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Stock Assessment of Summer Flounder for 2003

by

Mark Terceiro

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U.S. DEPARTMENT OF COMMERCE
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TABLE OF CONTENTS

SUMMARY

This assessment of the summer flounder (*Paralichthys dentatus*) stock along the Atlantic coast (Maine to North Carolina) is an update through 2002/2003 of commercial and recreational fishery catch data, research survey indices of abundance, and the analyses of the data. For 2002, commercial and recreational fishery quotas were 6,612 mt and 4,408 mt respectively, for a total of 11,020 mt. The reported commercial landings used in this assessment for 2002 were 6,407 mt, while estimated recreational landings were 3,610 mt, for a 2002 landings total of 10,017 mt.

An analytical assessment (virtual population analysis, VPA) of commercial and recreational total catch at age (landings plus discards) was conducted. Indices of recruitment and stock abundance were developed from Northeast Fisheries Science Center winter, spring and autumn, Massachusetts spring and autumn, Rhode Island annual, Connecticut spring and autumn, New Jersey annual, and Delaware annual trawl survey data. Recruitment indices were also developed from young-of-year surveys conducted by the states of North Carolina, Virginia, and Maryland.

The stock assessment indicates that the summer flounder stock is not overfished and overfishing is not occurring relative to the current biological reference points. The fishing mortality rate has declined from 1.32 in 1994 to 0.23 in 2002, below the overfishing definition reference point ($F_{threshold} = F_{target} = F_{max} = 0.26$). There is an 80% chance that the 2002 F was between 0.21 and 0.28. The estimate of F for 2002 may understate the actual fishing mortality; retrospective analysis shows that the current assessment method tends to underestimate recent fishing mortality rates (e.g., by about 40% over the last three years). Total stock biomass has increased substantially since 1989, and on January 1, 2003, was estimated to be 56,100 mt, 5% above the biomass threshold of 53,200 mt. There is an 80% chance that total stock biomass in 2003 was between 51,000 and 63,000 mt. Spawning stock biomass (SSB; Age 0+) declined 72% from 1983 to 1989 (18,800 mt to 5,200 mt), but has increased eightfold, with improved recruitment and decreased fishing mortality, to 42,200 mt in 2002. Retrospective analysis shows a tendency to slightly overestimate the SSB in the most recent years. The arithmetic average recruitment from 1982 to 2002 is 40 million fish at age 0, with a median of 35 million fish. The 2002 year class is currently estimated to be about average at 38 million fish. There is no consistent retrospective pattern in the estimation of the abundance of age 0 fish over the last three years. If the landings for 2003 do not exceed the Total Allowable Landings (TAL) and the proportion of catch discarded does not increase, the TAL in 2004 would need to be 12,790 mt (28.2 million lbs) to meet the target F rate of $F_{max} = 0.26$ with 50% probability.

INTRODUCTION

The Stock Assessment Workshop (SAW) Southern Demersal Working Group met on June 9, 2003 to assess the status of summer flounder. The following scientists and managers participated in the meeting:

Paul Caruso	MADMF
Sarah McLaughlin	NOAA Fisheries NERO
Chris Moore	MAFMC
Paul Nitschke	NOAA Fisheries NEFSC
David Simpson	CTDEP
Mark Terceiro (Chair)	NOAA Fisheries NEFSC

Although they were unable to attend the meeting, Najih Lazar of the RIDFW, Anne Mooney of the NYDEC, Don Byrne of the NJFGW, Stew Michels of the DEDFW, Steve Doctor of the MDDNR, Chris Bonzak of the Virginia Institute of Marine Science (VIMS), Rob O'Reilly of the VMRC, and Carter Watterson of the NCDMF provided research survey and/or fisheries catch data that were used in the assessment.

The following terms of reference were addressed for summer flounder:

1. Characterize the commercial and recreational catch including landings and discards.
2. Estimate fishing mortality, spawning stock biomass, and total stock biomass for the current year and characterize the uncertainty of those estimates.
3. Where appropriate, estimate a TAC and/or TAL based on stock status and target mortality rate for the year following the terminal assessment year.
4. Provide short term projections (2-3 years) of stock status based on the target fishing mortality rate.

For assessment purposes, the previous definition of Wilk *et al*. (1980) of a unit stock extending from Cape Hatteras north to New England has been accepted in this and previous assessments (e.g., NEFSC 2002). The joint Mid-Atlantic Fishery Management Council (MAFMC) Atlantic States Marine Fisheries Commission (ASMFC) Fishery Management Plan (FMP) for summer flounder has as a management unit all summer flounder from the southern border of North Carolina, northeast to the U.S.-Canadian border. A recent summer flounder genetics study, which revealed no population subdivision at Cape Hatteras (Jones and Quattro, 1999), is consistent with the definition of the management unit. A recent consideration of summer flounder stock structure incorporating new tagging data concluded that evidence supported the existence of stocks north and south of Cape Hatteras, with the stock north of Cape Hatteras possibly composed of two distinct spawning aggregations, off New Jersey and Virginia-North Carolina (Kraus and Musick, 2003). The conclusions of Kraus and Musick (2003) are consistent with the current assessment stock unit.

Amendment 1 to the FMP in 1990 established the overfishing definition for summer flounder as the fishing mortality rate equal to F_{max}, initially estimated as 0.23 (NEFC 1990). Amendment 2 in1992 set target fishing mortality rates for summer flounder for 1993-1995 (F =

0.53) and 1996 and beyond (F_{max} = 0.23). Major regulations enacted under Amendment 2 to meet those fishing mortality rate targets included: 1) an annual fishery landings quota, with 60% allocated to the commercial fishery and 40% to the recreational fishery, based on the historical (1980-1989) division of landings, with the commercial allocation further distributed among the states based on their share of commercial landings during 1980-1989; 2) commercial minimum landed fish size limit at 13 in (33 cm), as established in the original FMP; 3) a minimum mesh size of 5.5 in (140 mm) diamond or 6.0 in (152 mm) square for commercial vessels using otter trawls that possess 100 lb (45 kg) or more of summer flounder, with exemptions for the flynet fishery and vessels fishing in an exempted area off southern New England (the Northeast Exemption Area) during 1 November to 30 April; 4) permit requirements for the sale and purchase of summer flounder; and 5) annually adjustable regulations for the recreational fishery, including seasons, a 14 in (36 cm) minimum landed fish size, and possession limits.

Amendment 3 to the FMP revised the western boundary of the Northeast Exemption Area to 72°30'W (west of Hudson Canyon), increased the large mesh net possession threshold to 200 lbs during 1 November to 30 April, and stipulated that only 100 lbs could be retained before using a large mesh net during 1 May to 31 October. Amendment 4 adjusted Connecticut's commercial landings of summer flounder and revised the state-specific shares of the commercial quota accordingly. Amendment 5 allowed states to transfer or combine the commercial quota. Amendment 6 allowed multiple nets on board commercial fishing vessels if properly stowed, and changed the deadline for publication of overall catch limits and annual commercial management measures to 15 October and the recreational management measures to 15 February.

The results of previous assessments indicated that summer flounder abundance was not increasing as rapidly as projected when Amendment 2 regulations were implemented. In anticipation of the need to drastically reduce fishery quotas in 1996 to meet the management target of F_{max}, the MAFMC and ASMFC modified the fishing mortality rate reduction schedule in 1995 to allow for more stable landings from year to year while slowing the rate of stock rebuilding. Amendment 7 to the FMP set target fishing mortality rates of 0.41 for 1996 and 0.30 for 1997, with a target of F_{max} = 0.23 for 1998 and beyond. Total landings were to be capped at 8,400 mt (18.51 million lbs) in 1996-1997, unless a higher quota in those years provided a realized F of 0.23.

Amendment 12 in 1999 defined overfishing for summer flounder to occur when the fishing mortality rate exceeds the threshold fishing mortality rate of F_{MSY}. Since F_{MSY} could not be reliably estimated for summer flounder, F_{max} = 0.24 was used as a proxy for F_{MSY}, and was also defined as the target fishing mortality rate. The stock was defined to be overfished when the total stock biomass falls below the minimum biomass threshold of one-half of the biomass target, B_{MSY}. Because B_{MSY} could not be reliably estimated, the biomass target was defined as the product of total biomass per recruit and contemporary (1982-1996) median recruitment, estimated to be 153,350 mt (338 million lbs), with the biomass threshold defined as 76,650 mt (169 million lbs). In the 1999 stock assessment (Terceiro 1999), these reference points were updated using estimates of median recruitment (1982-1998) and mean weights at age (1997-1998), providing a biomass target of 106,444 mt (235 million lbs) and biomass threshold of 53,222 mt (118 million lbs). The Terceiro (1999) reference points were retained in the 2000 and 2001 stock assessments (NEFSC 2000, MAFMC 2001a) because of the stability of the input data. Concurrent with the development of the 2001 assessment, the MAFMC and ASMFC convened the ASMFC Summer Flounder Overfishing Definition Review Committee to review the reference points. The work of the Committee was reviewed by the MAFMC Scientific and Statistical Committee (SSC) in August 2001. The SSC recommended that the F_{MSY} proxy of F_{max} = 0.26 remain for 2002, and endorsed the recommendation of SARC 31 (NEFSC 2000) which stated that "...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 (MAFMC 2001b).

The most recent previous stock assessment completed in 2002 (SARC 35; NEFSC 2002) found that the summer flounder stock was overfished and overfishing was occurring relative to the current biological reference points. The fishing mortality rate had declined from 1.32 in 1994 to 0.27 in 2001, marginally above the overfishing definition reference point ($F_{threshold} = F_{target} = F_{max} = 0.26$). Total stock biomass in 2001 was estimated to be 42,900 mt, 19% below the biomass threshold (53,200 mt). In the review of the 2002 stock assessment, SARC 35 concluded that updating the biological reference points was not warranted at that time (NEFSC 2002).

FISHERY DATA

Commercial Fishery Landings

Total U.S. commercial landings of summer flounder from Maine to North Carolina peaked in 1979 at nearly 18,000 mt (40 million lbs, Table 1). The reported landings in 2002 of 6,407 mt (about 14.1 million lbs) were about 3% under the 2002 quota of 6,612 mt (14.6 million lbs). Since 1980, 70% of the commercial landings of summer flounder have come from the Exclusive Economic Zone (EEZ; greater than 3 miles from shore). The percentage of landings attributable to the EEZ was lowest in 1983 and 1990 at 63% and was highest in 1989 at 77%. Large variability in summer flounder landings exist among the states, over time, and the percent of total summer flounder landings taken from the EEZ has varied widely among the states.

Northeast Region (Maine to Virginia)

Annual commercial landings data for summer flounder in years prior to 1994 were obtained from trip-level detailed landings records contained in master data files maintained by the NEFSC (the weighout system; 1963-1993) and from summary reports of the Bureau of Commercial Fisheries and its predecessor the U.S. Fish Commission (1940-1962). Beginning in 1994, landings estimates were derived from mandatory dealer reports under the current NMFS Northeast Region (NER) summer flounder quota monitoring system.

Prior to 1994, summer flounder commercial landings were allocated to NEFSC 3-digit statistical area according to interview data (Burns *et al.* 1983). During 1994-2002, dealer landings were allocated to statistical area using fishing Vessel Trip Reports (VTR data) according to the general procedures developed by Wigley *et al.* (1997), in which a matched set of dealer and VTR data is used as a sample to characterize the statistical area distribution of monthly state landings. A comparison of the distribution of landings by state and month as indicated by the dealer, VTR, and matched set data for 1994-2002 is presented in Tables 2-10. Since the implementation of the annual commercial landings quota in 1993, the commercial landings have become concentrated during the first calender quarter of the year, with 46% of the landings taken during the first quarter in 2002 (Table 10).

The distribution of Northeast Region (ME to VA) 1992-2002 landings by three-digit statistical area is presented in Table 11. Areas 537-539 (Southern New England), areas 611-616 (New York Bight), areas 621, 622, 625, and 626 (Delmarva region), and areas 631 and 632 (Norfolk Canyon area) have generally accounted for over 80% of the NER commercial landings. A summary of length and age sampling of summer flounder landings collected by the NEFSC commercial fishery port agent system in the NER is presented in Table 12. For comparability with the manner in which length frequency sampling in the recreational fishery has been evaluated, sampling intensity is expressed in terms of metric tons of landings (mt) per 100 fish lengths measured. The sampling is proportionally stratified by market category (jumbo, large, medium, small, and unclassified), with the sampling distribution generally reflecting the distribution of commercial landings by market category. Overall sampling intensity has improved markedly since 1995, from 165 mt per 100 lengths to 30-60 mt per 100 lengths, and temporal and geographic coverage has generally improved as well (Tables 13-21).

The age composition of the NER commercial landings for 1994-2002 was generally estimated semiannually by market category and (usually) 1-digit statistical area (e.g., area 5 or area 6), using standard NEFSC procedures (market category length frequency samples converted to mean weights by length-weight relationships; mean weights in turn divided into landings to calculate numbers landed by market category; market category numbers at length apportioned to age by application of age-length keys, on semiannual area basis). For 2000-2002, sampling was generally sufficient to make quarterly estimates of the age composition in area 6 (in some cases, by division) for the large and medium market categories.

The distribution of 1994-2002 length frequency samples by market category, 1- and 2-digit statistical area (division), and calendar quarter is presented in Tables 13-21. NER landed numbers at age were raised to total NER (general canvas) commercial landings when necessary by assuming that landings not accounted for in the weighout/mandatory reporting system had the same age composition as that sampled, as follows: calculate proportion at age by weight; apply proportions at age by weight to total NER commercial landings to derive total NER commercial catch at age by weight; divide by mean weights at age to derive total NER commercial landed numbers at age. The proportion of large and jumbo market category fish in the NER landings has increased since 1996, while the proportion of small market category landings has become very low. The mean size of fish landed in the NER commercial fishery has been increasing since 1993, and was 0.9-1.0 kg (2.0-2.2 lbs) during 2000-2002, typical of an age 3 summer flounder (Tables 22-23).

North Carolina

The North Carolina winter trawl fishery accounts for about 99% of summer flounder commercial landings in North Carolina. A separate landings at age matrix for this component of the commercial fishery was developed from North Carolina Division of Marine Fisheries (NCDMF) length and age frequency sampling data. The NCDMF program samples about 10% of the winter trawl fishery landings annually, at a mean (2000-2002) rate of between 6 and 8 mt of landings per 100 lengths measured (Table 24). All length frequency data used in construction of the North Carolina winter trawl fishery landings at age matrix were collected in the NCDMF program; age-length keys from NEFSC commercial data and NEFSC spring survey data (1982-1987) and NCDMF commercial fishery data (1988-2002) were combined by appropriate statistical area and semiannual period to resolve lengths to age. Fishery regulations in North Carolina also changed between 1987 and 1988, with increases in both the minimum mesh size of the codend and minimum landed fish size taking effect. It is not clear whether the change in regulations or the change in keys, or some combination, is responsible for the decreases in the numbers of age-0 and age-1 fish estimated in the North Carolina commercial fishery landings since 1987. Landed numbers at age and mean weights at age from this fishery are shown in Tables 25-26.

Commercial Fishery Discards

In a previous assessment, analysis of variance of fishery observer data for summer flounder was used to identify stratification variables for an expansion procedure to estimate total landings and discards from the observer data kept and discard rates (weight per day fished) in the commercial fishery. Initial models included year, quarter, fisheries statistical division (2-digit area), area (divisions north and south of Delaware Bay), and tonnage class as main effects. Quarter and division consistently emerged as significant main effects without significant interaction with the year (NEFSC 1993). The estimation procedure expands transformation bias-corrected geometric mean catch (landings and discards) rates in year, quarter, and division strata by total days fished (days fished on trips landing any summer flounder by any mobile gear, including fish trawls and scallop dredges) to derive fishery landings and discards. The use of fishery effort as the multiplier (raising factor) allows estimation of landings from the fishery observer data for comparison with dealer reported landings, to help judge the potential accuracy of the procedure and/or sample data.

For strata with no fishery observer sampling, catch rates from adjacent or comparable strata were substituted as appropriate (except for Division 51, which generally has very low catch rates and negligible catch). Estimates of discard were stratified by 2 gear types (scallop dredges; trawls) for years when data were adequate (1992 and later years). Estimates at length and age were stratified by gear only for 1994-2000 and 2002, again due to sample size considerations. Only 11 fish were sampled from the sea scallop dredge fishery 2001, and so the scallop dredge discards were assumed to have the same length and age composition as the trawl fishery discards in 2001.

While estimates of catch rates from the NER fishery observer data were used in this assessment to estimate total discards, catch rate information is also reported in the VTR data. A comparison of discard to total catch ratios for the fishery observer and VTR data sets for trawl and scallop dredge gear indicates similar discard rates from the two data sources. Overall fishery observer and VTR discard to total catch ratios for 1994-2002 were generally within 10% of each other; 2001 was an exception, with an overall discard to total catch ratio of 49% in the fishery observer data and 29% in the VTR data. Discard rates of summer flounder in the scallop dredge fishery were much higher than in the trawl fishery (Tables 27-28).

The change in mid-1994 from the interview/weighout data reporting system to the VTR/mandatory dealer report system required a change in the estimation of effort (days fished) to estimate total discards. An initial examination of days fished and catch per unit effort (CPUE; landings per day fished) for cod conducted at SAW 24 (NEFSC 1997a) compared these quantities as reported in the full weighout and VTR data sets (DeLong *et al.*, 1997). This comparison indicated a shift to a higher frequency of short trips (trips with one or two days fished reported), and to a mode at a lower rate of CPUE. It was not clear at SAW 24 if these changes were due to the change in reporting system (units reported not comparable), or real changes in the fishery, and so effort data reported by the VTR system were not used quantitatively in the SAW 24 assessments. In the SAW 25 assessment for summer flounder (NEFSC 1997b), a slightly different comparison was made. The port agent interview data for 1991-93 and merged dealer/VTR data for 1994-1996 (the matched set data), which under each system serve as the "sample" to characterize the total commercial landings, were compared in relative terms (percent frequency). For summer flounder, the percent frequency of short trips (lower number of days fished per trip) increased during 1991-1996, but not to the degree observed for cod, and the mode of CPUE rates for summer flounder increased in spite of lower effort per trip. For the summer flounder fishery, these may reflect actual changes in the fishery, due to increased restrictions on allowable landings per trip (trip landings limits might lead to shorter trips) and stock size increases (higher CPUE). As for cod, however, the influence of each of these changes (reporting system, management changes, stock size changes) has not been quantified. Total days fished in the summer flounder fishery were comparable between 1989-1993 period and 1994 (Tables 29-37; WO DF and WO/VTR DF). With increasing restrictions on the fishery in 1995-2002 (lower landings quota, higher stock size, and thus increasing impact of trips limits and closures), total days fished declined relative to the early 1990s (Tables 38-53). Questions will remain about the accuracy of the VTR data . However, because the effort measure is critical to the estimation of discards for summer flounder, the VTR data were used as the best data source to estimate summer flounder fishery days fished for 1994-2002.

