	62%	58%	85%	58%	70%

[1]At the peak of the spawning season (i.e., November 1). [2]Over period 1982-1996.

Stock Distribution and Identification: A unit stock has been defined extending from Cape Hatteras north to New England. The Mid-Atlantic Fishery Management Council (MAFMC) and Atlantic States Marine Fisheries Commission (ASMFC) Fishery Management Plan for summer flounder defines the management unit as all summer flounder from the southern border of North Carolina northeast to the US-Canada border.

Catches: Recent commercial landings peaked in 1984 at 17,100 mt; recreational landings peaked in 1983 at 12,700 mt (Figure A1). During the late 1980s and into 1990, landings declined dramatically, reaching 4,200 mt in the commercial fishery in 1990 and 1,400 mt in the recreational fishery in 1989. Reported 1996 landings in the commercial fishery used in the assessment were 5,770 mt, about 15% over the commercial quota. Estimated 1996 landings in the recreational fishery were 4,704 mt, about 40% over the recreational harvest limit.

Data and Assessment: An analytical assessment (VPA) of commercial and recreational total catch at age (landings plus discard) was conducted. The natural mortality rate (M) was assumed to be 0.2. Indices of recruitment and stock abundance from NEFSC winter, spring, and fall, Massachusetts spring and fall, Rhode Island fall, Connecticut spring and fall trawl, and New Jersey trawl surveys were used in VPA tuning. In addition, recruitment indices from surveys conducted by the states of North Carolina, Virginia, Maryland, New Jersey, and Connecticut were used in VPA tuning. The uncertainty associated with the estimates of fishing mortality and spawning stock biomass in 1996 was evaluated with respect to research survey variability (Figures A5 and A6).

Biological Reference Points: Biological reference points for summer flounder are based on a Thompson-Bell model. The SAW-11 analysis in 1990 indicated that $F_{0.1} = 0.14$ and $F_{max} = 0.23$. An updated analysis incorporating revised partial recruitment patterns and mean weights at age estimated that $F_{0.1} = 0.14$ and $F_{max} = 0.24$ (Figure A3).

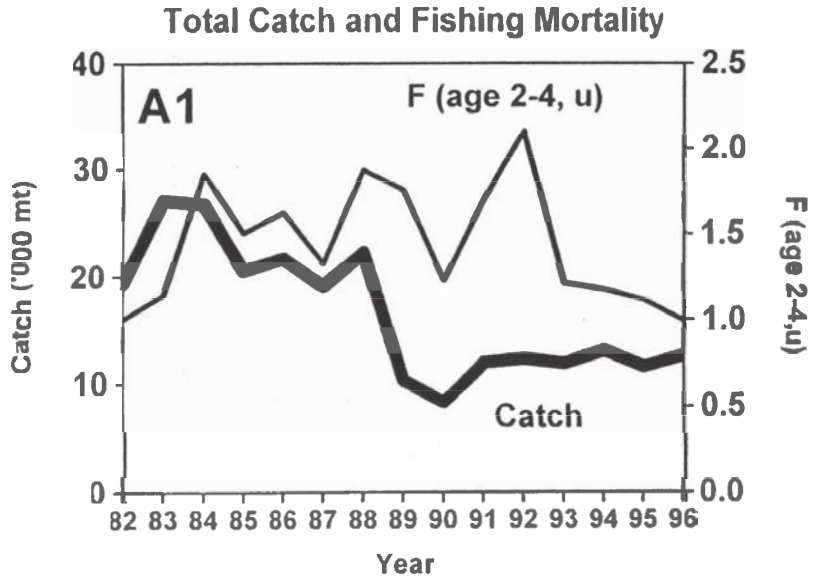
Fishing Mortality: Fishing mortality has been high, varying between 1.0 and 2.1 during 1982-1995 (58%-85% exploitation) (Figure A1), in excess of the revised overfishing definition, $F_{max} = 0.24$ (19% exploitation). The fishing mortality rate in 1996 was estimated to be 1.0 (58% exploitation) (Figure A1).

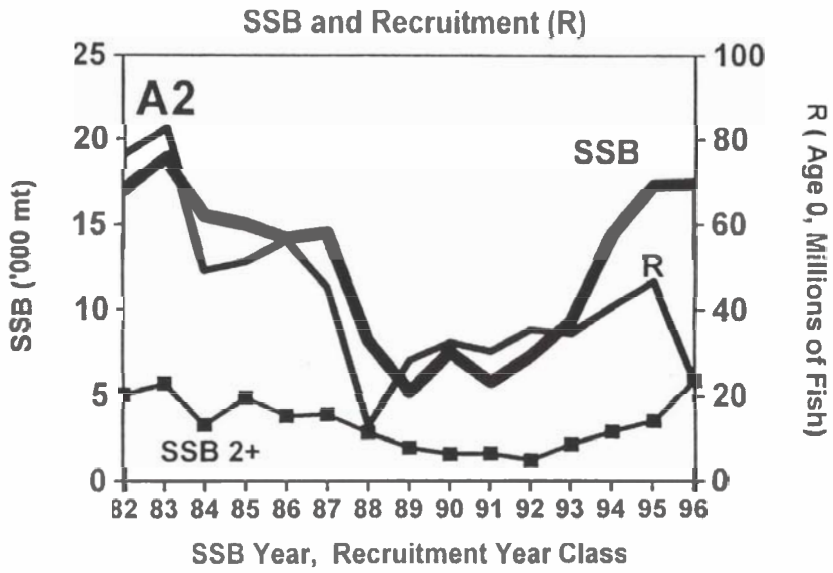
Recruitment: The 1982 and 1983 year classes are the largest in the VPA time series, at 76 and 83 million fish, respectively, at age 0. Recruitment declined from 1983 to 1988, with the 1988 year class the weakest at only 13 million fish. Recruitment since 1988 has generally improved, and the 1995 year class, at 47 million fish, is the strongest since 1986. The 1996 year class, however, at about 23 million, is estimated to be the weakest since 1988 (Figure A2).

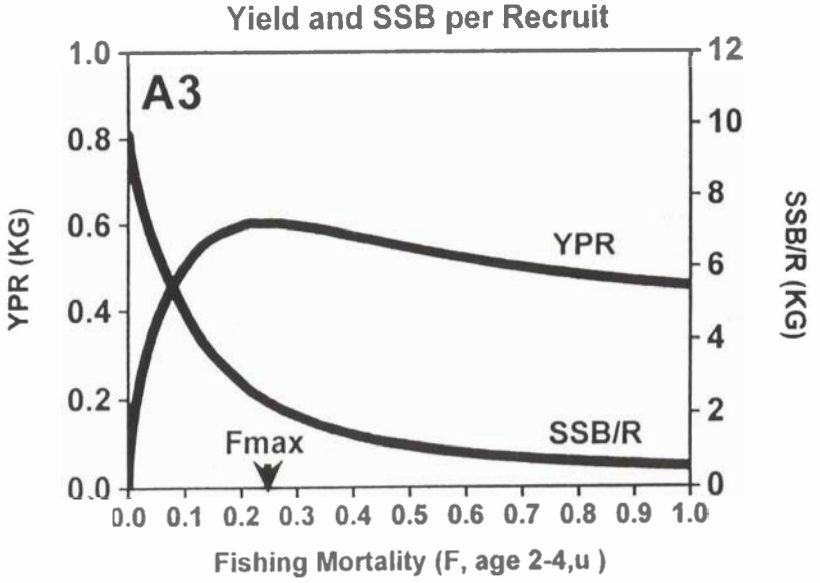
Spawning Stock Biomass: Spawning stock biomass declined 72% from 1983 to 1989 (18,900 mt to 5,200 mt), but has since increased with improved recruitment to 17,400 mt in 1996 (Figure A2). The age structure of the stock is improving, with 34% of the spawning biomass in 1996 composed of fish of ages 2 and older, compared to only 17% in 1992.

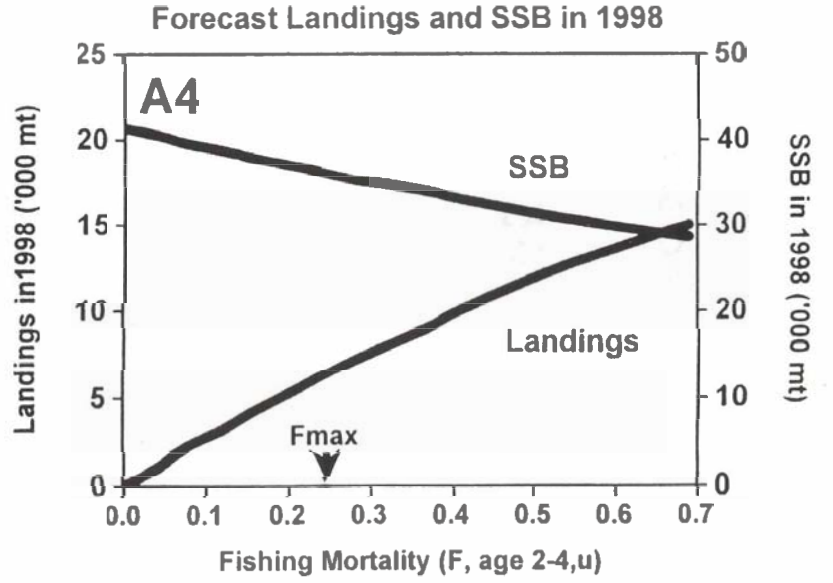
Sources of Information: Report of the 25th Northeast Regional Stock Assessment Workshop (25th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 97-xx.

