**Northeast Fisheries Science Center Reference Document 00-14**

# 31st Northeast Regional Stock Assessment Workshop (31st SAW)

## *Public Review Workshop*

**October 2000**

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*A Report of the 31st Northeast Regional Stock Assessment Workshop*

# 31st Northeast Regional Stock Assessment Workshop (31st 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**

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# OVERVIEW

## Introduction

The Northeast Stock Assessment Workshop (SAW) is a peer review process where, every six months, a number of fishery stock assessments are prepared and presented to a panel of assessment experts. The panel, the Stock Assessment Review Committee (SARC), prepares two reports. The first is the SAW Advisory Report; a brief summary for each stock assessed and reviewed, of the stock status, management advice, short term stock forecasts and other relevant assessment information. The second report, the SARC Consensus Summary of Assessments, is more detailed, containing specific assessment data, results and SARC discussion and research recommendations.

The Advisory report is presented to public via a series of Public Review Workshops, described below. Subsequent to the Workshops, the draft Advisory Report is finalized and folded into a larger document known as the Public Review Workshop Report. The Report also includes a summary of a SAW Steering Committee meeting held on September 11. This is the Public Review Workshop Report for SAW 31 and the 31st SARC.

SAW 31 reviewed assessments for scup, goosefish, ocean quahog, and summer flounder. The four stocks were peer reviewed by the 31st Stock Assessment Review Committee (SARC) at its June 26-30, 2000 meeting in Woods Hole, MA. The Public Review Workshop of the 31st Northeast Regional Stock Assessment Workshop (SAW 31) was held in two sessions. The first was at a meeting of the New England Fishery Management Council on July 26 in Portland ME, and dealt primarily with presentation of the results of the SARC's review of a goosefish (monkfish) assessment. The second was at a joint meeting of the Mid-Atlantic Fishery Management Council and a number of Atlantic States Marine Fisheries Commission Management Boards on August 14 in Philadelphia PA. The second Public Review Workshop focused on the reviews of assessments for scup, summer flounder and ocean quahog.

Copies of the SAW 31st draft *Advisory Report on Stock Status* and SAW 31 draft *Consensus Summary of Assessments* had been distributed to members of each Council or Board prior to the Workshops.

The SAW Chairman, Dr. Terry Smith of the Northeast Fisheries Science Center (NEFSC), NMFS, conducted the NEFMC Workshop and Dr. Steve Murawski, NEFSC, NMFS, the MAFMC/ASMFC Workshop.

## Status Summaries

Scup

The scup stock is overfished and overfishing is occurring. The current index of stock biomass is less than 5% of the biomass threshold. Catch curve analyses indicate that F for ages 0-3 exceeds 1.0, considerably above the fishing mortality rate threshold. Fishing mortality should be reduced substantially and immediately. Reduction in fishing mortality from discards will have the most impact on the stock. New or enhanced data reporting or sampling for scup is required.

Goosefish (Monkfish)

The goosefish stock is overfished and overfishing is occurring. Since the 1980s reported landings have steadily increased and biomass has declined. Size distributions have become truncated. In the northern region abundance in recent years has increased while biomass has declined, suggesting increased recruitment. Indices of egg production have declined about 80% since the 1970s. Stock status indicators indicate a need for reduced fishing mortality. The total mortality index has increased 2-3 fold over the last twenty years while biomass indices have been below targets and thresholds for at least the last 8 years.

Ocean quahog

The ocean quahog stock is not overfished and overfishing is not occurring. Current biomass is high, annual recruitment is about 1%-2% of biomass; less than or equal to the rate of natural mortality. Biomass is projected to decline gradually over the next decade assuming current catch levels continue. The condition of that portion of the stock off the coast of Maine is unknown. The current fishing mortality rate is near the Ftarget rate, however, it may be advantageous to avoid localized depletion.

Summer flounder

The summer flounder stock is overfished and overfishing is occurring. Total biomass has increased substantially since 1991 and has been stable since 1994 at 41,000 mt. This is below the biomass threshold of 53,200 mt. Although the fishing mortality rate has declined from 1.31 in 1994 to 0.32 in 1999, F in 1999 is 23% above the overfishing threshold. The 1995 year class was above average and the 1996, 1997, and 1998 year classes about average. The 1999 year class is the smallest since 1988. If landings do not exceed 8,400 mt, the FMP target F should be met.

# ADVISORY REPORT ON STOCK STATUS

## INTRODUCTION

The *Advisory Report on Stock Status* is one of two reports produced by the Northeast Regional Stock Assessment Workshop process. The *Advisory Report* 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 current stock status. The status of the stock relates to both the rate of removal of fish from the population B the exploitation rate B and the current stock size. 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 specified in an overfishing definition, overfishing is occurring. Fishery removal rates are usually expressed in terms of the instantaneous fishing mortality rate, F, and the maximum removal rate is denoted as $F_{THRESHOLD}$.

Another important factor for classifying the status of a resource is the current stock level, for example, spawning stock biomass (SSB) or total stock biomass (TSB). Overfishing definitions, therefore, characteristically include specification of a minimum biomass threshold as well as a maximum fishing threshold. If a stock=s biomass falls below the threshold ($B_{THRESHOLD}$) the stock is in an overfished condition. The Sustainable Fisheries Act mandates plans for rebuilding the stock should this situation arise.

Since there are two dimensions to the status of the stock B the rate of removal and the biomass level B it is possible that a stock not currently subject to overfishing in terms of exploitation rates is in an overfished condition, that is, has a biomass level less than the threshold level. This may be due to heavy exploitation in the past, or 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 stock size. Conversely, fishing down a stock that is at a high biomass level should generally increase the long-term sustainable yield. This philosophy is embodied in the Sustainable Fisheries Act C stocks should be managed on the basis of maximum sustainable yield (MSY). The biomass that produces this yield is called $B_{MSY}$ and the fishing mortality rate that produces MSY is called $F_{MSY}$.

Given this, stocks under review are classified with respect to current overfishing definitions. A stock is overfished if its current biomass is below $B_{THRESHOLD}$ and overfishing is occurring if current F is greater than $F_{THRESHOLD}$.

Overfishing guidelines are based on the precautionary approach to fisheries management and encourage the inclusion of a control rule in the overfishing definition. Control rules, when they exist, are discussed in the Advisory Report chapter for the stock under consideration. Generically, the control rules suggest actions at various levels of stock biomass and incorporate an assessment of risk, in that F targets are set so as to avoid exceeding F thresholds. The schematic noted below depicts a generic control rule of this nature.

| | | BIOMASS | | |
|---|---|---|---|---|
| | | **B** $<B_{THRESHOLD}$ | $B_{THRESHOLD} <$ **B** $< B_{MSY}$ | **B** $> B_{MSY}$ |
| EXPLOITATION RATE | $F_{THRESHOLD}$ | $F_{THRESHOLD} = 0$ or F min (The minimal achievable mortality rate.) | $F_{THRESHOLD} <$ FMSY (The maximum mortality rate that defines overfishing at various levels of biomass.) | $F_{THRESHOLD} = F_{MSY}$ |
| | $F_{TARGET}$ | $F_{TARGET} = 0$ or F min (The minimal achievable mortality rate.) | $F_{TARGET} < F_{THRESHOLD}$ (Where $F_{TARGET}$ is chosen to minimize the risk of exceeding $F_{THRESHOLD}$) | $F_{TARGET} < F_{MSY}$ |

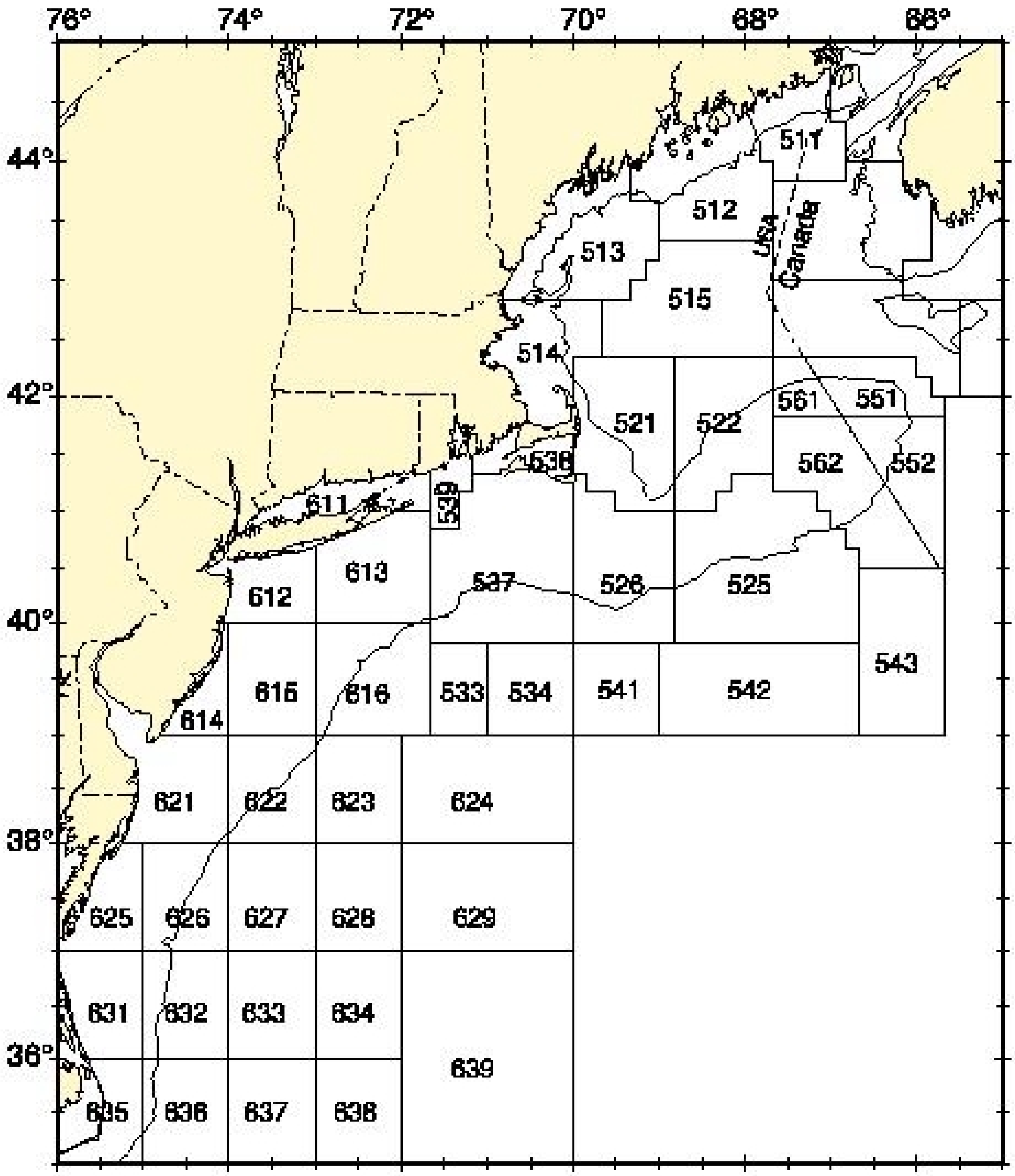



Figure 1. Statistical areas used for catch monitoring in offshore fisheries in the Northeast United States.

## GLOSSARY OF TERMS

**ADAPT:** A commonly used form of computer program used to optimally fit a Virtual Population Assessment (VPA, see below) to abundance data.

**Availability:** Refers to the distribution of fish of different ages or sizes relative to that taken in the fishery.

**Biological reference points:** Specific values for the variables that describe the state of a fishery system which 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.

**$B_0$:** Virgin stock biomass, i.e., the long-term average biomass value expected in the absence of fishing mortality.

**$B_{MSY}$:** Long-term average biomass that would be achieved if fishing at a constant fishing mortality rate equal to $F_{MSY}$.

**Biomass Dynamics Model:** A simple stock assessment model that tracks changes in stock biomass rather than numbers. Biomass dynamic models employ assumptions about growth (in weight) and can be tuned to abundance data such as commercial catch rates, research survey trends or biomass estimates.

**Catchability:** Proportion of the stock removed by one unit of effective fishing effort (typically age-specific due to differences in selectivity and availability by age).

**Control Rule:** Describes a plan for pre-agreed management actions as a function of variables related to the status of the stock. For example, a control rule can specify how F or yield should vary with biomass. In the National Standard Guidelines (NSG), the “MSY control rule” is used to determine the limit fishing mortality, or Maximum Fishing Mortality Threshold (MFMT). Control rules are also known as “decision rules” or “harvest control laws” in some of the scientific literature.

**Catch per Unit of Effort (CPUE):** Measures the relative success of fishing operations, but also can be used as a proxy for relative abundance based on the assumption that CPUE is linearly related to stock size. The use of CPUE that has not been properly standardized for temporal-spatial changes in catchability should be avoided.

**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 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 that 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).

**$F_{10\%}$:** The fishing mortality rate which reduces the spawning stock biomass per recruit (**SSB/R**) to 10% of the amount present in the absence of fishing. More generally, Fx%, is the fishing mortality rate that reduces the SSB/R to x% of the level that would exist in the absence of fishing.

**$F_{MSY}$:** The fishing mortality rate that produces the maximum sustainable yield.

**Fishery Management Plan (FMP).** Plan containing conservation and management measures for fishery resources, and other provisions required by the MSFCMA, developed by the Fishery Management Councils or the Secretary of Commerce.

**Generation Time.** In the context of the National Standard Guidelines, generation time is a measure of the time required for a female to produce a reproductively-active female offspring for use in setting maximum allowable rebuilding time periods.

**Growth overfishing:** The situation existing when the rate of fishing mortality is above $F_{MAX}$ and when the loss in fish weight due to mortality exceeds the gain in fish weight due to growth.

**Limit Reference Points.** Benchmarks used to indicate when harvests should be constrained substantially so that the stock remains within safe biological limits. The probability of exceeding limits should be low. In the National Standard Guidelines, limits are referred to as thresholds. In much of the international literature (e.g., FAO documents), "thresholds" are used as buffer points that signal when a limit is being approached.

**Landings per Unit of Effort (LPUE).** Analogous to CPUE and measures the relative success of fishing operations, but is also sometimes used a proxy for relative abundance based on the assumption that CPUE is linearly related to stock size.

**MSFCMA.** (Magnuson-Stevens Fishery Conservation and Management Act). U.S. Public Law 94-265, as amended through October 11, 1996. Available as NOAA Technical Memorandum NMFS-F/SPO-23, 1996.

**Maximum Fishing Mortality Threshold (MFMT, $F_{threshold}$).** One of the Status Determination Criteria (SDC) for determining if overfishing is occurring. It will usually be equivalent to the F corresponding to the MSY Control Rule. If current fishing mortality rates are above **$F_{threshold}$** overfishing is occurring.

**Minimum Stock Size Threshold (MSST, $B_{threshold}$).** Another of the Status Determination Criteria. The greater of (a) ½$B_{MSY}$, or (b) the minimum stock size at which rebuilding to $B_{MSY}$ will occur within 10 years of fishing at the MFMT. MSST should be measured in terms of spawning biomass or other appropriate measures of productive capacity. If current stock size is below **$B_{threshold}$**, the stock is overfished.

**Maximum Spawning Potential (MSP).** This type of reference point is used in some fishery management plans to define overfishing. The MSP is the spawning stock biomass per recruit (SSB/ R) when fishing mortality is zero. The degree to which fishing reduces the SSB/R is expressed as a percentage of the MSP (i.e., %MSP). A stock is considered overfished when the fishery reduces the %MSP below the level specified in the overfishing definition. The values of %MSP used to define overfishing can be derived from stock-recruitment data or chosen by analogy using available information on the level required to sustain the stock.

**Maximum Sustainable Yield (MSY).** The largest average catch that can be taken from a stock under existing environmental conditions.

**Overfishing.** According to the National Standard Guidelines, "overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis." Overfishing is occurring if the MFMT is exceeded for 1 year or more.

**Optimum Yield (OY):** The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems. MSY constitutes a "ceiling" for OY. OY may be lower than MSY, depending on relevant economic, social, or ecological factors. In the case of an overfished fishery, OY should provide for rebuilding to $B_{MSY}$.

**Partial Recruitment:** Patterns of relative vulnerability of fish of different sizes or ages due to the combined effects of selectivity and availability.

**Rebuilding Plan:** A plan that must be designed to recover stocks to the $B_{MSY}$ level within 10 years when they are overfished (i.e. when B < MSST). Normally, the 10 years would refer to an expected time to rebuilding in a probabilistic sense.

**Recruitment:** This is the number of young fish that survive (from birth) to a specific age or grow to a specific size. The specific age or size at which recruitment is measured may correspond to when the young fish become vulnerable to capture in a fishery or when the number of fish in a cohort can be reliably estimated by a stock assessment.

**Recruitment overfishing:** The situation existing when the fishing mortality rate reaches a level that causes a significant reduction in recruitment to the spawning stock. This is caused by a greatly reduced spawning stock and is characterized by a decreasing proportion of older fish in the catch and generally very low recruitment year after year.

**Recruitment per spawning stock biomass (R/SSB):** The number of fishery recruits (usually age 1 or 2) produced from a given weight of spawners, usually expressed as numbers of recruits per kilogram of mature fish in the stock. This ratio can be computed for each year class and is often used as an index of pre-recruit survival, since a high R/SSB ratio in one year indicates above-average numbers resulting from a given spawning biomass for a particular year class, and vice versa.

**Reference Points:** Values of parameters (e.g. $B_{MSY}$, $F_{MSY}$, $F_{0.1}$) that are useful benchmarks for guiding management decisions. Biological reference points are typically limits that should not be exceeded with significant probability (e.g., MSST) or targets for management (e.g., OY).

**Risk:** The probability of an event times the cost associated with the event (loss function). Sometimes "risk" is simply used to denote the probability of an undesirable result (e.g. the risk of biomass falling below MSST).

**Status Determination Criteria (SDC):** Objective and measurable criteria used to determine if a stock is being overfished or is in an overfished state according to the National Standard Guidelines.

**Selectivity:** Measures the relative vulnerability of different age (size) classes to the fishing gears(s).

**Spawning stock biomass:** The total weight of all sexually mature fish in a stock.

**Spawning stock biomass per recruit (SSB/R):** The expected lifetime contribution to the spawning stock biomass for each recruit. SSB/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 and rates of growth and natural mortality, all of which are also assumed to be constant.