Two adjustments were made to the dealer/VTR matched data subset days fished estimates to fully account for summer flounder fishery effort during 1994-2002. First, the landings to days fished relationship in the matched set was assumed to be the same for unmatched trips, and so the days fished total in each discard estimation stratum (2-digit area and quarter) was raised by the dealer to matched set landings ratio. This step in the estimation accounted for days fished associated with trips landing summer flounder, and provided an estimate of discard for trips landing summer flounder (Tables 36-53, variable OB EST DISC 1).

Given the restrictions on the fishery however, there is fishing activity which results in summer flounder discard, but no landings, especially in the scallop dredge fishery. The days fished associated with these trips was accounted for by raising strata discard estimates by the ratio of the total days fished on trips catching any summer flounder (trips with landings and discard, plus trips with discard only) to the days fished on trips landing summer flounder (trips with landings and discard) (Tables 36-53, variable NO KEPT RATIO), for VTR trips reporting discard of any species (DeLong *et al.* 1997). For this step, it is necessary to assume that the discard rate (as indicated by the fishery observer data, which includes trips with discard but no landings, and which is used in previous estimation procedure steps) is the same for trips with only discards as for trips with both landings and discards.

Discard estimates for 1989-2002 are summarized in Tables 29-53 (variable OB EST DISC MT). Discards as a proportion of the fishery observer data estimated landings (OB EST LAND MT) were highest in 2001 (53%), and lowest in 1995 and 1996 (5 and 7%). Estimates of landings from observer data ranged from +35% (1996) to -69% (2001) of the reported landings in the fisheries, with discards ranging from 41% (1990) to 6% (1995) of the reported landings. Total discards estimated for 2000, 2001, and 2002 were 18%, 16%, and 9% of the reported landings. Scallop dredge fishery discard to landed ratios are much higher than trawl fishery ratios, purportedly because of closures and trip limits. Although the scallop dredge landings of summer flounder are less than 5% of the total, the discards of summer flounder are of the same order of magnitude as in the trawl fishery.

These discard estimates were based only on the days fished data for ports in the NER during 1989-1996, and so it was necessary to raise the discard estimate to account for discarding occurring outside the NER reporting system (i.e., NER state reporting systems such as Connecticut and Virginia, and North Carolina). To determine the proper raising factor, landings accounted for by the NER reporting system (which result from the fishing effort on which the fishery observer discard estimate is based) were compared with total NER landings, plus that portion of North Carolina landings from the EEZ (it is assumed that only the North Carolina fishery in the EEZ would experience significant discard, as mesh regulations in state waters have resulted in very low discards in state waters since implementation of the regulation in 1989; R. Monaghan, NCDMF; personal communication, June 30, 1997). As a result of this exercise, the total discard estimates were raised by 11 to 38% for the 1989-1996 period. Since 1996, all states' landings and are included in the NER dealer reporting system, so no raising is necessary to account for missing landings. As recommended by SAW 16 (NEFSC 1993), a commercial fishery discard mortality rate of 80% was assumed to develop the final estimate of discard mortality (Table 54).

Existing fishery observer data were used to develop estimates of commercial fishery discard for 1989-2002. However, adequate data (e.g., interviewed trip data, survey data) are not available to develop summer flounder discard estimates for 1982-1988. Discard numbers were assumed to be very small relative to landings during 1982-1988 (because of the lack of a minimum size limit in the EEZ), but to have increased since 1989 with the implementation of fishery regulations under the FMP. It was recognized that not accounting directly for commercial fishery discards in 1982-1988 would result in an underestimation of fishing mortality and population sizes in these years.

NEFSC fishery observer length frequency samples were converted to sample numbers at age and sample weight at age frequencies by application of NEFSC survey length-weight relationships and fishery observer, commercial fishery, and survey age-length keys. Sample weight proportions at age were next applied to the raised fishery discard estimates to derive fishery total discard weight at age. Fishery discard weights at age were then divided by fishery observer mean weights at age to derive fishery discard numbers at age. Classification to age for 1989-1993 was done by semiannual (quarters 1 and 2 pooled, quarters 3 and 4 pooled) periods using NEFSC fishery observer age-length keys, except for 1989, when first period lengths were aged using combined commercial landings (quarters 1 and 2) and NEFSC spring survey age-length keys. For 1994-2002, only NEFSC winter, spring, and fall survey age-length keys were used, since fishery observer age-length keys were not yet available and commercial landings age-length keys contained an insufficient number of small summer flounder (<40 cm = 16 inches) that comprise most of the discards. Fishery observer sampling intensity is summarized in Table 54. Estimates of discarded numbers at age, mean length and mean weight at age are summarized in Tables 55-57.

The reason for discarding in the trawl and scallop dredge fisheries has been changing over time. During 1989 to 1995, the minimum size regulation was recorded as the reason for discarding summer flounder in over 90% of the observed trawl and scallop dredge tows. In 1999, the minimum size regulation was provided as the reason for discarding in 61% of the observed trawl tows, with quota or trip limits given as the discard reason in 26% of the observed tows, and high-grading in 11% of the observed tows. In the scallop fishery in 1999, quota or trip limits was given as the discard reason in over 90% of the observed tows. During 2000-2002, minimum size regulations were identified as the discard reason in 40-45% of the observed trawl tows, quota or trip limits in 25-30% of the tows, and high grading in 3-8%. In the scallop fishery during 2000-2002, quota or trip limits was given as the discard reason for over 99% of the observed tows. As a result of the increasing impact of trip limits, fishery closures, and high grading as reasons for discarding, the age structure of the summer flounder discards has also changed, with a higher proportion of older fish being discarded (Table 55).

Recreational Fishery Landings

Summary landings statistics for the summer flounder recreational fishery (catch type A+B1) as estimated by the National Marine Fisheries Service (NMFS) Marine Recreational Fishery Statistics Survey (MRFSS) are presented in Tables 58-59. Recreational fishery landings decreased 39% by number and 32% by weight from 2001 to 2002, as the fishery landed 82% (3,610 mt, 8.0 million lbs) of the 4,408 mt (9.7 million lbs) harvest limit established for 2002.

Length frequency sampling intensity for the recreational fishery for summer flounder was calculated by MRFSS subregions (North - Maine to Connecticut; Mid - New York to Virginia; South - North Carolina) on a metric tons of landings per hundred lengths measured basis (Burns *et al. In* Doubleday and Rivard, 1983). For 2002, aggregate sampling intensity averaged 112 mt of landings per 100 fish measured (Table 60).

MRFSS sample length frequency data, NEFSC commercial age-length data, and NEFSC survey age-length data were examined in terms of number of fish measured/aged on various temporal and geographical bases. Correspondences were made between MRFSS intercept date (quarter), commercial quarter, and survey season (spring and summer/fall), and between MRFSS subregion, commercial statistical areas, and survey depth strata to integrate data from the different sources. Based on the number, size range, and distribution of lengths and ages, a semiannual (quarters 1 and 2; quarters 3 and 4), subregional basis of aggregation was adopted for matching of commercial and survey age-length keys with recreational length frequency distributions to convert lengths to ages.

The recreational landings historically have been dominated by relatively young fish. Over the 1982-1996 period, age 1 fish accounted for over 50% of the landings by number; summer flounder of ages 0 to 4 accounted for over 99% of landings by number. No fish from the recreational landings were determined to be older than age 7. With increases in the minimum size during 1997-2001 (to 14.5 in [37 cm] in 1997, 15 in [38 cm] in 1998-1999, generally 15.5 in [39 cm] in 2000, and various state minimum sizes from 15.5 [38 cm] to 17.5 in [44 cm] in 2001-2002) and reductions in fishing mortality, the age composition of the recreational landings now includes mainly fish at ages 2 and 3. The number of summer flounder of ages 4 and older landed by the recreational fishery in 2002 (16% of the landings by number) was the highest in the time series (Table 61).

Limited MRFSS length sampling for larger fish resulted in a high degree of variability in mean length for older fish, especially at ages 5 and older. Attempts to estimate length-weight relationships from the MRFSS biological sampling data provided unsatisfactory results. As a result, quarterly length (mm) to weight (g) relationships from Lux and Porter (1966) were used to calculate annual mean weights at age from the estimated age-length frequency distribution of the landings.

Recreational Fishery Discards

MRFSS catch estimates were aggregated on a subregional basis for calculation of the proportion of live discard (catch type B2) to total catch (catch types A+B1+B2) in the recreational fishery for summer flounder. Examination of catch data in this manner shows that the live discard has varied from about 18% (1985) to about 81% (1999, 2001-2002) of the total catch (Table 62).

To account for all removals from the summer flounder stock by the recreational fishery, some assumptions about the biological characteristics and hooking mortality rate of the recreational live discard needed to be made, because biological samples are not routinely taken of MRFSS catch type B2 fish. In previous assessments, data available from New York Department of Environmental Conservation (NYDEC) surveys (1988-92) of New York party boats suggested the following: 1) nearly all (>95%) of the fish released alive from boats were below the minimum regulated size (during 1988-92, 14 in [36 cm] in New York state waters); 2) nearly all of these fish were age 0 and age 1 summer flounder; and 3) age 0 and 1 summer flounder occurred in approximately the same proportions in the live discard as in the landings. It was therefore assumed that all B2 catch would be of lengths below regulated size limits, and be either age 0 or age 1 in all three subregions during 1982-1996. Catch type B2 was allocated on a semi-annual, subregional basis in the same ratio as the annual age 0 to age 1 proportion observed in the landings during 1982-1996. Mean weights at age were assumed to be the same as in the landings during 1982-1996.

The minimum landed size in federal and most state waters increased to 14.5 in (37 cm) in 1997, to 15.0 in (38 cm) in 1998-1999, and to 15.5 in (39 cm) in 2000. Applying the same logic used to allocate the 1982-1996 recreational released catch to size and age categories during 1997-2000 implied that the recreational fishery released catch included fish of ages 2 and 3. Investigation of data from the CTDEP Volunteer Angler Survey (VAS) for 1997-1999 and from the American Littoral Society (ALS) for 1999, and comparing the length frequency of released fish in these programs with the MRFSS data on the length frequency of landed fish below the minimum size, indicated this assumption was valid for 1997-1999 (MAFMC 2001a). The CTDEP VAS and ALS data, along with data from the NYDEC Party Boat Survey (PBS) was used to validate this assumption for 2000. For 1997-2000 all B2 catch was assumed to be of lengths below regulated size limits, and therefore comprised of ages 0 to 3. Catch type B2 was allocated on a sub-regional basis in the same ratio as the annual age 0 to age 3 proportions observed in the landings at lengths less than 37 cm in 1997, 38 cm in 1998-1999, and 39 cm in 2000 (Table 63).

In 2001, many states adopted different combinations of minimum size and possession limits to meet management requirements. As a result, minimum sizes for summer flounder ranged from 15.5 in (39 cm) in Federal, VA, and NC waters, 16 in (41 cm) in NJ, 16.5 in (42 cm) in MA, 17 in (43 cm) in MD and NY, to 17.5 in (44 cm) in CT, RI, and DE. Examination of data provided by MD sport fishing clubs, the CTDEP VAS, the ALS, and the NYDEC PBS indicated that the assumption that fish released are those smaller than the minimum size remained valid for 2001, and so catch type B2 was characterized by the same proportion at length as the landed catch less than the minimum size in the respective states. The differential minimum sizes by state continued in 2002. For 2002, increased samples of the recreational fishery discards by the CT VAS and NYDEC PBS allowed direct characterization the length frequencies of the discards for these states (Table 63).

Studies conducted to estimate hooking mortality for striped bass and black sea bass suggest a hooking mortality rate of 8% for striped bass (Diodati and Richards 1996) and 5% for black sea bass (Bugley and Shepherd, 1991). Work by the states of Washington and Oregon with Pacific halibut (a potentially much larger flatfish species, but otherwise morphologically similar to summer flounder) found "average hooking mortality...between eight and 24 percent" (IPHC, 1988). An unpublished tagging study by the NYDEC (Weber MS 1984) on survival of released sublegal summer flounder caught by hook-and-line suggested a total, non-fishing mortality rate of 53%, which included hooking plus tagging mortality as well as deaths by natural causes (i.e., predation, disease, senescence). Assuming deaths by natural causes to be about 18%, (an instantaneous rate of 0.20), an annual hooking plus tagging mortality rate of about 35% can be derived from the NYDEC results. In the SARC 25 (NEFSC 1997b) and earlier assessments of summer flounder, a 25% hooking mortality rate was assumed for summer flounder released alive by anglers.

However, two recent investigations of summer flounder recreational fishery release mortality suggest that a lower release mortality rate is more appropriate. Lucy and Holton (1998) used field trials and tank experiments to investigate the release mortality rate for summer flounder in Virginia, and found rates ranging from 6% (field trials) to 11% (tank experiments). Malchoff and Lucy (1998) used field cages to hold fish angled in New York and Virginia during 1997 and 1998, and found a mean short term mortality rate of 14% across all trials. Given the results of these release mortality studies conducted specifically for summer flounder, a 10% release mortality rate was adopted in the Terceiro (1999) stock assessment and has been retained in all subsequent assessments (NEFSC 2000, MAFMC 2001a, NEFSC 2002).

Ten percent of the total B2 catch at age is added to estimates of summer flounder landings at age to provide estimates of summer flounder recreational fishery discard at age (Table 63), total recreational fishery catch at age in numbers (Table 64) and mean weights at age (Table 65). In 2002, the number of fish discarded and assumed dead in the recreational fishery (Table 63: 1.3 million fish, 676 mt) was 41% by number and 19% by weight of the total landed (Table 61: 3.2 million fish; Table 60: 3,610 mt) in the recreational fishery.

Total Catch Composition

NER commercial fishery landings and discards at age, North Carolina winter trawl fishery landings and discards at age, and MRFSS recreational fishery landings and discards at age totals were summed to provide a total fishery catch at age matrix for 1982-2002 (Table 66; Figure 1). The percentage of age-3 and older fish in the total catch in numbers has increased during the last decade from only 4% in 1993 to 41% in 2002. Overall mean lengths and weights at age in the total catch were calculated as weighted means (by number in the catch at age) of the respective mean values at age from the NER commercial (Maine to Virginia), North Carolina commercial, and recreational (Maine to North Carolina) fisheries (Tables 67-68; Figure 2). The recreational fishery component of the total summer flounder catch has generally increased since 1995 (Table 69; Figure 3).

BIOLOGICAL DATA

Aging

Work performed for the SAW 22 assessment (NEFSC 1996b) indicated a major expansion in the size range of 1-year old summer flounder collected during the 1995 and 1996 NEFSC winter bottom trawl surveys, and brought to light differences between ages determined by NEFSC and NCDMF fishery biology staffs. Age structure (scale) exchanges were performed after the SAW 22 assessment to explore these differences. The results of the first two exchanges, which were reported at SAW 22 (NEFSC 1996b), indicated low levels of agreement between age readers at the NEFSC and NC DMF (31 and 46%). In 1996, research was conducted to determine inter-annular distances and to back-calculate mean length at age from scale samples collected on all NEFSC bottom trawl surveys (winter, spring and fall) for comparison with NCDMF samples. While mean length at age remained relatively constant from year to year, inter-annular distances increased sharply in the samples from the 1995-1996 winter surveys, and increased to a lesser degree in samples from other 1995-1996 surveys. As a result, further exchanges were suspended pending the resolution of an apparent aging problem.

Age samples from the winter 1997 bottom trawl survey, aged utilizing both scales and otoliths by only by one reader, indicated a similar pattern as the previous two winter surveys (i.e., several large age 1 individuals), and some disagreement between scale and otolith ages obtained from the same fish. Because of these problems, a team of five experienced NEFSC readers was formed to re-examine the scales aged from the winter survey. After examining several hundred scales, the team determined that re-aging all samples from 1995-1997 would be appropriate, including all winter, spring, and fall samples from the NEFSC and MA DMF bottom trawl surveys and all samples from the commercial fishery. The age determination criteria remained the same as those developed at the 1990 summer flounder workshop (Almeida *et al.* 1992) and described in the aging manual utilized by NEFSC staff (Dery 1997). Only those fish for which a 100% agreement of all group members was attained were included in the revised database, however. The data from the re-aged database were used in analyses in the SAW 25 assessment (NEFSC 1997b).

A third summer flounder aging workshop was held at the NEFSC in February, 1999, to continue the exchange of age structures and review of aging protocols for summer flounder (Bolz *et al.* 2000). Participants at this workshop concluded that the majority of aging disagreements in recent NEFSC-NCDMF exchanges arose from the interpretation of marginal scale increments due to highly variable timing of annulus formation, and from the interpretation of first year growth patterns and first annulus selection. The workshop recommended regular samples exchanges between NEFSC and NCDMF, and further analyses of first year growth. An exchange of NEFSC and NCDMF aging structures for summer flounder will again be conducted in 2003. Recently, Sipe and Chittenden (2001) concluded that sectioned otoliths were the best structure for aging summer flounder over the age range from 0 to 10 years. Since 2001, both scales and otoliths have routinely been collected in all NEFSC trawl surveys for fish larger than 60 cm, and studies are underway to determine the best structure to use for aging these large summer flounder.