Summer flounder



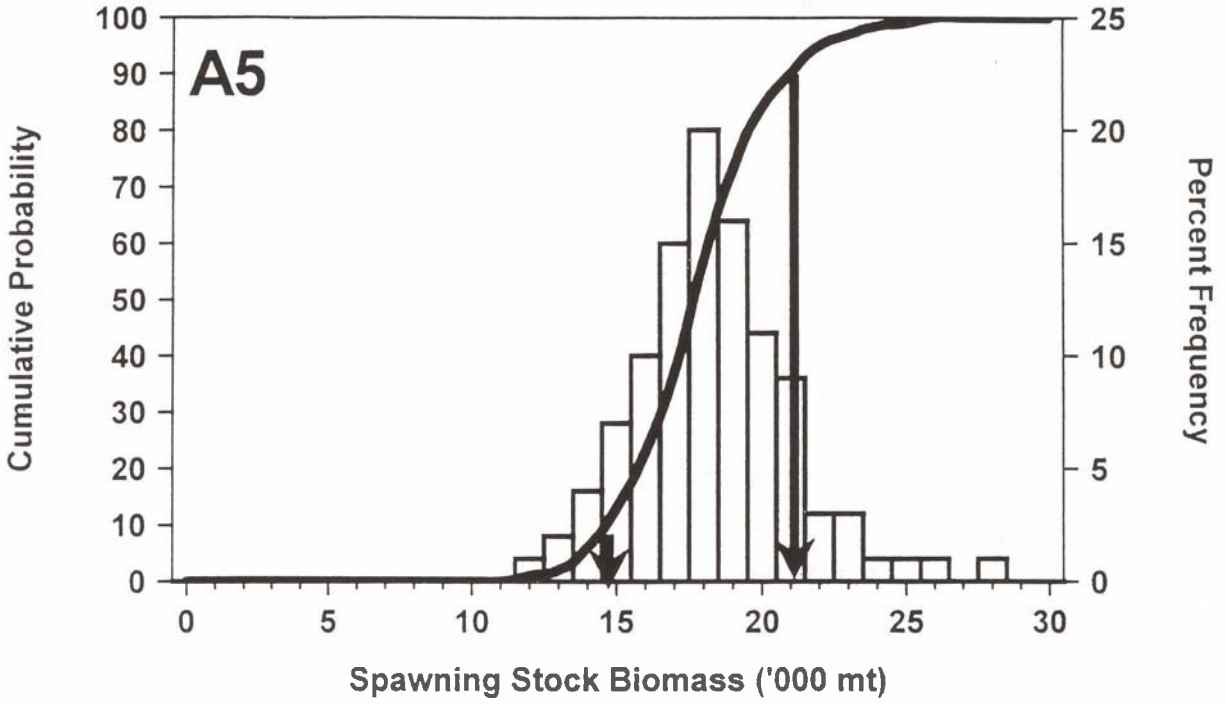


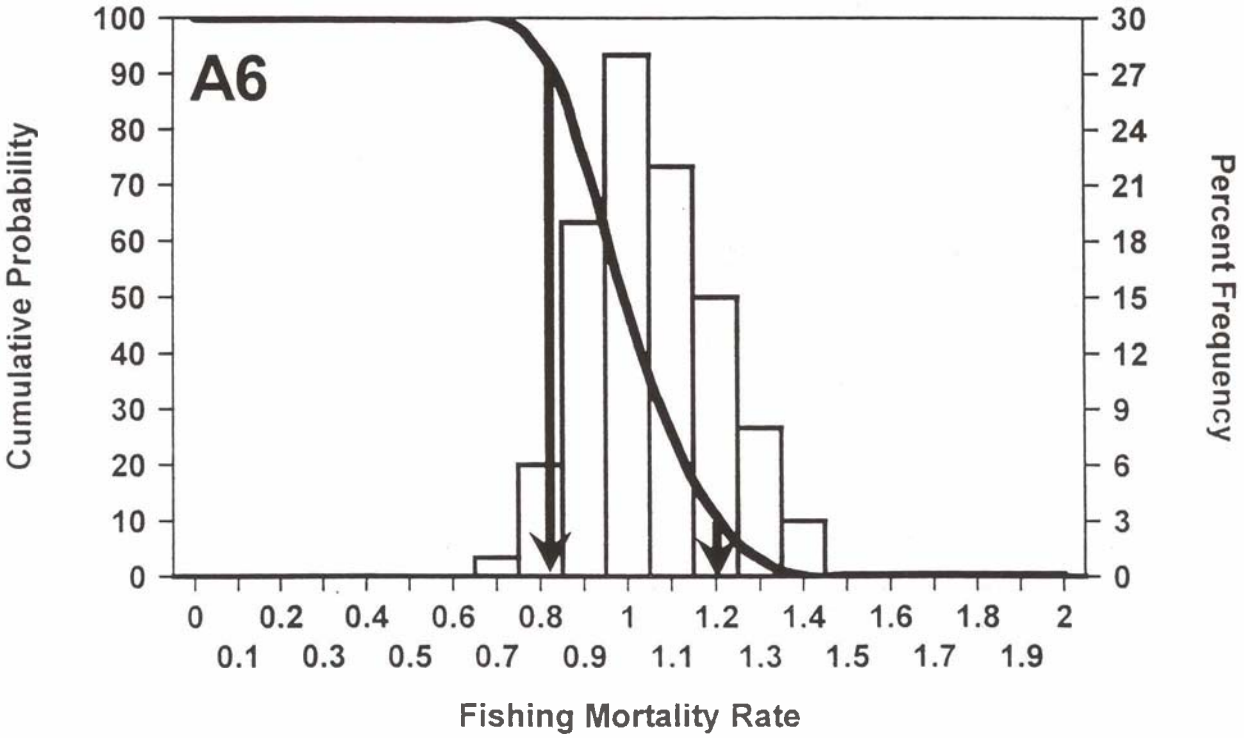




Summer flounder

Precision of 1996 Estimates for SSB and F





A7

Summer Flounder

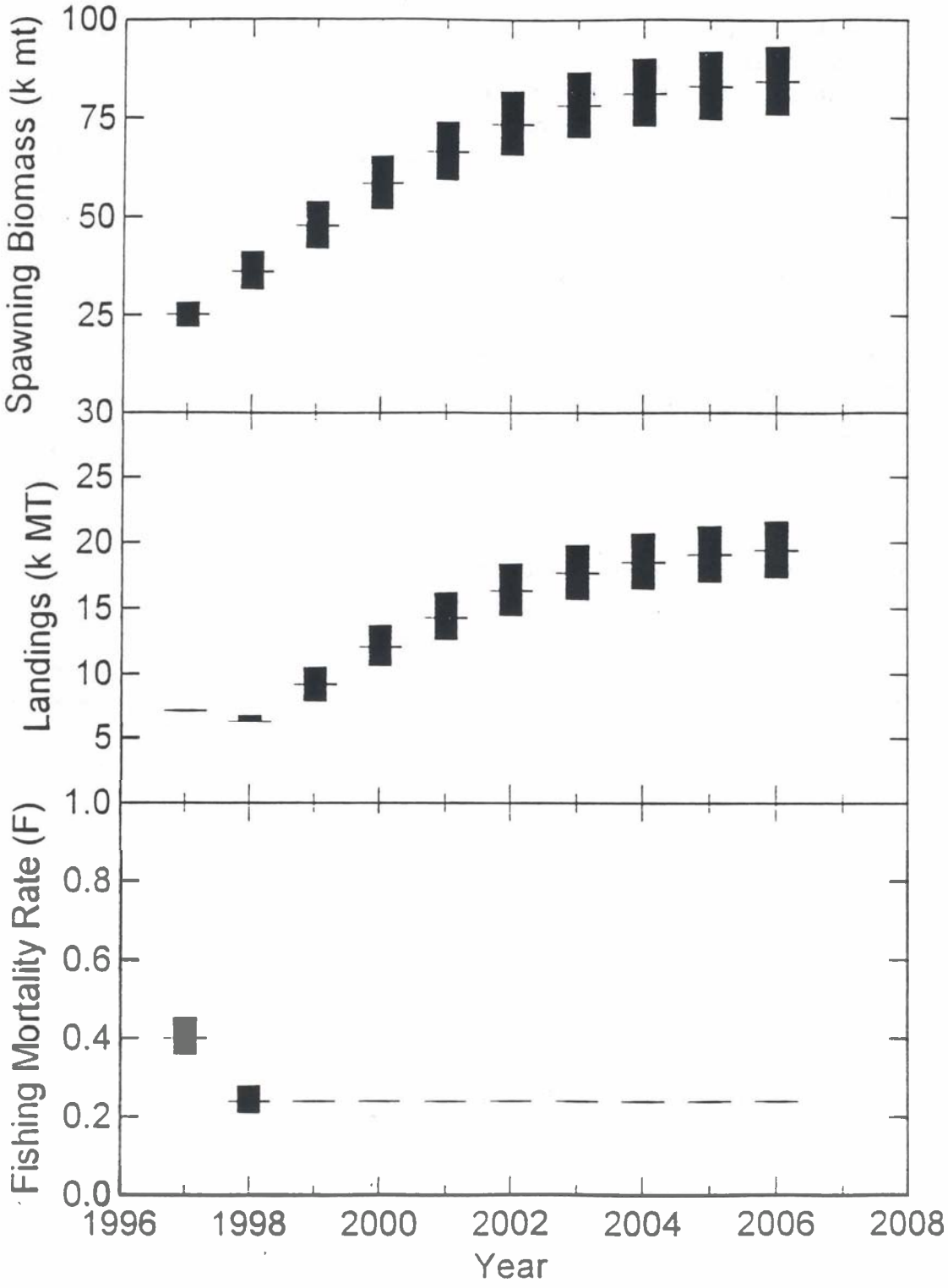


Figure A7. Results of medium-term projections for summer flounder under a fishing mortality rate scenario of F = 0.40 in 1997 and F = 0.24 in subsequent years. Annual spawning stock biomass, landings, and fishing mortality rate data are given. Horizontal bars are the median values from bootstrap results, vertical bars are the interquartile range (lower 25th percentile to the upper 75th percentile).

B. SCUP ADVISORY REPORT

State of Stock: The stock is over-exploited and at a low biomass level. Fishing mortality rates (1984-1996) have probably been above 1.0 (58% exploitation rate) and well above F_{max} = 0.24 (19% exploitation rate) since 1984. The 1996 index of age 0 abundance from the NEFSC autumn survey is the lowest of the 1984-1996 (age-based) series, and the five most recent years include the four lowest indices of age 0 abundance in the 1984-1996 series. Current spawning stock biomass is likely at a record-low level and has a highly truncated age structure (only 6% of the stock in 1995-1996 was age 3 and older). The 1996 total catch of 5,000 mt (50% commercial landings, 20% recreational landings, 30% discards) is the lowest in the time series (1984-1996). From an historical perspective, commercial landings in 1996 (2,500 mt) were 11% of the peak landings in 1960 and are the lowest observed in the 1930-1996 time series. About 90% of the total catch in numbers during 1993-1996 consisted of largely immature age 0-2 (< 7 in fork length) fish (Figure B2A).

Management Advice: Fishing mortality on fully-recruited fish has been far in excess of all biological reference points defined for this stock and should be substantially reduced immediately. Recruitment failure in a single year could result in a collapse of the fishery. In addition to the reduction in overall exploitation, the high exploitation rates on age 0-2 (< 7 in fork length) fish must be decreased to allow these fish to mature and contribute to future SSB. Delaying harvest until individuals are older and larger will results in significant increases in SSB and yield.

Forecast for 1998: Continuation of recent levels of fishing mortality are likely to result in further declines in stock biomass. If F were reduced by 50% (i.e., 34% reduction in exploitation rate), fishing mortality would likely be reduced to below 1.0. This would imply a 34% reduction in catch from the 1996 level of 5,000 mt to 3,300 mt in 1998. Given recent declines in stock biomass and uncertainties in the assessment input data, a reduction in catch to 3,300 mt in 1998 may be insufficient to achieve the target level of fishing mortality (e.g., 0.72 in 1998 and eventually 0.24). Reversing the decline in stock size will also depend on levels of incoming recruitment, but survey indices indicate that recent year classes have been relatively low.

C. BLACK SEA BASS ADVISORY REPORT

State of Stock: The stock is over-exploited and at a low biomass level. Estimated fishing mortality rates during 1984-1996 have been well above F_{max} (0.32) and generally have exceeded 1.0. Spawning stock biomass appears to have been relatively stable during 1984-1995, with an increase in 1996. Recruitment in 1993 and 1994 was very low, but has returned to near the long-term average. The stock has a highly truncated age structure which may severely limit reproduction due to the complex life history (i.e., sex change) of this species.

Management Advice: Fishing mortality on fully-recruited fish has been far in excess of all biological reference points defined for this stock and should be substantially reduced immediately. In addition to the reduction in overall exploitation, the high exploitation rates on young fish (primarily females) must be decreased to allow these fish to mature and change sex to contribute to future SSB. Fishing mortality should be reduced to improve yield per recruit, age/sex size structure, and recruitment.

Forecast for 1998: Recent levels of fishing mortality are unlikely to result in stock rebuilding. If F were reduced by 50% (i.e., 33% reduction in exploitation rate), fishing mortality would likely be reduced to below 1.0. This would imply a 33% reduction in landings from the 1996 level of 4,100 mt to 2,800 mt in 1998. Given the low level of stock biomass and uncertainties in the assessment input data, a reduction in landings to 2,800 mt in 1998 may be insufficient to achieve the target level of fishing mortality. Rebuilding the stock size will also depend on above-average levels of incoming recruitment, but survey indices indicate that recent year classes may have been relatively low.

Catch and Status Table (weights in '000 mt): Black Sea Bass

Year	1989	1990	1991	1992	1993	1994	1995	1996	Max[3]	Min[3]	Mean[3]
Commercial landings	1.3	1.6	1.3	1.4	1.4	0.9	0.9	1.5	2.0	0.9	1.5
Commercial discards[1]	0.1	0.1	0.1	0.1	0.1	0.1	<0.1	<0.1	0.2	<0.1	0.1
Recreational landings	1.5	1.3	1.9	1.2	2.0	1.5	2.6	2.6	5.6	0.7	1.8
Recreational discards[2]	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	<0 .1	0.1
Catch used in assessment	3.0	3.1	3.4	2.9	3.6	2.4	3.7	4.3	7.8	2.4	3.6

[1]Assuming 100% mortality (trawl) and 50% mortality (pots). [2]Assuming 25% mortality. [3]Over period 1984-1996.

Stock Distribution and Identification: Stock identification studies have indicated two stocks, one south of Cape Hatteras and one north of Cape Hatteras. The northern stock is distributed primarily between Cape Cod and Cape Hatteras. The management unit of the MAFMC and ASMFC is the northern stock, which was the subject of this assessment.