S**urvival Ratios:** Ratios of recruits to spawners (or spawning biomass) in a stock-recruitment analysis.

**TAC:** Total allowable catch is the total regulated catch from a stock in a given time period, usually a year.

**Target Reference Points:** Benchmarks used to guide management objectives for achieving a desirable outcome (e.g., OY). Target reference points should not be exceeded on average.

**Uncertainty:** Uncertainty results from a lack of perfect knowledge of many factors that affect stock assessments, estimation of reference points, and management. Rosenberg and Restrepo (1994) identify 5 types: measurement error (in observed quantities), process error (or natural population variability), model error (mis-specification of assumed values or model structure), estimation error (in population parameters or reference points, due to any of the preceding types of errors), and implementation error (or the inability to achieve targets exactly for whatever reason).

**Virtual population analysis (VPA) (or cohort analysis):** A retrospective analysis of the catches from a given year class which provides estimates of fishing mortality and stock size at each age over its life in the fishery. This technique is used extensively in fishery assessments.

**Year class (or cohort):** Fish born in a given year. For example, the 1987 year class of cod includes all cod born in 1987. This year class would be age 1 in 1988, age 2 in 1989, and so on.

**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 de-pendent on the exploitation pattern, rate of growth, and natural mortality rate, all of which are also assumed to be constant.

# A. SCUP ADVISORY REPORT

**Status of Stock:** The stock is overfished and overfishing is occurring. The current index of spawning stock biomass is low (1998-2000 average = 0.10 SSB kg/tow), less than 5% of the biomass threshold (2.77 SSB kg/tow; Figure A1). Although an estimate of fully-recruited F is not available, catch curve analyses of survey indices indicate that F for ages 0-3 exceeds 1.0 and is considerably above the fishing mortality rate threshold ($F_{MAX}$ = 0.26) for the 1984 – 1998 year-classes (Figure A2). Indices of recruitment have trended downward in recent years, except for moderate 1994, moderate to strong 1999 year-classes and a strong 1997 year class. The stock has a highly truncated age structure, which likely reflects prolonged high fishing mortality.

**Management Advice:** Fishing mortality should be reduced substantially and immediately. Reduction in fishing mortality from discards will have the most impact on the stock, particularly considering the importance of the 1999 and all future good recruitment to rebuilding the stock.

New or enhanced data reporting or sampling for scup is required now and will become more important as fishing mortality approaches the threshold.

**Forecast for 2001:** Deterministic projections of the NEFSC spring survey SSB show that starting with year 2000 survey index values (5.92, 0.72, 0.05, and 0.02 kg/tow at ages 1-4) the biomass threshold of 2.77 kg/tow is achieved in 6 years at F=0.24 and in 10 years at F=0.34 (M=0.20; Figure A3). Starting with 1993-2000 geometric mean survey index values (1.40, 0.27, 0.04, and 0.03 kg/tow at ages 1-4) the biomass threshold is achieved in$\leq$ 10 years at F$\leq$ 0.02 (Figure A4). The time to achieve the biomass threshold will decrease with good recruitment, especially if coupled with reduced fishing mortality due to discarding.

## Landings and Status Table (weights in '000 mt): Scup

| Year | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | Min. | Max. | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commercial landings | 4.6 | 7.1 | 6.3 | 4.7 | 4.4 | 3.1 | 2.9 | 2.2 | 1.9 | 1.5 | 1.5 | 7.1 | 3.9 |
| Recreational landings | 1.9 | 3.7 | 2.0 | 1.5 | 1.2 | 0.6 | 1.0 | 0.5 | 0.4 | 0.9 | 0.4 | 3.7 | 1.4 |
| Recreational discards | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | | | |
| Total landings/fn | 10.4 | 14.3 | 14.0 | 7.6 | 6.4 | 5.7 | 5.4 | 4.5 | 9.6 | 4.0 | 4.0 | 14.3 | 8.2 |
| Commercial quota | | | | | | | | 2.7 | 2.1 | 1.1 | | | |
| Recreational harvest limit | | | | | | | | 0.9 | 0.7 | 0.6 | | | |

[1] Over the period 1979-1999.
[2] Total catches not provided due to uncertainty in estimating commercial discards, see "Catches" below. Entries may differ from sum of commercial and recreational landings due to rounding.

**Stock Identification and Distribution:** Scup are distributed primarily between Cape Cod, MA and Cape Hatteras, NC. Although tagging studies have indicated the possibility of two stocks, one in Southern New England waters and the other extending south from New Jersey, the absence of definitive studies and distributional data from NEFSC bottom trawl surveys support the concept of a single unit stock extending from Cape Hatteras to New England.

**Catches:** Commercial landings averaged less than 10,000 mt in 1930-1947, increased to an average of over 19,000 mt in 1953-1964, peaked at over 22,000 mt in 1960, and fell to about 4,000 mt per year in the early 1970s. Commercial landings increased moderately in 1974-1986, varying between 7,000 and 10,000 mt per year, and have declined in recent years to historical low levels of 1,500-1,900 mt in 1998-1999 under quota management. Recreational landings ranged between 395 and 5,300 mt per year since 1979. Recreational landings reached a time series low of 395 in 1998 and increased to 861 mt in 1999. Total landings in 1984-1999 ranged from a high of 12,400 mt in 1986 to a low of 2,290 mt in 1998 (Figure A5).

Limited sea sampling information suggests that discards are variable and large; commonly equal to or exceeding landings during 1989-1997. All analyses showed substantial increases in the incidence of high discarding as well as the discard-to-landings ratio in 1998 and 1999, probably indicating influence of the1997 year-class. Biomass lost as recreational discards averaged 44 mt annually in 1984-1997.

**Data and Assessment:** Scup was last assessed at SAW-27 in 1998. Reliable estimates of commercial fishery discards are not available due to limited sample size and uncertainty as to their representative nature of the sea sampling data for scup. VPA and production models were not undertaken. Stock status was estimated from survey abundance indices. Standardized indices of abundance from the NEFSC autumn survey and the MRFSS (recreational) catch per tow show similar patterns over time (1981-1999, Figure A8). Total mortality rates were estimated from survey based calculations using both annual and cohort catch curves. Fishing mortality rates were then estimated by subtracting the assumed natural mortality rate of 0.2.

**Biological Reference Points:** A yield-per-recruit analysis from SAW-27 with an assumed M of 0.20 indicates that $F_{max}$ = 0.26 (21% exploitation rate). The biomass threshold is defined as the maximum value of a 3-year moving average of the NEFSC spring survey catch per tow of spawning stock biomass (1977-1979 = 2.77 SSB kg/tow).

**Fishing Mortality:** Catch curve analyses of survey indices indicate that F for ages 0-3 greatly exceeded the fishing mortality rate threshold (Fmax = 0.26) during 1984 – 1998 (Figure A2). F could not be estimated on older animals because they're currently absent from the NMFS spring and autumn surveys (Figure A6). A relative exploitation index (landings/relative biomass) indicates that exploitation reached a time series (1981-1999) high in 1995 and has declined each subsequent year (Figure A7).

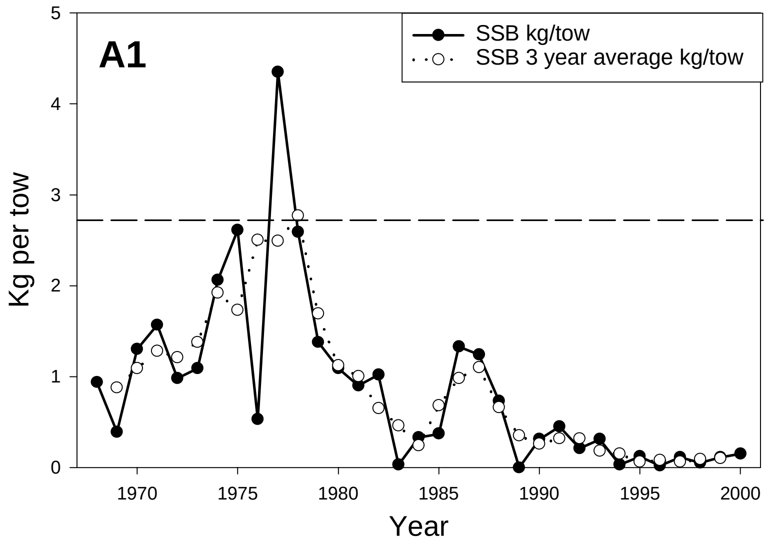
**Recruitment:** Age 0 indices from the NEFSC, MADMF, RIDFW, and CTDEP autumn trawl surveys indicate a moderate to strong 1999 year-class. Commercial catches indicate that the 1997 year-class was exceptionally strong in 1999. The 1996 index of age 0 abundance from the NEFSC autumn survey was the lowest of the 1984-1999 (age-based, inshore and offshore strata) series. The 1996 index of age 1 abundance from the NEFSC spring survey (inshore and offshore strata) was the second lowest in the 1984-1997 series.

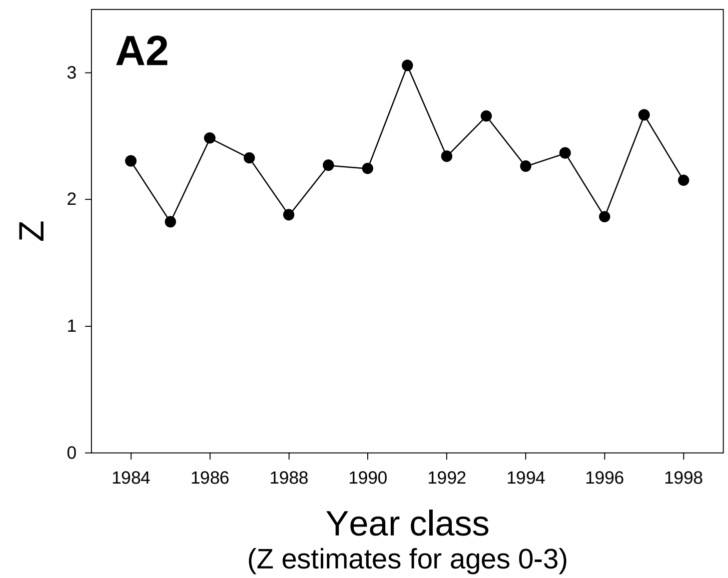
**Stock Biomass:** Indices of stock biomass and abundance for 1999 were slightly higher than the time series lows seen in 1995-1996 in the NEFSC, MADMF, CTDEP, RIDFW, and NJBMF research survey time series (Figures A1 and A8).

**Special Comments:** For this species, commercial discards may equal or exceed commercial landings. The SARC noted that because of this, reference points from the yield-per-recruit analysis are uncertain and production models or VPA were not updated. The use of analytical techniques is further hampered by the truncated age structure.

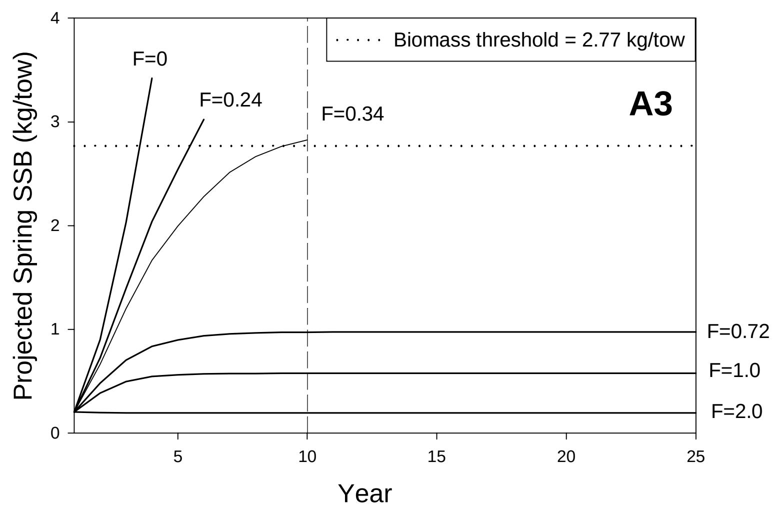
**Source of Information:** Report of the 31st Northeast Regional Stock Assessment Workshop (31st SAW), Stock Assessment Review Committee (SARC) Consensus Summary of Assessments, NEFSC Ref. Doc. 00-15.

NEFSC Spring Survey SSB

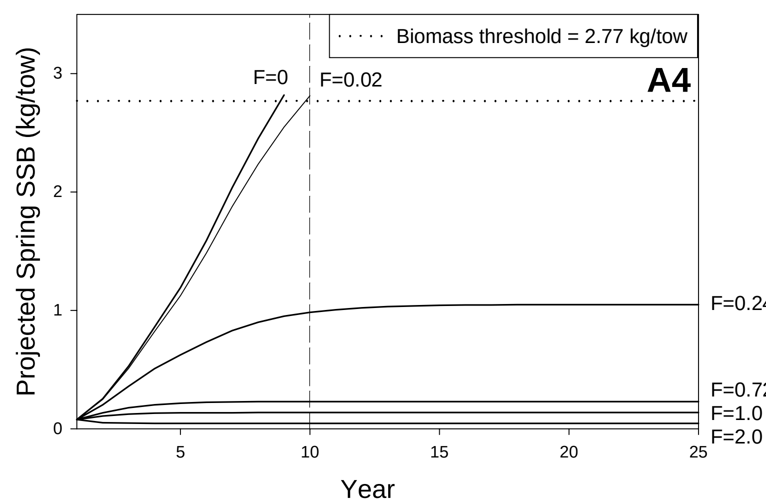


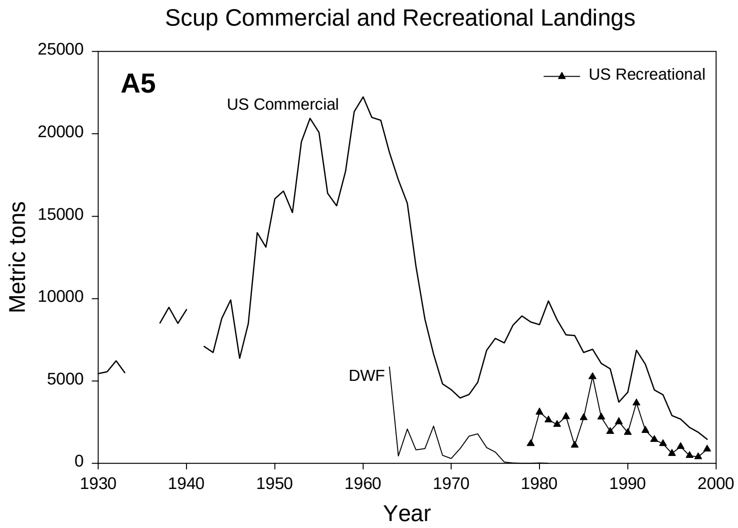



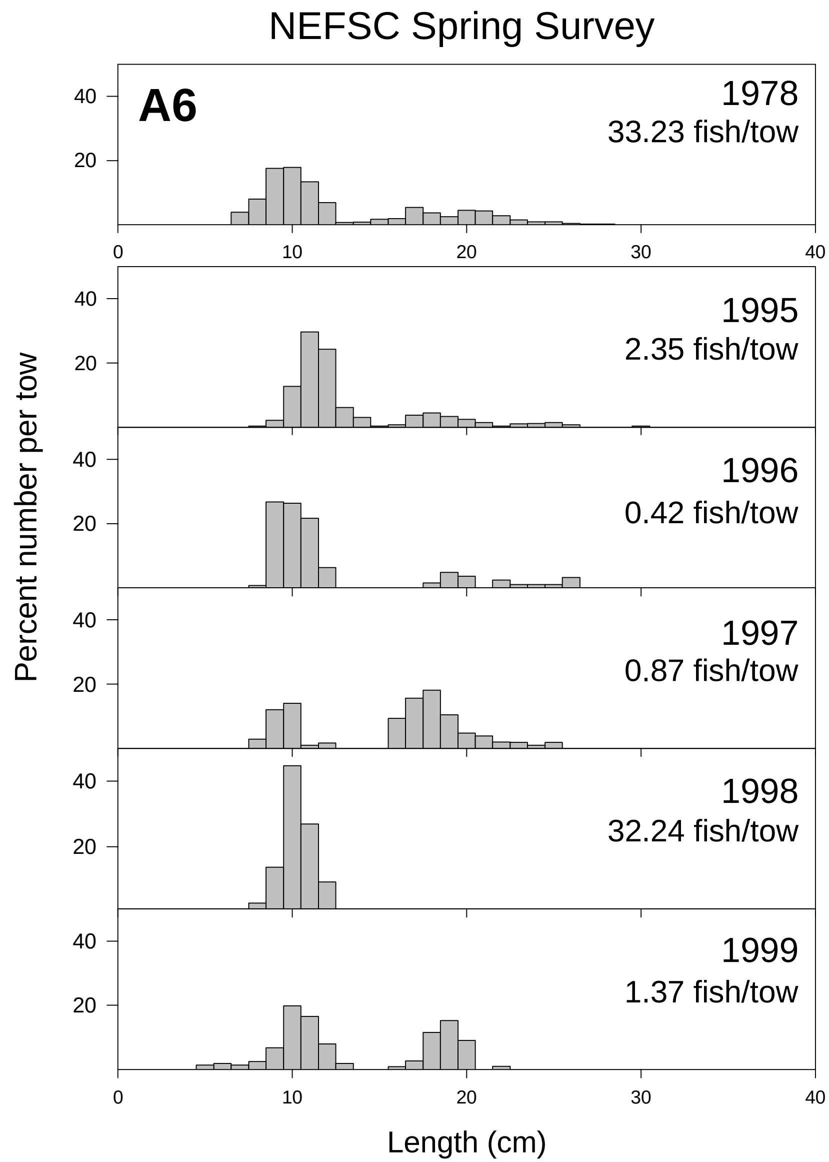

Projections starting with year 2000 NEFSC spring survey catch per tow at age and equilibrium recruitment thereafter from year 2000 survey catch per tow at age 1