Maturity

The maturity schedule for summer flounder used in the 1990 SAW 11 and subsequent stock assessments through 1999 was developed by the SAW 11 Working Group using NEFSC Fall Survey maturity data for 1978-1989 and mean lengths at age from the NEFSC fall survey (G. Shepherd, NEFSC, personal communication, July 1, 1990; NEFC 1990; Terceiro 1999). The SAW 11 work indicated that the median length at maturity (50th percentile, L_{50}) was 25.7 cm for male summer flounder, 27.6 cm for female summer flounder, and 25.9 cm for the sexes combined. Under the aging convention used in the SAW 11 and subsequent assessments (Smith *et al.* 1981, Almeida *et al.* 1992, Szedlmayer and Able 1992, Bolz *et al.* 2000), the median age of maturity (50th percentile, A_{50}) for summer flounder was determined to be 1.0 years for males and 1.5 years for females. Combined maturities indicated that at peak spawning time in the autumn, that 38% of age-0 fish are mature, 72% of age-1 fish are mature, 90% of age-2 fish are mature, 97% of age-3 fish are mature, 99% of age-4 fish are mature, and 100% of age-5 and older fish are mature. The maturities for age-3 and older were rounded to 100% in the SAW 11 and subsequent assessments.

In the series of summer flounder assessments, it has been noted that the NEFSC maturity schedules have been based on simple gross morphological examination of the gonads and therefore may not accurately reflect (i.e., may overestimate) the true spawning potential of the summer flounder stock (especially for age-0 and age-1 fish). It should also be noted, however, that spawning stock biomass (SSB) estimates based on age-2 and older fish show the same long term trends in SSB as estimates which include age 0 and 1 fish in the spawning stock. A research recommendation that the true spawning contribution of young summer flounder to the SSB be investigated has been included in summer flounder stock assessments since 1993 (NEFSC 1993). In light of the completion of a URI study to address this research recommendation, the maturity data for summer flounder for 1982-1998 were examined in the 2000 assessment (NEFSC 2000) to determine if changes in the maturity schedule were warranted.

The research at the University of Rhode Island (URI) by Drs. Jennifer Specker and Rebecca Rand Merson (hereafter referred to collectively as the "URI 1999" study) attempted to address the issue of the true contribution of young summer flounder to the spawning stock. The URI 1999 study examined the histological and biochemical characteristics of female summer flounder oocytes (1) to determine if age-0 and age-1 female summer flounder produce viable eggs, and (2) to develop an improved guide for classifying the maturity of summer flounder collected in NEFSC surveys (Specker *et al.* 1999, Merson *et al.* 2000, Merson *et al.* In review). The URI 1999 study examined 333 female summer flounder (321 aged fish) sampled during the NEFSC Winter 1997 Bottom Trawl Survey (February 1997) and 227 female summer flounder (210 aged fish) sampled during the NEFSC Autumn 1997 Bottom Trawl Survey (September 1997) using radioimmunoassays to quantify the biochemical cell components characteristic of mature fish.

The NEFSC and URI 1999 maturity determinations disagreed for 13% of the 531 aged fish, with most (10%) of the disagreement due to NEFSC mature fish classified as immature by the URI 1999 histological and biochemical criteria. The URI 1999 criteria indicated that 15% of the age-0 fish were mature, 82% of the age-1 fish were mature, 97% of the age-2 fish were mature, and 100% of the age 3 and older fish were mature. When the proportions of fish mature at length and age were estimated by probit analysis, median length at maturity (50th percentile, L_{50}) was estimated to be 34.7 cm for female summer flounder, with the following proportions mature at age: age-0: 30%, age-1: 68%, age-2: 92%, age-3: 98%, and age-4: 100%. Median age of maturity (50th percentile, A_{50}) was estimated to be about 0.5 years.

SARC 31 (NEFSC 2000) considered 5 options for the summer flounder maturity schedule for the 2000 stock assessment:

1. No change, use the maturity schedule for combined sexes as in the SAW 11 and subsequent assessments (rounded to 0.38, 0.72, 0.90, 1.00, 1.00, and 1.00 as in the SAW 25 and Terceiro (1999) assessment analyses).
2. Consider only age-2 and older fish of both sexes in the SSB.
3. Knife edged, age-1 and older maturity for both sexes. This would eliminate age-0 fish of both sexes from the SSB, and assume that the proportions mature at age-1 "round" to 100%.
4. NEFSC 1982-1989, 1990-1998 for both sexes, assuming a 1:1 sex ratio in deriving a combined schedule.
5. NEFSC 1982-1989, 1990-1998 for males, URI 1999 for females, assuming a 1:1 sex ratio in deriving a combined schedule.

The 5 options produce the following maturity schedules for both sexes combined:

Option	Age					
	0	1	2	3	4	5+
1	0.38	0.72	0.90	1.00	1.00	1.00
2	0.00	0.00	0.90	1.00	1.00	1.00
3	0.00	1.00	1.00	1.00	1.00	1.00
4	0.45, 0.45	0.88, 0.82	0.97, 0.93	1.00, 0.98	1.00, 0.99	1.00, 1.00
5	0.29, 0.31	0.74, 0.76	0.95, 0.94	0.99, 0.98	1.00, 1.00	1.00, 1.00

SARC 31 concluded that some contribution to spawning from ages 0 and 1 should be included, eliminating options 2 and 3. The differences among remaining options 1, 4, and 5 were considered to be relatively minor, and so the SAW 11 schedule (Option 1) was retained for the subsequent (MAFMC 2001a, NEFSC 2002) and current assessments. SARC 31 recommended that more biochemical and histological work should be done for additional years to determine if the results of the URI 1999 study will be applicable over the full VPA time series. SARC 31 also noted the need for research to explore whether the viability of eggs produced by young, first time spawning summer flounder is comparable to the viability of eggs produced by older, repeat spawning summer flounder.

RESEARCH SURVEY INDICES

NEFSC Spring

Long-term trends in summer flounder abundance were derived from a stratified random bottom trawl survey conducted in spring by NEFSC between Cape Hatteras and Nova Scotia since 1968 (Clark 1979). NEFSC spring survey indices suggest that total stock biomass last peaked during 1976-1977, and the 2003 index (2.42 kg/tow) was at a new historical high, about 20% above the peak 1976 value of 2.00 kg/tow (Table 70, Figure 4). Age composition data from the NEFSC spring surveys indicate a substantial reduction in the number of ages in the stock between 1976-1990 (Table 71). Between 1976-1981, fish of ages 5-8 were captured regularly in the survey, with the oldest individuals aged 8-10 years. Between 1982-1986, fish aged 5 and older were only occasionally observed in the survey, and by 1986, the oldest fish observed in the survey were age 5. In 1990 and 1991, only three age groups were observed in the survey catch, and there was an indication that the 1988 year class was very weak. Since 1991, the survey age composition has expanded significantly. There is strong evidence in the 1998-2002 NEFSC spring surveys of increasing abundance of age-3 and older fish, due to increased survival of the 1994 and subsequent year classes. Mean lengths at age in the NEFSC spring survey are presented in Table 72.

NEFSC Autumn

Summer flounder are frequently caught in the NEFSC autumn survey at stations in inshore strata (< 27 meters = 15 fathoms = 90 feet) and at offshore stations in the 27-55 meter depth zone (15-30 fathoms, 90-180 feet) at about the same level as in the spring survey (Table 70). Furthermore, the autumn survey catches age-0 summer flounder in abundance, providing an index of summer flounder recruitment (Table 73, Figure 5). Autumn survey indices suggest improved recruitment since the late 1980s, and an increase in abundance of age-2 and older fish since 1995. The NEFSC autumn surveys indicate that the 1995 year class was the most abundant in recent years, and that subsequent, weaker year classes are experiencing increased survival (Table 73). Mean lengths at age in the NEFSC autumn survey are presented in Table 74.

NEFSC Winter

A new series of NEFSC winter trawl surveys was initiated in February 1992 to provide improved abundance indices for flatfish, including summer flounder. The surveys target flatfish when they are concentrated offshore during the winter. A modified 36 Yankee trawl is used that differs from the standard trawl employed during the spring and autumn surveys in that long trawl sweeps (wires) are added before the trawl doors to better herd fish to the mouth of the net, and the large rollers used on the standard gear are absent with only a chain "tickler" and small spacing "cookies" are present on the footrope.

The design and conduct of the winter survey (timing, strata sampled, and the use of the modified 36 Yankee trawl gear) has resulted in greater catchability of summer flounder compared to the other surveys. Most fish area captured in survey strata 61-76 (27-110 meters; 15-60 fathoms) off the Delmarva and North Carolina coasts . Other concentrations of fish are found in strata 1-12, south of the New York and Rhode Island coasts, in slightly deeper waters. Significant numbers of large summer flounder are often taken along the southern flank of Georges Bank (strata 13-18).

Indices of summer flounder abundance from the winter survey indicate stable stock size during 1992-1995, with catch per tow values ranging from 10.9 in 1995 to 13.6 in 1993 (Tables 70 and 75). For 1996, the winter survey index increased by 290% over 1995, from 10.9 to 31.2 fish per tow. The largest increases in 1996 occurred in the Mid-Atlantic Bight region (offshore strata 61-76), where increases up to an order of magnitude occurred in several strata, with the largest increases in strata 61, 62, and 63 off the northern coast of North Carolina. Most of the increased catch in 1996 consisted of age-1 summer flounder from the 1995 year class. In 1997, the index dropped to 10.3 fish per tow, due to the lower numbers of age-1 (1996 year class) fish caught. Since 1998, the Winter trawl survey indices have increased, with the Winter 2003 survey number and weight per tow indices the highest in the time series (Tables 70 and 75, Figure 4). As with the other two NEFSC surveys, there is strong evidence in recent winter surveys of increased abundance of age-3 and older fish relative to earlier years in the time series (Table 76). Mean lengths at age in the NEFSC winter survey are presented in Table 77.

Massachusetts DMF

Spring and fall bottom trawl surveys conducted by the Massachusetts Division of Marine Fisheries (MADMF) show a decline in abundance in numbers of summer flounder from high levels in 1986 to record lows in 1990 (MADMF fall survey), and 1991 (MADMF spring survey). In 1994, the MADMF survey indices increased to values last observed during 1982-1986, but then declined substantially in 1995, although the indices remain higher than the levels observed in the late 1980s. Since 1996, both the MADMF spring and fall indices have increased to record high levels (Tables 78-79, Figure 6). The MADMF also captures a small number of age-0 summer flounder in a seine survey of estuaries, and these data constitute an index of recruitment (Table 80, Figure 7).

Connecticut DEP

Spring and fall bottom trawl surveys are conducted by the Connecticut Department of Environmental Protection (CTDEP). The CTDEP surveys show a decline in abundance in numbers of summer flounder from high levels in 1986 to record lows in 1989. The CTDEP surveys indicate recovery since 1989, and evidence of increased abundance at ages 2 and older since 1995. The 2002 spring and autumn indices were the highest in the respective time series (Tables 81-82 Figure 8). An index of recruitment from the autumn series is available (Table 82, Figure 5).

Rhode Island DFW

Standardized bottom trawl surveys have been conducted since 1979 during the spring and fall months in Narragansett Bay and state waters of Rhode Island Sound by the Rhode Island Department of Fish and Wildlife (RIDFW). Indices of abundance at age for summer flounder have been developed from the autumn survey data using NEFSC autumn survey age-length keys. Survey indices show that the 1984-1987, 1999, 2000, and 2002 year classes are all strong. The autumn survey reached a time series high in 2002 (Table 83, Figure 6). An abundance index has also been developed from a set of fixed stations sampled monthly during 1990-2002. Age-1 indices from this series indicate that strong year classes recruited to the stock in 1996, 1999, 2000, and 2002, with age 2+ abundance peaking in 2000 (Table 84). Recruitment indices are available from both the autumn (Figure 7) and monthly fixed station surveys.

New Jersey BMF

The New Jersey Bureau of Marine Fisheries (NJBMF) has conducted a standardized bottom trawl survey since 1988. Indices of abundance for summer flounder incorporate data collected from April through October. The NJBMF survey mean number per tow indices and frequency distributions were converted to age using the corresponding annual NEFSC combined spring and fall survey age-length keys. Indices of the 1995 year class at age-0 and at older ages in subsequent years indicate that this cohort is the strongest in the time series. Indices of the 1996-2001 year classes are below average, while the 2002 year class is average. The NJBMF survey indices reached a peak in 2002 (Table 85, Figure 8). Age 0 recruitment indices are available from the NJBMF survey (Figure 5).

Delaware DFW

The Delaware Division of Fish and Wildlife (DEDFW) has conducted a standardized bottom trawl survey with a 16 foot headrope trawl since 1980, and with a 30 foot headrope trawl since 1991. Recruitment indices (age 0 fish; one index from the Delaware estuary proper for 1980 and later, one from the inland bays for 1986 and later) have been developed from the 16 foot trawl survey data. Indices for age-0 to age-4 and older summer flounder have been compiled from the 30 foot headrope survey. The indices use data collected from June through October (arithmetic mean number per tow), with age 0 summer flounder separated from older fish by visual inspection of the length frequency. The 16 foot headrope survey indices suggest poor recruitment in 1988 and 1993, improved recruitment in 1994-1995, and above average recruitment in 2000 (Tables 86-87, Figure 7). The 30 foot headrope survey indices suggest stable stock sizes over the 1991-2001 time series, with strong recruitment in 1991, 1994, 1995, and 2000. The 2002 index from the 30 foot survey was a time series low, presumably reflecting decreased availability to the survey, rather than a true decrease in abundance (Table 88, Figure 8).

Maryland DNR

The Maryland Department of Natural Resources (MDDNR) has conducted a standardized trawl survey in the seaside bays and estuaries around Ocean City, MD since 1972. Samples collected during May to October with a 16 foot bottom trawl have been used to develop a recruitment index for summer flounder for the period 1972-2002. This index suggests that weakest year class in the time series recruited to the stock in 1988, and the strongest in 1972, 1983, 1986, and 1994. The 2000 and 2001 indices were about average, while the 2002 index was below average (Table 89, Figure 9).

Virginia Institute of Marine Science

The Virginia Institute of Marine Science (VIMS) conducts a juvenile fish survey using trawl gear in Virginia rivers and the mainstem of Chesapeake Bay. The time series for the rivers began in 1979. With the Bay included, the series is available only since 1988, but many more stations are included. Trends in the two time series are very similar. An index of recruitment developed from the rivers only series suggests weak year classes recruited to the stock in 1987 and 1999, with strong year classes recruiting during 1980-1984, and 1990. Recruitment indices since 1990 have been below average (Table 90, Figure 9).

North Carolina DMF

The NCDMF has conducted a stratified random trawl survey using two 30 foot headrope nets with 3/4" mesh codend in Pamlico Sound since 1987. An index of recruitment developed from these data suggests weak year classes recruited to the stock in 1988 and 2000, with strong year classes in 1987, 1992, and 1996, 2001, and 2002 (Table 91, Figure 9). The survey normally takes place in mid-June, but in 1999 was delayed until mid-July. The 1999 index is therefore inconsistent with the other indices in the time series, and the 1999 value was excluded from the VPA calibration in the SARC 31 assessment (NEFSC 2000).

ESTIMATES OF MORTALITY AND STOCK SIZE

Natural Mortality Rate

The instantaneous natural mortality rate (M) for summer flounder was assumed to be 0.2 in all analyses, although alternative estimates of M were considered in the SAW 20 assessment (NEFSC 1996a). In the SAW 20 work, estimates were derived with the methods described by: 1) Pauly (1980) using growth parameters derived from NCDMF age-length data and a mean annual bottom temperature (17.5^{o}C) from NC coastal waters; 2) Hoenig (1983) using a maximum age for summer flounder of 15 years; and 3) consideration of age structure expected in unexploited populations (5% rule, 3/M rule, e.g., Anthony 1982). SAW 20 (NEFSC 1996a) concluded that M = 0.2 was a reasonable value given the mean (0.23) and range (0.15-0.28) obtained from the various analyses, and this value for M has been used in all subsequent assessments.

ASPIC Model

The non-equilibrium surplus production model incorporating covariates (ASPIC; Prager 1994, 1995) can be used to estimate maximum sustainable yield (MSY) and other biological reference points. An ASPIC analysis applied to summer flounder using various state and federal agency survey biomass indices (the 1998 analysis) was previously reviewed by the NEFMC Overfishing Review Panel (Applegate *et al.* 1998). Based on total weighted mean squared error (MSE), the NEFSC spring and autumn biomass indices gave the best fit to the data in that analysis. However, the Overfishing Review Panel concluded that biological reference points estimated in the

1998 analysis for summer flounder were unreliable, due to the short time series of reliable catch estimates and lack of dynamic range in the input data (Applegate *et al.* 1998).

An ASPIC analysis using projected catch and NEFSC survey biomass indices through 1999 was reviewed in the 1999 assessment (Terceiro 1999). Model results were examined for sensitivity by employing a Monte Carlo search routine and by initializing over a broad range the values of MSY (10,000 to 50,000 mt) and the intrinsic rate of increase (r : 0.12 to 1.25). The ratio of initial to current biomass (B1 ratio) was assigned a starting value of 0.50. Overall, the 1999 ASPIC model results for summer flounder were not well defined and suggested the possibility of numerous local minima in the sums of squared errors (SSE) response surface. The Monte Carlo search algorithm was employed in an attempt to provide a better search of the SSE response surface, and the this generated a range of estimates of MSY from 19,000 mt to 58,000 mt and of r from 0.49 to 1.08. Due to the number of iterations needed to reach convergence (>25) and the probable number of local minima, these results also appeared to be unreliable. Thus, biological reference points for summer flounder estimated by the 1999 ASPIC analysis were not considered to be robust, and the ASPIC analysis has not been repeated in the assessment.

Virtual population analysis

Fishing mortality rates in 2002 and stock sizes in 2003 were estimated using the ADAPT method for calibration of the VPA (Parrack 1986, Gavaris 1988, Conser and Powers 1990) as implemented in the NOAA Fisheries Toolbox (NFT) version 2.1 VPA. As recommended by the MAFMC S&S Committee during the review of the Terceiro (1999) assessment and by the National Research Council review of the summer flounder assessment (NRC 2000), ages 0-6 were included in the analysis as true ages, with ages 7 and older combined as a plus group. An instantaneous natural mortality rate of M = 0.2 was assumed for all ages in all years. Maturities at age for all years were 38% for age-0, 72% for age-1, 90% for age-2, and 100% for ages 3 and older. Stock sizes in 2003 were directly estimated for ages 1-6, while the age 7+ group was calculated from Fs estimated in 2002. Fishing mortality on the oldest true age (6) in the years prior to the terminal year was estimated from back-calculated stock sizes for ages 3-6. Fishing mortality on the age 7+ group was assumed equal to the fishing mortality for age 6. Winter, spring, and mid-year (e.g., RIDFW monthly fixed station, DEDFW, and NJBMF) survey indices and all survey recruitment (age-0) indices were compared to population numbers of the same age at the beginning of the same year. The recruitment indices available from the research surveys are summarized in Table 92. Fall survey indices were compared to population numbers one year older at the beginning of the next year. Tuning indices were unweighted.