Catches: Commercial landings increased from around 2,600 mt prior to 1948 to a peak of 9,900 mt in 1952, but then fell to only about 1,000 mt per year in the early 1970s. Commercial landings increased moderately during 1975-1979, varying between 1,700 and 2,400 mt per year, and have remained relatively constant in recent years (900-2,000 mt), and were 1,500 mt in 1996 (Figure C1). Recreational landings have ranged between 560 and 5,600 mt per year, with 2,600 mt taken in 1996, the highest since 1986. Commercial discards averaged 110 mt per year during 1989-1994; the 1995 and 1996 estimates declined sharply to 2 and 13 mt, respectively. Recreational discards during 1984-1996 ranged from 34 to 205 mt annually (average 118 mt). Recreational discards during 1995 and 1996 were the highest in the time series at 205 and 165 mt, respectively. Total catch during 1984-1996 ranged from a high of nearly 8,000 mt in 1986 to a low of 2,400 mt in 1994.

Data and Assessment: An exploratory VPA integrated existing data to produce estimates of fishing mortality and biomass indicative of general trends, but due to the existing inadequacies in the input data, the point estimates of fishing mortality and stock size were not used. Consequently, the results were not acceptable for use in catch and stock projections. Estimates of discards in the commercial fisheries, length compositions of recreational discards, and commercial and recreational age compositions were considered unreliable due to insufficient data.

Biological Reference Points: An updated analysis incorporating revised partial recruitment patterns and mean weights estimated that $F_{0.1} = 0.18$ (15% exploitation) and $F_{max} = 0.32$ (25% exploitation) (Figure C3).

Fishing Mortality: Fishing mortality (F) has been very high for the past ten years, generally greater than 1.0 and without any trend (Figure C2).

Recruitment: Survey data indicate that recruitment in 1996 was near the average for the last decade (Figure C4).

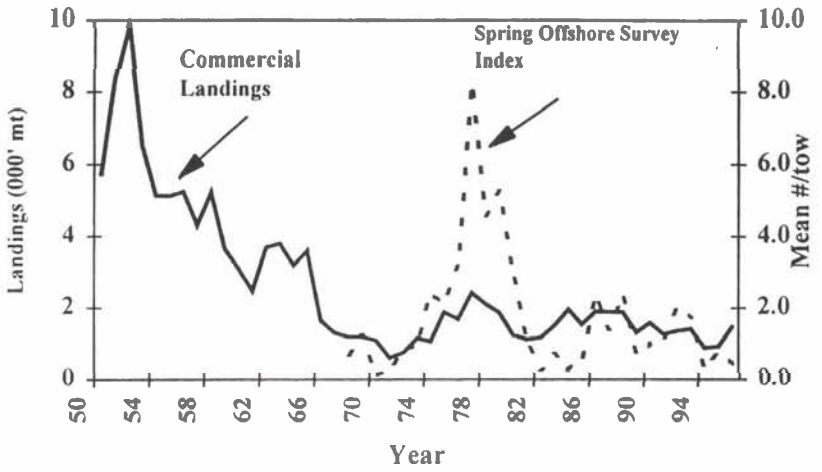
Spawning Stock Biomass: SSB remained relatively constant during 1984-1995, but increased in 1996 (Figure C2).

Special Comments: Discard mortality in the commercial and recreational fisheries is uncertain due to insufficient sampling data from some components of the fishery. Sampling should be substantially increased in the commercial and recreational fisheries to improve estimates of length and age composition of catches. In addition, there is some uncertainty in the population estimates due to a refuge effect in the structured habitat preferred by black sea bass, which may result in biased estimates of abundance and size composition from standard sampling gear.

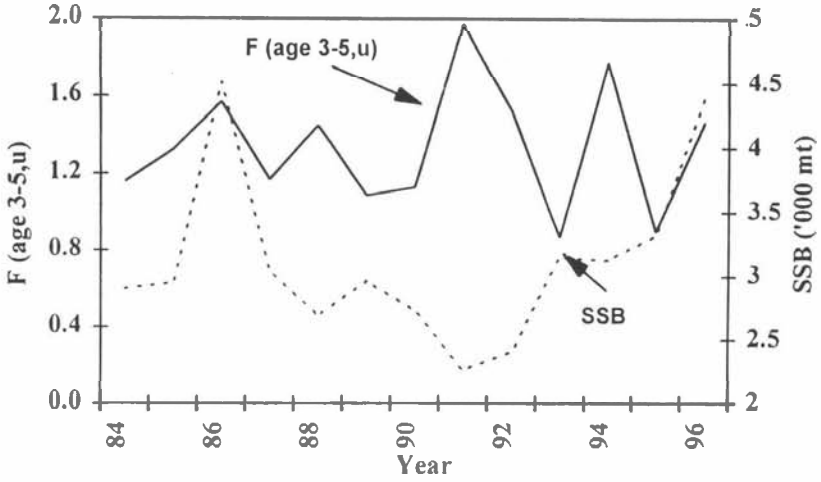
Source of Information: Report of the 25th Northeast Regional Stock Assessment Workshop (25th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 97-xx.

Black Sea Bass

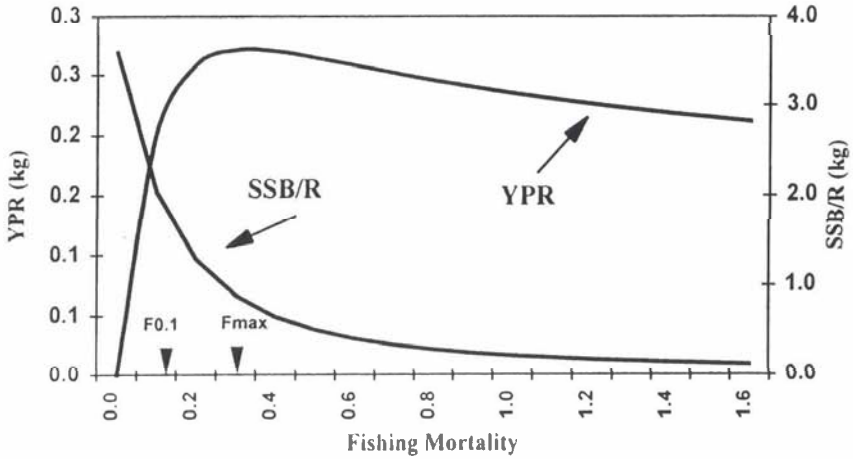
Landings and Survey Indices



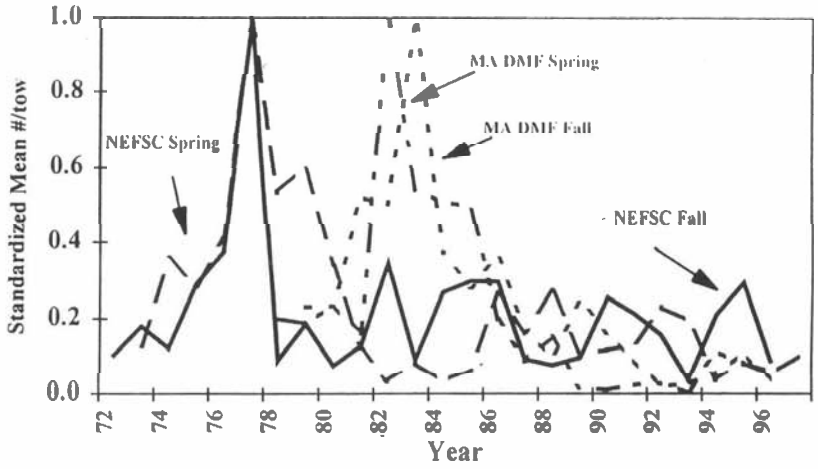
SSB and Fishing Mortality



Yield and Spawning Stock Biomass



Trends in Survey Indices



D. NORTHERN SHRIMP ADVISORY REPORT

State of Stock: The stock is at a below-average level of biomass, and the fishing mortality rate (F) is high (there is currently no overfishing definition). Abundance of recruited shrimp at the end of the 1996 fishing season was the lowest since the early 1980s. F ranged from 0.13 to 0.47 during 1985-1995 and increased to 0.90 in the 1996 fishing season, the highest level since 1975. There is a 90% probability that F_{96} exceeded 0.74. Fishing mortalities at this level were associated with a stock collapse in the mid-1970s. Recent trends of declining biomass and lower survival associated with higher temperatures increase the potential for overfishing and resultant stock collapse.

Management Advice: Fishing mortality should be reduced substantially to minimize the risk of a further decline in stock size. For the long term, managers should establish target fishing levels and overfishing reference points. Based on a decade of relatively stable stock levels, an appropriate target may be an F of approximately 0.36, which was the average for 1985-1995. An F of 0.36 corresponds to 38% of maximum eggs per recruit and is slightly below $F_{0.1}$. Overfishing definitions should be based on stock and recruitment considerations.

Forecast: No projections were performed in this assessment.

Catch and Status Table (landings in mt, abundance in millions): Northern Shrimp

Season[1]	1989	1990	1991	1992	1993	1994	1995	1996	1997[4]	Max[5]	Min[5]	Mean[5]
Landings	3,315	4,662	3,571	3,444	2,143	2,915	6,466	9,166	6,500	9,166	2,143	4,394
Recruits[2]	942	1,043	652	478	404	575	837	721	404	1,043	404	699
Full recruits[2]	727	1,071	1,159	899	673	547	628	769	473	1,159	473	833
F[3]	0.19	0.35	0.45	0.47	0.43	0.33	0.40	0.90	-	0.90	0.13	0.41
Exploitation rate	15%	26%	32%	34%	31%	25%	29%	53%	-	53%	11%	29%

[1]Fishing season defined as August of previous calendar year to July of current calendar year. [2]Abundance of recruits and full recruits at the start of the season (August 1 of the previous calendar year). [3]Average F for total exploited population (F = Z - M). [4]1997 landings estimate is preliminary and was not included in the assessment. [5]Maximum, minimum, and mean landings and abundance over the period 1985-1997; maximum, minimum, and mean F and exploitation rate over the period 1985-1996..

Stock Distribution and Identification: Northern shrimp, *Pandalus borealis*, (also referred to as pink shrimp) are distributed discontinuously throughout boreal waters of the North Atlantic, North Pacific, and Arctic Oceans. In the Gulf of Maine, northern shrimp are considered to comprise a unit stock. They inhabit soft mud bottom at depths of about 10-300 m, most commonly in the cold waters of the southwest Gulf of Maine.

Catches: Annual landings averaged 63 mt from 1938 to 1953, but no shrimp were landed from 1954 to 1957. The fishery resumed in 1958 and landings increased to a peak of 12,100 mt during the 1969 season. After 1972, landings declined rapidly, and the fishery was closed in 1978. The fishery reopened in 1979 and landings increased gradually to 5,300 mt by 1987 and averaged 3,300 mt from 1988 to 1994. Landings increased to 6,500 mt in 1995 and 9,200 mt in 1996. Landings for the 1997 fishing season were at least 6,500 mt. Sea sampling observations indicate that discards (by weight) were less that 1% of the total catch. Therefore, discarding is considered to be negligible, and discard estimates were not included in the present assessment.

Data and Assessment: Total landings were derived from dealer weighout reports. Landings in numbers were estimated using monthly size distributions from state port-sampling programs. Total landings and indices of abundance from the summer shrimp survey were analyzed with a modified DeLury model to estimate abundance and mortality rates for 1985-1997. DeLury results were corroborated by a biomass dynamics model based on 1968-1996 landings, the biomass indices from the Maine summer survey, the NEFSC fall survey, and the summer shrimp survey.

Biological Reference Points: Overfishing criteria are not currently defined in the management plan. Yield-per-recruit analysis indicates that $F_{max} = 0.77$ and $F_{0.1} = 0.46$ (Figure D4). Eggs-per-recruit analysis indicates that $F_{50\%} = 0.25$, $F_{40\%} = 0.34$, $F_{30\%} = 0.45$, and $F_{20\%} = 0.63$ (Figure D4). Biomass dynamics analysis suggests that $F_{MSY} = 0.17$.

Fishing Mortality: Annual estimates of F averaged 0.36 (27% exploitation) from 1985 to 1995, and increased to 0.90 (53% exploitation) during the 1996 fishing season (Figure D1). The increased F in 1996 reflects the recent increase in nominal fishing effort. There is an 80% probability that F_{96} was between 0.74 and 1.14 (Figure D3).