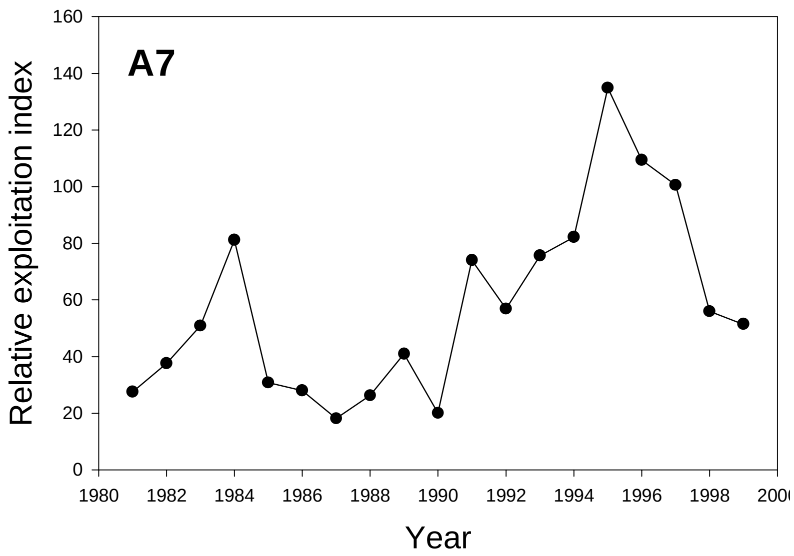


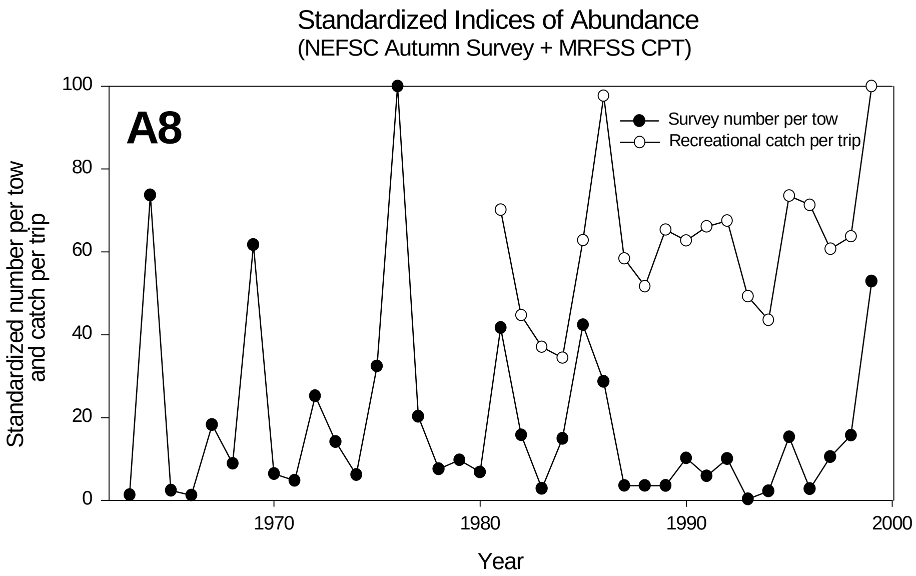

Projections starting with NEFSC spring survey 1993-2000 geometric mean catch per tow at age and equilibrium recruitment thereafter from 1993-2000 geometric mean catch per tow at age 1




Scup Commercial and Recreational Landings
A5
US Recreational
US Commercial
DWF
Metric tons
25000
20000
15000
10000
5000
0
1930
1940
1950
1960
1970
1980
1990
2000
Year


NEFSC Spring Survey
A6
1978
33.23 fish/tow
1995
2.35 fish/tow
1996
0.42 fish/tow
1997
0.87 fish/tow
1998
32.24 fish/tow
1999
1.37 fish/tow
Percent number per tow
40
20
0
10
20
30
40
Length (cm)


A7
Relative exploitation index
Year


Standardized Indices of Abundance
(NEFSC Autumn Survey + MRFSS CPT)
A8
Survey number per tow
Recreational catch per trip
Standardized number per tow and catch per trip
Year

## B. GOOSEFISH ADVISORY REPORT

**State of Stock:** Goosefish (also known as monkfish) is managed in two stock areas, north and south. In both areas the resource is overfished and overfishing is occurring. Reported landings (converted to live weight) have steadily increased from an annual average of 2,500 mt in the 1970s to 8,700 mt in the 1980s and 23,000 in the 1990s (Figure B1). Biomass has declined since the mid-1980s and size distributions in fishery-independent surveys have become truncated over time. Abundance has increased in recent years in the northern region as biomass has declined, suggesting increased recruitment. Indices of egg production have declined by around 80% since the 1970s and the proportion of spawners below the age of full maturity has increased.

Conservation benefits of regulations implemented with the FMP in November 1999 are not reflected in this assessment and should be evaluated as soon as practicable.

**Management Advice:** Indicators of stock status for this resource consistently indicate a need for reducing fishing mortality. The total mortality index has increased 2-3 fold over the last twenty years and biomass indices have been below targets and thresholds for at least 8 years.

**Forecasts for 2000-2002:** No forecasts were produced..

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

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | Max[1] | Min[1] | Mean[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| USA Commercial landings | | | | | | | | | | |
| Northern area | 10.6 | 11.0 | 12.0 | 10.8 | 9.8 | 7.4 | 9.4 | 12.0 | 0.2 | 5.0 |
| Southern area | 15.1 | 12.0 | 14.4 | 15.8 | 18.5 | 19.3 | 15.7 | 19.3 | 0.0 | 6.3 |
| Total | 25.7 | 23.0 | 26.4 | 26.6 | 28.3 | 26.7 | 25.0 | 28.3 | 0.2 | 11.4 |
| Canadian landings[2] | 0.4 | 0.5 | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 | 1.5 | 0.2 | 0.6 |
| USA Commercial discards | not available | | | 3.6 | 2.9 | 1.6 | 1.9 | 1.6 | 3.6 | 2.5 |
| Total Catch | 26.1 | 23.5 | 26.8 | 30.4 | 31.4 | 28.5 | 27.1 | 31.4 | 0.2 | 12.0 |
| | | | | | | | | | | |
| Northern area | | | | | | | | | | |
| Biomass index | 1.04 | 0.97 | 1.71 | 1.07 | 0.70 | 0.97 | 0.83 | 5.57 | 0.67 | 2.09 |
| Z index(≥ 59cm,23.2") | 0.23 | 0.39 | 0.29 | 0.39 | 0.64 | 0.93 | 0.55 | 0.93 | 0.17 | 0.34 |
| Annual mortality index,% | 20.9 | 32.6 | 25.2 | 32.3 | 47.3 | 60.5 | 42.3 | 60.5 | 15.9 | 27.9 |
| Z index(≥ 30 cm, 11.8") | 0.37 | 0.55 | 0.59 | 0.55 | 0.59 | 0.42 | 0.69 | 0.69 | 0.11 | 0.29 |
| Annual mortalityindex(%) | 30.9 | 42.3 | 44.6 | 42.3 | 44.6 | 34.3 | 49.8 | 49.8 | 10.4 | 24.0 |
| Egg production index[3] | 0.46 | 0.41 | 0.47 | 0.46 | 0.41 | 0.40 | 0.33 | 2.19 | 0.33 | 1.07 |
| | | | | | | | | | | |
| Southern area | | | | | | | | | | |
| Biomass index | 0.29 | 0.61 | 0.39 | 0.39 | 0.59 | 0.50 | 0.30 | 4.92 | 0.27 | 1.15 |
| Z index(≥ 19 cm, 7.5") | 0.65 | 0.77 | 0.75 | 0.44 | 0.35 | 0.41 | 0.92 | 1.14 | 0.22 | 0.49 |
| Annual mortalityindex,% | 48.0 | 53.6 | 52.8 | 35.6 | 29.5 | 33.6 | 60.2 | 68.2 | 19.6 | 37.2 |
| Z index(≥ 30 cm, 11.8") | 0.92 | 0.65 | 0.84 | 0.61 | 0.46 | 0.39 | 1.14 | 1.14 | 0.20 | 0.51 |
| Annual mortalityindex,% | 60.2 | 47.8 | 56.8 | 45.7 | 36.9 | 32.3 | 68.0 | 68.0 | 18.1 | 38.8 |
| Egg production index[3] | 0.13 | 0.13 | 0.13 | 0.11 | 0.14 | 0.17 | 0.14 | 1.11 | 0.11 | 0.48 |

[1] 1970-1999. Commercial fishery discards not available before 1996, Canadian landings not available before 1985.
[2] Canadian landings are for NAFO Area 5Zc only; not available before 1985.
[3] Egg production index is a function of mean number per tow at length, proportion mature at length and fecundity at length.

**Stock Distribution and Identification:** The goosefish resource in US waters is distributed from the Gulf of Maine through Cape Hatteras. Data to definitively distinguish separate stock units of goosefish are currently unavailable. Assessment units as described in SAW-14 and SAW-23 are continued in this assessment.

**Catches:** Total reported landings (live weight) increased from several hundred mt in the early 1970s to 28,300 mt in 1997 and have since remained high (Figure B1). Landings in the early part of the time series are under-reported. The situation improved with mandatory reporting beginning in 1994. In the southern area (Figure B3), the pattern was similar to the northern (Figure B2), but with about a 5-year lag. By 1993, landings had reached 15,000 mt in the southern area. Landings (live weight) from Canadian waters (5Zc) are only available since 1986, but rose rapidly from about 340 mt in 1986 to a peak of over 1,550 mt in 1990. In more recent years, Canadian landings have remained below 200 mt (Figure B1). During 1997-1999, trawls caught 53% of USA landings, scallop dredges 20%, and gill nets 26%.

**Data and Assessment:** Goosefish were last assessed at SAW-23 in 1996. Data used in the current assessment included NEFSC research survey catch per tow indices (mean numbers and weights), research survey length distributions, and commercial fishery data from vessel trip reports, dealer records and on-board fishery observers. Mortality estimates were based on catch-per-tow-at-length indices from autumn, spring, scallop and winter surveys and on autumn bottom trawl survey catch-per-tow-at-age indices.

**Biological Reference Points:** Biological reference points for goosefish as defined in the Monkfish Fishery Management Plan are as follows: for the northern stock component, $F_{threshold}$ (average F during 1970-1979) = 0.05, $B_{threshold}$ (33rd percentile of the 1963-1994 NEFSC autumn trawl survey catch (kg) per tow) =1.46 kg/tow, $F_{target}$ (= $F_{0.1}$) is undefined, $B_{target}$ (the median of the 3-year moving average of the 1965-1981 NEFSC autumn trawl survey catch (kg) per tow) = 2.29 kg/tow; for the southern stock component, $F_{threshold}$ = 0.21, $B_{threshold}$ = 0.75 kg/tow, $F_{target}$ = 0.10, $B_{target}$ =1.85 kg/tow.

In previous assessments fishing mortality was estimated from the autumn survey length frequencies using L' of 59 cm for the north and 19 cm for the south. Analyses conducted during SARC 31 indicated that L' = 30 cm was appropriate for both components based on similarities in selectivity. Using this approach resulted in an unfeasible estimate of $F_{threshold}$ for the northern component and F = 0.12 for the southern component. The analysis shows an underlying trend in total mortality is consistent with increasing catches and decreases in average and maximum size but F cannot be estimated reliably. Therefore, although the current proxies are considered unreliable, the total mortality index reflects that overfishing is occurring. The SARC noted that the fishing Reference Points need to be reevaluated. However, neither the data nor analysis was available to recommend updated values.

The time period of survey indices use to determine biomass thresholds for the southern stock was reconsidered to ensure the use if a directly comparable series of indices; the SARC suggests adoption of a revised $B_{threshold}$ for the southern stock component of 0.70 kg/tow. $B_{target}$ is unaffected by the change in time period.

**Fishing Mortality:** Although the absolute fishing mortality rate could not be reliably estimated, trends in the total mortality index indicate increases in the northern survey indices and 2 of the 4 of the southern indices. Indices based on the longest period and widest area coverage indicate that total mortality has increased in both areas. Total mortality indices in the 1990s were two to three times those in the 1970s (Figures B2 and B5). The above estimates are based on length; age based estimates are consistent with these results.

**Recruitment:** There is evidence of increased recruitment in the northern area during the 1990s (Figure B6). These fish, however, have not appeared to persist long enough to translate into increased biomass. In the southern area recruitment appears to have fluctuated without trend. (Figure B7)

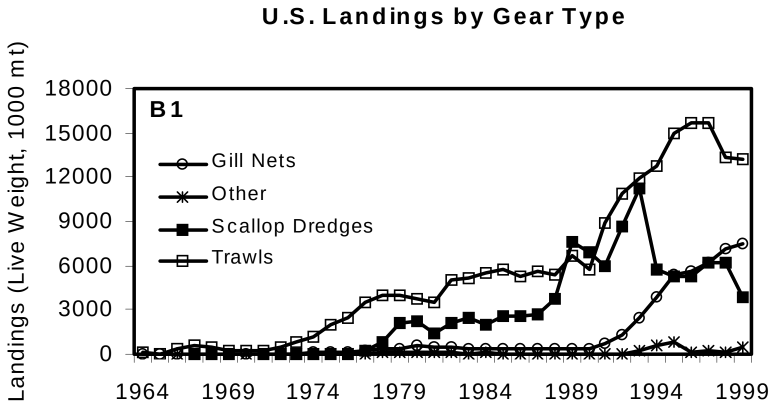
**Total Stock Biomass:** The current biomass index for the northern component is 0.82 kg/tow relative to a $B_{threshold}$ of 1.46 (Figure B8); and the southern component index is 0.47 kg/tow relative to a $B_{threshold}$ of 0.75 (Figure B9).

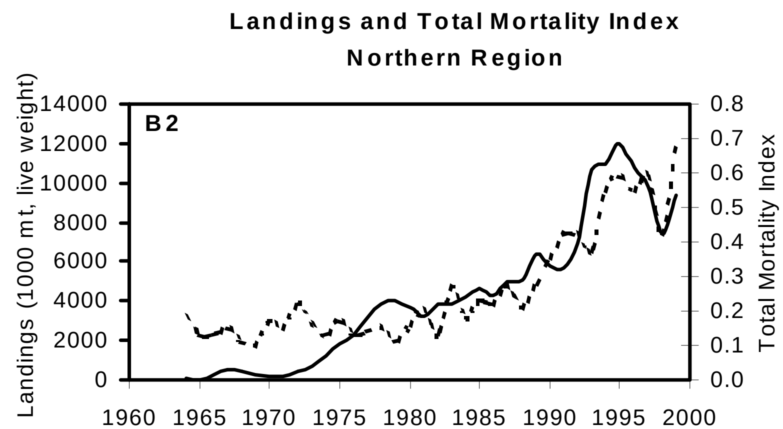
**Spawning Stock Biomass:** Egg production indices for the northern area are at 22% of their 1970-1979 average and 15% of the maximum observed (Figure B10). For the southern area, egg production indices are at 17% of the 1970-1979 average and 7% of the maximum observed (Figure B10). The proportion of egg production generated by females smaller than the size at full maturity increased rapidly from the early 1980s through the mid-1990s and has since declined.

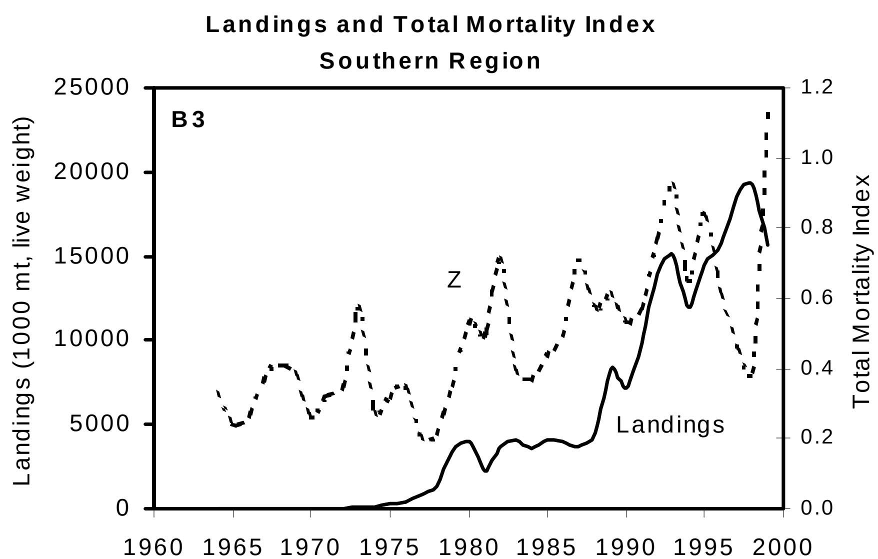
**Special Comments**: Both fishing mortality rate (F) and biomass (B) criteria need to be reevaluated for consistency and attainability with respect to the control rules implied by the FMP. Of particular concern are the biomass targets.

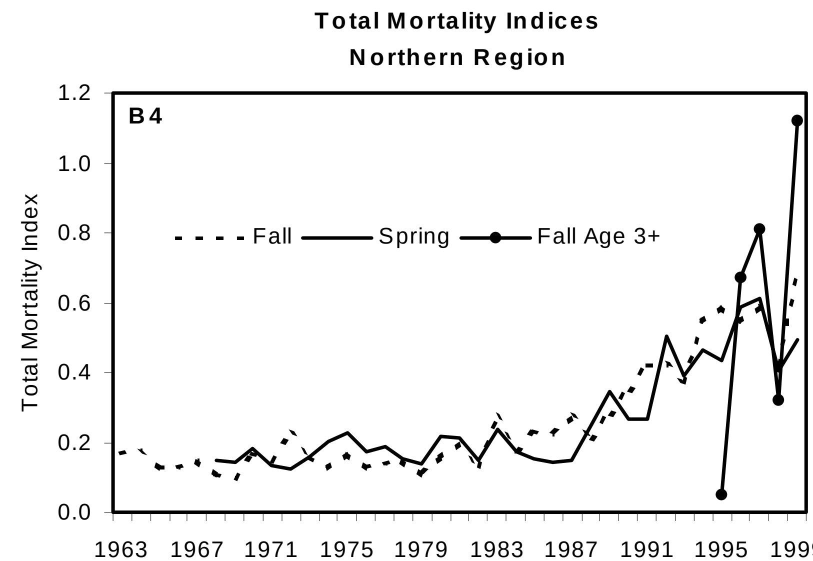
The SARC examined unaudited VTR data indicating location of commercial fishing trips (Figure B12). Because of outliers among the unaudited data, only patterns can be inferred.