A number of exploratory VPA runs using different combinations of research survey tuning indices were used to examine the sensitivity of the summer flounder VPA. The inclusion of each survey index was considered based on a pre-calibration correlation analysis among all indices, a post-calibration correlation analysis among the indices and resulting VPA estimates of stock size, and an examination of the VPA diagnostics (including the partial variance accounted for by each index, patterns in residuals, and the mean squared residual (MSR) of the calibrated solution). Survey indices with trends that did not reasonably match corresponding patterns in abundance as estimated by other indices and/or the VPA (as evidenced by poor correlation, high partial variance in tuning diagnostics, or patterns in residuals) were eliminated from the VPA tuning configuration.

The final run (run F03_1) included the same set of indices (n=41) in terms of source and age range as used in the 2002 SARC 35 assessment (NEFSC 2002). In addition to a run including all available indices (F03_ALL) and the run chosen as final (F03_1), the results from two other runs were also considered (Table 93). The NEFSC survey indices generally had the lowest partial variances within the VPA and demonstrated similar rank order of stock sizes at age (significant correlation among indices at age), but sometimes indicated patterns in stock size dissimilar to those in the state surveys. Therefore runs were also examined that contrasted the VPA solutions provided by NEFSC (F03_NEC) versus state survey (F03_STATE) series. Run F03_NEC had the smallest MSR of the six runs considered (about 12% smaller than final run F03_2), but due in part to fewer degrees of freedom, provided less precise (by about 50%) 2003 stock size estimates. Run F03_STATE had the largest MSR (Table 93). The output for the final 2003 assessment VPA (run F03_1) is presented in Table 94.

The annual partial recruitment of age-1 fish decreased from near 0.50 during the first half of the VPA time series to less than 0.30 since 1994, and to about 0.20 during 2000-2002; the partial recruitment of age-2 fish has decreased from 1.00 in 1993 to about 0.80 during 2000-2002 (Table 94). These decreases in partial recruitment at age are in line with expectations given recent changes in commercial and recreational fishery regulations. For these reasons, summer flounder are currently considered to be fully recruited to the fisheries at age 3, and fully recruited fishing mortality is expressed as the unweighted average of fishing mortality at age for ages 3 to 5.

Fishing mortality calculated from the average of the currently fully recruited ages (3-5) has been high, varying between 0.94 and 2.15 during 1982-1997 (55%-82% exploitation), far in excess of the revised FMP Amendment 12 overfishing definition, $F_{threshold} = F_{target} = F_{max} = 0.26$ (21% exploitation). Fishing mortality has declined substantially since 1997 and was estimated to be 0.23 (18% exploitation) in 2002, the lowest observed in the 21-year VPA time series (Figure 10).

Summer flounder spawn in the late autumn and early winter (peak spawning on November 1), and age 0 fish recruit to the fishery during the autumn after they are spawned. For example, summer flounder spawned in autumn 1987 (from the November 1, 1987 spawning stock biomass) recruit to the fishery in autumn 1988, and appear in VPA tables as age 0 fish in 1988. This assessment indicates that the 1982 and 1983 year classes were the largest of the VPA series, at 74 and 80 million fish, respectively. The 1988 year class was the smallest of the series, at only 13 million fish. The 2002 year class is estimated at 38 million fish, above the time series median of 35 million (Table 94, Figures 11-12).

Total stock biomass has increased substantially since 1989, and at the beginning of 2003 total stock biomass was estimated to be 56,100 mt. Spawning stock biomass (SSB; Age 0+) declined 72% between 1983 and 1989 (18,800 mt to 5,200 mt), but has increased eight-fold, with improved recruitment and decreased fishing mortality, to 42,200 mt in 2002 (Table 94, Figures 11-12). In general, the abundance of summer flounder age 2 and older has increased substantially since the early 1990s. The age structure of the spawning stock has thus also expanded, with 80% at ages 2 and older, and 19% 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 13).

A bootstrap procedure (Efron 1982) was used to evaluate the precision of the final VPA estimates with respect to random variation in tuning data (survey abundance indices). The procedure does not reflect uncertainty in the catch-at-age data. Five hundred bootstrap iterations were used to generate distributions of the 2002 fishing mortality rate and the 2003 total stock biomass. Histogram plots of the distribution of the terminal year VPA estimates visually indicate the amount of variability. The cumulative probability can be used to evaluate the risk of making a management decision based on the estimated value. For fishing mortality, the cumulative plot indicates the probability that the fishing mortality rate in 2002 was greater than a given level when measurement errors are considered (e.g., some target fishing mortality rate). For stock biomass, the cumulative plot indicates the probability that biomass at the beginning of 2003 was less than a given level (e.g., some desired minimum stock biomass).

The precision and bias of the 2002 fishing mortality rates, 1 January 2003 stock sizes, 1 November 2002 spawning stock biomass, 2002 mean stock biomass, and 1 January 2003 total stock biomass estimates are presented in Table 95. Bias was less than 10% for all parameters estimated. The bootstrap estimate of the 2003 total stock biomass was relatively precise, with a corrected CV of 9%. The bootstrap mean (56,717 mt) was slightly higher than the VPA point estimate (56,088 mt). The bootstrap results suggest a high probability (>90%) that total stock biomass in 2003 was at least 50,600 mt, reflecting only variability in survey observations (Table 95, Figure 14).

The corrected coefficients of variation for the Fs in 2002 on individual ages were 23% for age 0, 19% for age 1, 15% for age 2, 16% for age 3, 21% for age 4, 31% for age 5, 13% for age 6, and 13% for ages 7 and older. The distribution of bootstrap Fs was not strongly skewed, resulting in the bootstrap mean F for 2002 (0. 2392) being slightly higher than the point estimate from the VPA (0.2310). There is a 80% chance that F in 2002 was between about 0.21 and 0.28, given variability in survey observations (Table 95, Figure 14).

Retrospective analysis of the summer flounder VPA was carried out for terminal catch years 1998-2001. This "internal" retrospective analysis indicates a pattern of underestimation of fully recruited F (ages 3-5) for 1999-2001, continuing the pattern observed in the last three assessments (NEFSC 2000, MAFMC 2001a, NEFSC 2002). Fishing mortality was underestimated by 51% for 1999 (0.41 versus 0.84), by 40% for 2000 (0.60 versus 0.36), and by 20% for 2000 (0.35 versus 0.28), relative to the current VPA estimates. Spawning stock biomass has been generally been overestimated in recent years, ranging from 20% for 1999 and 2000 to 7% for 2001, relative to the current VPA estimates. There is no consistent retrospective pattern in the estimation of the abundance of age 0 fish over the last three years (Table 96, Figure 15). Comparison with previous assessments ("historical retrospective") shows a tendency to substantially underestimate fully-recruited fishing mortality (ages 2-4, for comparability across assessments) and slightly overestimate the SSB (ages 0-7+) from the the mid-1990s through 2000 (Figure 16). The 2002 (NEFSC 2002) and 2003 assessments provide the most consistent sequential estimates of fishing mortality and SSB since the 1996 and 1997 assessments.

BIOLOGICAL REFERENCE POINTS

The calculation of biological reference points based on yield per recruit for summer flounder using the Thompson and Bell (1934) model was detailed in the 1990 SAW 11 assessment (NEFC 1990). The 1990 analysis estimated $F_{max} = 0.23$. In the 1997 SAW 25 assessment (NEFSC 1997b), an updated yield per recruit analysis reflecting the partial recruitment pattern and mean weights at age for 1995-1996 estimated that $F_{max} = 0.24$. The analysis in the Terceiro (1999) assessment, reflecting partial recruitment and mean weights at age for 1997-1998, estimated that Fmax = 0.263 (Figure 17).

The Overfishing Definition Review Panel (Applegate *et al.* 1998) recommended that the MAFMC base MSY proxy reference points on yield per recruit analysis, and this recommendation was adopted in formulating the FMP Amendment 12 reference points (see Introduction), based on the 1999 assessment (Terceiro 1999). The 1999 assessment yield per recruit analysis indicated that $F_{threshold} = F_{target} = F_{max} = 0.263$, yield per recruit (YPR) at F_{max} was 0.55219 kg/recruit, and January 1 biomass per recruit (BPR) at Fmax was 2.8127 kg/recruit. The median number of summer flounder recruits estimated from the 1999 VPA for the 1982-1998 period was 37.844 million fish. Based on this recruitment, maximum sustainable yield (MSY) was estimated to be 20,897 mt (46 million lbs) at a biomass (B_{MSY}) of 106,444 mt (235 million lbs). The biomass threshold, one-half B_{MSY}, was therefore estimated to be 53,222 mt (118 million lbs; Figure 18). The Terceiro (1999) reference points were retained in the 2000 and 2001 stock assessments (NEFSC 2000, MAFMC 2001a) because of the stability of the input data. In the review of the 2002 stock assessment, SARC 35 concluded that updating these reference points was not warranted (NEFSC 2002), and therefore the reference points were not updated in this assessment either.

PROJECTIONS

Stochastic projections were made to provide forecasts of stock size and catches in 2003-2005 consistent with target reference points established in the FMP. The projections assume that recent patterns of discarding will continue over the time span of the projections. Different patterns that could develop in the future due to additional trip and bag limits and fishery closures have not been evaluated. The partial recruitment pattern (including discards) used in the projections was estimated as the geometric mean of F at age for 2000-2002, reflecting recent conditions in the fisheries. Mean weights at age were estimated as the geometric means of 2000-2002 values. Separate mean weight at age vectors were developed for the January 1 biomass, landings, and discards.

One hundred projections were made for each of the 500 bootstrapped realizations of 2003 stock sizes from the final 2003 VPA, using algorithms and software described by Brodziak and Rago (MS 1994) as implemented in the NFT AGEPRO version 3.01. Recruitment during 2003-2004 was generated randomly from a cumulative density function of the VPA recruitment series for 1982-2002 (median recruitment = 35.368 million fish). Other input parameters were as in Table 97; uncertainty in partial recruitment patterns, discard rates, or components other than survey variability was not considered.

If landings in 2003 are 10,570 mt (23.3 million lbs) and discards are 1,100 mt (2.4 million lbs), the forecast estimates a median (50% probability) F in 2003 = 0.25 and a median total stock biomass on January 1, 2004 of 63,600 mt, above the biomass threshold of ½ B_{MSY} = 53,200 mt. Landings of 12,790 mt (28.2 million lbs) and discards of 1,300 mt (2.9 million lbs) in 2004 provide a median F in 2004 = 0.26 and a median total stock biomass level on January 1, 2005 of 70,500 mt. Landings of 14,500 mt (32.0 million lbs) and discards of 1,400 mt (3.1 million lbs) in 2005 provide a median F in 2005 = 0.26 and a median total stock biomass level on January 1, 2006 of 75,800 mt (Table 97, Figures 18-19).

CONCLUSIONS

Assessment results

The summer flounder stock is not overfished and overfishing is not occurring relative to the current biological reference points. The fishing mortality rate has declined from 1.32 in 1994 to 0.23 in 2002, below the overfishing definition reference point ($F_{threshold} = F_{target} = F_{max} = 0.26$). There is an 80% chance that the 2002 F was between 0.21 and 0.28. The estimate of F for 2002 may understate the actual fishing mortality; retrospective analysis shows that the current assessment method tends to underestimate recent fishing mortality rates (e.g., by about 40% over the last three years).

Total stock biomass has increased substantially since 1989, and on January 1, 2003 was estimated to be 56,100 mt, 5% above the biomass threshold (53,200 mt). There is an 80% chance that total stock biomass in 2003 was between 51,000 and 63,000 mt. Spawning stock biomass (SSB; Age 0+) declined 72% from 1983 to 1989 (18,800 mt to 5,200 mt), but has increased eight-fold, with improved recruitment and decreased fishing mortality, to 42,200 mt in 2002. Retrospective analysis shows a tendency to slightly overestimate the SSB in the most recent years. The age structure of the spawning stock has expanded, with 80% at ages 2 and older, and 19% 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.

The arithmetic average recruitment from 1982 to 2002 is 40 million fish at age 0, with a median of 35 million fish. The 2002 year class is currently estimated to be about average at 38 million fish. There is no consistent retrospective pattern in the estimation of the abundance of age 0 fish over the last three years.

If the landings for 2003 do not exceed the TAL and the proportion of catch discarded does not increase, the total allowable landings (TAL) in 2004 would need to be 12,790 mt (28.2 million lbs) to meet the target F rate of $F_{max} = 0.26$ with 50% probability. As noted above, retrospective analysis suggests that the assessment tends to underestimate fishing mortality rates in the most recent years.

Research Recommendations

The following major data and analytic needs for future assessments were identified in the SARC 35 review of the 2002 assessment (NEFSC 2002) and in the preparation of the 2003 assessment:

1. Expand the NEFSC fishery observer program for summer flounder, with special emphasis on a) comprehensive areal and temporal coverage, b) adequate length and age sampling, and c) continued sampling after commercial fishery areal and seasonal quotas are reached and fisheries are limited or closed, and d) sampling of summer flounder discard in the scallop dredge fishery. Maintaining adequate observer coverage will be especially important in order to monitor a) the effects of implementation of gear and closed/exempted area regulations, both in terms of the response of the stock and the fishermen, b) potential continuing changes in "directivity" in the summer flounder fishery, as a results of changes

in stock levels and regulations, and c) discards of summer flounder in the commercial fishery once quota levels have been attained and the summer flounder fishery is closed or restricted by trip limits.

2. Evaluate the amount of observer data needed to reliably estimate discards of summer flounder in all components of the fishery
3. Conduct further research to better determine the discard mortality rate of recreational and commercial fishery summer flounder discards.
4. Develop a program to annually sample the length and age frequency of summer flounder discards from the recreational fishery.
5. RIDFW monthly fixed station survey length frequencies are currently converted to age using length cut-offs points. Investigate the utility of applying the appropriate NEFSC or MADMF age-length keys to convert the RIDFW monthly fixed station survey lengths to age.
6. Explore the possibility of weighting survey indices used in VPA calibration by the areal coverage (e.g., in square kilometers) of the respective seasonal surveys.
7. Explore the sensitivity of the VPA calibration to the addition of 1 and/or a small constant to values of survey series with "true zeros."
8. Statistically analyze changes in mean weights at age in the catch and NEFSC surveys. Determine if using mean weights at age in the survey are more appropriate for estimating the B_{MSY} proxy. Explore the sensitivity of the mean weights of the catch and partial recruitment pattern from a longer time series (1997 to 2001) to the re-estimated B_{MSY} proxy. As the NEFSC fall survey age structure expands, investigate the use of survey mean weights at age for stock weights at age in yield per recruit, VPA, and projection analyses.
9. Monitor changes in life history (growth and maturity) as the stock rebuilds.
10. Evaluate use of a forward calculating age-structured model for comparison with VPA. Forward models would facilitate use of expanding age/sex structure and allow inclusion of historical data. If sex-specific assessments are explored, the implications on YPR should also be investigated.
11. Explore the sensitivity of the VPA results to separating the summer flounder stock into multiple components.
12. Evaluate trends in the regional components of the NEFSC surveys and contrast with the state surveys that potentially index components of the stock.
13. Use NEFSC fishery observer age-length keys for 1994 and later years (as they become available) to supplement NEFSC survey data in aging the commercial fishery discard.

Major sources of assessment uncertainty

The SARC 35 review of the 2002 assessment (NEFSC 2002) identified the following major sources of uncertainty:

1. The landings from the commercial fisheries used in this assessment assume no under reporting of summer flounder landings. Therefore, reported landings from the commercial fisheries should be considered minimal estimates.

2. The recreational fishery landings and discards used in the assessment are estimates developed from the Marine Recreational Fishery Statistics Survey (MRFSS). While the estimates of summer flounder catch are considered to be among the most reliable produced by the MRFSS, they are subject to possible error. The proportional standard error (PSE) of estimates of summer flounder total landings in numbers has averaged 7%, ranging from 26% in 1982 to 3% in 1996, during 1982-2002.
3. The intensity of fishery observer sampling of the commercial scallop dredge fishery (outside of exempted area fisheries) was particularly low in 2001. This level of observer coverage likely was insufficient to accurately characterize summer flounder discards.
4. The length and age composition of the recreational discards are based on data from a limited geographic area (Long Island, New York, 1988-1992; Connecticut, 1997-2001, New York party boats 2000-2001, ALS releases focused in New York and New Jersey, 1999-2001). Sampling of recreational fishery discards on a annual, synoptic basis is needed.

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LITERATURE CITED

Almeida, F.P., R.E. Castaneda, R. Jesien, R.C. Greenfield, and J.M.Burnett, 1992. Proceedings of the NEFC/ASMFC Summer Flounder, *Paralichthys dentatus*, Ageing Workshop. NOAA Tech. Memo. NMFS-F/NEC-89. 7p.

Anthony, V. 1982. The calculation of $F_{0.1}$: a plea for standardization. Northwest Atlantic Fisheries Organization, Serial Document SCR 82/VI/64, Halifax, Canada.

Applegate, A., S. Cadrin, J. Hoenig, C. Moore, S. Murawski, and E. Pikitch. 1998. Evaluation of existing overfishing definitions and recommendations for new overfishing definitions to comply with the Sustainable Fisheries Act. Overfishing Definition Review Panel Final Report. 179 p.

Bolz, G., R. Monaghan, K. Lang, R. Gregory, and J. Burnett. 2000. Proceedings of the summer flounder aging workshop, 1-2 February 1999, Woods Hole, MA. NOAA Tech. Memo. NMFS-NE-156. 15 p.

Brodziak, J., and P. Rago. MS 1994. A general approach for short-term stochastic projections in age-structured fisheries assessment methods. Population Dynamics Branch, Northeast Fisheries Science Center, Woods Hole, MA 02543.