Recruitment: Annual recruitment consists of several year-classes which recruit to the fishery over several years. Recruitment during the time series has been dominated by three strong year classes, the most recent recruiting in 1994- 1996. Recruitment in 1997 is equivalent to the lowest in the series (Figure D2).

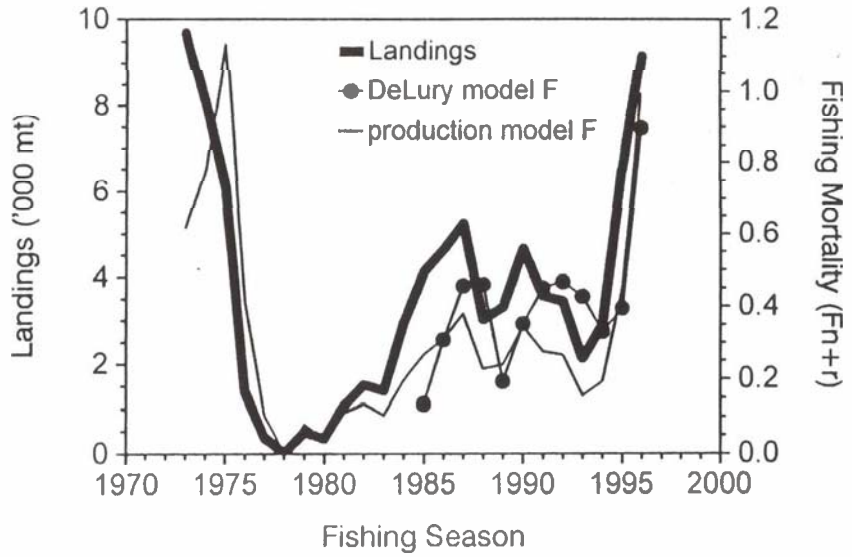
Stock Biomass: Total biomass averaged 12,500 mt during 1985-1997, peaked at 17,000 mt in 1991, and decreased to 7,000 mt in 1997 (Figure D2).

Special Comments: This assessment is based on data through 1996 and incorporates new analytical techniques. Data from the 1997 fishery and survey will be included in an updated stock assessment which is scheduled for presentation to the ASMFC Northern Shrimp Section in the fall of 1997. The updated analysis will reduce the uncertainty in the estimates of fishing mortality and stock biomass in the last year and provide further management advice for the 1998 fishing season.

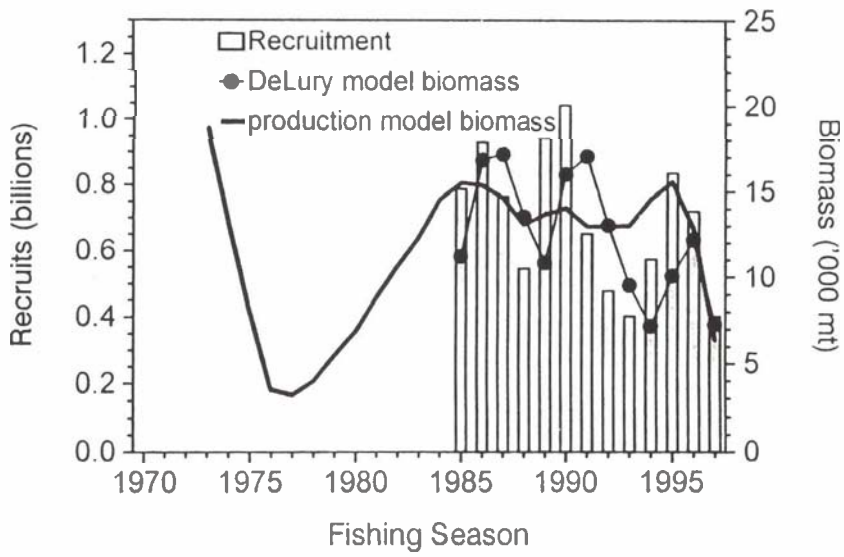
Sources of Information: Report of the 25th Northeast Regional Stock Assessment Workshop (25th SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 97-xx; S. Cadrin, D. Schick, D. McCarron, S. Clark, M. Armstrong, B. Smith, B. O'Gorman, Stock assessment of Gulf of Maine northern shrimp, NEFSC Ref. Doc. 97-xx.

Gulf of Maine Northern Shrimp

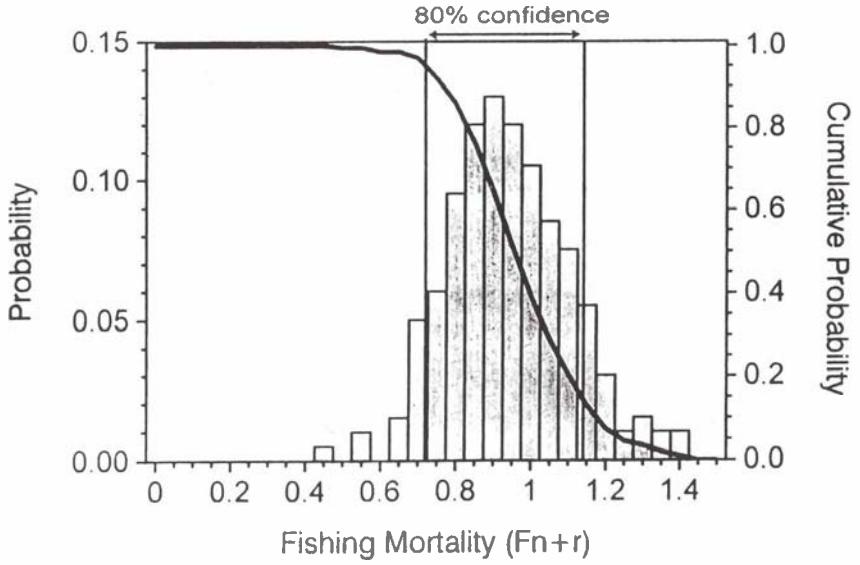
D1. *Trends in Landings and Fishing Mortality*



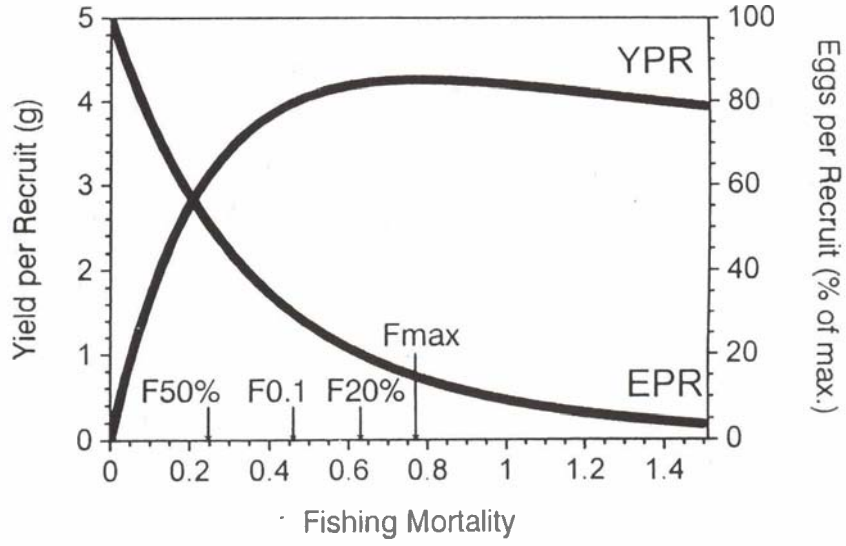
D2. *Trends in Biomass and Recruitment*



D3. *Precision of 1996 F estimate*



D4. *Yield and Egg Production per Recruit*



CONCLUSIONS OF THE SAW STEERING COMMITTEE

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The SAW Steering Committee held two meetings during the SAW-25 cycle: 1) a teleconference on September 5, 1997, and 2) a meeting on November 3, 1997 in Saugus, MA. Discussions at and conclusions from those meetings are summarized below.

Teleconference of September 5, 1997

The SAW Steering Committee met by teleconference on September 5, 1997. Participants were: G. Lapointe, ASMFC; P. Howard, C. Kellogg, NEFMC; D. Keifer, T. Hoff MAFMC; A. Rosenberg, NMFS/NER; J. Boreman, F. Serchuk, S. Murawski, E. Anderson (SAW Chairman), and H. Mustafa (SAW Coordinator), NMFS/NEFSC.

The agenda items for the meeting included 1) a recap of the SAW-24 and SAW-25 meetings and reports, 2) agenda and terms of reference for SAW-26, 3) data inadequacies and implications for future assessments, 4) tentative agenda for SAW-27, 5) further action on the SAW issue paper, and 6) status of the proposed Atlantic Stock Assessment Review Process.

Recap of SAW-24 and SAW-25

There would be three SAW cycles in 1997 because of the extra demands imposed by the Congressionally-mandated NRC review of the Northeast groundfish stocks. The first of the three, SAW-24, was specifically to meet the demands and time schedule of the NRC review. Both SAW-24 and SAW-25 went well, and the documentation and advice were well received. The final reports would be finalized for publication as soon as possible. It was noted that all SARC participants (NMFS, Council, and state scientists), and especially Dr. Anderson, performed exceptionally well under remarkable pressure and extremely difficult circumstances. The extra burden of SAW-24 was particularly evident for personnel of the NEFSC Population Dynamics Branch. The NRC review panel had informally expressed its appreciation of the work and the level of cooperation received from the Center. The NRC report was expected to be completed in October and would be presented to Congress before being released to the public.

SAW-26

Dr. Anderson noted that it would be impossible for NEFSC staff to complete assessments for both surfclams and ocean quahogs for SAW-26 because of the exceptional amount of work to be done for each species. The MAFMC had agreed to defer the ocean quahog assessment until SAW-27.

It was confirmed that the weakfish assessment would be completed by the ASMFC Weakfish Technical Committee's Stock Assessment Subcommittee and be available for consideration at SAW-26. Also, at the request of ASMFC, it was agreed to put striped bass on the SAW-26 agenda. The assessment would be prepared by the ASMFC Striped Bass Technical Committee's Stock Assessment Subcommittee..

Since the New England Aquarium was sponsoring a Herring Stock Assessment & Research Priorities Workshop to be held December 8-9 (the week immediately following the SARC meeting), it would be inappropriate to have Atlantic herring on the SAW-26 agenda, as proposed at the previous Steering Committee meeting. Instead, it was agreed to defer herring to SAW-27. It was anticipated that, although the Workshop would produce research issues for guidance, information from the Workshop would not have an immediate, significant impact on assessment input data. The organization of and participation in the Workshop was discussed and, although participants were unknown, David Stevenson (ME DMR) and Rob Stephenson (DFO Canada) were known to be involved in its organization. It was suggested that NEFMC members be added to the Workshop Steering Committee.

The Steering Committee also agreed to place spiny dogfish on the SAW-26 agenda. There would not be a new assessment, but only an update of certain information (e.g., landings, survey indices, length frequencies and sex composition of commercial and

survey catches) contained in the SAW-18 assessment in 1994.

Terms of reference for weakfish, striped bass, and spiny dogfish stocks would be submitted to the SAW Chairman by about October 1 and approved by the Steering Committee prior to the SARC meeting in December. Terms of reference for surfclams had been approved earlier.

The following stocks and SARC meeting dates were agreed.

Stocks

Surfclams
Weakfish
Striped bass
Spiny dogfish

Meeting dates and places

SARC
December 1-5, 1997
Woods Hole, MA

Public Review Workshop
NEFMC
January 14-15, 1998
Wakefield, MA
MAFMC
January 27-29, 1998
Atlantic City, NJ
ASMFC
February 2-6, 1998
Baltimore, MD area

Data Inadequacies

The Steering Committee was reminded that the scup and black sea bass assessments reviewed at SAW-25 were rejected by the SARC as a basis of catch/stock projections because of unacceptable uncertainty of the input data. The SARC indicated that age-based assessments and catch/stock projections would not be feasible until the quality of the input data was significantly improved, which would require at least several years. Resolving these data inadequacies would include intensification of sea sampling and length and age sampling of commercial and recreational fisheries.

In light of these data inadequacies and the unlikelihood of additional funding to address them, assessment scientists should investigate the use of non-age-based models for these and other stocks where catch-at-age data were highly uncertain. In addition, Council expectations must change and become more realistic regarding limitations faced by the SARC in giving management advice. Alternative forms of advice should also be considered ("education issue"). SARC terms of reference would have to be realistic and based on an awareness of the general quality and availability of input data for each stock. Perceived limitations could accompany the terms of reference.