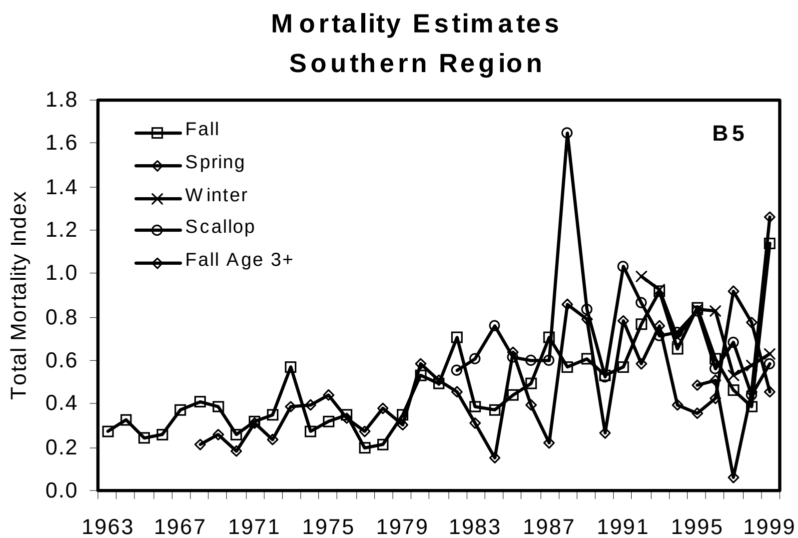
**Sources of Information:** NEFSC 1997. Report of the 23rd Northeast Regional Stock Assessment Workshop (23rd SAW). NEFSC Reference Document 97-05. NEFSC 2000. Report of the 31st Northeast Regional Stock Assessment Workshop (31st SAW): SARC Consensus Summary of Assessments. NEFSC Reference Document 00-15.


U.S. Landings by Gear Type
B1
Landings (Live Weight, 1000 mt)
18000
15000
12000
9000
6000
3000
0
1964
1969
1974
1979
1984
1989
1994
1999
Gill Nets
Other
Scallop Dredges
Trawls

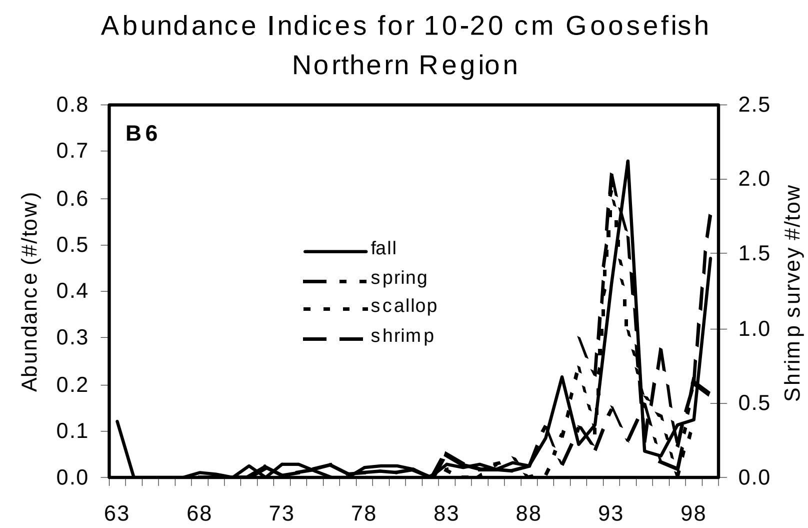

Landings and Total Mortality Index
Northern Region
B2
Landings (1000 mt, live weight)
Total Mortality Index
14000
12000
10000
8000
6000
4000
2000
0
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1960
1965
1970
1975
1980
1985
1990
1995
2000


Landings and Total Mortality Index
Southern Region
B3
Landings (1000 mt, live weight)
Total Mortality Index
25000
20000
15000
10000
5000
0
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Z
Landings
1960
1965
1970
1975
1980
1985
1990
1995
2000

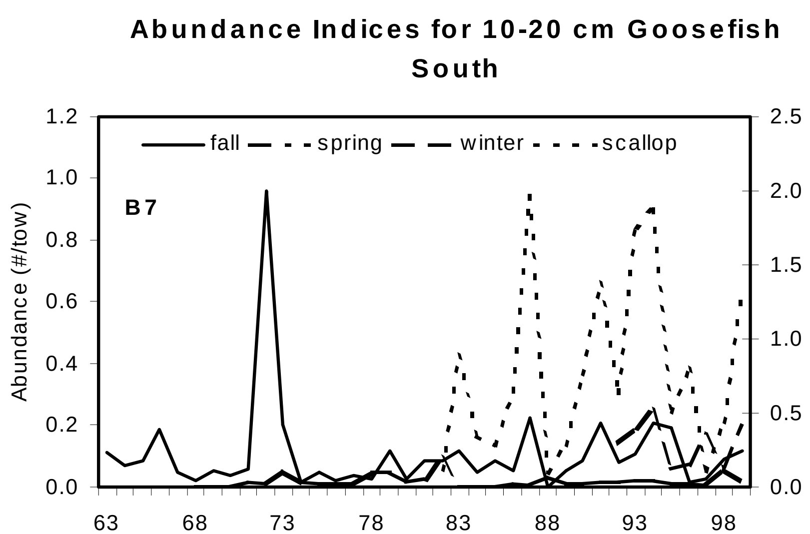

Total Mortality Indices
Northern Region
B4
Total Mortality Index
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Fall
Spring
Fall Age 3+
1963
1967
1971
1975
1979
1983
1987
1991
1995
1999



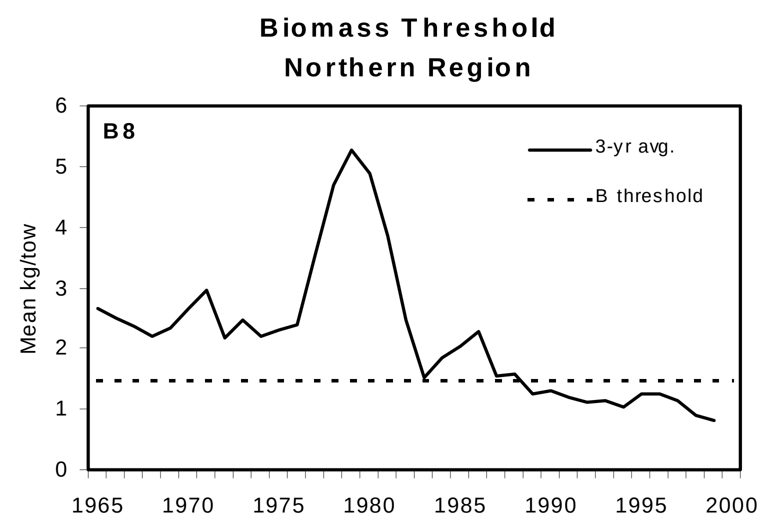
Mortality Estimates
Southern Region
B5
Fall
Spring
Winter
Scallop
Fall Age 3+
Total Mortality Index
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1963
1967
1971
1975
1979
1983
1987
1991
1995
1999

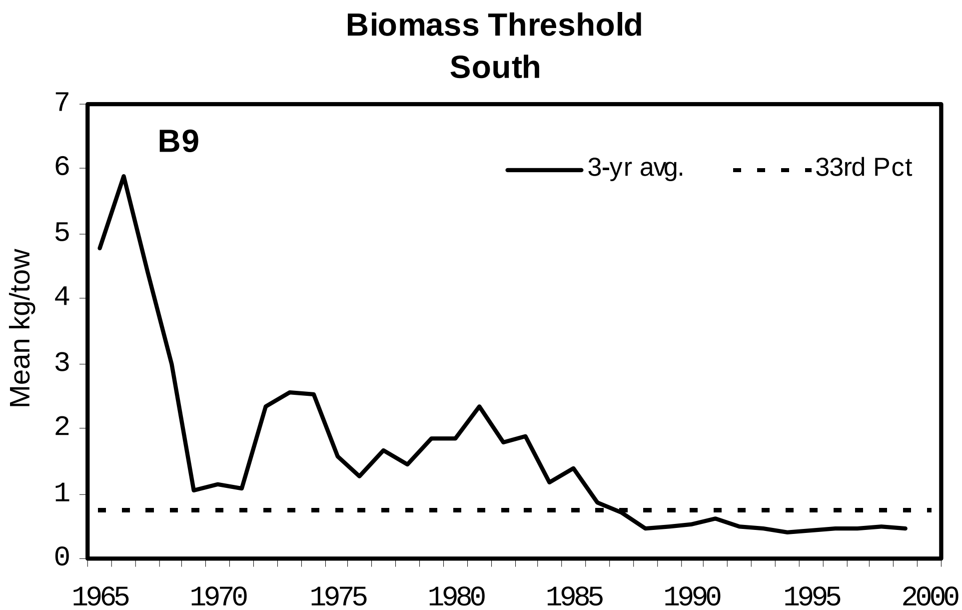
Abundance Indices for 10-20 cm Goosefish
Northern Region
B6
fall
spring
scallop
shrimp
Abundance (#/tow)
Shrimp survey #/tow
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2.5
2.0
1.5
1.0
0.5
0.0
63
68
73
78
83
88
93
98

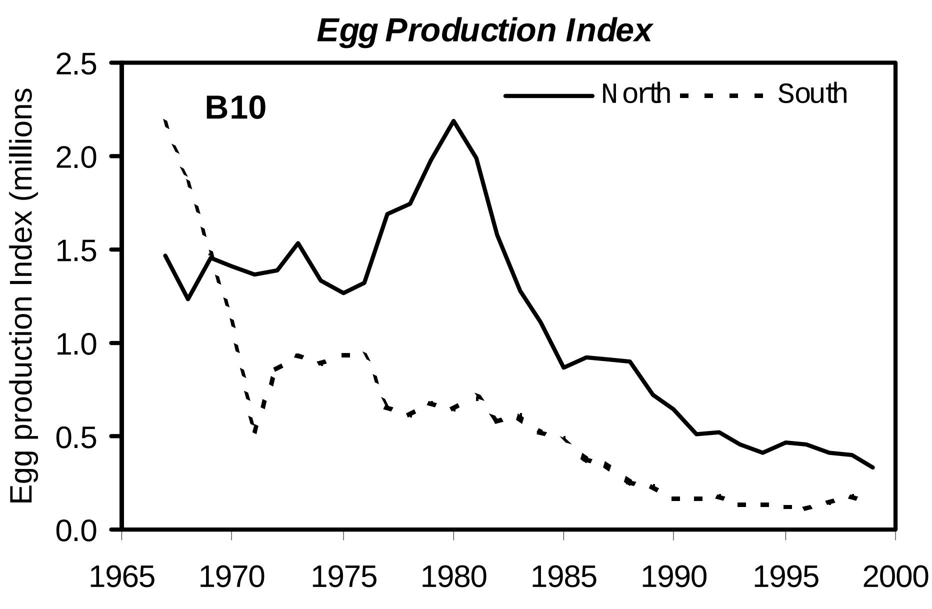



Abundance Indices for 10-20 cm Goosefish
South
fall
spring
winter
scallop
B7
Abundance (#/tow)
Scallop survey #/tow
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2.5
2.0
1.5
1.0
0.5
0.0
63
68
73
78
83
88
93
98

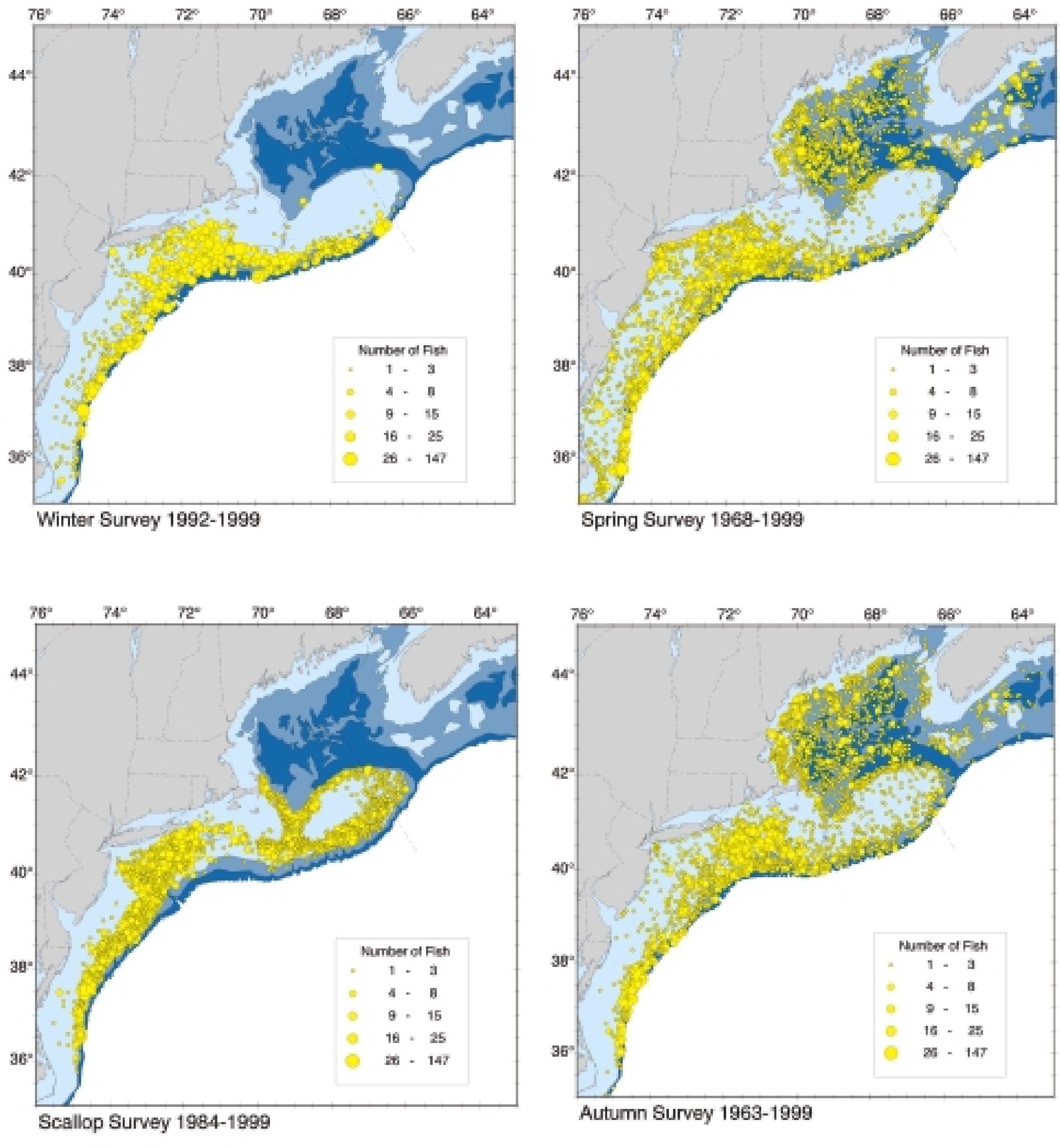



Biomass Threshold
Northern Region
B8
3-yr avg.
B threshold
Mean kg/tow
6
5
4
3
2
1
0
1965
1970
1975
1980
1985
1990
1995
2000

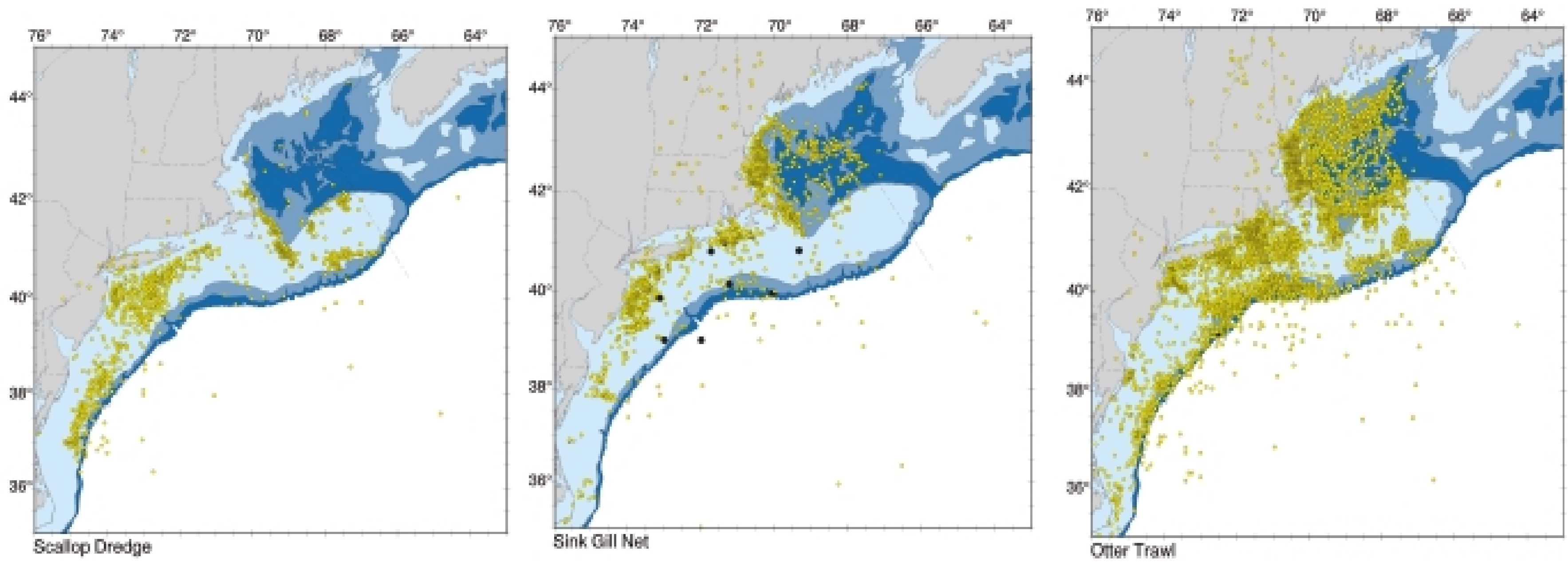

Biomass Threshold
South
B9
3-yr avg.
33rd Pct
Mean kg/tow
0
1
2
3
4
5
6
7
1965
1970
1975
1980
1985
1990
1995
2000


Egg Production Index
B10
North
South
Egg production Index (millions
0.0
0.5
1.0
1.5
2.0
2.5
1965
1970
1975
1980
1985
1990
1995
2000

### *B11. Goosefish Survey Distributions*



## *B12. Goosefish Trip Locations 1998 (Unaudited Vessel Trip Reports)*



# C. OCEAN QUAHOG ADVISORY REPORT

**State of Stock:** The ocean quahog resource in EEZ waters from Southern New England (SNE) to Southern Virginia (SVA) is not overfished and overfishing is not occurring. The current biomass is high (Figures C1-C3) with current catches near MSY. Annual recruitment is approximately 1-2% of stock biomass and lower or roughly equal to the rate of natural mortality. Since the fishery began in the late 1970s, biomass has declined slowly from virgin levels. At current catch levels biomass is projected to decline gradually over the next decade. The percentage of virgin biomass in the assessed area remaining in 1997-1999 is 88% (all regions) and 82% (all regions less Georges Bank). The stock off the coast of Maine continues to be harvested, but the condition of the resource there is unknown. The status of the stock relative to Biological reference points is shown in Figure C7.