Bugley, K., and G. Shepherd. 1991. Effect of catch-and-release angling on the survival of black sea bass. N. Amer. J. Fish. Mgmt. 11:468-471.

Burns, T.S., R. Schultz, and B.E. Brown. 1983. The commercial catch sampling program in the northeastern United States. In Doubleday, W.G., and D. Rivard [ed.]. 1983. Sampling commercial catches of marine fish and invertebrates. Can. Spec. Publ. Fish. Aquat. Sci. 66: 290 p.

Clark, S.H. 1979. Application of bottom-trawl survey data to fish stock assessments. Fisheries 4: 9-15

Conser, R.J. and J.E. Powers. 1990. Extension of the ADAPT VPA tuning method designed to facilitate assessment work on tuna and swordfish stocks. Int. Comm. Conserv. Atlantic Tunas, Coll. Vol. Sci. Pap. 32: 461-47.

DeLong, A., K. Sosebee, and S. Cadrin. 1997. Evaluation of vessel logbook data for discard and CPUE estimates. SAW 24 SARC Working Paper Gen 5. 33 p.

Dery, L. M. 1997. Summer flounder, *Paralichthys dentatus*. *In:* Almeida, F. P., and T. F. Sheehan, eds. Age determination methods for northwest Atlantic species. http://www.wh.whoi.edu/fbi/age-man.html (February 1997).

Diodati, P.J., and R.A. Richards. 1996. Mortality of striped bass hooked and released in salt water. Trans. Am. Fish. Soc. 125(2):300-307.

Efron, B. 1982. The jackknife, the bootstrap, and other resampling plans. Phila. Soc. for Ind. and Appl. Math. 38.

Gavaris, S. 1988. An adaptive framework for the estimation of population size. Canadian Atl. Fish. Sci. Adv. Comm. (CAFSAC) Res. Doc. 88/29. 12 p.

Hoenig, J.M. 1983. Empirical use of longevity data to estimate mortality rates. Fish. Bull. 81:898-902.

IPHC. 1988. Annual Report, 1987. International Pacific Halibut Commission. Seattle, Washington. 51 p.

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.

Kraus, R.T., and J. A. Musick. 2003. A brief interpretation of summer flounder, *Paralichthys dentatus*, movements and stock structure with new tagging data on juveniles. Mar. Fish. Rev. 63(3): 1-6.

Lucy, J.A., and T.D. Holton. 1998. Release mortality in Virginia's recreational fishery forsummer flounder, *Paralichthys dentatus*. Virginia Marine Resource Report Number 97-8, 48 p.

Lux, F.E., and L.R. Porter. 1966. Length-weight relation of the summer flounder (*Paralichthys dentatus* (Linneaus). U.S. Bureau Comm. Fish., Spec. Sci. Rept. Fish., No. 531, 5 p.

Malchoff, M.H., and J. Lucy. 1998. Short-term hooking mortality of summer flounder in New York and Virginia. Interim report for Cornell Univ/DEC Project MOU 000024, 6 p.

Merson, R.R., C.S. Casey, C. Martinez, B. Soffientino, M. Chandlee, and J.L. Specker. 2000. Oocyte development in summer flounder (*Paralichthys dentatus*): seasonal changes and steriod correlates. J. Fish. Biol. 57(1): 182-196.

Merson, R.R., M. Terceiro, and J.L. Specker. In review. Length and age at maturity of the summer flounder *Paralichthys dentatus* (L.). J. Fish. Biol.

Mid-Atlantic Fishery Management Council. (MAFMC). 2001a. SAW Southern Demersal Working Group 2001 Advisory Report: Summer Flounder. 12 p.

Mid-Atlantic Fishery Management Council. (MAFMC). 2001b. SSC Meeting - Overfishing Definition. July 31-August 1, 2001. Baltimore, MD. 10 p.

National Research Council (NRC). 2000. Improving the collection, management, and use of marine fisheries data. National Academy Press, Washington, DC. 222 p.

Northeast Fisheries Center (NEFC). 1990. Report of the Eleventh NEFC Stock Assessment Workshop Fall 1990. NEFC Ref. Doc. No. 90-09. 121 p.

Northeast Fisheries Science Center (NEFSC). 1993. Report of the 16th Northeast Regional Stock Assessment Workshop (16th SAW). NEFSC Ref. Doc. No. 93-18. 116 p.

Northeast Fisheries Science Center (NEFSC). 1996a. Report of the 20th Northeast Regional Stock Assessment Workshop (20th SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. No. 95-18. 211 p.

Northeast Fisheries Science Center (NEFSC). 1996b. Report of the 22nd Northeast Regional Stock Assessment Workshop (22nd SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. No. 96-13. 242 p.

Northeast Fisheries Science Center (NEFSC). 1997a. Report of the 24th Northeast Regional Stock Assessment Workshop (24th SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. No. 97-12. 291 p.

Northeast Fisheries Science Center (NEFSC). 1997b. Report of the 25th Northeast Regional Stock Assessment Workshop (25th SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. No. 97-14. 143 p.

Northeast Fisheries Science Center (NEFSC). 2000. Report of the 31st Northeast Regional Stock Assessment Workshop (31st SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. No. 00-15. 400 p.

Northeast Fisheries Science Center (NEFSC) 2002. Report of the 35th Northeast Regional Stock Assessment Workshop (35th SAW): SARC Consensus Summary of Assessments. NEFSC Reference Document 02-14. 259 p.

Parrack, M.L. 1986. A method of analyzing catches and abundance indices from a fishery. Int. Comm. Conserv. Atlantic Tunas, Coll. Vol. Sci. Pap. 24: 209-221.

Pauly, D. 1980. On the interrelationship between natural mortality, growth parameters, and mean environmental temperature in 175 fish stocks. J. Cons. int. Explor. Mer 42: 116-124.

Prager, M.H. 1994. A suite of extensions to a non-equilibrium surplus-production model. Fish. Bull. 92:374-389.

Prager, M.H. 1995. Users manual for ASPIC: a stock-production model incorporating covariates. SEFSC Miami Lab. Doc. MIA-92/93-55.

Sipe, A.M., and M.E. Chittenden. 2001. A comparison of calcified structures for aging summer flounder, *Paralichthys dentatus*. Fish. Bull. 99:628-640.

Smith, R.L, L.M. Dery, P.G. Scarlett, and A. Jearld, Jr. 1981. Proceedings of the summer flounder (*Paralichthys dentatus*) age and growth workshop, 20-21 May 1980, Northeast Fisheries Center, Woods Hole, Massachusetts. NOAA Tech. Memo. NMFS- F/NEC-11. 30 p.

Specker, J., R.R. Merson, C. Martinez, and B. Soffientino. 1999. Maturity status of female summer flounder and monkfish. URI/NOAA Cooperative Marine Education and Research Program (CMER) Final Report, Award Number NA67FE0385. 9 p.

Szedlmayer, S.T., and K.W. Able. 1992. Validation studies of daily increment formation for larval and juvenile summer flounder, *Paralichthys dentatus*. Can. J. Fish. Aquat. Sci. 49:1856-1862.

Terceiro, M. 1999. Stock assessment of summer flounder for 1999. Northeast Fisheries Science Center Reference Document 99-19, 178 p.

Thompson, W.F., and F.H. Bell. 1934. Biological statistics of the Pacific halibut fishery. 2. Effect of changes in intensity upon total yield and yield per unit of gear. Rep. Int. Fish. (Pacific halibut) Comm. 8: 49 p.

Weber, A.M. MS 1984. Summer flounder in Great South Bay: survival of sublegals caught by hook-and-line and released. New York State Department of Environmental Conservation, Division of Marine Resources. Stony Brook, NY. 27 p.

Wigley, S., M. Terceiro, A. DeLong, and K. Sosebee. 1997. Proration of 1994-96 commerciallandings of cod, haddock, and yellowtail flounder. SAW 24 SARC Working Paper Gen 4. 32 p.

Wilk, S.J., W. G. Smith, D.E. Ralph and J. Sibunka. 1980. The population structure of summer flounder between New York and Florida based on linear discriminant analysis. Trans. Am. Fish. Soc. 109:265-271.

Table 1. Summer Flounder Commercial Landings by State (thousands of lb) and coastwide (thousands of pounds ('000 lbs), metric tons (mt)).

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD+	VA+	NC+	Total '000 lbs	Total mt
1940	0	0	2847	258	149	1814	3554	3	444	1247	498	10814	4905
1941	na	na	na	na	na	na	na	na	183	764	na	947	430
1942	0	0	193	235	126	1286	987	2	143	475	498	3945	1789
1943	0	0	122	202	220	1607	2224	11	143	475	498	5502	2496
1944	0	0	719	414	437	2151	3159	8	197	2629	498	10212	4632
1945	0	0	1730	467	270	3182	3102	2	460	1652	1204	12297	5578
1946	0	0	1579	625	478	3494	3310	22	704	2889	1204	14305	6489
1947	0	0	1467	333	813	2695	2302	46	532	1754	1204	11146	5056
1948	0	0	2370	406	518	2308	3044	15	472	1882	1204	12219	5542
1949	0	0	1787	470	372	3560	3025	8	783	2361	1204	13570	6155
1950	0	0	3614	1036	270	3838	2515	25	543	1761	1840	15442	7004
1951	0	0	4506	1189	441	2636	2865	20	327	2006	1479	15469	7017
1952	0	0	4898	1336	627	3680	4721	69	467	1671	2156	19625	8902
1953	0	0	3836	1043	396	2910	7117	53	1176	1838	1844	20213	9168
1954	0	0	3363	2374	213	3683	6577	21	1090	2257	1645	21223	9627
1955	0	0	5407	2152	385	2608	5208	26	1108	1706	1126	19726	8948
1956	0	0	5469	1604	322	4260	6357	60	1049	2168	1002	22291	10111
1957	0	0	5991	1486	677	3488	5059	48	1171	1692	1236	20848	9456
1958	0	0	4172	950	360	2341	8109	209	1452	2039	892	20524	9310
1959	0	0	4524	1070	320	2809	6294	95	1334	3255	1529	21230	9630
1960	0	0	5583	1278	321	2512	6355	44	1028	2730	1236	21087	9565
1961	0	0	5240	948	155	2324	6031	76	539	2193	1897	19403	8801
1962	0	0	3795	676	124	1590	4749	24	715	1914	1876	15463	7014
1963	0	0	2296	512	98	1306	4444	17	550	1720	2674	13617	6177
1964	0	0	1384	678	136	1854	3670	16	557	1492	2450	12237	5551
1965	0	0	431	499	106	2451	3620	25	734	1977	272	10115	4588
1966	0	0	264	456	90	2466	3830	13	630	2343	4017	14109	6400
1967	0	0	447	706	48	1964	3035	0	439	1900	4391	12930	5865
1968	0	0	163	384	35	1216	2139	0	350	2164	2602	9053	4106
1969	0	0	78	267	23	574	1276	0	203	1508	2766	6695	3037
1970	0	0	41	259	23	900	1958	0	371	2146	3163	8861	4019
1971	0	0	89	275	34	1090	1850	0	296	1707	4011	9352	4242
1972	0	0	93	275	7	1101	1852	0	277	1857	3761	9223	4183
1973	0	0	506	640	52	1826	3091	*	495	3232	6314	16156	7328
1974	*	0	1689	2552	26	2487	3499	0	709	3111	10028	22581	10243
1975	0	0	1768	3093	39	3233	4314	5	893	3428	9539	26311	11934
1976	*	0	4019	6790	79	3203	5647	3	697	3303	9627	33368	15135
1977	0	0	1477	4058	64	2147	6566	5	739	4540	10332	29927	13575
1978	0	0	1439	2238	111	1948	5414	1	676	5940	10820	28586	12966
1979	5	0	1175	2825	30	1427	6279	6	1712	10019	16084	39561	17945

* = less than 500 lb; na = not available; + = NMFS did not identify flounders to species prior to 1978 for NC and 1957 for both MD and VA and thus the numbers represent all unclassified flounders.

Sources: 1940-1977 USDC 1984; 1978-1979 unpublished NMFS General Canvas data

Table 1 continued.

Year	ME	NH	MA	RI	CT	NY	NJ	DE	MD+	VA+	NC+	Total '000 lb	mt
1980	4	0	367	1277	48	1246	4805	1	1324	8504	13643	31216	14159
1981	3	0	598	2861	81	1985	4008	7	403	3652	7459	21056	9551
1982	18	*	1665	3983	64	1865	4318	8	360	4332	6315	22928	10400
1983	84	0	2341	4599	129	1435	4826	5	937	8134	7057	29548	13403
1984	2	*	1488	4479	131	2295	6364	9	813	9673	12510	37765	17130
1985	3	*	2249	7533	183	2517	5634	4	577	5037	8614	32352	14675
1986	0	*	2954	7042	160	2738	4017	4	316	3712	5924	26866	12186
1987	8	*	3327	4774	609	2641	4451	4	319	5791	5128	27052	12271
1988	5	0	2421	4719	741	3439	6006	7	514	7756	6770	32377	14686
1989	9	0	1878	3083	513	1464	2865	3	204	3689	4206	17913	8125
1990	3	0	628	1408	343	405	1458	2	138	2144	2728	9257	4199
1991	0	0	1124	1672	399	719	2341	4	232	3715	3516	13722	6224
1992	*	*	1383	2532	495	1239	2871	12	319	5172	2576	16599	7529
1993	6	0	903	1942	225	849	2466	6	254	3052	2894	12599	5715
1994	4	0	1031	2649	371	1269	2356	4	179	3091	3571	14525	6588
1995	5	0	1128	2325	319	1248	2319	4	174	3304	4555	15381	6977
1996	8	0	800	1763	266	936	2369	8	266	2286	4218	12920	5861
1997	3	0	745	1566	257	823	1321	5	215	2370	1501	8806	3994
1998	6	0	707	1712	263	822	1863	11	224	2616	2967	11190	5076
1999	6	0	813	1637	245	804	1918	8	201	2196	2801	10627	4820
2000	7	0	789	1703	240	800	1848	12	252	2206	3354	11211	5085
2001	22	0	694	1800	267	751	1745	7	223	2660	2789	10958	4970
2002	1	0	1010	2288	14	1057	2407	3	316	2970	4059	14124	6407

* = less than 500 lb; na = not available;

Sources: 1980-2002 State and Federal reporting systems, 1995-98 NC DMF Trip Ticket System

Table 2. 1994 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata). Most landings for the first quarter of 1994 (Jan-Mar) were reported under the previous NER weighout system and are not included here; the total will therefore not match that for 1994 in Table 1.

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	0.1	0.0	3.0	0.2	0.0	0.0
NH	0.0	0.0	0.0	0.0	0.0	0.0
MA	352.6	16.4	265.8	13.0	109.5	10.3
RI	476.5	22.1	393.2	19.2	253.5	23.9
CT	0.0	0.0	0.0	0.0	0.0	0.0
NY	121.1	5.6	373.8	18.2	67.4	6.4
NJ	633.1	29.4	535.2	26.1	404.0	38.0
DE	0.0	0.0	56.0	2.7	0.0	0.0
MD	45.2	2.1	39.7	1.9	37.2	3.5
VA	524.5	24.4	382.2	18.7	190.3	17.9
Unknown	0.0	0.0	1.1	0.0	0.0	0.0
Total	2152.9	100.0	2049.9	100.0	1061.8	100.0

Month	mt	%	mt	%	mt	%
Jan	0.0	0.0	0.0	0.0	0.0	0.0
Feb	5.2	0.2	0.0	0.0	0.0	0.0
Mar	0.0	0.0	6.8	0.3	0.0	0.0
Apr	114.6	5.3	138.8	6.8	68.6	6.5
May	235.3	10.9	221.0	10.8	92.2	8.8
Jun	228.0	10.6	174.9	8.5	72.2	6.8
Jul	198.2	9.2	186.7	9.1	111.7	10.5
Aug	210.0	9.8	228.1	11.1	104.7	9.9
Sep	355.7	16.5	384.3	18.8	230.3	21.7
Oct	302.4	14.1	301.6	14.7	146.6	13.8
Nov	204.3	9.5	158.3	7.7	99.0	9.3
Dec	299.2	13.9	249.3	12.2	135.5	12.8
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
Total	2152.9	100.0	2049.9	100.0	1061.8	100.0

Table 3. 1995 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata). North Carolina landings not reported through the Dealer/VTR system; the total will therefore not match that for 1995 in Table 1.

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	2.4	0.1	9.8	0.2	2.4	0.1
NH	0.0	0.0	7.5	0.2	0.0	0.0
MA	511.7	10.4	487.9	10.5	179.1	8.1
RI	1054.8	21.5	914.9	19.8	569.5	25.6
CT	144.5	2.9	113.1	0.0	0.0	0.0
NY	566.1	11.5	648.5	14.0	141.5	6.4
NJ	1052.0	21.4	984.4	21.3	594.1	26.7
DE	1.9	0.0	0.0	0.0	0.0	0.0
MD	78.8	1.6	56.0	1.2	45.8	2.1
VA	1498.5	30.5	1390.0	30.0	690.2	31.1
Unknown	0.0	0.0	41.1	0.0	0.0	0.0
Total	4910.7	100.0	4666.7	100.0	2222.5	100.0
Month	mt	%	mt	%	mt	%
Jan	1550.1	31.6	1636.6	35.1	749.4	33.7
Feb	692.4	14.1	768.1	16.5	416.5	18.7
Mar	128.8	2.6	137.4	2.9	52.7	2.4
Apr	130.1	2.7	140.5	3.0	80.2	3.6
May	268.3	5.5	304.5	6.5	101.6	4.6
Jun	203.0	4.1	192.9	4.1	67.7	3.1
Jul	188.0	3.8	131.4	2.8	64.7	2.9
Aug	350.0	7.1	325.8	7.0	138.5	6.2
Sep	300.0	6.1	288.7	6.2	145.7	6.6
Oct	338.6	6.9	326.1	7.0	196.9	8.9
Nov	305.3	6.2	141.7	3.0	82.0	3.7
Dec	436.5	8.9	272.9	5.9	126.6	5.7
Unknown	19.8	0.4	0.0	0.0	0.0	0.0
Total	4910.7	100.0	4666.7	100.0	2222.5	100.0

Table 4. 1996 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata). North Carolina landings not reported through the Dealer/VTR system; the total will therefore not match that for 1996 in Table 1.