SAW-27

Ocean quahogs and Atlantic herring had been deferred from SAW-26, and terms of reference had previously been approved for ocean quahogs.

Various groundfish species were mentioned for consideration at SAW-27, including Georges Bank winter flounder, plaice, witch, and pollock. It was noted that tentative agreement had been reached for joint USA/Canada assessment and peer review of transboundary groundfish stocks, a process which would begin in spring 1998. It was tentatively agreed that this joint process would update the assessments of Georges Bank cod, haddock, and yellowtail flounder and, if possible, Gulf of Maine cod and Southern New England yellowtail flounder. Management advice for all stocks assessed and reviewed by the USA/Canada process would be produced separately by each country (e.g., by the SARC in the USA). Although assessments of some transboundary stocks have been done jointly with Canadian scientists for a number of years, the joint USA/Canada peer review of such stocks was first done in April 1997 at a meeting of the Canadian Maritimes Regional Advisory Process (RAP). Logistics for the proposed joint assessment and peer-review process were still incomplete, but would be resolved in the next several months.

Placing all of the above stocks on the SAW-27 agenda would pose a major burden for the NEFSC

Population Dynamics Branch. The assessments of winter flounder, plaice, witch, and pollock had not been done for several years and would be viewed as benchmark assessments. Consequently, they would require substantially more work than those for cod, haddock, and yellowtail flounder, which would only be updates.

It was tentatively agreed that only winter flounder and plaice would be placed on the SAW-27 agenda, with witch and pollock possibly deferred to SAW-28. Georges Bank cod, haddock, and yellowtail flounder would be peer reviewed in the joint USA/Canada process in April 1998, with management advice to be prepared by the SARC in SAW-27. Gulf of Maine cod and Southern New England yellowtail flounder would be updated either in the joint USA/Canada meeting or in the SARC.

Summer flounder, scup, and black sea bass were also proposed for the SAW-27 agenda. However, it was pointed out that an NRC review of summer flounder in 1998 would likely be mandated by Congress, in which case it would be inappropriate to place this stock on the SAW agenda. Regarding scup and black sea bass, it was felt that the problems associated with the SAW-25 assessments of these two stocks (see section on Data Inadequacies) would not be resolved by the time of SAW-27 and that the general advice given for these stocks at SAW-25 should be sufficient for the next several years.

There was a short discussion on the process of selecting stocks for each SAW agenda. It was suggested that a decision-making matrix should be developed and used which would consider the needs of the Councils, development of technology, and data availability.

A suggestion was made that Council Monitoring Committees or Plan Development Teams might be assigned the responsibility of reviewing updated assessments and preparing management advice. The NEFSC would, however, have to provide some guarantee of its support (i.e., assessment staff assistance) for such an approach. In an attempt to address the documentation of updates, it was suggested that updates might be documented in the SAW reports or in a separately issued update document. More thought, however, would need to be given to a process for handling and documenting updates.

Tentative stocks

Ocean quahogs
Atlantic herring
Georges Bank winter flounder
Gulf of Maine - Georges Bank plaice
Gulf of Maine cod
Georges Bank cod
Georges Bank haddock
Georges Bank yellowtail flounder
Southern New England yellowtail flounder

Meeting dates and places

SARC
June 22-26, 1998
Woods Hole, MA

SAW Issue Paper

It was noted that many points in this paper (e.g., joint USA/Canada assessments) were already being implemented and that other points (e.g., nationally-funded pool of experts) were still being considered by the NMFS Science Board.

It was suggested that a separate 1-day meeting of the Steering Committee should be devoted to this topic sometime after October 1. Schedules of Committee members should be provided to the SAW Coordinator to facilitate the scheduling of such a meeting.

Atlantic Stock Assessment Review Process

Dr. Anderson noted that a document entitled "A proposal for an Atlantic Stock Assessment Review Process (ASARP)" (**Appendix I**), that Dr. J. Powers (NMFS/SEFSC), Dr. V. Restrepo (NMFS/S&T), and he had drafted at the request of the NMFS Atlantic Coastal Board, had been circulated in May to Committee members. The proposal was still being consid-

ered by the Coastal Board and being reviewed within the Southeast Region.

Initial reaction to the proposed coast-wide peer-review process by the NEFMC and MAFMC was negative. Their concern stemmed from a perception that such an expanded process would result in more stocks to review and fewer scientists to perform the reviews.

Further discussion on this matter would be on the agenda of the next Steering Committee meeting.

Meeting of November 3, 1997

The SAW Steering Committee met on November 3, 1997 at NEFMC headquarters in Saugus, MA. Participants were: J. Dunnigan, ASMFC; T. Hoff, MAFMC; P. Howard, C. Kellogg, NEFMC, A. Rosenberg, NMFS/NER; M. Sissenwine, E. Anderson (SAW Chairman), H. Mustafa (SAW Coordinator), NMFS/NEFSC.

The agenda items for the meeting included 1) status of documentation for SAW-24 and SAW-25, 2) terms of reference for SAW-26, 3) joint USA/Canada stock assessment process for transboundary resources, 4) tentative agenda for SAW-27, 5) future SAW policy on reviewing assessments and producing advice, 6) and other policy issues.

SAW-24 and SAW-25 Documentation

The SAW-24 documentation had been finalized and published in the NEFSC Reference Document series. The report of the NRC review of Northeast groundfish stocks was not expected to be available until December. The possibility of the NRC report being presented at an NEFMC meeting by the NRC Committee Chairman, or another appropriate person designated by the Committee, was discussed. It was viewed as improper for someone from the NEFSC to present the actual report, although a presentation of the Center's reaction to the NRC findings would be appropriate and welcome.

The draft documentation from SAW-25, which had been quickly prepared for presentation at the Public Review Workshop session in August, was now being edited and would be available for publication and distribution by the end of November.

SAW-26

The four stocks to be on the SAW-26 agenda had been agreed at the September 5 teleconference. Draft terms of reference circulated to Steering Committee members in advance of the meeting were approved, with an additional term of reference added for surfclams relative to advising on new biological reference points consistent with SFA requirements. It was also agreed to have a Public Review Workshop session at the ASMFC meeting in early February.

Stocks

Surfclams
Weakfish
Striped bass
Spiny dogfish

Terms of reference

Surfclams:

a. Evaluate the efficiency of current research vessel dredge surveys through field studies of dredge tow path length, size selectivity and retention of surfclams and ocean quahogs, and other factors, as appropriate.

b. Develop and implement a sampling plan for the proposed 1997 region-wide surfclam and ocean quahog resource survey, incorporating appropriate tests and monitoring of dredge performance and efficiency.

c. Develop, test, and implement models to estimate surfclam abundance and mortality rates, using appropriate indices of abundance and total catch.

d. Review existing biological reference points and advise on new reference points consistent with SFA requirements.

e. Assess the status of EEZ surfclam populations under management, and provide quota options consistent with biological reference points.

f. Estimate the resource level, density, and potential harvest from the surfclam beds located off Delmarva (under current FMP criteria).

g. Compare the average size, growth, and yield of Delmarva surfclams with surfclams harvested in other areas.

h. Determine if high density is constricting growth of Delmarva surfclams, and estimate an "optimal" density of surfclams off Delmarva.

I. Estimate the long-term outlook/projection for the Delmarva surfclam resource if the harvest continues at the present level.

Weakfish:

a. Summarize the life history, recreational and commercial landings, and available age-length data by state (Massachusetts to Florida) for the Atlantic coast-wide stock of weakfish.

b. Summarize available indices of stock abundance by state.

c. Estimate the age composition of recreational and commercial landings.

d. Provide estimates of fishing mortality.

e. Perform a virtual population analysis and yield-per-recruit and spawning-stock-biomass-per-recruit analyses.

f. Review progress towards meeting the goals in Amendment 3 to the Weakfish FMP, including mortality targets and age composition.

g. Summarize recreational and commercial regulations for the last five years.

Striped bass:

a. Assess the status of the Atlantic coast striped bass stock complex through 1996 by means of virtual population analysis and characterize the variability of estimates of stock abundance and fishing mortality rates.

b. Provide projected estimates of catch for 1998 and SSB for 1999 at various levels of fishing mortality incorporating uncertainty in recruitment and stock size estimates.

c. Estimate fishing mortality rates for specific components of the coastal stock complex using tagging data.

d. Review the estimation of F_{msy}, defined as the overfishing definition in the ASMFC Striped Bass FMP.

e. Review the historical SSB model concept and its use in defining stock reconstruction.

f. Review the current SSB model methodology for estimating TACs under ASMFC management.

Spiny dogfish:

a. Update the historical patterns of landings and summarize the size and sex composition of commercial landings and research survey catches for the coast-wide stock of spiny dogfish.

b. Summarize recent changes in minimum stock biomass, population rate of change, size and sex composition of commercial landings and survey indices, and fishing mortality rates.

c. Evaluate implications for sustainable harvest rates and advise on appropriate biological reference points for this stock.

Meeting dates and places

SARC
December 1-5, 1997
Woods Hole, MA

Public Review Workshop
NEFMC
January 14-15, 1998
Wakefield, MA
MAFMC
January 27-29, 1998
Atlantic City, NJ

ASMFC
February 2-6, 1998
Baltimore, MD area

It was expected that a schedule of two SAW cycles per year, with reports available in August and January and 4-5 stocks per SAW, would continue for the time being.

The species/stocks considered at the various SAWs are listed in Table 2.

Joint USA/Canada Stock Assessment Process for Transboundary Resources

The SAW Chairman reported that, historically, there had always been some informal interaction between NEFSC and Canadian (DFO) scientists, with scientists from each country participating in the other country's respective assessment and peer-review processes for stocks of common interest. However, it now seemed appropriate to formalize the interaction and establish a single assessment and peer-review process for transboundary and other stocks of common interest so as to eliminate redundancy and ensure greater consistency. Management advice would continue to be developed separately by each country. Such a process had been partially implemented during the SAW-24 cycle when USA and Canadian scientists had jointly assessed the transboundary Georges Bank groundfish stocks, and NEFSC scientists had participated in the Canadian RAP meeting in April prior to the SAW-24 SARC meeting in May. There had also been Canadian participation in SARC meetings beginning with SAW-9 (1989).

A draft document entitled "A Joint Canada/USA Stock Assessment Process for Transboundary Resources", which proposed the establishment of a Transboundary Assessment Working Group (TAWG) and a Transboundary Resources Assessment Committee (TRAC), was reviewed. TRAC membership consisting of no more than seven or eight scientists from each country was considered sufficient. USA members, in addition to NEFSC staff, should include state, Council, and ASMFC representatives.

TRAC membership and meeting arrangements remained to be agreed between USA and Canadian officials. Openness at TRAC meetings was considered essential and was an issue requiring clarification as soon as possible. In Canada, RAP meetings were closed, and fishermen were permitted to serve as members. In the USA, SARC meetings were open, but only scientists served as members. Council members should to able to attend RAP meetings as observers. Consistency in the use of biological reference points by the two countries was also an issue potentially needing resolution.

A Coordination Committee was not viewed as necessary, since the essential coordination could be handled jointly by the SAW and RAP Chairmen in consultation with the respective Steering Committees.

The following stocks were identified for possible joint assessment and peer review: Gulf of Maine cod, Georges Bank cod, Georges Bank haddock, Georges Bank yellowtail flounder, Southern New England yellowtail flounder, Georges Bank winter flounder, and Gulf of Maine - Georges Bank plaice. Considering the capabilities within the SAW process and Regional priorities, full or benchmark assessments of these stocks should be possible about every three years.

SAW-27

A number of stocks had been tentatively agreed at the September 5, 1997 teleconference for consideration at SAW-27: ocean quahogs, Atlantic herring, and the seven groundfish stocks noted above. Terms of reference for ocean quahogs were already available and would also include the additional term of reference agreed for surfclams at SAW-26 (i.e., review existing biological reference points and advise on new reference points consistent with SFA requirements).

There was some discussion relative to the type of assessment possible for Atlantic herring and the merits of deferring consideration until SAW-28, but it was agreed to keep herring on the agenda for SAW-27.