**Management Advice:** Current fishing mortality is near $F_{target}$ for the resource taken as a whole. However, it may be advantageous to avoid localized depletion.

**Projections (weights in mt of meats):**

| | SVA[1] | DMV | NJ | LI | SNE | GBK | EEZ |
|---|---|---|---|---|---|---|---|
| Estimated Biomass in 1999 (000 mt meats)[2] | 0.079 | 60 | 260 | 530 | 330 | 620 | 1,800 |
| CV[3] | 10% | 18% | 24% | 17% | 13% | 37% | 14% |
| Projected Recruitment (000 mt meats)[2,4] | 0.0035 | 1.5 | 3.9 | 6.5 | 4.1 | 6.8 | 23 |
| Projected Catch (000 mt meats)[5] | 0.0 | 1.2 | 3.3 | 6.0 | 7.3 | 0.0 | 18 |
| Projected Biomass in 2002 (000 mt meats)[2] | 0.089 | 62 | 250 | 512 | 310 | 620 | 1,760 |
| % Change | 12% | 0% | -1% | -3% | -6% | 0% | -2% |

[1]Estimates for SVA not reliable. [2]From KLAMZ delay-difference biomass dynamics model for quahog 70+ mm shell length. [3]Bootstrap, 500 iterations. [4]Constant over time. [5]Mean 1997-1999.

## Catch and Status Table (weights in ‘000 mt meats): Ocean quahogs

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | Max[1] | Min[1] | Mean[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Landings | | | | | | | | | | | | |
| SVA | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | < 0.1 |
| DMV | 5 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 12 | 1 | 4 |
| NJ | 15 | 7 | 10 | 7 | 5 | 5 | 4 | 3 | 3 | 16 | 3 | 8 |
| LI | 2 | 12 | 9 | 12 | 9 | 6 | 5 | 7 | 6 | 12 | 0 | 3 |
| SNE | 1 | 1 | 1 | 1 | 5 | 8 | 9 | 6 | 7 | 9 | 0 | 2 |
| GBK | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EEZ | 22 | 22 | 22 | 21 | 21 | 20 | 19 | 17 | 17 | 22 | 8 | 18 |
| Biomass[2] | | | | | | | | | | | | |
| SVA[3] | 0.054 | 0.057 | 0.060 | 0.063 | 0.066 | 0.070 | 0.073 | 0.076 | 0.079 | 0.320 | 0.054 | 0.152 |
| DMV | 70 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 130 | 60 | 90 |
| NJ | 290 | 280 | 270 | 270 | 260 | 260 | 260 | 260 | 260 | 360 | 260 | 310 |
| LI | 590 | 590 | 570 | 560 | 550 | 540 | 540 | 530 | 530 | 590 | 530 | 580 |
| SNE | 360 | 360 | 360 | 360 | 360 | 360 | 350 | 340 | 330 | 370 | 330 | 360 |
| GBK | 620 | 620 | 620 | 620 | 620 | 620 | 620 | 620 | 620 | 620 | 620 | 620 |
| EEZ | 1,900 | 1,900 | 1,900 | 1,900 | 1,900 | 1,800 | 1,800 | 1,800 | 1,800 | 2,100 | 1,800 | 2,000 |
| Fishing Mortality Rate (F $y^{1}$)[2] | | | | | | | | | | | | |
| SVA[3] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.01 | 0.00 | 0.09 |
| DMV | 0.08 | 0.04 | 0.03 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.15 | 0.01 | 0.05 |
| NJ | 0.05 | 0.03 | 0.04 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.05 | 0.01 | 0.03 |
| LI | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 | 0.01 |
| SNE | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.03 | 0.00 | 0.01 |
| GBK | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| EEZ | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |

[1]1978-1999. [2]From KLAMZ delay-difference biomass dynamics model for quahog 70+ mm shell length.
[3]Estimates for SVA not reliable.

**Stock Distribution and Identification:** Ocean quahogs are distributed on both sides of the North Atlantic. They occur from Norway to Spain, intermittently across the North Atlantic and down the North American coast to Cape Hatteras. Commercial concentrations occur on the continental shelf, off the coast of Maine and between Georges Bank and the Delmarva Peninsula, to at least 90 m (Figure C4). The assessment and management regime assumes a unit stock.

**Catches:** EEZ landings generally account for about 95-100% of total US landings. Annual EEZ quotas have been set since 1978. EEZ landings increased from 0 in 1975 to 14 thousand mt (meats) in 1979, and peaked at 23 thousand mt in 1992 (Figure C3). The spatial distribution of fishing grounds has changed markedly over last two decades (Figures C3, C4) in response to a variety of factors including reductions in local catch rates and relocations of processing plants. The fishery was concentrated off Delmarva and Southern New Jersey from the 1970s to mid-1980s. During the late 1980s and early 1990s, the fishery expanded northward into the Northern New Jersey region, and then to the Long Island region. In 1995, it expanded to the Southern New England region. In 1999, 76% of the catches were from the Long Island and S. New England regions. Total annual landings off the coast of Maine ranged from 200-400 mt during 1995-1999

**Data and Assessment:** Ocean quahogs were last assessed in 1998 (SAW-27). The present assessment uses efficiency corrected swept area biomass estimates for the EEZ from the 1997 and 1999 surveys. The catch-swept area assessment model estimated recent fishing mortality rates by dividing recent catches (mean catches during 1997-1999) by recent biomass (the mean of 1997 and 1999 swept area biomass). The new biomass dynamics model (KLAMZ) used efficiency-corrected swept area biomass estimates from 1997 and 1999, LPUE, a von Bertalanffy growth curve, region-specific shell length-meat weight relationships, and research survey data to estimate ocean quahog biomass, mean annual recruitment biomass and fishing mortality rates during 1978-1999. Discards and indirect mortality from commercial dredging were assumed equal to 0 in all analyses. Neither the thirty-year supply model nor the production model, used previously, was used in this assessment. Figure C5 shows the trends in survey and LPUE since 1980. )

**Biological Reference Points:** Reference points were last revised in 1997 for SARC-27 (NEFSC, 1998) and are retained for this assessment. The estimates for ocean quahogs from 1997 were $F_{max}$= 0.065 $y^{-1}$, $F_{0.1}$= 0.022 $y^{-1}$ and $F_{25\%MSP}$ = 0.042 $y^{-1}$. These estimates assumed M = 0.02 $y^{-1}$, recruitment to the fishery at 60 mm (Age 17) and maturity between 5 and 11 years.

The present management "targets" are one-half of the virgin biomass for the total stock and the $F_{0.1}$ level of fishing mortality in the exploited region. The present "thresholds" are one quarter of the total virgin biomass and $F_{25\%MSP}$ .

The proxy $F_{MSY}$=$F_{0.1}$=0.022 $y^{-1}$ and estimates of one-half virgin biomass indicate that the MSY catch level is about 22 thousand mt meats $y^{-1}$ (4.8 million bushels) for the whole stock and 14 thousand mt meats $y^{-1}$ (3.1 million bushels)for the whole stock minus Georges Bank (GBK) where no fishing occurs due to paralytic shellfish poison (PSP).

**Fishing Mortality:** Recent F (for 1997-1999) was estimated to be 0.015 $y^{-1}$ for the EEZ excluding GBK and the Gulf of Maine (Figure C1) (95% confidence interval 0.011 - 0.022 $y^{-1}$). A stockwide estimate (excluding Gulf of Maine) of F is 0.010 (95% confidence interval 0.007 - 0.014 $y^{-1}$). Recent observed Fs do not exceed the overfishing threshold ( $F_{25\%MSP}$ = 0.042 $y^{-1}$) or the overfishing target (0.022). The uncertainty in the estimated fishing mortalities is shown in Figure C7

**Recruitment:** The mean annual recruitment was estimated as 23,000 mt per year for the stock as a whole and 16,000 mt per year excluding Georges Bank.

**Stock Biomass:** Current biomass is 1.8 million mt meats (95% confidence interval 1.4 – 2.4) for the stock as a whole and 1.2 million mt (95% confidence interval 1.0-1.5) excluding Georges Bank (GBK). Approximately 83% of the current biomass is located in the GBK, Long Island, and S. New England regions (Figure C3). The biomass in 1976, which is assumed to approximate an unfished or virgin stock, was 2.1 million mt for the stock as a whole and 1.5 million mt excluding GBK. Ratios of recent to virgin biomass were 100% (GBK), 92% (SNE), 90% (LI), 73% (NJ), 47% (DMV). The uncertainty in the estimated biomass is shown in Figure C8.

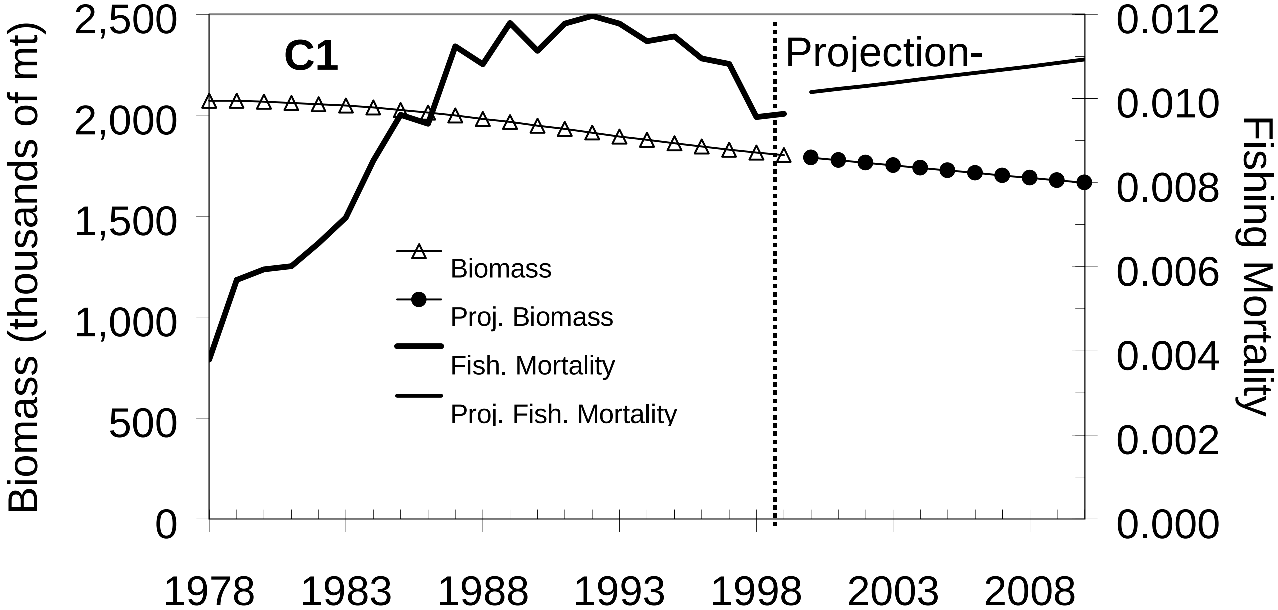
**Special Comments:** NMFS survey sampling in 1999 was extended to strata in deeper water, 40 - 60 fm, in LI, SNE and GBK for the first time in 1999 to estimate the fraction of the resource that had not been surveyed previously. The percentage of the total regional biomass estimated in the deep strata is 0% (LI), 2% (SNE), and 13% (GBK).

A major effort was made by NMFS, academia and industry collaborators from 1997-2000 to estimate the efficiency of the NMFS clam dredge. Nevertheless, a key source of uncertainty in the assessment was the survey dredge efficiency. Also, the assumption that indirect mortality due to fishing is 0 is a source of uncertainty.

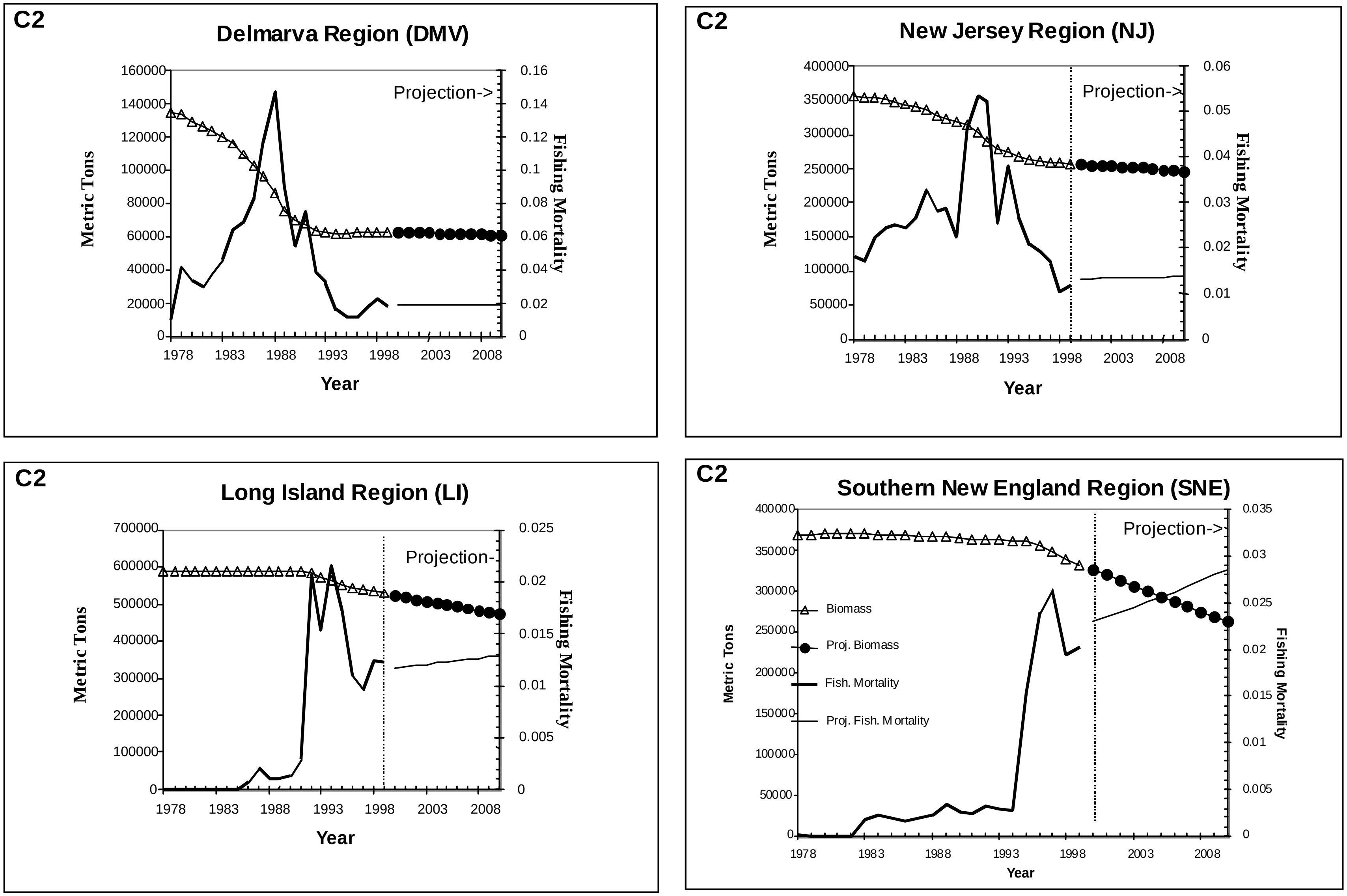
The results of a recent genetic study (Dahlgren et al., in press) are consistent with the assumption that ocean quahogs throughout the EEZ are a single population."
Current $F_{MSY}$ and $B_{MSY}$ proxies should be reviewed because of the unusual life history (extreme longevity, slow growth, low productivity) of ocean quahogs.

**Sources of Information:** NEFSC, 1998a. 27th Northeast Regional Stock Assessment Workshop (27th SAW). Public Review Workshop. E. Ocean quahog Advisory Report pp 32-42. NEFSC Ref. Doc. 98-14; NEFSC, 1998b. 27th Northeast Regional Stock Assessment Workshop (27th SAW). Consensus Summary of Assessments. E. Ocean quahogs. pp 171-244. NEFSC Ref. Doc. 98-15; NEFSC, 2000. 31st Northeast Regional Stock Assessment Workshop (31st SAW). Consensus Summary of Assessments. NEFSC Ref. Doc. 00-15.