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	3.7	0.1	5.3	0.2	1.4	0.1
NH	0.0	0.0	26.5	0.8	0.0	0.0
MA	363.0	9.8	336.9	10.4	167.0	9.7
RI	799.8	21.5	654.8	20.3	441.7	25.5
CT	120.5	0.0	98.0	3.0	0.0	0.0
NY	424.8	11.1	374.6	11.6	99.5	5.8
NJ	1074.6	28.7	974.9	30.2	561.6	32.4
DE	3.6	0.0	0.4	0.0	0.0	0.0
MD	120.4	2.7	91.3	2.8	79.9	4.6
VA	1036.8	26.2	634.0	19.7	381.0	22.0
Unknown	0.0	0.0	113.9	3.4	0.0	0.0
Total	3947.3	100.0	3310.6	100.0	1732.1	100.0
Month	mt	%	mt	%	mt	%
Jan	1290.9	33.0	1049.3	31.7	442.2	25.5
Feb	433.0	11.6	418.0	12.6	232.4	13.4
Mar	26.9	0.6	63.9	1.9	13.3	0.8
Apr	127.7	3.0	131.0	4.0	29.6	1.7
May	330.7	8.4	188.4	5.7	109.4	6.3
Jun	233.6	5.9	204.8	6.2	116.2	6.7
Jul	256.6	6.5	204.2	6.2	120.3	6.9
Aug	268.8	6.6	243.2	7.4	116.9	6.8
Sep	611.5	15.4	583.6	17.6	391.1	22.6
Oct	342.8	8.8	209.4	6.3	148.9	8.6
Nov	13.4	0.2	10.4	0.3	10.1	0.6
Dec	10.8	0.1	4.6	0.1	1.9	0.6
Unknown	0.7	0.0	0.0	0.0	0.0	0.0
Total	3947.3	100.0	3310.6	100.0	1732.1	100.0

Table 5. 1997 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata).

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	1.3	0.0	1.4	0.0	1.4	0.1
NH	0.0	0.0	0.0	0.0	0.0	0.0
MA	338.0	8.5	259.4	7.7	108.1	5.9
RI	710.0	17.8	593.4	17.6	416.0	22.6
CT	116.6	2.9	76.3	2.3	0.0	0.0
NY	373.3	9.3	343.3	10.2	72.4	3.9
NJ	599.2	15.0	541.9	16.0	443.0	24.1
DE	2.4	0.1	0.1	0.0	0.0	0.0
MD	97.5	2.4	80.0	2.4	73.1	4.0
VA	1075.1	26.9	817.4	24.2	624.1	33.9
NC	681.0	17.0	663.6	19.6	100.3	5.5
Unknown	0.0	0.0	0.4	0.0	0.0	0.0
Total	3994.4	100.0	3377.2	100.0	1838.4	100.0
Month	mt	%	mt	%	mt	%
Jan	1684.7	42.2	1427.5	42.3	624.6	34.0
Feb	195.6	4.9	206.3	6.1	76.4	4.2
Mar	216.5	5.4	217.2	6.4	115.3	6.3
Apr	240.1	6.0	193.7	5.7	125.6	6.8
May	213.2	5.3	165.6	4.9	111.9	6.1
Jun	245.2	6.1	192.9	5.7	124.1	6.8
Jul	267.2	6.7	188.5	5.6	94.6	5.1
Aug	202.3	5.1	154.7	4.6	75.2	4.1
Sep	356.6	8.9	312.9	9.3	238.9	13.0
Oct	334.5	8.4	286.8	8.5	233.5	12.7
Nov	24.2	0.6	17.1	0.5	11.7	0.6
Dec	14.3	0.4	13.8	0.4	6.6	0.4
Unknown	0.0	0.0	0.2	0.0	0.0	0.0
Total	3994.4	100.0	3377.2	100.0	1838.4	100.0

Table 6. 1998 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata).

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	2.6	0.1	3.8	0.1	0.0	0.0
NH	0.0	0.0	0.1	0.0	0.0	0.0
MA	320.5	6.3	221.7	5.6	98.5	3.8
RI	776.6	15.3	569.7	14.4	421.4	16.4
CT	119.2	2.3	101.7	2.6	0.0	0.0
NY	372.6	7.3	297.7	7.5	52.6	2.0
NJ	845.0	16.6	784.2	19.8	642.3	24.9
DE	5.0	0.1	0.1	0.0	0.0	0.0
MD	101.7	2.0	73.5	1.9	68.1	2.6
VA	1186.5	23.4	1017.4	25.6	797.9	31.0
NC	1346.0	26.5	857.3	21.6	494.9	19.2
Unknown	0.0	0.0	41.2	1.0	0.0	0.0
Total	5075.7	100.0	3968.4	100.0	2575.7	100.0

Month	mt	%	mt	%	mt	%
Jan	1631.4	32.1	1325.6	33.4	898.4	34.9
Feb	474.9	9.4	442.6	11.2	191.7	7.4
Mar	211.8	4.2	186.5	4.7	109.3	4.2
Apr	260.3	5.1	226.3	5.7	154.0	6.0
May	307.9	6.1	217.5	5.5	149.3	5.8
Jun	211.7	4.2	122.2	3.1	75.4	2.9
Jul	275.5	5.4	159.7	4.0	77.4	3.0
Aug	172.7	3.4	112.3	2.8	55.5	2.2
Sep	404.1	8.0	337.2	8.5	284.6	11.0
Oct	53.3	1.0	44.2	1.1	13.8	0.5
Nov	539.4	10.6	495.1	12.5	385.6	15.0
Dec	532.7	10.5	299.0	7.5	180.1	7.0
Unknown	0.0	0.0	0.2	0.0	0.6	0.0
Total	5075.7	100.0	3968.4	100.0	2575.7	100.0

Table 7. 1999 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata).

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	2.6	0.1	3.9	0.1	2.5	0.1
NH	0.0	0.0	0.3	0.0	0.0	0.0
MA	368.6	7.6	246.9	6.4	138.8	5.8
RI	742.3	15.4	612.1	15.8	437.5	18.2
CT	111.2	2.3	82.0	2.1	2.2	0.1
NY	364.7	7.6	271.5	7.0	40.7	1.7
NJ	870.0	18.0	818.5	21.1	586.6	24.3
DE	3.4	0.1	0.0	0.0	0.0	0.0
MD	91.2	1.9	62.8	1.6	59.7	2.5
VA	996.0	20.7	715.7	18.5	517.5	21.5
NC	1270.4	26.4	1004.1	25.9	624.8	25.9
Unknown	0.0	0.0	54.7	1.4	0.0	0.0
Total	4820.4	100.0	3872.5	100.0	2410.3	100.0
Month	mt	%	mt	%	mt	%
Jan	1673.4	34.7	1603.0	41.4	1011.3	42.0
Feb	505.3	10.5	539.5	13.9	264.0	11.0
Mar	238.9	5.0	212.1	5.5	109.3	4.5
Apr	294.4	6.1	237.6	6.1	125.4	5.2
May	290.7	6.0	196.2	5.1	144.8	6.0
Jun	165.1	3.4	92.4	2.4	63.6	2.6
Jul	279.7	5.8	134.0	3.5	88.3	3.7
Aug	146.9	3.0	89.1	2.3	66.0	2.7
Sep	325.6	6.8	250.4	6.5	197.6	8.2
Oct	186.6	3.9	161.9	4.2	124.3	5.2
Nov	276.5	5.7	215.3	5.6	137.8	5.7
Dec	437.3	9.1	139.9	3.6	77.5	3.2
Unknown	0.0	0.0	1.1	0.0	0.5	0.0
Total	4820.4	100.0	3872.5	100.0	2410.3	100.0

Table 8. 2000 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata).

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	3.1	0.1	5.4	0.1	0.0	0.0
NH	0.0	0.0	2.3	0.1	0.0	0.0
MA	357.9	7.0	226.0	5.1	66.5	2.5
RI	772.7	15.2	570.2	12.9	420.1	15.6
CT	108.7	2.1	84.8	1.9	0.0	0.0
NY	362.8	7.1	265.4	6.0	42.5	1.6
NJ	838.3	16.5	831.9	18.8	650.8	24.1
DE	5.6	0.1	0.1	0.0	0.0	0.0
MD	114.2	2.2	86.1	1.9	70.0	2.6
VA	1000.9	19.7	928.0	21.0	669.3	24.8
NC	1521.2	29.9	1381.7	31.2	778.2	28.9
Unknown	0.0	0.0	42.5	1.0	0.0	0.0
Total	5085.4	100.0	4424.4	100.0	2697.4	100.0
Month	mt	%	mt	%	mt	%
Jan	1149.5	22.6	1105.6	25.0	733.3	27.2
Feb	1175.1	23.1	1119.9	25.3	658.8	24.4
Mar	347.8	6.8	317.9	7.2	161.7	6.0
Apr	226.9	4.5	198.5	4.5	117.4	4.4
May	311.3	6.1	216.4	4.9	136.1	5.0
Jun	169.7	3.3	82.7	1.9	46.6	1.7
Jul	324.1	6.4	203.4	4.6	111.3	4.1
Aug	159.9	3.1	110.6	2.5	52.7	2.0
Sep	334.1	6.6	261.9	5.9	201.6	7.5
Oct	54.6	1.1	33.2	0.8	17.8	0.7
Nov	484.3	9.5	473.2	10.7	325.4	12.1
Dec	348.1	6.8	301.1	6.8	134.7	5.0
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
Total	5085.4	100.0	4424.4	100.0	2697.4	100.0

Table 9. 2001 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata).

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	10.0	0.2	17.8	0.4	9.1	0.3
NH	0.0	0.0	0.2	0.0	0.0	0.0
MA	314.8	6.3	248.1	5.9	68.8	2.6
RI	815.9	16.4	594.4	14.2	426.6	16.2
CT	121.2	2.4	86.9	2.1	0.2	0.0
NY	340.8	6.9	241.4	5.8	44.5	1.7
NJ	791.7	15.9	745.3	17.8	611.9	23.2
DE	3.4	0.1	0.1	0.0	0.0	0.0
MD	101.0	2.0	73.0	1.7	65.1	2.5
VA	1206.4	24.3	1044.8	24.9	705.1	26.7
NC	1265.1	25.5	1104.6	26.4	707.9	26.8
Unknown	0.0	0.0	35.4	0.8	0.0	0.0
Total	4970.3	100.0	4192.0	100.0	2639.2	100.0
Month	mt	%	mt	%	mt	%
Jan	1617.0	32.5	1474.6	35.2	983.1	37.2
Feb	467.1	9.4	417.5	10.0	212.3	8.0
Mar	199.8	4.0	171.1	4.1	80.5	3.0
Apr	246.4	5.0	219.6	5.2	157.0	5.9
May	236.0	4.7	148.7	3.5	91.0	3.4
Jun	188.9	3.8	100.3	2.4	61.8	2.3
Jul	271.4	5.5	175.1	4.2	103.9	3.9
Aug	198.1	4.0	133.7	3.2	48.1	1.8
Sep	304.6	6.1	259.2	6.2	193.4	7.3
Oct	81.6	1.6	50.5	1.2	26.0	1.0
Nov	578.3	11.6	545.5	13.0	356.3	13.5
Dec	581.1	11.7	496.2	11.8	325.9	12.3
Unknown	0.0	0.0	0.0	0.0		0.0
Total	4970.3	100.0	4192.0	100.0	2639.2	100.0

Table 10. 2002 Summer flounder landings (mt, live and percent) from the Dealer Report data, Vessel Trip Report data, and the matched set, by state and month of landing (proration strata).

	Dealer Report		Vessel Trip Report		Matched Set	
State	mt	%	mt	%	mt	%
ME	0.2	0.0	0.7	0.0	0.0	0.0
NH	0.0	0.0	0.2	0.0	0.0	0.0
MA	458.0	7.1	312.7	5.5	87.1	2.5
RI	1037.8	16.2	759.5	13.4	525.9	15.3
CT	6.1	0.1	144.1	2.5	0.0	0.0
NY	479.6	7.5	377.3	6.6	77.4	2.3
NJ	1091.8	17.0	1068.6	18.8	816.8	23.8
DE	1.2	0.0	0.0	0.0	0.0	0.0
MD	143.5	2.2	97.7	1.7	81.3	2.4
VA	1347.3	21.0	1197.3	21.0	730.4	21.3
NC	1841.0	28.7	1696.7	29.8	1113.4	32.4
Unknown	0.0	0.0	33.6	0.6	0.0	0.0
Total	6406.7	100.0	5688.4	100.0	3432.4	100.0

Month	mt	%	mt	%	mt	%
Jan	1084.2	16.9	1066.0	18.7	666.3	19.4
Feb	988.1	15.4	967.8	17.0	544.5	15.9
Mar	873.7	13.6	839.7	14.8	461.0	13.4
Apr	484.2	7.6	428.7	7.5	277.5	8.1
May	233.4	3.6	160.1	2.8	96.4	2.8
Jun	278.6	4.3	177.5	3.1	93.6	2.7
Jul	267.5	4.2	209.8	3.7	105.0	3.1
Aug	377.1	5.9	254.1	4.5	149.7	4.4
Sep	419.4	6.5	378.9	6.7	262.0	7.6
Oct	154.6	2.4	120.0	2.1	70.1	2.0
Nov	629.6	9.8	547.6	9.6	366.2	10.7
Dec	616.3	9.6	538.3	9.5	340.1	9.9
Unknown	0.0	0.0	0.0	0.0	0.0	0.0
Total	6406.7	100.0	5688.4	100.0	3432.4	100.0

Table 11. Distribution of Northeast Region (ME-VA) commercial fishery landings by statistical area.

Area	1992	1993	1994	1995	1996	1997	1998	1999
511	0	0	0	0	1	0	0	0
512	0	0	0	0	1	1	0	0
513	0	3	0	0	2	0	0	2
514	9	11	10	12	3	15	17	11
515	0	0	0	0	0	0	0	0
521	8	3	14	4	16	2	9	2
522	8	8	7	6	13	6	2	3
561	2	1	0	0	1	1	3	2
562	6	4	5	10	1	1	0	3
525	22	35	26	85	140	16	27	28
526	294	242	193	128	45	22	33	17
533	0	0	0	0	6	2	3	5
537	916	557	707	770	553	449	417	354
538	228	255	341	332	273	270	229	275
539	217	157	223	258	248	284	373	418
611	117	35	181	283	170	141	204	230
612	404	393	169	221	353	297	316	403
613	237	167	280	242	188	194	128	171
614	81	97	141	129	18	41	41	13
615	61	15	49	99	20	37	41	44
616	532	476	743	730	474	245	280	122
621	1028	526	258	279	325	266	286	304
622	299	363	323	522	264	53	141	301
623	0	6	0	14	28	0	1	0
625	289	227	122	118	282	227	142	91
626	743	601	821	347	395	94	502	415
631	655	98	219	220	21	174	258	140
632	160	77	60	43	75	30	41	79
635	45	45	77	55	29	418	228	97
636	0	0	0	4	2	27	8	20
Total	6361	4402	4969	4911	3947	3313	3730	3550

Table 11 continued.

Area	2000	2001	2002
511	1	0	0
512	1	0	0
513	0	1	0
514	2	1	3
515	0	0	2
521	4	15	31
522	6	5	12
561	4	7	8
562	8	3	24
525	41	29	43
526	16	23	23
533	10	2	1
537	326	337	451
538	260	214	258
539	455	432	545
611	142	155	199
612	308	379	616
613	170	162	241
614	3	11	27
615	70	115	91
616	384	247	215
621	208	274	533
622	101	234	153
623	8	18	3
625	60	129	295
626	697	510	489
631	185	142	189
632	39	41	8
635	54	212	99
636	1	7	6
Total	3564	3705	4566

Table 12. Summary of sampling of the commercial fishery for summer flounder, ME-VA[1].

Year	Lengths	Ages	NER Landings (MT)	Sampling Intensity (mt/100 lengths)
1982	8,194	2,288	7,536	92
1983	6,893	1,347	10,202	148
1984	5,340	1,794	11,455	215
1985	6,473	1,611	10,767	166
1986	7,840	1,967	9,499	121
1987	6,605	1,788	9,945	151
1988	9,048	2,302	11,615	128
1989	8,411	1,325	6,217	74
1990	3,419	853	2,962	87
1991	4,627	1,089	4,626	100
1992	3,385	899	6,361	188
1993	3,638	844	4,402	121
1994	3,950	956	4,969	126
1995	2,982	682	4,911	165
1996	4,580	1,235	3,947	86
1997	8,855	2,332	3,313	37
1998	10,055	2,641	3,730	37
1999	10,460	3,244	3,550	34
2000	10,952	3,307	3,564	33
2001	10,310	2,838	3,705	36
2002	7,422	1,870	4,566	62

[1] Does not include unclassified market category landings for 1982-93.

Table 13. Distribution of 1994 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured.

MC = Large, 1210 Landings = 1,323 mt; 26.7% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53	2 188	1 100	1 76	2 127	6 491
61			2 192		2 192
62	1 100			2 200	3 300
63					
Total	3 288	1 100	3 268	4 327	11 983

MC = Medium, 1212 Landings = 2,212 mt; 44.5% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51		1 122	1 87		2 209
52					
53	3 300	3 310	3 323	3 298	12 1,231
61			2 200	1 96	13 296
62	1 100	1 100		2 200	4 400
63					
Total	4 400	5 532	6 610	6 594	21 2,136

Table 13 continued.

MC = Small, 1214   Landings = 511 mt; 10.3% of NER Total

DIV	Quarter 1	2	3	4	Total
51		1 103			1 103
52					
53					
61			1 56		1 56
62	1 50	1 50		2 152	4 252
63					
Total	1 50	2 153	1 56	2 152	6 411

MC = Jumbo, 1218   Landings = 315 mt; 6.3% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53	1 36		1 22	1 57	3 115
61					
62			1 18	1 100	1 118
63					
Total	1 36		2 40	2 157	5 233

Table 13 continued.

MC = Unclassified, 1219   Landings = 608 mt; 12.2% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53					
61		1 46		1 36	2 82
62			2 105		2 105
63				1 36	1 36
Total		1 46	2 105	1 36	4 187

Table 14. Distribution of 1995 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured.