The seven groundfish stocks to be jointly assessed and peer reviewed with Canada would be on the SAW-27 agenda only for the preparation of the advice by the SARC.

Species such as tilefish and Atlantic sturgeon, for which survey indices and other information required for assessments were lacking, and for which FMPs were not available, were considered to be of very low priority for SAW consideration.

Summer flounder, scup, and black sea bass were again mentioned for SAW-27. The Committee was reminded that if an NRC review of summer flounder in 1998 were mandated by Congress, it would be inappropriate to have summer flounder on the SAW-27 agenda. The workload for NEFSC staff associated with such an NRC review could also make it difficult to have even scup and black sea bass on the agenda. Furthermore, the data inadequacies identified by the SARC at SAW-25 for these two stocks would be problematic in conducting new assessments so soon. The Committee agreed that if an NRC review of summer flounder were not mandated, these three stocks would be placed on the SAW-27 agenda. However, there would only be an updated assessment for summer flounder, and the terms of reference for scup and black sea bass would specify that analytical assessments would be performed only if sufficient input data were available.

Tentative stocks

Ocean quahogs
Atlantic herring
Georges Bank winter flounder
Gulf of Maine - Georges Bank plaice
Gulf of Maine cod
Georges Bank cod
Georges Bank haddock
Georges Bank yellowtail flounder
Southern New England yellowtail flounder
Summer flounder
Scup
Black sea bass

Meeting dates and places

SARC
June 22-26, 1998
Woods Hole, MA

Public Review Workshop
NEFMC
August 10-11, 1998
Peabody, MA
MAFMC
August 17-20, 1998
Philadelphia, PA

Future SAW Policy on Reviewing Assessments and Producing Advice

The Committee discussed ways to possibly ease the workload on the SARC by delegating routine assessment updates to other fora, such as Council Monitoring Committees (MCs), Plan Development Teams (PDTs), or Scientific and Statistical Committees (SSCs), and using the SARC primarily as a forum for reviewing benchmark assessments. In the context of this discussion, the characteristics/elements of the SAW process were outlined as follows:

Action	Appropriate fora
Conduct assessments; updates or benchmarks	SARC Working Groups, ASMFC Assessment Subcommittees, TAWG
Review benchmark assessments	SARC, TRAC, special committees (e.g., lobster)
Advice (all assessments)	SARC or SSC
Trigger benchmarks	SAW Steering Committee, SARC, SSC (every 3-5 years or when there is new information or new idea/methodology)
Integrate advice into management	MC, PDT

The process needs to be based on the involvement of high quality scientists (more external experts required) and the avoidance of any duplication of effort.

Council MCs or PDTs, as currently constituted , were not viewed as being capable of performing or reviewing assessment updates, although SSCs might be appropriate for the latter. If updates were performed by a working group, the MAFMC SSC, for example, would be quite capable of reviewing them. Recognizing that processing assessment updates via

the SARC confer a degree of legitimacy and acceptability to the product, one possibility might be to have two SARCs per year to deal with benchmark assessments and a third SARC to deal only with updates.

Although the SAW-27 (spring 1998) SARC meeting will be a good test case for handling updates, the Committee was concerned about the heavy workload for the respective working groups if they were tasked with 40-50 updates per year. The number of stocks handled by the two Council requiring annual updates was estimated to be at least 15, with most of these classified as overfished. Additional stocks handled by ASMFC also require annual updates. If benchmark or updated assessments are required annually for 40-50 species, additional assessment staff (i.e., analysts and data processing technicians) will be required at the NEFSC.

The NEFSC Status of the Stocks documents, normally published annually, contain an update for about 40 stocks based on catch statistics, survey results, and analytical assessments, and provide a form of advice which might be sufficient for the management of some stocks.

The documentation of assessment results and advice was discussed. In cases where the SARC does not peer review an assessment, but only develops the advice, the SARC reports (i.e., Consensus Summary of Assessments and Advisory Report on Stock Status) should only make reference to the available documentation instead of reproducing it. For example, the relevant Canadian Stock Assessment Secretariat Research Document series reports will be cited in the case of the groundfish stocks which will be assessed and peer reviewed in April 1998 by the TAWG and TRAC, respectively, and for which advice will be prepared by the SAW-27 SARC in June 1998.

The Steering Committee concluded that greater efficiency could be achieved through appropriate changes to the process (as described earlier), prioritization of Council and ASMFC management needs, and different management approaches for particular stocks based on the type and quality of the assessments and associated advice. This would enable a better match between management needs and assessment/peer-review capabilities.

Other Policy Issues

Federal Advisory Committee Act (FACA) implications for the SARC

The SAW Chairman reviewed a number of options being considered to ensure that the SARC, as well as other advisory committees in NMFS comprised of both Federal and non-Federal employees and providing scientific advice for resource management, was fully in compliance with the Federal Advisory Committee Act (FACA). This was an issue which would be addressed soon by the NMFS Executive Board. One option being considered for the SARC, at least in the short term, would be to place it under the authority of one or both Councils, since Council advisory committees were not subject to the requirements of FACA.

Further action on SAW Issue Paper

Relative to the SAW Issue Paper (Appendix I of SAW-24 *Public Review Workshop* report), it was noted that the NMFS Office of Science and Technology would like to establish and fund a national pool of experts (e.g., 20 scientists) to serve as a source of external assistance to the SARC and/or its working groups. One benefit of such a national pool would be to assist in deflecting demands for NRC reviews of NMFS assessments and assessment methods. However, the odds of sufficient funds being made available in the FY 98 NMFS budget for this purpose were not very good.

The possibility of funding a pool of experts at the Regional level in support of the SARC was discussed. Funds for this might be available from the Councils and ASMFC. An annual Regional budget of about $50,000 (15 weeks at $500/day/person)for this purpose would be required to bring in new high quality people. This could be accomplished by means of advisory and assistance contracts or through the CMER institutions which could handle the identification and selection of qualified experts.

Action on proposed Atlantic Stock Assessment Review Process (ASARP)

In discussing the proposed coast-wide ASARP process (**Appendix I**), both Councils favored keeping the process at the Regional level for fear that a coast-wide process might take on a greater workload which would lead to a reduction in the amount of service currently provided by the SAW process in the Northeast Region. It was pointed out that a coast-wide system would not be adopted if there were a likelihood that existing services and capabilities in the Northeast would be compromised. Although it would obviously be inappropriate to press for a coast-wide process in 1998, such a process would bring funds and many good scientists from the SEFSC. The coming year could be productively devoted to investigating the possible establishment of a coast-wide system and exploring funding possibilities (i.e., Congress). Considering the cost of an NRC review, it would be beneficial in the long term to fund a coast-wide process because of the prospects for better cross-fertilization among scientists and better opportunities for more participation by state people. Although the SEFSC was in favor of a coast-wide process, there had been no formal response from the Councils in the Southeast Region. Drs. Rosenberg and Sissenwine would further explore the issue within NMFS, while Mr. Dunnigan would investigate funding possibilities.

Other Business

A suggestion that Allen Peterson be somehow recognized for his contribution to the SAW process was taken under advisement.

Table 2. SAW/SARC Assessment Reviews by Species

YEAR	85	1986		1987		1988		1989		1990		1991		1992		1993		1994		1995		1996		1997			1998	
SAW #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Black Sea Bass	X				+	+			X		X		X							X					X			
Bluefish	X		X	X	X	X					X						X	X		X			X					
Butterfish	X	X		X		X		X		X		X					X											
Cod, Georges Bank	X		X				X				X		X		X			X			+			X			X	
Cod, Gulf of Maine	X		X				X					X			X				X		+			X			X	
Cusk	X																				+							
Flounder, Am. Plaice	X	X		X							X			X							+						X	
Flounder, Summer	X		X			X	+	+	X		X		X			X		X		X		X			X			
Flounder, Winter, Offshore	X		X																									
Flounder, Winter, Inshore	X		X		+	+	+						X															
Flounder, Winter, SNE																					X							
Flounder, Winter, GOM																					X							
Flounder, Winter, GB	X		X										X														X	
Flounder, Witch	X	X																X			+							
Flounder, Yellowtail, SNE	X	X					X					X					X				+			X			X	
Flounder, Yellowtail, GB	X	X					X					X						X			+			X			X	
Goosefish														X							+		X					
Haddock, Georges Bank	X	X		X									X							X	+			X			X	
Haddock, Gulf of Maine	X	X																			+							
Herring, Atlantic					X				X		X		X			X					X						X	
Lobster, American	X		X							X		X		X		X						X						
Mackerel, Atlantic	X	X		X		X		X		X		X								X								
Ocean Pout	X										X										+							
Ocean Quahog	X		X							X					X				X			+					X	
Pollock	X		X						X	X						X					+							
Red Hake	X	X									X										+							
Redfish	X	X													X						+							
River Herring/Shad	X					X																						
Salmon, Atlantic	X																											
Scallop, Sea	X	X				X			X	X	X	X	X	X						X			X					
Scup	X			X			X		X		X								X						X			
Shrimp, Northern	X		X		X																				X			
Silver Hake	X	X		X						X	X						X				+							
Skate	X																											
Spiny Dogfish	X										X							X								X		
Squid, Illex	X	X		X		X		X		X		X		X			X				X							
Squid, Loligo	X	X		X		X		X		X		X		X			X				X							
Striped Bass	X																									X		
Surfclam	X		X				X		X						X				X			X				X		
Tautog																				X								
Tilefish	X													X		X												
Weakfish			+																							X		
White Hake	X	X									X								X		+							
Wolffish	X																				+							

+ = No formal assessment review; research needs, working group or special topic report.

X - assessment suggested or X - assessment completed

Appendix I

A PROPOSAL FOR AN ATLANTIC STOCK ASSESSMENT REVIEW PROCESS (ASARP)

by

Joseph Powers, Emory D. Anderson,
and Victor Restrepo

INTRODUCTION

The development of scientific advice for fisheries management is the primary objective of fish stock assessment research and analyses. Therefore, maintenance of quality assurance in these activities is paramount. Both the Southeast and Northeast Fisheries Science Centers in conjunction with their respective Fishery Management Councils (and the Atlantic States Marine Fisheries Commission in the Northeast Region) have developed systems of internal and external reviews of assessments for their respective Regions to solicit external input into the process and to create avenues of review and feedback. The procedures established in the two Regions are very different and have evolved considerably over the years. However, additional demands for high quality scientific management advice in both Regions have been placed on the existing mechanisms. Such demands include more assessments each year coupled with closer external scrutiny by stakeholders and the associated need for improved credibility. Therefore, improvements are being sought to address the new demands.

One suggested way to improve the existing situation is to consolidate the Northeast and Southeast assessment review mechanisms into a unified Atlantic Stock Assessment Review Process (ASARP). The purpose of this proposal is to provide 1) background information on the current processes in the two Regions, 2) outline a possible consolidation of those two processes, and 3) comment on advantages and disadvantages of a coast-wide peer-review process.

BACKGROUND

Before contemplating or implementing changes in the stock assessment review procedures in the two Regions, the existing procedures and their strengths and weaknesses need to be reviewed and understood. The consolidation proposal can then be evaluated in terms of the expected improvements, possible disadvantages, and the actions necessary to implement a consolidation.

Southeast Region

The Fishery Management Councils of the Southeast Region (South Atlantic, Gulf of Mexico, and Caribbean) and the Southeast Fisheries Science Center have, since 1985, cooperatively employed a system of Stock Assessment Panels to provide scientific advice for management. Panels with the longest history are the joint South Atlantic - Gulf of Mexico Fishery Management Council Mackerel Stock Assessment Panel and the Gulf of Mexico Fishery Management Council Reef Fish Stock Assessment Panel. The former is responsible for assessments of 6-10 stocks of coastal pelagics and the latter handles the 5-10 most important of the 30-50 stocks of snappers, groupers, and other reef fish in the Gulf of Mexico. These two Panels have met at least annually for the last decade or so. Additional Panels have been set up to provide scientific advice for the management of Gulf of Mexico red drum, Caribbean conch, South Atlantic snapper-grouper (this Panel is called a Plan Development Team), Gulf of Mexico shrimp, Gulf and South Atlantic spiny lobster, and others. The latter group of Panels has a more *ad hoc* schedule of meetings driven by particular Council needs and management issues.