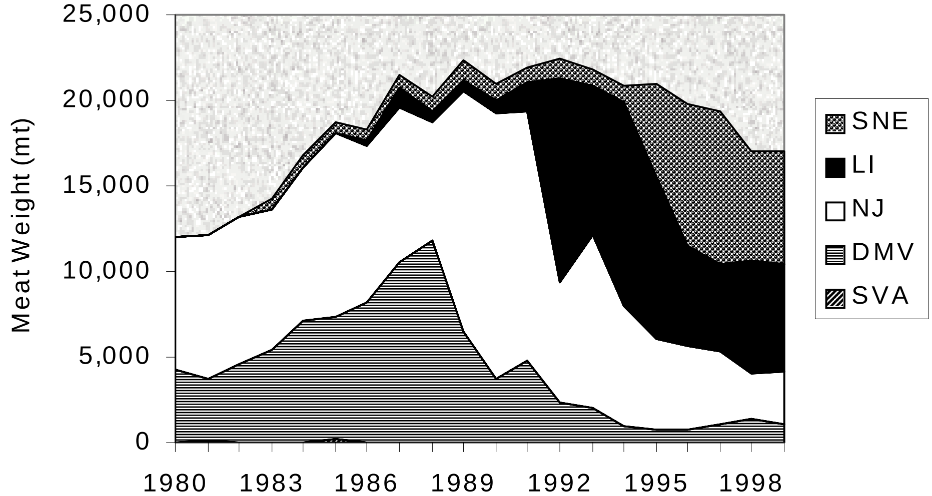
## Estimated and Projected Ocean Quahog Biomass and Fishing Mortality (EEZ)



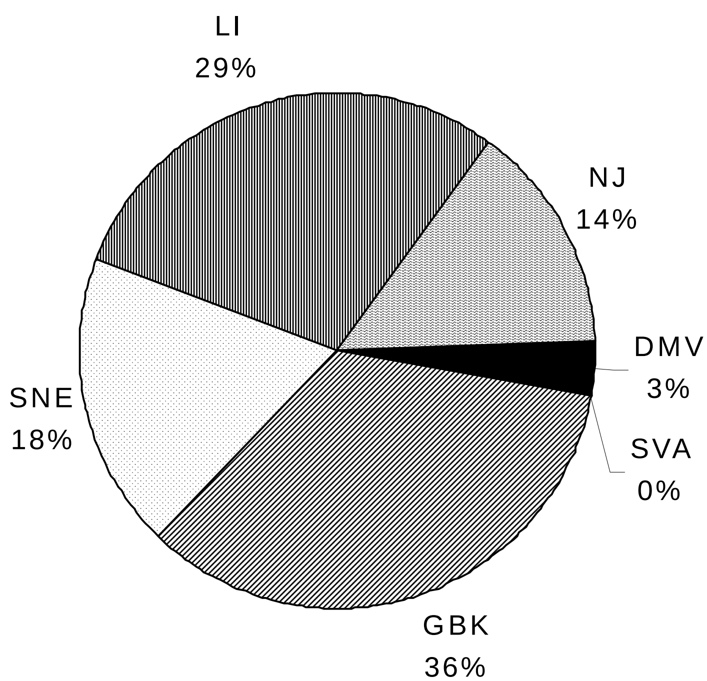
## Estimated and Projected Ocean Quahog Biomass and Fishing Mortality (by Subregion)



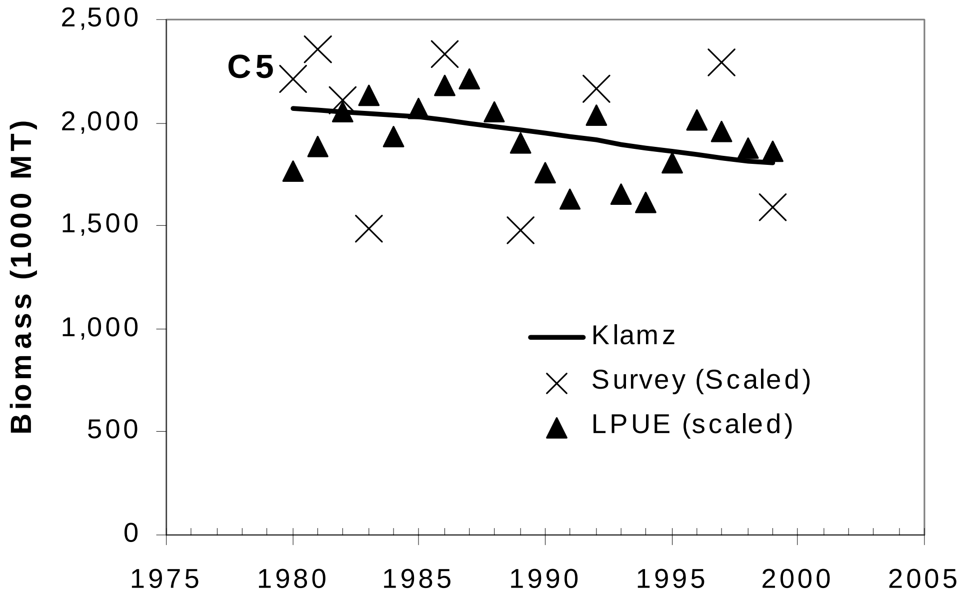
## C3. Ocean Quahog Landings (by Subregion)



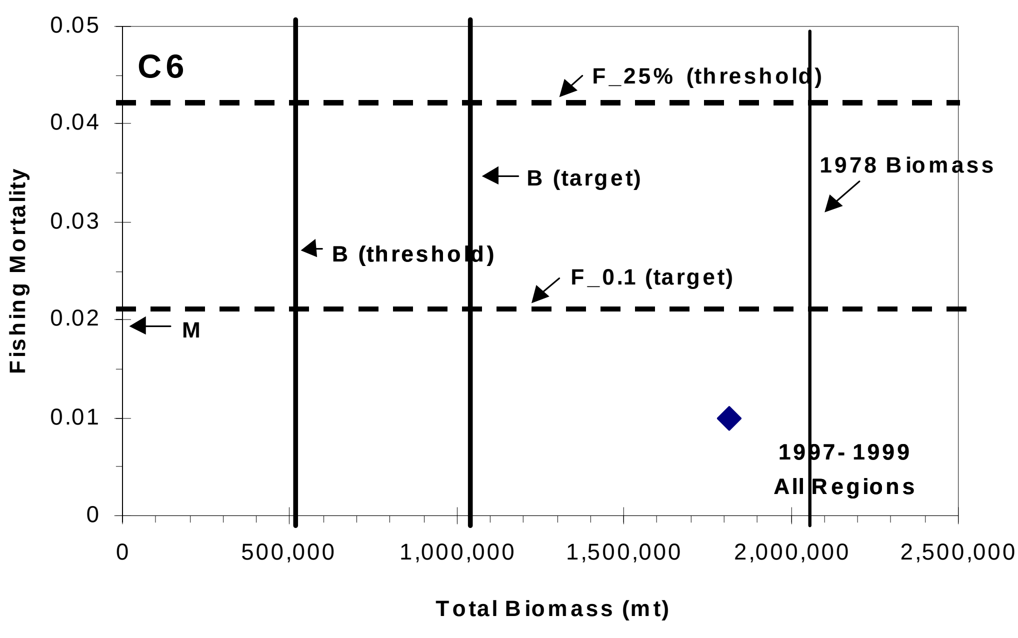

## C4. Ocean Quahog Biomass in 1999 (percentage by Subregion)

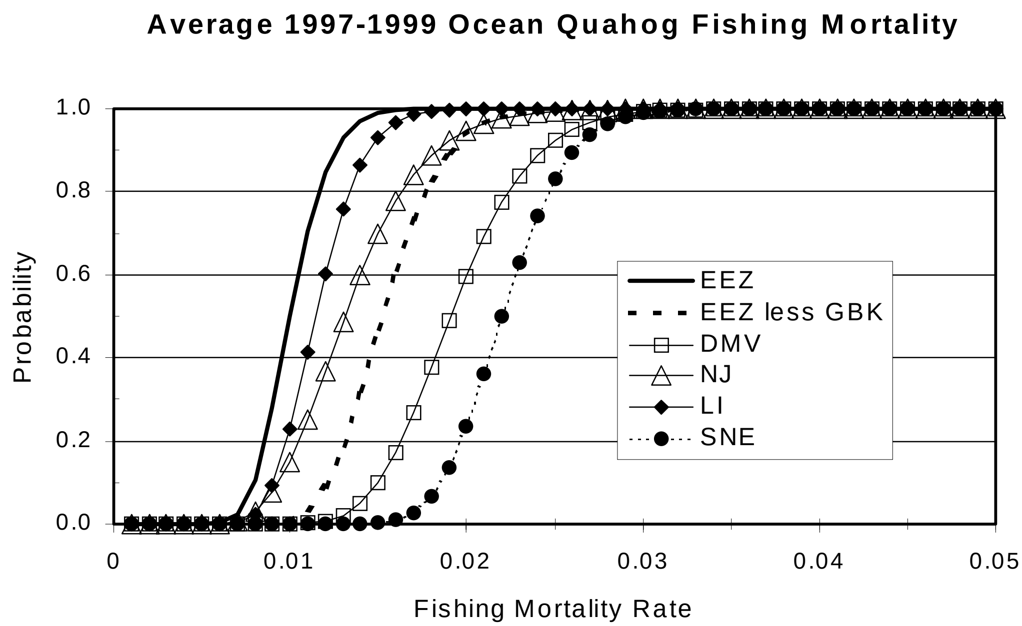


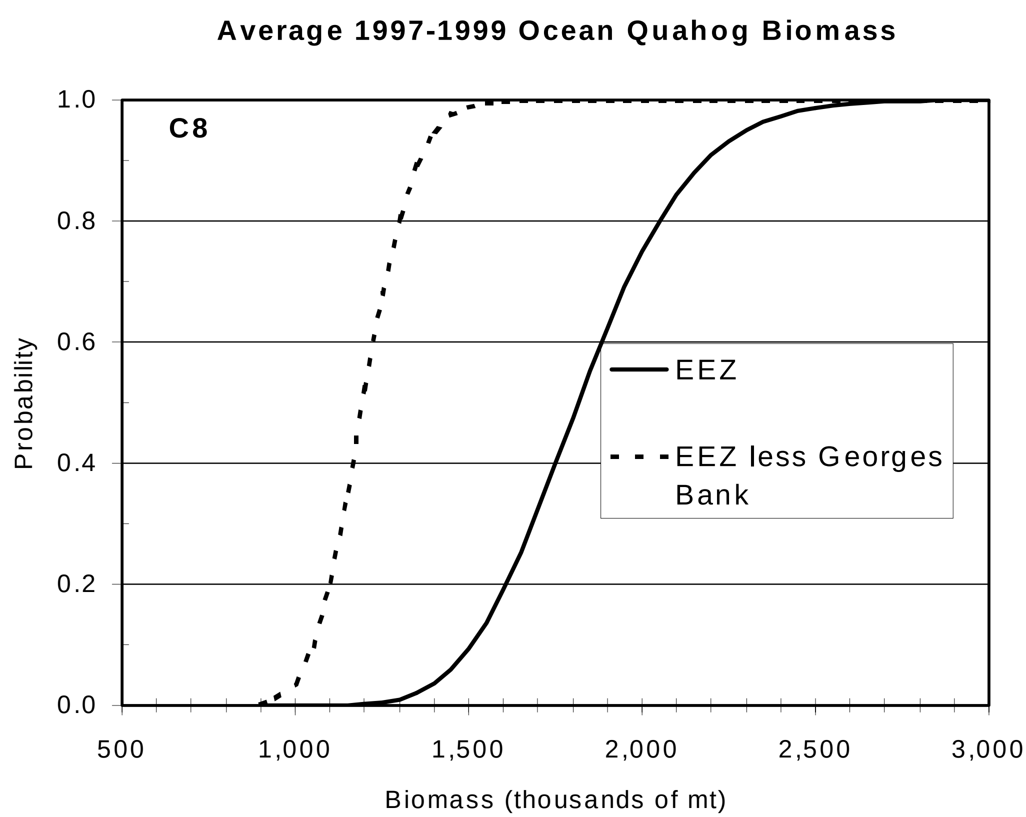
## Survey and LPUE Trends for EEZ Stock and Biomass Estimates from the KLAMZ Model




## SFA Biomass and F Targets and Thresholds




Average 1997-1999 Ocean Quahog Fishing Mortality
Probability
1.0
0.8
0.6
0.4
0.2
0.0
0
0.01
0.02
0.03
0.04
0.05
Fishing Mortality Rate
EEZ
EEZ less GBK
DMV
NJ
LI
SNE


Average 1997-1999 Ocean Quahog Biomass
C8
Probability
1.0
0.8
0.6
0.4
0.2
0.0
500
1,000
1,500
2,000
2,500
3,000
Biomass (thousands of mt)
EEZ
EEZ less Georges Bank

# D. SUMMER FLOUNDER ADVISORY REPORT

**State of Stock:** The fishing mortality rate has declined from 1.31 in 1994 to 0.32 in 1999 (Figure D1). However, the stock is overfished and overfishing is occurring relative to the FMP overfishing definition. The 1999 estimate of fishing mortality is 23% above the FMP overfishing definition ($F_{threshold} = F_{target} = F_{max} = 0.26$; Figure D7). There is an 80% chance that the 1999 F was between 0.28 and 0.38 (Figure D6).

Total stock biomass has increased substantially since 1991 and has been stable since 1994 at about 41,000 mt. The 1999 biomass was estimated to be 41,400 mt, still 23% below the FMP biomass threshold (Figures D2, D7). The NEFSC spring survey (1968-2000) stock biomass index peaked during 1976-1977, and in 2000 was at about 90% of that peak (Figure D8). There is an 80% chance that total stock biomass in 1999 was between 37,500 and 45,500 mt (Figure D5). The FMP biomass target ($B_{MSY}$) required to produce maximum sustainable yield (MSY=20,900 mt) is estimated to be $B_{MSY}$ = 106,400 mt, and the FMP biomass threshold of one-half $B_{MSY}$ = 53,200 mt.

Spawning stock biomass (SSB; Age 0+) declined 72% from 1983 to 1989 (18,800 mt to 5,200 mt), but has increased five-fold, with improved recruitment and decreased fishing mortality, to 29,300 mt in 1999 (Figure D2). The age structure of the spawning stock has expanded, with 78% at ages 2 and older, and 10% at ages 5 and older. Under equilibrium conditions at $F_{max}$, about 85% of the spawning stock biomass would be expected to be ages 2 and older, with 50% at ages 5 and older (Figure D9).

The 1995 year-class is estimated at 46 million fish, the largest since 1986. The 1996, 1997, and 1998 year-classes are estimated to be of about average size at 32 to 38 million fish (VPA 1982-1999 arithmetic mean = 40 million; median = 38 million). The 1999 year-class is currently estimated to be the smallest since 1988, at 19 million fish (Figure D2) It should be noted that retrospective analysis shows that the VPA tends to underestimate recent year-classes. Recent recruitment per unit of SSB has been lower than that observed at comparable abundance of SSB observed during the early 1980s.

**Management Advice:** If the landings for 2000 do not exceed 8,400 mt, the total allowable landings (TAL) in 2001 should be 9,281 mt (20.5 million lbs) to meet the FMP target F rate of $F_{max}$ = 0.26 (Figure D4).

**Forecasts for 2000-2002:** Stochastic forecasts incorporate only uncertainty in 2000 stock sizes caused by survey variability and assume current discard to landings proportions. If landings in 2000 are at the TAL (8,400 mt), the forecast estimates a median F = 0.28 It also implies that there is a 75% probability that the target F for 2000 (i.e., $F_{max}$ = 0.26) will be exceeded. Also under the 8,400 mt scenario, the median total stock biomass on January 1, 2001 is 55,600 mt, which is above the biomass threshold of ½ $B_{MSY}$ = 53,2000 mt (Figures D4, D7).

Landings of 9,300 mt and discards of 1,100 mt in 2001 provide a median F = 0.26 and a median total stock biomass level on January 1, 2002 of 66,100 mt. For the forecast that assumes that median F in 2000 will be 0.26, landings of 8,000 mt and discards of 1,000 mt in 2000 provide a median total stock biomass on January 1, 2001 of 56,300 mt.

**Assumptions:** Option 1 - 2000 landings = 8, 400 mt; Option 2 - 2000 landings such that median F=0.26; 2000-2002 median recruitment from 1982-1999 VPA estimates (37.8 million).

**Forecast medians (50% probability level)**
(landings, discards, and total stock biomass (TB) in '000 mt)

| | 2000 | | | | 2001 | | | | 2002 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Option | F | Land. | Disc. | TB | F | Land. | Disc. | TB | F | Land. | Disc. | TB |
| **1** | 0.28 | 8.4 | 1.1 | 47.1 | 0.26 | 9.3 | 1.1 | 55.6 | 0.26 | 10.9 | 1.4 | 66.1 |
| **2** | 0.26 | 8.0 | 1.0 | 47.1 | 0.26 | 9.4 | 1.1 | 56.3 | 0.26 | 11.0 | 1.4 | 66.4 |

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

| Year | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | Max[2] | Min[2] | Mean[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| Commercial landings | 5.7 | 6.6 | 7.0 | 5.8 | 4.0 | 5.1 | 4.8 | 17.1 | 3.9 | 8.9 |
| Commercial discards | 0.8 | 0.9 | 0.3 | 0.5 | 0.3 | 0.4 | 1.5 | 1.5 | 0.3 | 0.8 |
| Recreational landings | 3.5 | 4.1 | 2.5 | 4.7 | 5.4 | 5.7 | 3.8 | 12.7 | 1.4 | 4.2 |
| Recreational discards | 0.7 | 0.6 | 0.7 | 0.6 | 0.6 | 0.5 | 0.7 | 0.7 | 0.1 | 0.6 |
| Catch used in assessment | 10.8 | 12.2 | 10.5 | 11.6 | 10.3 | 11.7 | 10.9 | 26.5 | 8.0 | 15.1 |
| Commercial quota | 5.6 | 7.1 | 6.6 | 4.9 | 3.8 | 4.8 | 4.9 | | | |
| Recreational harvest limit | 3.8 | 4.8 | 3.5 | 3.2 | 3.4 | 3.4 | 3.4 | | | |
| Spawning stock biomass[1] | 9.3 | 12.4 | 17.8 | 20.0 | 22.4 | 28.2 | 29.4 | 29.4 | 5.2 | 15.0 |
| Recruitment (age 0) | 33.6 | 38.3 | 46.1 | 37.8 | 37.5 | 32.2 | 19.2 | 80.3 | 13.0 | 40.3 |
| Total stock biomass[3] | 21.3 | 29.2 | 39.1 | 42.0 | 37.9 | 42.7 | 41.4 | 48.3 | 16.1 | 33.2 |
| F (ages 3-5, u) | 0.98 | 1.31 | 1.20 | 1.05 | 0.95 | 0.49 | 0.32 | 2.15 | 0.32 | 1.30 |
| Exploitation rate | 58% | 67% | 65% | 62% | 58% | 37% | 25% | 83% | 25% | 67% |

[1]At the peak of the spawning season (i.e., on November 1), ages 0-7+ . [2]Over period 1982-1999. [3]On January 1.