MC = Large, 1210 Landings = 1,800 mt; 36.7% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53	2 201	1 88			3 289
61	1 105	2 133		1 39	4 277
62	2 201		1 100	1 100	4 401
63					
Total	5 507	3 221	1 100	2 139	11 967

MC = Medium, 1212 Landings = 1,988 mt; 40.5% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51		2 110			2 110
52					
53	3 285	4 353			7 638
61	1 98	1 100		1 69	3 267
62	2 201		1 100	1 100	4 401
63					
Total	6 584	7 563	1 100	2 169	16 1,416

Table 14 continued.

MC = Small, 1214 Landings = 345 mt; 7.0% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53					
61		1 44			1 44
62	2 150		1 50	1 50	4 250
63					
Total	2 150	1 44	1 50	1 50	5 294

MC = Jumbo, 1218 Landings = 370 mt; 7.5% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53					
61					
62	2 187				2 187
63					
Total	2 187				2 187

Table 14 continued.

MC = Unclassified, 1219   Landings = 408 mt; 8.3% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53					
61		1 62			1 62
62			1 56		1 56
63					
Total		1 62	1 56		2 118

Table 15. Distribution of 1996 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured.

MC = Large, 1210 Landings = 1,151 mt; 29.2% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	2 20	3 240			5 260
53	1 78		1 100		2 178
61	3 167	4 409			7 576
62			3 300		3 300
63					
Total	6 265	7 649	4 400		17 1314

MC = Medium, 1212 Landings = 1,649 mt; 41.8% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	1 62	2 200			3 262
53	1 146		1 100	2 204	4 450
61	2 175	4 401	2 156		8 732
62			2 200	2 187	4 387
63				1 83	1 83
Total	4 383	6 601	5 456	5 474	20 1914

Table 15 continued.

MC = Small, 1214   Landings = 420 mt; 10.6% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52		2 105			2 105
53					
61	1 50	3 181	1 50		5 281
62			3 150	1 50	4 200
63					
Total	1 50	5 286	4 200	1 50	11 586

MC = Jumbo, 1218   Landings = 366 mt; 9.3% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52	2 25	2 201			4 226
53			2 131		2 131
61	1 100	3 132			4 232
62			1 100		1 100
63					
Total	3 125	5 333	3 231		11 689

Table 15 continued.

MC = Unclassified, 1219   Landings = 361 mt; 9.1% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53					
61		1 32	1 45		2 77
62					
63					
Total		1 32	1 45		2 77

Table 16. Distribution of 1997 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured.

MC = Large, 1210 Landings = 1,125 mt; 34.0% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51			1 12		1 12
52					
53	3 331				3 331
61	3 300	5 454	5 435		13 1189
62	4 400	3 300	1 100	4 192	12 992
63	1 100				1 100
Total	11 1131	8 754	7 547	4 192	30 2624

MC = Medium, 1212 Landings = 1,305 mt; 39.4% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51		1 117	2 199		3 316
52			1 116		1 116
53	3 305	3 325	2 214		8 844
61	6 628	7 651	6 499		19 1778
62	6 601	4 343	3 182	1 43	14 1169
63	4 400				4 400
Total	19 1934	15 1436	14 1210	1 43	49 4623

Table 16 continued.

MC = Small, 1214   Landings = 86 mt; 2.6% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53					
61	1 50				1 50
62	1 100				1 100
63	1 50				1 50
Total	3 200				3 200

MC = Jumbo, 1218   Landings = 398 mt; 12.0% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52		1 41			1 41
53	2 196	1 100			3 296
61	7 495	1 28			8 523
62	1 100	1 10	1 10	2 110	5 230
63	1 72				1 72
Total	11 863	4 179	1 10	2 110	18 1162

Table 16 continued.

MC = Unclassified, 1219   Landings = 399 mt; 12.1% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53		1 101			1 101
61	1 106			1 39	2 145
62					
63					
Total	1 106	1 101		1 39	3 246

Table 17. Distribution of 1998 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured.

MC = Large, 1210 Landings = 1,577 mt; 42.3% of NER Total

DIV	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
51		1 30	2 109		2 139
52					
53	1 100				1 100
61	9 791	4 403	9 913		22 2107
62	4 400	2 146	3 91	4 347	13 984
63	1 100			4 402	5 502
Total	15 1391	7 579	14 1113	8 749	43 3832

MC = Medium, 1212 (1,447 mt) plus Small, 1214 (5 mt); Landings = 1,452 mt, 38.9% of NER Total

DIV	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
51		1 104	4 302		5 406
52		1 72			1 72
53	1 98	2 204			3 302
61	8 809	4 408	8 710	1 102	21 2029
62	5 440	2 166	1 80	4 377	12 1063
63	6 636			6 604	12 1240
Total	20 1983	10 954	13 1092	11 1083	54 5112

MC = Jumbo, 1218   Landings = 372 mt; 10.0% of NER Total

DIV	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
51	1 124				1 124
52					
53	1 47				1 47
61			3 37		3 37
62	2 200			1 100	3 300
63				4 400	4 400
Total	4 371		3 37	5 500	12 908

MC = Unclassified, 1219 Landings = 328 mt; 8.8% of NER Total

DIV	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
51					
52					
53					
61	2 116	1 87			3 203
62					
63					
Total	2 116	1 87			2 203

Table 18. Distribution of 1999 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured.

MC = Large, 1210 Landings = 1,550 mt; 44% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53	1 101		8 577		9 678
61	5 490	5 508		5 504	15 1502
62	6 364		2 70	7 634	15 1068
63	3 300			5 424	8 724
Total	15 1255	5 508	10 647	17 1562	47 3972

MC = Medium, 1212 (1,212 mt) plus Small, 1214 (8 mt); Landings = 1,220 mt, 34% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53	3 416		2 202		5 618
61	9 902	6 613		5 503	20 2018
62	9 619	4 203	8 325	12 843	33 1990
63	4 363			3 298	7 661
Total	25 2300	10 816	10 527	20 1644	65 5287

Table 18 continued.

MC = Jumbo, 1218 Landings = 501 mt; 14% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53			1 37		1 37
61	3 174	1 26			4 200
62	1 59			3 229	4 288
63				6 368	6 368
Total	4 233	1 26	1 37	9 597	15 893

MC = Unclassified, 1219 Landings = 279 mt; 8% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53		3 246	1 62		4 308
61					
62					
63					
Total		3 246	1 62		4 308

Table 19. Distribution of 2000 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639.MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured. Samples include data collected by the NEFSC (119 samples, 9,513 fish), the VMRC (65 samples, 1,091 fish), and MADMF (5 samples, 348 fish)

MC = Large, 1210 Landings = 1,485 mt; 42% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53	5 619				5 619
61	13 1226		4 380		17 1606
62	5 284	3 72	4 94	6 444	21 894
63	5 497	6 274	6 84	7 66	24 921
Total	28 2626	9 346	14 558	13 510	64 4040

MC = Medium, 1212 (1,258 mt) plus Small, 1214 (7 mt); Landings = 1,265 mt, 35% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	1 144				1 144
53	2 226		1 83	1 102	4 411
61	14 1365		6 593		20 1958
62	7 573	6 228	4 161	5 435	22 1397
63	3 227	6 66	13 91	8 123	30 507
Total	27 2535	12 294	24 928	14 660	77 4417

Table 19 continued.

MC = Jumbo, 1218   Landings = 641 mt;   18% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52	1 104				1 104
53	3 207				3 207
61	5 357				5 357
62	3 139			6 471	9 610
63	4 255	2 181		2 19	8 455
Total	16 1062	2 181		8 490	26 1733

MC = Unclassified, 1219 Landings = 173 mt;   5% of NER Total

DIV	Quarter 1	2	3	4	Total
51					
52					
53		1 41	5 352		6 393
61	1 100				1 100
62					
63	3 31	6 176	4 42	2 20	15 269
Total	4 131	7 217	9 394	2 20	22 762

Table 20. Distribution of 2001 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639. MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured. Samples include data collected by the NEFSC (118 samples, 9,521 fish), the VMRC (1 sample, 63 fish), and MADMF (6 samples, 726 fish)

MC = Large, 1210 Landings = 1,515 mt; 41% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	4 291		1 20		5 311
53	1 102	1 49	3 74	2 142	7 367
61	10 902				10 902
62	8 839	5 289	6 458	5 500	24 1986
63	5 504				5 504
Total	28 2538	6 338	10 552	7 642	51 4070

MC = Medium, 1212 (1,183 mt) plus Small, 1214 (10 mt); Landings = 1,193mt, 32% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	2 235				2 235
53	1 105		2 116	1 95	4 316
61	8 684				8 684
62	9 770	8 675	5 427	4 403	26 2275
63	3 304				3 304
Total	23 2098	8 675	7 543	5 498	43 3814

Table 20 continued.

MC = Jumbo, 1218   Landings = 690 mt;   19% of NER Total

DIV	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
51					
52	2 26		6 250		8 276
53		1 104			1 104
61	3 248				3 248
62	4 372	1 46	1 74	2 201	8 693
63	2 189	1 100			3 289
Total	11 835	3 250	7 324	2 201	23 1610

MC = Unclassified, 1219 Landings = 308 mt;   8% of NER Total

DIV	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
51					
52					
53		6 726			6 726
61	1 27				1 27
62		1 63			1 63
63					
Total	1 27	7 789			8 816

Table 21. Distribution of 2002 NER commercial fishery length frequency samples. Two digit divisions (DIV) defined as: 51 = 511 to 515, 52 = 521 to 562, 53 = 533 to 539, 61 = 611 to 616, 62 = 621 to 629, 63 = 631 to 639. MC = landings market category defined as: 1210 = large, 1212 = medium, 1214 = small, 1218 = jumbo, 1219 = unclassified. Top entry in each table cell is the number of samples, bottom entry is the number of fish measured. Samples include data collected by the NEFSC (94 samples, 7,199 fish), and the MADMF (12 samples, 223 fish)

MC = Large, 1210 Landings = 1,914 mt; 42% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	3 270				3 270
53	4 227		5 134		9 361
61	3 211	2 127	4 400	1 95	10 833
62	6 461	4 264		4 403	14 1128
63	3 301	1 100			4 401
Total	19 1470	7 491	9 534	5 498	40 2993

MC = Medium, 1212 (1,572 mt) plus Small, 1214 (16 mt); Landings = 1,588 mt, 35% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53	3 341	3 175	4 100		10 616
61	1 102	2 168	3 268	1 100	7 638
62	7 701	3 170		2 200	12 1071
63	4 401	1 101			5 502
Total	15 1545	9 614	4 368	3 300	34 2827

Table 21 continued.

MC = Jumbo, 1218 Landings = 814 mt; 18% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52	1 31				1 31
53	3 176	1 41	5 61		9 278
61	4 164	3 77	1 65		8 306
62	4 377	1 21	1 25	3 303	9 726
63	1 85	1 28			2 113
Total	13 833	6 167	7 151	3 303	29 1454

MC = Unclassified, 1219 Landings = 250 mt; 5% of NER Total

	Quarter				
DIV	1	2	3	4	Total
51					
52					
53					
61			3 148		3 148
62					
63					
Total			3 148		3 148

Table 22. Commercial landings at age of summer flounder ('000), ME-VA. Does not include discards, assumes catch not sampled by NEFSC has same biological characteristics as port sampled catch.

					AGE						
Year	0	1	2	3	4	5	6	7	8	9+	Total
1982	1,441	6,879	5,630	232	61	97	57	22	2	0	14,421
1983	1,956	12,119	4,352	554	30	62	13	17	4	2	19,109
1984	1,403	10,706	6,734	1,618	575	72	3	5	1	4	21,121
1985	840	6,441	10,068	956	263	169	25	4	2	1	18,769
1986	407	7,041	6,374	2,215	158	93	29	7	2	0	16,326
1987	332	8,908	7,456	935	337	23	24	27	11	0	18,053
1988	305	11,116	8,992	1,280	327	79	18	9	5	0	22,131
1989	96	2,491	4,829	841	152	16	3	1	1	0	8,430
1990	0	2,670	861	459	81	18	6	1	1	0	4,096
1991	0	3,755	3,256	142	61	11	1	1	0	0	7,227
1992	114	5,760	3,575	338	19	22	0	1	0	0	9,829
1993	151	4,308	2,340	174	29	43	19	2	1	0	7,067
1994	119	3,698	3,692	272	64	12	6	0	5	0	7,868
1995	46	2,566	4,280	241	40	8	0	1	0	0	7,182
1996	0	1,401	3,187	798	156	15	3	0	1	0	5,559
1997	0	380	2,442	1,214	261	69	10	4	0	0	4,381
1998	0	196	1,719	2,022	437	72	15	1	0	0	4,462
1999	0	123	1,570	1,522	585	160	26	8	0	0	3,994
2000	0	212	1,934	1,083	449	119	47	15	6	2	3,867
2001	0	706	1,402	1,000	331	155	59	16	4	3	3,676
2002	0	366	2,617	1,332	379	130	76	10	0	1	4,911

Table 23. Mean weight (kg) at age of summer flounder landed in the commercial fishery, ME-VA.

					AGE						
Year	0	1	2	3	4	5	6	7	8	9+	ALL
1982	0.26	0.42	0.62	1.84	2.33	2.94	2.71	4.04	5.99		0.55
1983	0.31	0.46	0.80	1.40	2.35	1.85	2.76	3.30	4.17	4.37	0.56
1984	0.28	0.39	0.60	0.11	1.43	2.16	3.21	3.62	4.64	4.03	0.54
1985	0.33	0.44	0.59	1.08	1.73	2.22	2.59	4.71	4.78	4.80	0.59
1986	0.30	0.44	0.63	1.11	1.76	1.89	3.14	2.96	4.81		0.63
1987	0.27	0.45	0.62	1.06	2.00	2.85	3.08	3.02	4.14		0.59
1988	0.36	0.46	0.60	1.21	2.07	2.88	3.98	3.91	4.50		0.60
1989	0.36	0.55	0.74	1.06	1.83	2.47	3.57	3.59	2.25		0.74
1990		0.52	0.86	1.37	1.84	2.13	3.21	3.92	5.03		0.72
1991		0.48	0.75	1.54	2.26	3.01	3.91	3.87			0.64
1992	0.34	0.50	0.82	1.88	2.68	3.09		4.59			0.67
1993	0.35	0.49	0.75	1.63	2.10	1.79	2.81	4.14	5.20		0.62
1994	0.39	0.55	0.62	1.43	2.27	3.08	3.32		3.70		0.63
1995	0.33	0.54	0.70	1.54	2.37	2.92		4.09			0.68
1996		0.54	0.58	1.14	1.88	2.85	3.78		4.76		0.69
1997		0.54	0.63	0.84	1.31	2.10	2.56	3.43			0.76
1998		0.55	0.64	0.85	1.39	2.31	2.52	3.98			0.84
1999		0.52	0.62	0.86	1.36	1.93	2.84	3.62			0.89
2000		0.57	0.68	0.97	1.46	2.13	2.51	2.60	3.30	3.53	0.92
2001		0.59	0.76	1.03	1.73	2.39	2.86	3.57	3.90	4.94	1.01
2002		0.59	0.70	1.01	1.66	2.14	2.85	3.58		2.98	0.93

Table 24. Summary of North Carolina Division of Marine Fisheries (NCDMF) sampling of the commercial winter trawl fishery for summer flounder.

Year	Lengths	Ages	Total Landings (MT)	Total MT per 100 lengths
1982	5,403	0	2,864	53
1983	8,491	0	3,201	38
1984	14,920	0	5,674	38
1985	13,787	0	3,907	28
1986	15,754	0	2,687	17
1987	12,126	0	2,326	19
1988	13,377	189	3,071	23
1989	15,785	106	1,908	12
1990	15,787	191	1,237	8
1991	24,590	534	1,595	6
1992	14,321	364	1,168	8
1993	18,019	442	1,313	7
1994	21,858	548	1,620	7
1995	18,410	548	2,066	11
1996	17,745	477	1,913	11
1997	12,802	388	681	5
1998	21,477	476	1,346	6
1999	11,703	412	1,271	11
2000	24,177	568	1,521	6
2001	19,655	499	1,265	6
2002	21,653	546	1,841	8

Table 25. Number ('000) of summer flounder at age landed in the North Carolina commercial winter trawl fishery. The 1982-1987 NCDMF length samples were aged using NEFSC age-lengths keys for comparable times and areas (i.e., same quarter and statistical areas). Since 1987, the NCDMF length samples have been aged using NCDMF age-lengths keys.

	AGE									
Year	0	1	2	3	4	5	6	7	8+	Total
1982	981	3,463	1,021	142	52	19	6	4	2	5,691
1983	492	3,778	1,581	287	135	41	3	3	<1	6,321
1984	907	5,658	3,889	550	107	18	<1	0	0	11,130
1985	196	2,974	3,529	338	85	24	5	<1	0	7,152
1986	216	2,478	1,897	479	29	32	1	1	<1	5,134
1987	233	2,420	1,299	265	28	1	0	0	0	4,243
1988	0	2,917	2,225	471	227	39	1	6	<1	5,887
1989	2	49	1,437	716	185	37	1	2	0	2,429
1990	2	142	730	418	117	12	1	<1	0	1,424
1991	0	382	1,641	521	116	20	2	<1	0	2,682
1992	0	36	795	697	131	21	2	<1	0	1,682
1993	0	515	1,101	252	44	1	<1	0	0	1,913
1994	6	258	1,262	503	115	14	3	<1	0	2,161
1995	<1	181	1,391	859	331	53	2	<1	0	2,817
1996	0	580	2,187	554	132	56	13	<1	2	3,526
1997	0	17	625	378	18	3	<1	0	0	1,041
1998	18	548	694	230	28	3	<1	0	0	1,520
1999	1	70	504	579	152	88	6	3	<1	1,403
2000	0	50	398	906	345	55	18	1	2	1,775
2001	0	79	408	556	334	63	18	5	<1	1,463
2002	1	221	650	458	184	108	59	19	5	1,705

Table 26. Mean weight (kg) at age of summer flounder landed in the North Carolina commercial winter trawl fishery.