The Southeast Stock Assessment Panels typically consist of 5-8 people from state agencies, academia, the SEFSC, and (sometimes) Council staff. There is no Panel which includes more than one NMFS person. Indeed, there is presently no NMFS representative on the Gulf of Mexico Reef Fish Stock Assessment Panel. The Panels are bodies of the Councils: the Councils make appointments to the Panels and the Panels report back to the Councils; reports are subject to review by the Scientific and Statistics Committees (SSCs) of the Councils. Panel Chairs are selected by the Panels themselves from within their own membership. Councils pay travel costs for non-NMFS members (NMFS covers its own travel costs); members receive no additional financial compensation for their participation. Meetings are usually 2-4 days in duration and are open to the public. However, actual par-

ticipation is limited to members and others whom the members ask to furnish information.

Scheduling and broad agendas are set by agreement between the Councils, SEFSC, and Southeast Regional Office through annual Operations Plans. Detailed agendas for Panel meetings are developed through the Panel Chairs in consultation with Council staff and the SEFSC. Panel meetings occur throughout the year, the timing of which is driven largely by FMP regulatory cycles and cycles of data availability.

The function of a Panel is generally one of review and synthesis. Assessment analyses are usually prepared by NMFS personnel and presented to the Panel. Additional supporting scientific working documents prepared by NMFS, state, and academic colleagues are presented as well. (The SEFSC and the appropriate Council maintains an archive of working documents and Panel reports for reference). The Panel makes modifications as necessary and synthesizes the results in terms of the recommended Allowable Biological Catch and other scientific advice useful for management. The Panel prepares a written report of its findings and recommendations for the appropriate Council and its SSC. Additionally, the Panel report is presented orally to the Council(s) by the Panel Chair or designee.

However, there are several developments, especially recently, which have had an impact on the functioning of these Panels. First, as the number of Panels have proliferated, the pool of scientists has actually declined. Therefore, many people are serving on multiple Panels. Additionally, the number of Panel meetings (especially the Gulf Reef Fish) have increased to several per year. These developments have made it difficult for all participants (including those from NMFS responsible for assessment preparation), but especially for academic participants who have to take time from mainline responsibilities without remuneration. Recently, a Reef Fish Assessment Panel meeting had to be canceled for lack of a quorum.

A second issue is the amount of time for Panel meetings. Because of the limited time and resources allotted to the Panels, it is difficult for them to accomplish in-depth reviews of assessments. This generally results in only simple modifications to assessments at the meeting or recommendations for future analyses. However, one Panel recently recommended a separate 8-day meeting, during which an entire assessment was conducted, to ensure that the members would feel comfortable and satisfied with the results. This meeting was viewed as necessary because of the Panel being accountable for the results and the necessity for the members to fully understand the details. (Note that the strongest proponent for this supplementary meeting did not actually attend due to academic commitments).

Another issue is that Panels are more frequently being asked to comment on regulatory options (i.e., whether a particular minimum size or bag limit will achieve management objectives). The details of evaluation are often more than members are able (or want) to absorb within limited time frames. This adversely impacts the ability of a Panel to address larger issues of stock status.

Additionally, assessment activities related to Highly Migratory Species (tunas, swordfish, and billfishes) are not reviewed through the Council apparatus, but rather through the Standing Committee for Research and Statistics of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Nevertheless, there are often domestic issues relating to the assessments of these species that are not well addressed within the ICCAT process and should be considered as well in a domestic peer-review process.

Finally, in the Southeast Region, there is a history of direct management through the Council/Commission system using quotas, closures, bag limits, etc. which are integrally based on assessments. However, as the management stakes for user-groups have increased, there has been a move to go outside the Council/Commission framework (i.e., Congress) to call for further peer review. This has occurred for red snapper evaluations, bycatch evaluations, and others. These activities can be costly, disruptive, and duplicative. Nevertheless, NMFS and the Councils need to ensure that quality assurance in scientific advice for management is routinely maintained, regardless of the recent tendency towards further external peer review.

Problems of maintaining an adequate pool of qualified reviewers, increasing demands for both assess-

ments and reviews of those assessments, more frequent meetings, and broadening responsibilities and processes to obviate the need for Congressionally-mandated reviews constitute a strong argument for changes in the Southeast assessment review process.

Northeast Region

The Northeast Fisheries Science Center (NEFSC), Northeast Regional Office (NER), New England and Mid-Atlantic Fishery Management Councils (NEFSC and MAFMC), and Atlantic States Marine Fisheries Commission (ASMFC) are partners in the Northeast Regional Stock Assessment Workshop (SAW) process. This is a process that began in 1985 and has since evolved in structure and procedure to its present format of two SAW cycles per year.

There are three principal components or stages to each of the two SAW cycles per year: 1) a Stock Assessment Review Committee (SARC) meeting, 2) meetings of SARC Working Groups, and 3) two sessions of a Public Review Workshop. The SAW process is under the direction of a Steering Committee comprised of the NER Regional Administrator, NEFSC Science and Research Director, and the Executive Directors of the NEFMC, MAFMC, and ASMFC, and chaired by the SAW Chairman. The Steering Committee, chaired by the SAW Chairman (appointed by the Committee), is responsible for 1) attending Public Review Workshop sessions and participating in the discussions of management advice; 2) setting priorities for review of the stocks in the Region, allocating resources (people and funding), and overseeing the assessment and advisory process; 3) selecting species/stocks to review at the next SARC; 4) setting terms of reference for assessments; 5) setting dates and places for SARC and Public Review Workshop sessions; 6) evaluating sufficiency and style of SARC and Advisory reports and additional communication required; 7) setting Working Groups in force and functioning; and 8) establishing overall SAW policy.

There are currently five standing Working Groups (Northern Demersal, Southern Demersal, Pelagic/Coastal, Invertebrate, and Assessment Methods) all chaired by NEFSC personnel and with assigned species (except Assessments Methods). Depending on the species or topics on the agenda for a particular SAW, some or all of the Working Groups (previously called Subcommittees) meet 1-2 months in advance of a SARC meeting to perform the assessments and prepare working papers for SARC review. The Working Groups have no formal membership other than a Chairmen (appointed by the Steering Committee). Meetings are attended mainly by NEFSC personnel whose assessment responsibilities or expertise coincide with the species being handled. State, Council, Commission, academic, or other external (e.g., Canadian) scientists with data to contribute or having an interest in the assessment(s) are invited to attend meetings. Fishing industry representatives are also welcome. Since most participants are from the NEFSC and to take advantage of computer facilities, Working Group meetings are generally held at NEFSC headquarters in Woods Hole, MA. Meetings are occasionally held at other venues (e.g., state labs) when the stock being assessed (or its management) is primarily a state responsibility and the available data or assessment expertise is at the state level. Working Group meetings typically range from 3-5 days in duration.

The Stock Assessment Review Committee holds two open meetings each year, usually in June and November, one for each SAW cycle. Each meeting typically last five days, during which time 4-6 assessments are reviewed. The function of the SARC is to oversee the assessment process, review the information prepared by Working Groups and provide peer review of the assessments, develop research needs for the next assessment, and determine the advice to managers. The composition of the SARC (at least 12 members) includes the SAW Chairman, four *ad hoc* assessment experts chosen by the Chairman from the NEFSC, two state personnel (Maine - North Carolina), one person each from the NEFMC and MAFMC staffs, one person from the ASMFC staff, one person from the Northeast Regional Office, and one or more scientists each from Canada (Department of Fisheries and Oceans), academia, and outside the Region (generally from another NMFS Fisheries Science Center). The respective Working Group Chairmen are responsible for presenting the assessments to the SARC. Although the appointed SARC members are exclusively responsible for peer reviewing the assessments and preparing the management advice, any-

one attending a SARC meeting is permitted to ask questions and make comments.

The Public Review Workshop (previously called the Plenary) currently consists of two half-day sessions, one each held in conjunction with a NEFMC and MAFMC meeting, at which time the assessment results and management advice from the SARC are presented and explained by the SAW Chairman (with support from relevant Working Group Chairmen). These sessions are open to the public and offer an opportunity for dialogue among Council members, scientists, and the public regarding the assessment results and management advice.

Documentation from each SAW cycle includes 1) Working Group papers and reports presented to the SARC (preferably two weeks in advance of the SARC meeting); 2) a SARC Consensus Summary of Assessments report (detailed report consisting of the Working Group assessment report, SARC comments, and research recommendations for each stock); and 3) a Public Review Workshop report containing the SARC Advisory Report on Stock Status and the Conclusions of the SAW Steering Committee (summary of meetings held during the current SAW cycle). The latter two documents are initially distributed in draft form at or prior to the Public Review Workshop sessions and, following presentation at the Public Review Workshop sessions and final editing by the SAW Chairman, are later published in the NEFSC Reference Document series.

As noted above, the SAW process in the Northeast Region has continually evolved to accommodate changing circumstances and demands. However, that process, already burdened with heavy demands by managers for assessments and advice, is faced with increasing requests. At the same time, assessment results are becoming more directly used in management actions and are, thus, coming under more critical scrutiny relative to their credibility by various stakeholders. Additionally, the Northeast has now begun to be faced with Congressionally-mandated reviews (i.e., groundfish), as has occurred in the Southeast. As a result, the SAW process is being carefully examined so as to restructure it to be able to provide more assessment advice in a timely fashion while also ensuring that the advice will be of the highest quality practicable and thus be credible in spite of the increasing external scrutiny.

PRINCIPLES FOR RESTRUCTURING AND CONSOLIDATING THE STOCK ASSESSMENT REVIEW PROCESSES IN THE NORTHEAST AND SOUTHEAST REGIONS

The following requirements form the basis for a modified and consolidated Atlantic Stock Assessment Review Process (ASARP): 1) transparency (ability to attend and participate in meetings) and openness (ability to contribute scientific information to as well as participate in meetings); 2) working group and review committee consensus of outcome (more independent/external participants, no individual dominance); 3) timeliness of output (timetable matching management specifications, quick dissemination of information); 4) increased quantity of output (many more stocks than at present); and 5) increased credibility (reduce external criticism by incorporating fail-safe procedures to accommodate demands for independence, without separate review processes that are expensive, e.g., NRC reviews).

Three types of possible peer reviews to be used in a modified and consolidated coast-wide process are suggested:

1) Integrated review: Integrate peer review into the assessment process itself (i.e., a Working Group, with the participation of more external experts, would review its own assessment).

2) Sequential review: Similar to the current process in the Northeast where analysis and peer review are done by Working Groups and the SARC, respectively, with an overlap between the two tiers and the SARC assuming "ownership" (including responsibility for flaws) of accepted assessments. The peer-review body would meet at least three times a year. Although advice from Working Groups may be reframed under this format, assessments would not be reworked, but would, if necessary, be referred back to Working Groups for reconsideration. The peer review would focus on promoting consistency.

3) Independent review: A review panel of members who have had no involvement with the assessment(s) being reviewed and are not associated with the management process or the affected industry such that there would be a perception of a conflict of interest. This type of peer review would be especially important where high stakes are concerned and would have to be used sparingly. This approach would be recommended for use in the case of a major change in, problem with, or question on the status of a stock or in management, for "benchmark" assessments, or a major change in assessment methodology. There would be no overlap between the analysis and peer-review functions, the review forum would not redo unacceptable assessments nor assume "ownership" of accepted assessments.

PROPOSED STRUCTURE OF THE ATLANTIC STOCK ASSESSMENT REVIEW PROCESS (ASARP)

The ASARP would be a joint Northeast-Southeast Regional structure consisting of a Steering Committee, a Stock Assessment Review Committee (SARC), Working Groups to perform assessments to be reviewed by the SARC, and a system for reporting and presenting the SARC results and advice to the management bodies. A staff of three people (ASARP Secretariat) dedicated exclusively to presiding over and administering the ASARP would be required.

Steering Committee

An ASARP Steering Committee would serve the same oversight function as the SAW Steering Committee in the Northeast Region. This Committee would consist of the ASARP Chairman, the NER and SER Regional Administrators, the NEFSC and SEFSC Science and Research Directors, the Directors of the NMFS Headquarters Offices of a) Science and Technology and b) Sustainable Fisheries, the Executive Directors of the NEFMC, MAFMC, SAFMC, GMFMC, and CAFMC, the Executive Directors of the ASMFC and GSMFC, and the Chairman of the US ICCAT Advisory Committee.