**Stock Distribution and Identification:** 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. A new summer flounder genetics study, which revealed no significant population subdivision centered around Cape Hatteras (Jones and Quattro, 1999), is consistent with the definition of the management unit.

**Catches:** Recent commercial landings peaked in 1984 at 17,100 mt; recreational landings peaked in 1983 at 12,700 mt. 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 1999 landings in the commercial fishery used in the assessment were 4,826 mt, about 1% under the commercial quota. Estimated 1999 landings in the recreational fishery were 3,804 mt, about 13% 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 autumn, Massachusetts spring and autumn, Rhode Island, Connecticut spring and autumn trawl, Delaware, and New Jersey trawl surveys were used in VPA tuning. In addition, recruitment indices from surveys conducted by the states of North Carolina, Virginia, and Maryland were used in VPA tuning in an ADAPT framework. The uncertainty associated with the estimates of fishing mortality and spawning stock biomass in 1999 was evaluated with respect to research survey variability (Figures D5, D6).

**Biological Reference Points:** Biological reference points for summer flounder are based on a yield per recruit model (Thompson-Bell). The SAW-11 analysis in 1990 using 1987-1989 partial recruitment patterns and mean weights at age estimated that $F_{max}$ = 0.23. The SAW 25 analysis in 1997 using 1995-1996 partial recruitment patterns and mean weights at age estimated that $F_{max}$ = 0.24. The yield per recruit analysis conducted for the 1999 assessment (Terceiro 1999) has been retained for this assessment, because of the stability of the input data. and indicates that $F_{max}$ = 0.26 (Figure D3) which is used as a proxy for $F_{target}$ and $F_{threshold}$. SFA stock biomass reference points have been estimated as the product of yield per recruit (0.552 kg per recruit) and total stock biomass per recruit (2.813 kg per recruit) at $F_{max}$ = 0.26, and median recruitment of 37.8 million fish per year. Yield at $F_{max}$ used as a proxy to MSY is estimated to be 20,900 mt (46 million lbs), and the corresponding biomass, used as a proxy for $B_{MSY,}$ is estimated to be 106,400 mt (235 million lbs; Figure D7).

**Fishing Mortality:** Fishing mortality calculated from the average of the currently fully recruited ages (3-5) summer flounder has been high, varying between 0.9 and 2.2 during 1982-1997 (55%-83% exploitation), far in excess of the revised FMP Amendment 12 overfishing definition, $F_{threshold} = F_{target} = F_{max}$ = 0.26 (21% exploitation). The fishing mortality rate has declined substantially since 1997 and was estimated to be 0.32 (25% exploitation) in 1999, but is still 23% higher than the overfishing definition (Figures D1 & D7). The annual partial recruitment of age-1 fish decreased from near 0.50 during the first half of the VPA series to 0.25 since 1994; the partial recruitment of age-2 fish has decreased from 1.00 in 1993 to 0.72 in 1998-1999. These decreases in partial recruitment at age are in line with expectations given recent changes in commercial and recreational fishery regulations.

**Total Stock Biomass**: The NEFSC spring survey stock biomass index (1968-1999) peaked during 1976-1977, and in 1999 was 90% of that peak (Figure D8). Total stock biomass on January 1, estimated by VPA (1982-1999) reached 48,300 mt in 1983, before falling to 16,100 mt in 1989. Total stock biomass has increased since 1991, has been stable since 1994 at about 41,000 mt, and in 1999 was estimated to be 41,400 mt (Figure D2), which is 39% of the biomass target of $B_{MSY}$ = 106,400 mt, and 78% of the biomass threshold of one-half $B_{MSY}$ = 53,200 mt.

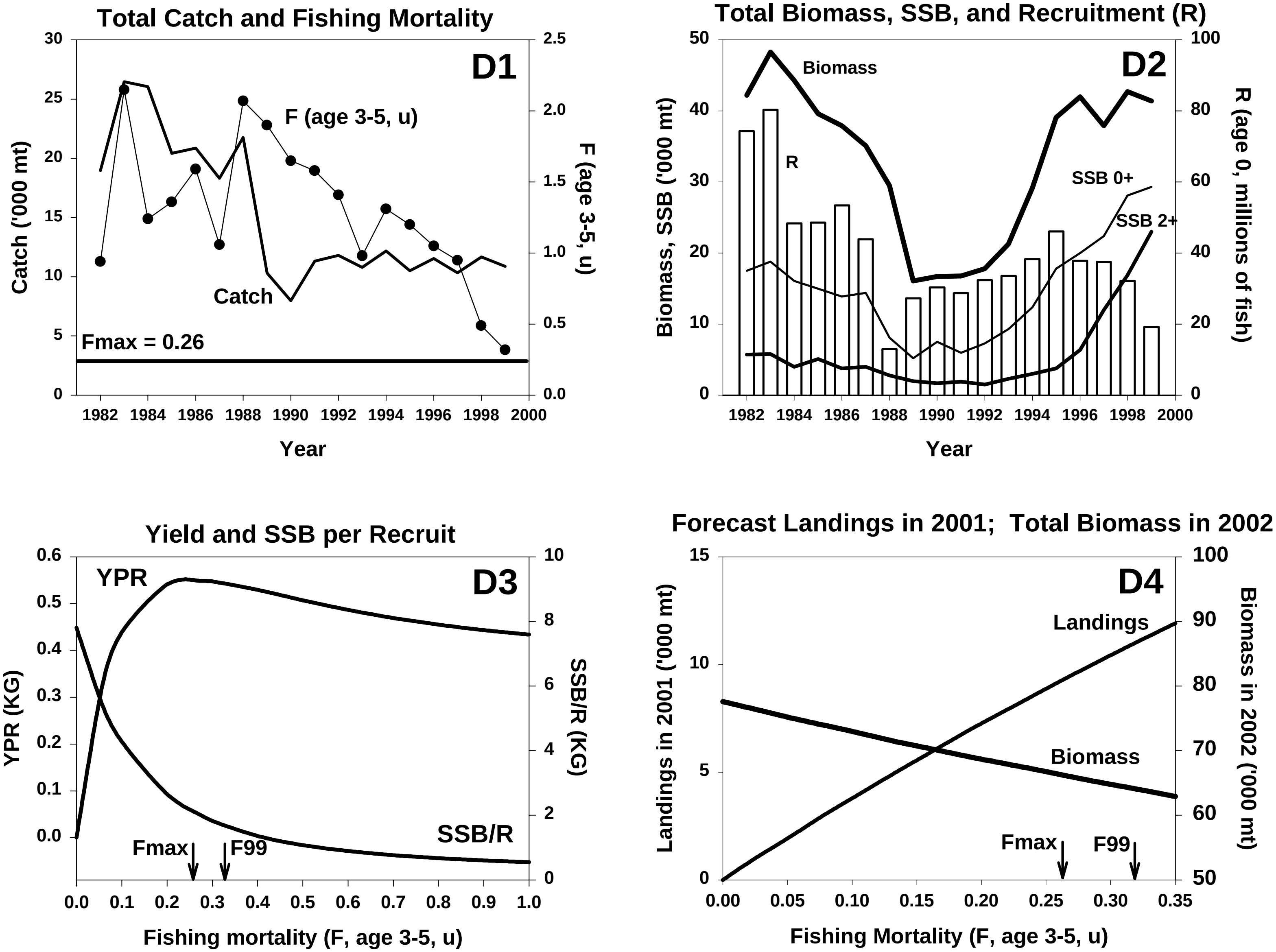
**Recruitment:** The arithmetic average recruitment from 1982 to 1999 was 40 million fish at age 0, with a median of 38 million fish. The 1982 and 1983 year-classes are the largest in the VPA time series, at 74 and 80 million fish, respectively, at age 0. Recruitment declined from 1983 to 1988, with 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, was above average. The 1996-1998 year-classes, ranging between 32 and 38 million fish, are estimated to be about average. The 1999 year-class, at 19.2 million fish, is estimated to be below average (Figure D2). Recent recruitment per unit of SSB has been lower than that estimated at a comparable abundance of SSB during the early 1980s.

**Spawning Stock Biomass:** Spawning stock biomass declined 72% from 1983 to 1989 (18,800 mt to 5,200 mt), but has since increased with improved recruitment and decreased fishing mortality to 29,300 mt in 1999 (Figure D2). The age structure of the spawning stock has expanded, with 78% at ages 2 and older, and 10% at ages 5 and older. Under equilibrium conditions at $F_{max}$, however, about 85% of the spawning stock biomass would be expected to be ages 2 and older, with 50% at ages 5 and older (Figure D9).

**Special Comments:** The use of $F_{max}$ as a proxy for $F_{msy}$ should be reconsidered as more information on the dynamics of growth in relation to biomass, and the shape of the stock-recruitment function become available. Setting a target fishing mortality equal to the threshold ($F = 0.26$) implies that, on average, the threshold will be exceeded half of the time. SFA guidelines recommend that F target reference points be set below the threshold.

**Sources of Information:** Terceiro, M. 1999. Stock assessment of summer flounder for 1999. NEFSC Reference Document 99-19. Jones, W.J., and J.M. Quattro. 1999. Genetic structure of summer flounder (*Paralichthys dentatus*) populations north and south of Cape Hatteras. Marine Biology 133(129-135). NEFSC 2000. Report of the 31st Northeast Regional Stock Assessment Workshop (31st SAW): SARC Consensus Summary of Assessments. NEFSC Reference Document. 00-15.

# Summer Flounder



## Summer Flounder

### Precision of 1999 Estimates of Stock Biomass and F

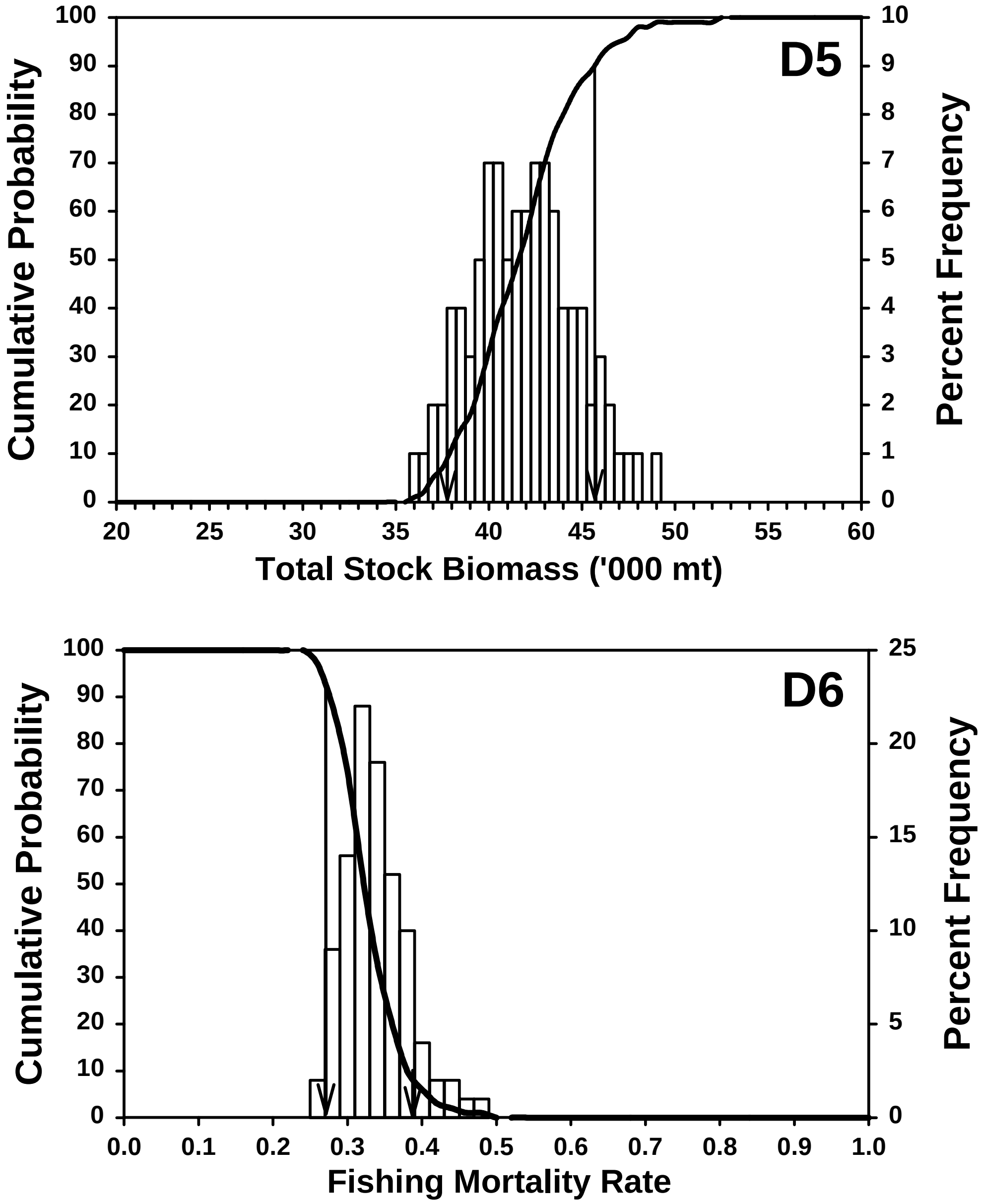
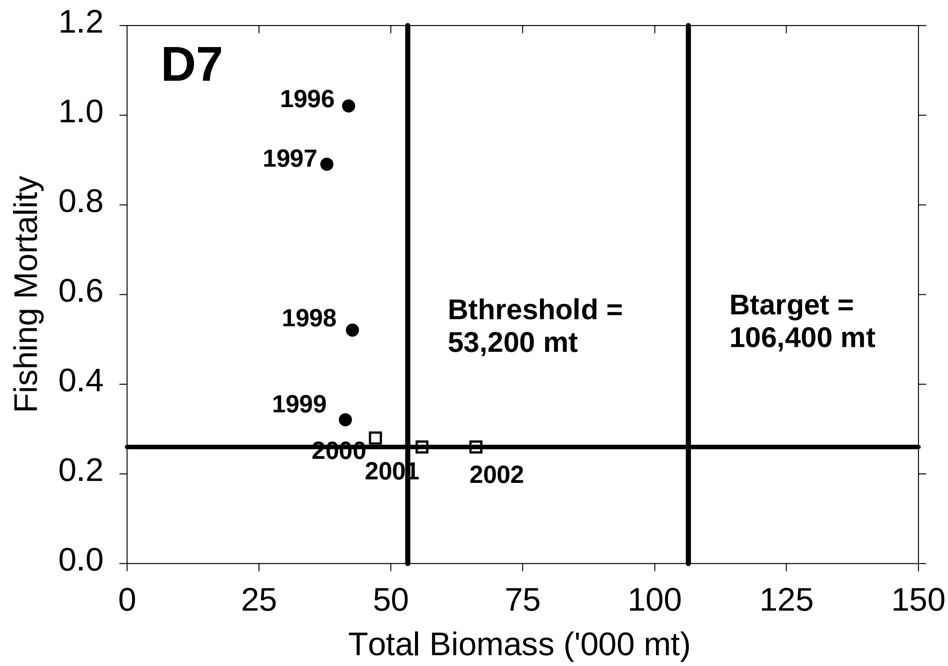
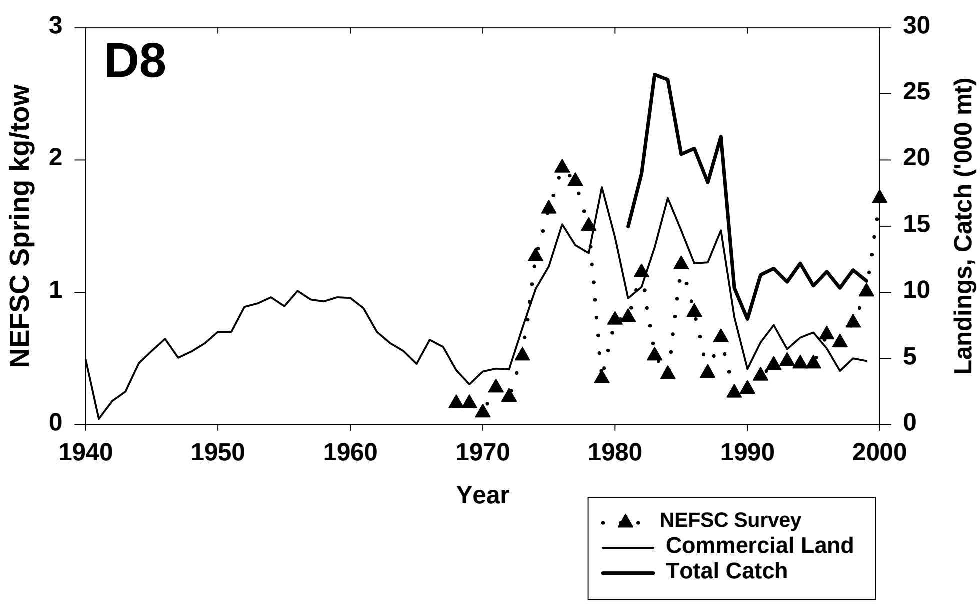



Figure . Precision of the estimates of January 1, 1999 total stock biomass (B) and fully recruited fishing mortality on age 3-5 (F) in 1999 for summer flounder.