The Steering Committee, even with as many as 15 members (compared to six for the SAW Steering Committee), would provide each partner in the proposed ASARP with an equal voice in setting policy, placing priorities on stocks to be assessed and reviewed, and deciding on agendas and terms of reference for Working Group and SARC meetings. Major concerns in both Regions relative to the need to enhance participation by state scientists in the peer-review process and improve the credibility of assessment results, coupled with the stated commitment by NMFS to involve stakeholders in the fisheries management process, constitute strong arguments for full and equal representation by NMFS, the Councils, and the interstate Commissions on an ASARP Steering Committee. The current SAW Steering Committee in the Northeast Region, with representation from NMFS, NEFMC, MAFMC, and ASMFC (six members), has proven to be effective and efficient and has been a strong and visible demonstration of the partnership existing among the participants in the fisheries management process. It is assumed that a 15-member ASARP Steering Committee would be capable of functioning equally well, particularly if supported by a qualified, experienced, and adequately funded ASARP Secretariat.

SARC and Working Group Structure

Of the three types of possible peer reviews described earlier, the two-tier, sequential process, with increased participation by state and independent experts, would be the preferred format for the ASARP in most situations:

1) Working Groups comparable to the current SARC Working Groups in the Northeast, Stock Assessment Panels in the Southeast, and Working Groups in other organizations (e.g., ASMFC and GSMFC) would prepare assessments based on terms of reference established by the ASARP Steering Committee.

2) A Stock Assessment Review Committee (SARC) would a) peer review the assessments prepared by Working Groups to ensure their consistency and scientific acceptability and b) prepare management advice. The SARC would not redo unacceptable analyses, but would refer them back to Working Groups for revision.

The membership of the SARC would not be fixed, but would vary depending on the stocks being reviewed, the type of expertise required, and the availability of particular experts. However, there should be an appropriate cross-section of experts from the NEFSC, SEFSC, Council and Commission staffs, state agencies from within the two Regions, other NMFS Fisheries Science Centers, government research agencies or institutes from other countries (e.g., Canada) and a pool of paid experts drawn from academia, private or government research or consulting organizations (domestic or foreign), and other sources. The SARC would be chaired by the ASARP Chairman and consist of 15-18 experts. Of this number, there should be two from each of the two Fisheries Science Centers, one from each of the two Regional Offices, one from each of the five Councils, with the remaining 4-7 from the other sources indicated above. Specific experts for each SARC would be selected by the Chairman in consultation with appropriate officials from the ASARP partners.

An independent review capability should be built into the process to accommodate the need for an NRC-type review. This capability should be used on an as-needed basis and involve experts with no specific research connection or "vested interest" in the species under review. Such a review could report to the SARC or directly to the Steering Committee, depending on the circumstances.

The new process would require more SARC meetings per year than the present two held in the Northeast. Given the increasing workload in each Region and to accommodate the greater number of assessments that would need to be reviewed by a single, consolidated SARC, compared with the number currently handled in each Region, it is likely that at least three meetings a year would be required. It is also conceivable that the duration of each of those three or more meetings would exceed the current five days for a Northeast SARC meeting.

Although there may be standardization and consistency problems, a whole array of Working Groups could function under the ASARP umbrella comparable to or including existing Northeast SAW Working Groups, existing Southeast Stock Assessment Panels, existing ASMFC and GSMFC groups (but with a more diversified membership through the infusion of NEFSC/SEFSC personnel and independent participants), and other (e.g., independent) expert groups tasked with developing management advice. Plan Development Teams (PDTs) and Monitoring Committees (MCs) would continue to address particular management specifications for the needs of the respective Councils.

There should be increased flexibility in the establishment of Working Groups. Current SARC Working Groups and Southeast Stock Assessment Panels, each responsible for particular groups of species, could be replaced by a variety of short- and long-term Working Groups created by the Steering Committee, as needed, to perform assessments for particular species or groups of species for the next SARC or handle other tasks of a longer-term nature. These might include multispecies groups, some long-term groups, some very specific short-term (e.g., species-specific) groups, and some independent/standing groups.

Types of Assessments

The assessments that would be performed and reviewed within the ASARP can generally be included in one of the following three categories:

1) benchmark assessment: update all input data, new analytical methods likely or re-examination of previous assessment assumptions and analytical methods;

2) updated assessment: update catch-at-age data and survey indices for latest year(s), run new VPA, make new catch/stock projections;

3) projection assessment: projection of ABCs or regulatory options based upon previous assessment (VPA) results and, perhaps, other data subsequent to the VPA time series.

4) exploratory assessment: characterized as first-time or possibly repeat assessment where data are highly uncertain and output equally uncertain, as-

semble or update available data (e.g., catch at age, survey), attempt analytical methods and catch/ stock projections.

Expanded Participation

Two main issues involved in ensuring the success of a consolidated ASARP are staffing and funding. There is currently a deficiency in the number of non-NMFS participants (e.g., state, academic, and other national and international experts) attending Working Group and SARC meetings in the Northeast. A similar situation occurs in the Southeast relative to participation in Council Stock Assessment Panels. Such meetings provide excellent opportunities for state personnel to provide scientific interaction. State Directors must be encouraged to have their experts attend such meetings. Indeed, their participation is critical in many cases to the credibility of assessments in the management arena. Industry representation is also desired and should be encouraged. Although Canadian scientists have participated in meetings both of Working Groups (when stocks of interest to Canada are being assessed) and the SARC in the Northeast Region, joint assessments of transboundary stocks with Canada (or with countries such as Mexico or those in the Caribbean, in the case of the Southeast Region) would serve to increase the pool of experts. Clearly, the new process must involve more people (e.g., experts from states, academia, other private or government research organizations, other countries) than presently involved in the assessment and peer-review process in either Region.

The possibility of subsidizing the participation of more state people with ASMFC/GSMFC or Federal funds needs to be explored further. For example, covering the cost of hotel accommodation for state people attending Working Group and SARC meetings in Woods Hole or Miami and holding meetings at different locations in the two Regions are two possible ways to make participation by state personnel more affordable.

A pool of experts (national and international), from which to obtain external participants for Working Group meetings, SARC meetings, or independent reviews as necessary should be established. Such experts would be engaged on a retainer basis for a specified number of days per year (e.g., 20) to be called upon on as needed or would be simply be on a list to be contacted and engaged when needed and available. This pool would include experts nominated by the fishing industry on the condition that potential conflicts of interest were avoided.

Funding Support

A process for funding the participation of external experts (see above) as well as a process for verifying their qualifications should be established and implemented. A funding pool would be necessary to cover not only travel and per diem expenses for qualified external experts, but consulting fees, retainers, or honoraria (e.g., for independent consultants, academics, scientists from privately funded laboratories, scientists from other countries). The sources for such funds should presumably be the participating partners in the proposed ASARP. In the Northeast, the NEFSC has traditionally provided funds for travel expenses and per diem for academic participants at SARC meetings, and ASMFC has similarly covered the costs for the state participants (usually three). In the Southeast, the respective Council cover the travel costs for non-NMFS participants at meetings of their Stock Assessment Panels.

Reporting and Presenting ASARP Results to Managers

A system for reporting ASARP assessment results and management advice, acceptable to all the partners, would have to be developed. Options might include one comprehensive report from each SARC, separate reports submitted to each management entity from each SARC containing only the stocks of interest to that Council or Commission, separate reports for each species considered at each SARC, a single comprehensive report for all SARCs in a given year, or other variations.

As described earlier, the final stage in a review cycle in both the Northeast and Southeast systems is the presentation of assessment results and manage-

ment advice to the Councils and the public. Differences between the two systems are whether the presentations are consolidated or distributed. An ASARP should include a presentation phase. It is expected that there would be effeciencies in this by using the Northeast model in which sessions (two for each cycle) are held in conjunction with meetings of the appropriate Council, are open to the public, and offer an opportunity for dialogue among Council members, scientists, and the public regarding the assessment results and management advice. Such a system would entail the ASARP Chair (or designee) making oral presentations at meetings of the respective Councils and Commissions.

ASARP Secretariat

The magnitude of the work involved in presiding over and administrating an ASARP would require a staff of about three people whose sole responsibilities would be exclusively those of the ASARP. This group of people, or ASARP Secretariat, would be located in either Woods Hole, MA (NEFSC) or Miami, FL (SEFSC). The ASARP Chairman would be responsible for organizing and running the ASARP (under the direction of the Steering Committee), chairing all meetings of the Steering Committee and SARC, final editing of all SARC reports, and presenting the peer-reviewed assessment results and advice to the management bodies. A technical assistant would be needed to handle the preparation, initial editing and publication of all SARC reports. An administrative assistant would be responsible for office management, correspondence, finances, meeting arrangements, and the like.

Budget

An initial draft of an annual budget for the proposed ASARP is as follows:

Salaries and benefits	
Chairman	$120K
Administrative assistant[1]	40K
Technical assistant[1]	50K
Travel	
Staff	60K
Reviewers	50K
Consultant fees	
Retainer for reviewers	40K
Meeting costs	
Facilities	10K
Equipment	
Computer/audio visual	20K
Supplies	
Misc.	10K
Printing	
Reports/publications	20K
TOTAL	$420K

[1] Not necessarily permanent NMFS staff

ADVANTAGES AND DISADVANTAGES OF A COAST-WIDE PEER-REVIEW PROCESS

The creation of a new coast-wide stock assessment review process which would incorporate the systems currently in place in the Northeast and Southeast Regions has both advantages and disadvantages. These pros and cons must be compared both with existing processes and conditions in the two Regions as well as with likely future events.

First and foremost, the proposed consolidation will improve the present individual assessment review processes through the infusion of additional scientific expertise through joint SEFSC-NEFSC interaction, as well as through drawing in broader state, academic, and other non-MNFS scientific participation. In the Northeast, recent discussions aimed at improving the Northeast SAW process have included, as one of several possibilities, merging with the Southeast Region's assessment review process for this very reason, i.e., in order to gain access to additional scientific expertise.

A large, well organized coast-wide peer-review process, as proposed, would stand a better chance, than would two separate and smaller Regional processes, of attracting necessary additional support and funding from NMFS and the interstate Commissions, such as for establishing a pool of experts, as described earlier.

An equally important benefit from having a comprehensive review process in place would be the ability of the Councils and NMFS to better respond to Congressional mandates for external peer reviews and, indeed in many instances, to obviate the need for such actions. It would seem that a mechanism to ac-

complish this would be a highly coordinated system of peer review such as that proposed in this document.

Another advantage of a coast-wide system would be to better accommodate those fish stocks whose distributional ranges cross the boundaries of multiple Councils or multiple states in different Regions, but which come under the responsibility of a single interstate commission (e.g., ASMFC).

Relative to disadvantages, it has been recognized in both Regions that an expanded coast-wide peer-review process might create an added administrative burden, control complications, workload, practicality, and parochialism. A disadvantage to both Regions would be the increased workload for some people (primarily NEFSC and SEFSC scientists) who might be obligated to participate in more than the current number of assessment and peer-review meetings each year. However, this would have to be compared to the likelihood of their participation in Congressionally-mandated review activities if these type of reviews were not done initially.

In light of the growing number of stocks in both Regions for which assessments and management advice are annually requested, there is an obvious and legitimate concern by the respective Councils and interstate Commissions that a single coast-wide stock assessment review process responsible for all the stocks now being handled by separate processes in the two Regions might not be capable of meeting the anticipated management needs.

The concerns of an additional workload for some scientists and whether or not current management needs can be satisfactorily met under a coast-wide stock assessment review process remain speculative pending further planning and evaluation to determine actual personnel requirements for an ASARP and the number of assessment reviews actually required each year. Regardless whether a coast-wide or two separate Regional processes are ultimately decided, current operating procedures will have to modified in the near future. In order for the peer-review process to cope with the growing management demands, there will have to be either more meetings, longer meetings, more scientists engaged in the process, or changes to the peer-review process to shorten the time devoted to an individual assessment. Alternatively, management decisions (e.g., TACs) for more and more stocks will have to be made for multi-year periods (e.g., 3 years) instead of annually so that assessments and reviews for individual stocks will be required less frequently than at present.

On balance, there is the potential for net benefits to both Regions of a carefully structured review process such as that proposed here.