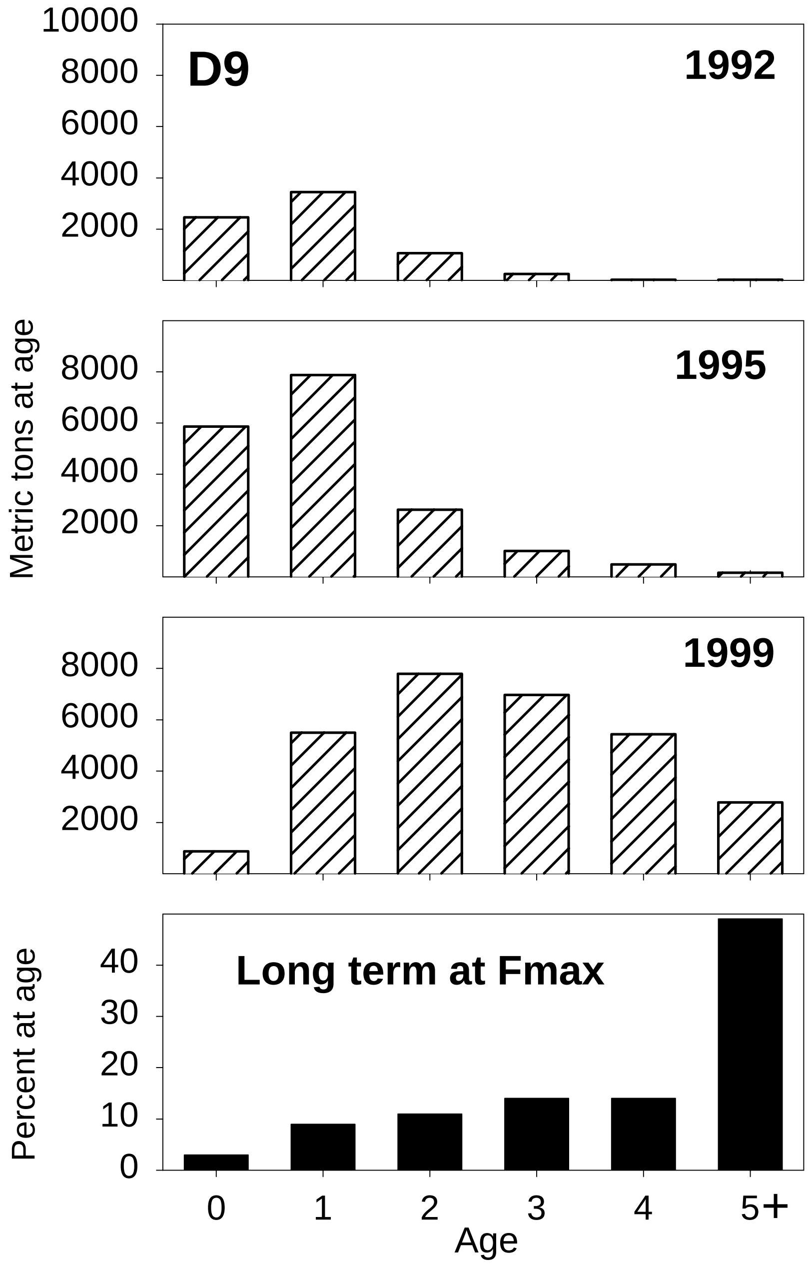
**SFA Reference Points for Summer flounder**




**Commercial Fishery Landings,**
**Total Catch and NEFSC Spring Survey**



## Summer Flounder Spawning Stock Biomass at Age



## CONCLUSIONS OF THE SAW STEERING COMMITTEE MEETING

The Steering Committee for the Northeast Regional Stock Assessment Workshop (SAW) held a teleconference call on 11 September, 2000. Discussed were the Terms of Reference for assessment review at SARC 32 (November, 2000), potential assessments to be reviewed by SARC 33 (June, 2001), and revisions to the overall SARC/SAW process.

Participating were: Jack Dunnigan of the ASMFC; Paul Howard and Andrew Applegate of the NEFMC; Dan Furlong and Chris Moore of the MAFMC; Patricia Kurkul of the Northeast Regional Office; Steve Clark, Fred Serchuk, Mike Sissenwine, Terry Smith (SAW Chairman), and Pie Smith (SAW Coordinator), NEFSC.

**SAW 31**

The 31st Stock Assessment Workshop cycle is complete. The Stock Assessment Review Committee (SARC) reviewed assessments for monkfish, scup, summer flounder and ocean quahog in June. Draft documents (31st Northeast SAW Public Advisory Report; the 31st Northeast SAW SARC Consensus Summary of Assessments) have been produced and distributed to the Council/Commission. Chairman of the SARC was Dr. Bob Mohn, of DFO Halifax, representing the Center for Independent Experts (CIE). It is hoped that Dr. Mohn will be able to chair subsequent SARC meetings.

Two Public Review Workshops were held: one at a NEFMC meeting on July 26th in Portland ME which focused on the monkfish assessment and was presented by Terry Smith and a second workshop at a MAFMC meeting (joint with the relevant ASMFC Management Boards) on August 14th in Philadelphia, PA which focused on scup, summer flounder and ocean quahog and was delivered by Dr. Steve Murawski of the NEFSC. The final versions of the two reports will be published and distributed as soon as possible.

**SAW 32 (SARC November 2000)**

The NEFMC distributed suggested Terms of Reference (TOR) for the upcoming November SARC in mid-August. These included specific suggestions for TORs for sea scallop and silver hake and a list of generic TORs which would apply to all assessments. The NEFSC distributed two sets of suggested TORs. The first included TORs for sea scallops, silver hake, redfish and Gulf of Maine haddock and the second for the same stocks except for the substitution of American plaice for redfish.

<u>Stocks</u>

**Sea Scallops:** Following some specific questions and clarification on the NEFSC's versions of TOR "A and B" it was agreed that the phrase "accounting for current management measures......" be appended to the NEFSC TOR B.

**Silver Hake (Whiting):** Paul Howard stated that he'd like to see the TORs request age-based assessment data and he was informed that an age-based assessment for the silver hake stocks is expected to be developed and presented to the SARC.

**Gulf of Maine Haddock:** Paul Howard, more generically, motivated the need for age-based assessments and asked if this was possible for Gulf of Maine haddock. Unfortunately, the necessary data are lacking and an index assessment update will be undertaken. In general, it is not always preferable to use an analytical assessment over a non-analytical one as the best approach depends on the usefulness and relevance of the age-based data, the precision of the assessment and the need for very precise point estimates of management parameters relative to management's ability to precisely regulate the fishery.

The Steering Committee also discussed, in this context, the 'generic' TORs supplied by the NEFMC with particular focus on Essential Fish Habitat (EFH) issues and socio-economic considerations. These topics were more broadly discussed later in the meeting (see 'Overall Process').

**Redfish/American Plaice:** Terry Smith indicated that the Groundfish Assessment Update completed by the SAW Northern Demersal Working Group two weeks ago updated a number of index-based assessments, including that for redfish. There would be little additional information available should the redfish assessment be presented to the SARC and the NEFSC suggests substitution of an analytical assessment for American plaice (dabs). Plaice has not been assessed in several years (SAW 28, 1998) and it would be useful to bring the assessment current. In the discussion that followed there was general consensus that the information on redfish arising from the update was sufficient for management purposes. Subsequent to the call there was consensus that plaice should assessed and reviewed.

<u>Terms of Reference</u>

**Sea Scallop:**

(A) Update the status of the Georges Bank, Mid-Atlantic and Gulf of Maine sea scallop resources through 2000, providing (where feasible) estimates of fishing mortality and stock size. Characterize uncertainty in estimates.

(B) Update estimates of Fmsy, Fmax, Bmax and other appropriate reference points or proxies for scallop stocks. Provide guidance on development of biological reference points relevant for rotational area management of scallop resources, accounting for current management measures that affect size selection by the fishery, new estimates of growth and scallop meat yield.

(C) Characterize the spatial distribution of fishing effort and fishing success and the size of the scallop resource (pre-recruits and harvestable sizes) based on research vessel and fishery data.

(D) Analyze results of recent surveys, depletion experiments and survey gear studies; provide recommendations for future gear-related research.

(E) Provide (to the extent practicable) short- and medium term projections of scallop biomass, and landings, accounting for spatial and temporal variation in the pattern and intensity of fishing.

**Silver Hake (Whiting) (Northern and Southern Stocks):**

(A) Update the status of silver hake stocks, providing, to the extent practicable, estimates of fishing mortality and stock size. Characterize uncertainty in estimates.

(B) Provide updated estimates of biological reference points (biomass and fishing mortality targets/thresholds), or appropriate proxies, based on available population data.

(C) Provide updated indices of relative abundance and biomass, based on appropriate research vessel survey series.

(D) Update the results of sea sampling and, to the extent feasible, characterize discarding.

**Gulf of Maine Haddock:**

(A) Update the status of Gulf of Maine haddock, based on indices of abundance and biomass from research vessel surveys.

(B) Characterize population dynamics of Gulf of Maine haddock resource (size/age composition and recruitment), and update catches.

(C) Consider current biological reference points for the Gulf of Maine haddock resource and recommend changes, as appropriate.

(D) Provide recommendations for enhanced biological monitoring of the stock and other research as needed.

**American Plaice (Dab):**

(A) Update the status of the American plaice stock, providing, the extent practicable, estimates of fishing mortality and stock size. Characterize the uncertainty in the estimates.

(B) Provide updated estimates of biological reference points (biomass and fishing mortality targets/thresholds), or appropriate proxies, based on available population data.

(C) Provide projections of biomass in 2000 and 2001 and catch in 2000 under various fishing mortality rate options.

**Dates**

The 32nd SARC is scheduled to meet in Woods Hole, November 27-December 1, 2000.

**SAW 33 (SARC, June 2001)**

Stocks

**Pollock:** Following discussions with NEFSC staff responsible for assessing pollock and their Canadian counterparts, it was decided that a new pollock assessment best be reviewed at the spring SARC.

**Gulf of Maine Cod:** Although the Gulf of Maine cod assessment was updated recently, the impact of discard mortality was simulated, not formally analyzed. It would be appropriate, therefore, to have the spring 2001 SARC review and advise on several potential discard models which would improve (and substantively change) the current assessment methodology. The Steering Committee agreed that this stock should be on the spring agenda.

**Bluefish:** An assessment review for bluefish had been suggested at the last SAW Steering Committee meeting by the ASMFC. The question was raised as to whether the ASMFC Technical Committee/subassessement committee or a SAW working group was the more appropriate group to provide the assessment on this stock Dr. Chris Moore, MAFMC, suggested that it might not be necessary to formally pass bluefish through the SARC as several recent updates had been peer reviewed by the MAFMC's S&S Committee. Subsequent to the call, the Steering Committee decided that a formal SARC review of a recent bluefish assessment was not necessary.

**Summer Flounder:** It was agreed that an updated assessment for this stock was useful but it was decided that a standard update need not go through SARC panel review.

**Gulf of Maine Winter Flounder:** Paul Howard suggested this stock be added to the SAW 33 agenda. The ASMFC has convened a technical group to assess this stock. It is not clear when the assessment might be ready for SARC review. The ASMFC will discuss this issue this fall and advise the SAW Steering Committee as to whether an assessment is anticipated and, if so, whether peer review should be provided by the SARC or by an external ASMFC peer review panel. In the interim, Gulf of Maine winter flounder will be placed on the agenda for the spring 2001 SARC.

**Other stocks:** Paul Howard asked if an assessment for Atlantic herring could be scheduled for the spring SARC. Steve Clark, TRAC co-chair, informed the group that the US had officially responded to a request from the US-Canada Herring Management Committee for a new assessment and that Spring 2002 would be the earliest date for a complete review of the assessment under the auspices of the TRAC. The TRAC anticipates a planning meeting this winter to develop a joint assessment approach for the species.

A re-assessment of monkfish was also suggested by the NEFMC. After a full discussion it was agreed that in the short term there was little additional data or analysis that could brought to the table to improve upon the recent assessment, but, in the longer term, another benchmark would be appropriate. What is not clear is when that should occur or even whether there should be some process external to the SARC undertaken in 2001 that should provide monkfish management advice to the NEFMC by the end of the calendar year. It was agreed to agenda discussion on how to approach monkfish assessment for the winter Steering Committee meeting (see below).

Black sea bass was suggested as a stock for SARC 32 review, but the MAFMC indicated that little new data exist and that it would likely not be worthwhile to re-assess the stock at this time.

The possibility of a more thorough examination of a redfish assessment, presuming the substitution of American plaice for redfish at the fall 2000 SARC, was discussed. New stock production models could be explored as could candidate revised overfishing definitions. It is not clear that the Council's need for this information is immediate, however, and the person responsible for this assessment is already responsible for two assessments on the spring 2001 agenda, thus, it would be best to consider an assessment of this stock for a later SARC.

A review of an assessment for white hake was suggested for the 33rd SARC (in lieu of monkfish) and it was agreed that the stock would be a good candidate for review.

*Dates*

The meeting dates for the 33rd SARC were proposed for the week of 25 June.

**OVERALL PROCESS**

Given the above discussion, the need to better formalize the 'new' SAW/SARC model agreed to at the last meeting of the Steering Committee, and the more general need to coordinate activities among the region's partners, it was agreed that a winter meeting of the SAW Steering Committee executives would be appropriate.

Suggested topics for the meeting include (1) how the SAW/Update process can be made more formal and effective; (2) the appropriateness and content of a 'generic' set of Terms of Reference; (3) the role of the TRAC and the interaction of the TRAC and SAW processes; (4) strategies for dealing with monkfish management/assessment; (5) general science and operational coordination issues; (6) a process for peer review or evaluation of EFH issues or other issues of common concern; (7) status of the NMFS with respect to FY 2001 fiscal and personnel commitments; and, (8) general planning and prioritization evaluation for topics of common concern to the NMFS, ASMFC, NEFMC and MAFMC.

Given the broad scope articulated, a 2-3 day meeting in Providence or Warwick was suggested and given the necessary lead time to arrange such a meeting the month of January 2001 was suggested. Since this would be a meeting of the region's principal executives and since the scope of discussions includes issues broader than the SAW, it was agreed that the NMFS' Regional Office would coordinate and facilitate the meeting. Subsequent to the call, the Regional Coordinating meeting was scheduled for February, 2001 in Providence, RI.

**OTHER BUSINESS**

Jack Dunnigan requested advice and counsel from the Steering Committee as to how to resolve the difficulty of providing a non-peer reviewed document to the public, especially as this related to the recent Lobster Peer Review. Michael Sissenwine suggested a more tightly controlled process, similar to the SARC's carefully controlled distribution of Working Group papers to panel members only prior to a SAW. The working group papers have no standing, per se, since the SARC report is a derivative of them. Fred Serchuk suggested the problem might have been lack of clarity on the function of the meeting. Dan Furlong felt the public should be given the information up front, and Michael Sissenwine suggested the difference lay in the interchange of professional, mature information whereby the SAW and Lobster Peer Review provided two different types of information.

The Conference Call adjourned at 3:30 PM.

**Table 1. Northeast Stocks, Assessment Classification and Status**

| STOCK | Assessment Type | Last Assessed | Assessment Frequency | Next Assessment |
|---|---|---|---|---|
| BLUEFISH | Analytical | 1996 | 3 | 2000 |
| FLDR, SUMMER | Analytical | 1999 | 2 | 2000 |
| LOBSTER | Analytical | 1996 | 3 | 2000 |
| COD, Georges Bank | Analytical | 1999 | 2 | 2000 |
| COD, Gulf of Maine | Analytical | 1999 | 2 | 2001 |
| FLDR, WINTER, GB | Analytical | 1999 | 2 | 2000 |
| FLDR, Yellowtail, GB | Analytical | 1999 | 2 | 2000 |
| FLDR, Yellowtail, SNE | Analytical | 1999 | 2 | 2001 |
| HADDOCK-Georges Bank | Analytical | 1999 | 2 | 2000 |
| HERRING | Analytical | 1998 | 3 | 2001 |
| SHRIMP, NORTHERN | Analytical | 1997 | 5 | 2002 |
| STRIPED BASS | Analytical | 1997 | 5 | 2002 |
| FLDR, AM. PLAICE | Analytical | 1998 | 3 | 2001 |
| FLDR, WINTER, SNE | Analytical | 1998 | 3 | 2001 |
| FLDR, Yellowtail, CC | Analytical | 1998 | 3 | 2001 |
| OCEAN QUAHOG | Analytical | 1998 | 3 | 2000 |
| SCALLOPS | Analytical | 1999 | 2 | 2001 |
| WHITE HAKE | Analytical | 1998 | 3 | 2001 |
| FLDR, WITCH | Analytical | 1999 | 3 | 2002 |
| POLLOCK | Analytical | 1997 | 5 | 2000 |
| SPINY DOGFISH | Analytical | 1999 | 5 | 2004 |
| SQUID, ILLEX | Analytical | 1999 | 5 | 2004 |
| SQUID, LOLIGO | Analytical | 1999 | 5 | 2004 |
| SURFCLAM | Analytical | 2000 | 3 | 2003 |
| MACKEREL, ATLANTIC | Analytical | 2000 | 3 | 2003 |
| WEAKFISH | Analytical | 2000 | 5 | 2005 |
| CUSK | Index | 1995 | 5 | *2000* |
| SCUP | Index | 1998 | 5 | 2004 |
| TILEFISH | Index | 1999 | 5 | 2004 |
| WOLFFISH | Index | 1995 | 5 | *2000* |
| BLACK SEA BASS | Index | 1998 | 5 | 2003 |
| RIV. HERRING/SHAD | Index | 1988 | 5 | TBD |
| BUTTERFISH | Index | 1993 | 5 | *1998* |
| FLDR, Windowpane, GB | Index | 1997 | 5 | 2002 |
| FLDR, Windowpane, Mid-Atlantic | Index | 1997 | 5 | 2002 |
| FLDR, WINTER, GOM | Index | 1995 | 5 | *2000* |
| GOOSEFISH | Index | 1996 | 5 | 2001 |
| HADDOCK-Gulf of Maine | Index | 1995 | 5 | *2000* |
| OCEAN POUT | Index | 1990 | 5 | TBD |
| RED HAKE, Northern | Index | 1990 | 5 | 2000 |
| RED HAKE, Southern | Index | 1990 | 5 | 2000 |
| REDFISH | Index | 1992 | 5 | TBD |
| SILVER HAKE, Northern | Index | 1995 | 5 | 2000 |
| SILVER HAKE, Southern | Index | 1995 | 5 | 2000 |
| SKATES | Index | 1995 | 5 | 2005 |
| TAUTOG | Index | 1995 | 5 | 2005 |

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**STANDARD**
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# Publications and Reports of the Northeast Fisheries Science Center

The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment." As the research arm of the NMFS's Northeast Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS mission by "planning, developing, and managing multidisciplinary programs of basic and applied research to: 1) better understand the living marine resources (including marine mammals) of the Northwest Atlantic, and the environmental quality essential for their existence and continued productivity; and 2) describe and provide to management, industry, and the public, options for the utilization and conservation of living marine resources and maintenance of environmental quality which are consistent with national and regional goals and needs, and with international commitments." Results of NEFSC research are largely reported in primary scientific media (*e.g.*, anonymously-peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own media. Those media are in three categories:

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