	AGE									
Year	0	1	2	3	4	5	6	7	8+	ALL
1982	0.34	0.46	0.76	1.28	1.66	2.05	2.12	2.23	2.58	0.53
1983	0.32	0.45	0.75	1.14	1.26	1.49	1.73	2.43	2.70	0.57
1984	0.33	0.48	0.70	1.06	1.50	2.17	3.48			0.59
1985	0.38	0.46	0.66	1.20	1.66	2.49	3.07	4.57		0.62
1986	0.36	0.51	0.67	1.09	1.62	1.96	3.40	3.23	3.63	0.64
1987	0.33	0.51	0.66	1.09	1.88	2.94				0.59
1988		0.41	0.60	0.93	1.19	1.70	2.24	2.98	3.41	0.57
1989	0.12	0.38	0.60	0.99	1.16	2.10	3.09	2.50		0.78
1990	0.08	0.48	0.66	0.87	1.31	2.10	1.90	3.97		0.77
1991		0.45	0.66	1.07	1.73	2.25	2.51	3.13	4.10	0.77
1992		0.36	0.50	0.85	1.20	1.46	2.30			0.71
1993		0.49	0.61	1.13	1.37	2.95	3.41			0.66
1994	0.27	0.45	0.62	1.27	2.04	2.44	2.89	5.78		0.84
1995	0.04	0.21	0.46	0.85	1.47	2.49	3.79	3.82		0.72
1996		0.42	0.47	0.73	1.35	1.72	2.29	3.20	2.86	0.56
1997		0.41	0.62	0.76	1.32	2.07	3.25			0.68
1998	0.41	0.71	0.89	1.24	1.49	2.80	3.38			0.89
1999	0.14	0.58	0.73	0.92	1.40	1.68	2.61	3.06	3.90	0.95
2000		0.56	0.66	0.80	1.20	1.96	2.59	3.31	3.52	0.90
2001		0.59	0.67	0.76	1.07	1.72	2.39	3.07	4.24	0.87
2002	0.28	0.38	0.66	0.82	1.43	2.58	3.04	3.79	5.10	1.00

Table 27. Summary NER Fishery Observer data for trips catching summer flounder. Total trips (trips are not split for multiple areas), observed tows, total summer flounder catch (lb), total summer flounder kept (lb), and total summer flounder discard (lb), and percentage of summer flounder discard (lb) to summer flounder catch (lb).

Year	Gear	Trips	Obs Tows	Total Catch	Total Kept	Total Discard	Discard: Total (%)
1989	All	57	413	53,714	48,406	5,308	9.9
1990	All	61	463	47,954	35,972	11,982	25.0
1991	All	82	635	61,650	50,410	11,240	18.2
1992	Trawl	66	643	136,632	118,026	18,606	13.6
	Scallop	8	178	1,477	767	710	48.1
	All	74	821	138,109	118,793	19,316	14.0
1993	Trawl	37	410	74,982	67,603	7,379	9.8
	Scallop	15	671	2,967	1,158	1,809	61.0
	All	52	1,081	77,949	68,761	9,188	11.8
1994	Trawl	51	574	174,347	163,734	10,612	6.1
	Scallop	14	651	5,811	435	5,376	92.5
	All	65	1,225	180,158	164,169	15,988	8.9
1995	Trawl	134	1,004	242,784	235,011	7,773	3.2
	Scallop	19	1,051	10,044	2,247	7,778	77.4
	All	153	2,055	252,828	237,258	15,551	6.2
1996	Trawl	111	653	101,389	90,789	10,600	10.5
	Scallop	24	1,083	9,575	1,345	8,230	86.0
	All	135	1,736	110,964	92,134	18,830	17.0
1997	Trawl	59	334	31,707	26,475	5,232	16.5
	Scallop	23	835	5,721	583	5,138	89.8
	All	82	1,169	37,428	27,058	10,370	27.7

Table 27 continued.

Year	Gear	Trips	Obs Tows	Total Catch	Total Kept	Total Discard	Discard: Total (%)
1998	Trawl	53	329	72,396	65,507	6,889	9.5
	Scallop	22	359	1,962	652	1,310	66.8
	All	75	688	74,358	66,159	8,199	11.0
1999	Trawl	56	374	60,733	45,987	14,746	24.3
	Scallop	10	247	3,199	458	2,741	85.7
	All	66	621	63,932	46,445	17,487	27.4
2000	Trawl	115	688	162,015	144,752	17,263	10.7
	Scallop	23	608	8,457	501	7,956	94.1
	All	138	1,296	170,472	145,253	25,219	14.8
2001	Trawl	137	605	109,910	61,625	48,295	43.9
	Scallop	68	1,606	11,622	800	10,822	93.1
	All	205	2,211	121,532	62,425	59,117	48.6
2002	Trawl	175	837	141,246	124,053	17,193	12.2
	Scallop	55	2,522	25,871	887	24,984	96.6
	All	230	3,359	167,117	124,940	42,177	25.2

Table 28. Summary NER Vessel Trip Report (VTR) data for trips reporting discard of any species and catching summer flounder. Total trips, total summer flounder catch (lb), total summer flounder kept (lb), total summer flounder discard (lb), and percentage of summer flounder discard (lb) to summer flounder catch (lb).

Year	Gear	Trips	Total Catch	Total Kept	Total Discard	Discard: Total (%)
1994	Trawl	4,267	2,149,332	2,015,296	134,036	6.2
	Scallop	85	70,353	22,877	47,476	67.5
	All	4,352	2,219,685	2,038,173	181,512	8.2
1995	Trawl	3,733	2,444,231	2,332,516	111,715	4.6
	Scallop	113	78,758	25,084	53,674	68.2
	All	3,846	2,522,989	2,357,600	165,389	6.6
1996	Trawl	2,990	1,662,313	1,459,155	203,158	12.2
	Scallop	79	69,557	16,657	52,900	76.1
	All	3,069	1,731,870	1,475,812	256,058	14.8
1997	Trawl	3,044	988,599	851,090	137,509	13.9
	Scallop	51	21,553	4,665	16,888	78.4
	All	3,095	1,010,152	855,755	154,397	15.3
1998	Trawl	3,004	1,128,578	868,706	259,872	23.0
	Scallop	62	23,538	10,323	13,215	56.1
	All	3,066	1,152,116	879,029	273,087	23.7
1999	Trawl	2,884	959,275	772,924	186,351	19.4
	Scallop	41	26,334	14,324	12,010	45.6
	All	2,925	985,609	787,248	198,361	20.1
2000	Trawl	3,140	1,048,791	786,576	262,215	25.0
	Scallop	41	12,183	3,798	8,385	68.8
	All	3,181	1,060,974	790,374	270,600	25.5
2001	Trawl	3,035	1,086,331	783,900	307,156	28.3
	Scallop	71	14,662	1,349	13,313	90.8
	All	3,106	1,100,993	785,249	320,469	29.1

Table 28 continued.

Year	Gear	Trips	Total Catch	Total Kept	Total Discard	Discard: Total (%)
2002	Trawl	3,475	1,130,419	903,390	231,856	20.5
	Scallop	102	22,332	6,567	16,617	74.4
	All	3,577	1,152,751	909,957	248,473	21.6

Table 29. Summary of fishery observer data for summer flounder by NAFO division and quarter for 1989: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	0	85	0	2	0
	2	1	66	<1	137	9	4	<1
	3	0	0	0	75	0	3	0
	4	1	19	<1	157	3	3	<1
52	1	1	756	48	1319	998	687	64
	2	5	3	8	1250	4	129	10
	3	2	280	<1	536	150	9	<1
	4	1	35	40	1545	54	98	61
53	1	4	588	41	689	405	473	29
	2	10	68	<1	2045	138	224	2
	3	5	260	2	1619	421	298	4
	4	3	91	6	898	82	330	6
61	1	4	544	51	1661	904	528	84
	2	5	107	4	1391	149	165	5
	3	0	213	24	513	109	106	13
	4	5	142	38	575	82	125	22
62	1	5	934	84	1867	1744	1460	158
	2	2	244	101	922	225	85	93
	3	8	213	24	216	46	104	5
	4	1	672	17	1118	752	361	19
63	1	2	1116	110	490	546	323	54
	2	0	244	101	41	10	9	4
	3	0	213	24	40	9	<1	1
	4	0	672	17	616	415	292	10
TOTAL/ MEAN		65	296	28	19,805	7,255	5,817	642

Table 30. Summary of fishery observer data for summer flounder by NAFO division and quarter for 1990: number of observed trips trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	0	9	0	<1	0
	2	0	0	0	78	0	<1	0
	3	0	0	0	29	0	<1	0
	4	0	0	0	82	0	<1	0
52	1	1	15	5	581	9	148	3
	2	2	12	7	1107	13	31	8
	3	2	14	205	332	5	9	68
	4	3	12	<1	818	10	40	<1
53	1	6	113	3	577	65	129	2
	2	3	50	1	1212	60	51	1
	3	0	92	6	1194	110	187	7
	4	8	92	6	1052	97	288	6
61	1	10	222	40	716	159	84	29
	2	5	14	23	1153	16	22	27
	3	0	91	55	580	53	150	32
	4	3	367	115	535	197	131	62
62	1	4	446	253	2040	911	333	517
	2	9	19	49	558	11	8	27
	3	7	221	74	227	50	126	17
	4	8	360	43	1779	641	368	77
63	1	1	505	321	650	328	258	209
	2	0	19	49	47	1	1	2
	3	0	221	74	0	0	0	0
	4	0	360	43	625	225	384	27
TOTAL/ MEAN		72	166	56	15,980	2,959	2,749	1,121

Table 31. Summary of fishery observer data for summer flounder by NAFO division and quarter for 1991: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	<1	29	0	<1	0
	2	0	0	<1	79	0	1	0
	3	0	0	<1	43	0	1	0
	4	1	31	<1	188	6	2	<1
52	1	3	218	128	1254	274	79	161
	2	2	88	3	1756	154	44	5
	3	1	13	<1	706	9	17	<1
	4	1	26	<1	1721	44	53	<1
53	1	7	117	9	806	94	242	7
	2	9	55	1	1688	92	147	2
	3	6	92	1	1401	128	279	1
	4	10	163	4	1475	240	259	6
61	1	6	173	49	2763	477	384	134
	2	5	43	37	2983	128	184	111
	3	1	577	1	572	330	260	1
	4	15	187	24	1855	347	225	45
62	1	5	97	9	1981	192	673	19
	2	4	169	143	1203	203	78	172
	3	4	953	177	555	529	236	98
	4	10	249	38	1935	482	602	73
63	1	0	97	9	382	37	231	4
	2	0	169	143	2	<1	<1	<1
	3	0	953	177	19	18	12	3
	4	4	492	212	702	346	346	149
TOTAL/ MEAN		94	196	42	26,096	4,133	4,355	993

Table 32. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1992: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	0	39	0	<1	0
	2	0	0	0	80	0	2	0
	3	0	0	0	35	0	1	0
	4	1	17	<1	225	4	5	0
52	1	4	427	26	441	188	107	12
	2	1	85	<1	1476	126	112	1
	3	0	11	<1	397	5	11	0
	4	1	11	<1	622	7	72	0
53	1	13	157	11	823	129	386	9
	2	1	21	<1	1836	38	215	1
	3	1	<1	<1	1603	<1	311	0
	4	7	236	13	1561	368	367	20
61	1	16	313	17	757	237	333	13
	2	2	169	36	1350	228	306	49
	3	1	1009	23	954	961	417	22
	4	5	130	6	558	73	208	3
62	1	13	350	23	1589	556	709	37
	2	3	150	71	657	99	88	47
	3	6	502	164	782	392	724	127
	4	4	606	131	925	561	610	121
63	1	4	420	90	491	206	192	44
	2	0	150	71	34	5	1	2
	3	0	502	164	1	1	<1	0
	4	2	381	7	912	347	597	7
TOTAL/ MEAN		85	300	38	18148	4532	5776	517

Table 33. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1992: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	0	3	0	<1	0
	2	0	0	0	5	0	<1	0
	3	0	0	0	2	0	<1	0
	4	0	0	0	20	0	<1	0
52	1	0	232	0	961	223	4	0
	2	3	29	<1	1845	53	6	0
	3	1	22	0	443	10	1	0
	4	0	34	10	1079	36	11	11
53	1	1	232	<1	38	9	<1	0
	2	0	29	<1	6	<1	<1	0
	3	1	37	<1	8	<1	<1	0
	4	0	34	10	294	10	17	3
61	1	1	137	<1	1749	239	33	1
	2	0	11	17	909	10	9	15
	3	0	37	<1	152	6	<1	0
	4	1	34	10	1342	45	56	14
62	1	1	75	129	1000	75	45	129
	2	1	11	17	691	8	7	12
	3	0	37	<1	22	<1	<1	0
	4	0	34	10	1480	50	63	15
63	1	1	93	129	224	21	13	29
	2	0	11	17	281	3	4	5
	3	0	0	0	0	0	0	0
	4	0	34	10	283	10	12	3
TOTAL/ MEAN		11	47	3	12837	811	290	237

Table 34. Summary of TRAWL GEAR (‘05') fishery observer data for summer flounder by NAFO division and quarter for 1993: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	0	77	0	<1	0
	2	0	12	4	58	0	8	0
	3	0	0	0	78	0	3	0
	4	1	<1	55	9	0	<1	0
52	1	4	1018	44	836	851	204	37
	2	3	12	4	1024	13	38	4
	3	0	21	6	390	8	8	2
	4	2	21	6	143	3	24	1
53	1	9	429	58	857	368	344	49
	2	5	105	2	1687	176	109	3
	3	2	143	26	1541	220	304	40
	4	8	121	7	1093	132	138	7
61	1	7	534	48	576	308	393	28
	2	3	29	23	1147	34	181	26
	3	0	526	63	514	274	266	32
	4	2	526	63	114	60	42	7
62	1	1	52	3	1503	78	811	5
	2	0	52	3	601	31	98	2
	3	4	646	177	1120	724	298	200
	4	3	693	55	488	338	411	26
63	1	0	52	3	123	6	63	1
	2	0	52	3	6	<1	<1	0
	3	0	646	177	3	2	<1	1
	4	2	604	18	324	196	131	6
TOTAL/ MEAN		56	368	29	14312	3823	3878	477

Table 35. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1993:number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout database days fished on trips landing any summer flounder (WO DF), estimate of landings calculated from observed kept rates and NEFSC weighout database days fished (OB EST LAND MT), landings as recorded in the NEFSC weighout database (WO LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO DF	OB EST LAND MT	WO LAND MT	OB EST DISC MT
51	1	0	0	0	0	0	0	0
	2	0	0	0	18	0	0	0
	3	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0
52	1	1	32	<1	141	4	1	0
	2	3	31	5	1401	44	6	7
	3	0	31	5	109	3	0	1
	4	1	140	61	28	4	0	2
53	1	0	32	<1	61	2	<1	0
	2	0	31	5	32	1	<1	0
	3	0	31	5	3	0	0	0
	4	1	56	9	22	1	5	0
61	1	2	22	16	798	18	16	13
	2	4	12	20	1013	12	9	20
	3	0	<1	15	155	0	0	2
	4	2	97	13	122	12	6	2
62	1	2	88	335	515	46	39	173
	2	2	1	62	295	0	4	18
	3	1	<1	15	12	0	0	0
	4	0	97	13	311	30	9	4
63	1	0	88	335	243	21	13	81
	2	0	1	62	255	<1	4	16
	3	0	0	0	0	0	0	0
	4	0	97	13	101	10	3	1
TOTAL/ MEAN		19	11	10	5635	209	117	340

Table 36. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1994:number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout (WO, quarter 1) and vessel trip report (VTR, quarter 2-4) database prorated days fished on trips landing any summer flounder (WO/VTR DF), estimate of landings calculated from observed kept rates and NEFSC WO (quarter 1) and VTR (quarter 2-4) database days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC WO and dealer (DEAL, quarter 2-4) database (WO/DEAL LAND MT), an interim step fishery observer estimate of discard in mt (OB EST DISC 1), a raising factor to account for fishing effort and discards which occur with landings (NO KEPT RATIO), and the raised fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO/VTR DF	OB EST LAND MT	WO/DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	0	0	40	0	0	0	1.0	0
	2	0	0	0	73	0	7	0	1.0	0
	3	0	0	0	6	0	2	0	1.0	0
	4	0	0	0	0	0	0	0	1.0	0
52	1	2	9	6	526	5	217	3	1.0	3
	2	5	165	3	163	27	14	1	1.0	1
	3	0	165	3	378	62	13	1	2.8	3
	4	1	<1	14	4	0	1	0	2.8	0
53	1	10	756	40	924	698	460	37	1.0	37
	2	0	165	3	819	135	234	3	1.1	3
	3	2	387	5	1337	517	371	6	1.0	6
	4	8	167	20	678	113	205	14	1.0	14
61	1	12	380	31	737	280	487	23	1.0	23
	2	0	380	31	1497	569	406	46	1.0	46
	3	1	278	7	603	168	460	4	1.1	4
	4	4	50	23	611	31	188	14	1.0	14
62	1	7	1538	77	1437	2211	1016	111	1.0	111
	2	1	845	177	419	354	96	74	1.1	78
	3	5	241	36	189	45	130	7	1.0	7
	4	2	530	103	500	265	184	51	1.0	51
63	1	1	1538	77	73	112	41	6	1.0	6
	2	0	845	177	38	32	8	7	1.2	8
	3	0	241	36	1	0	0	0	1.0	0
	4	5	451	27	519	234	250	14	1.0	14
TOTAL/ MEAN		66	240	18	11572	5858	4790	422	1.0	429

Table 37. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1994: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC weighout (WO, quarter 1) and vessel trip report (VTR, quarter 2-4) database prorated days fished on trips landing any summer flounder (WO/VTR DF), estimate of landings calculated from observed kept rates and NEFSC WO (quarter 1) and VTR (quarter 2-4) database days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC WO and dealer (DEAL, quarter 2-4) database (WO/DEAL LAND MT), an interim step fishery observer estimate of discard in mt (OB EST DISC 1), a raising factor to account for fishing effort and discards which occur with landings (NO KEPT RATIO), and the raised fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	WO/VTR DF	OB EST LAND MT	WO/DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	0	0	0	0	0	0	1.0	0
	2	0	0	0	0	0	0	0	1.0	0
	3	0	0	0	0	0	0	0	1.0	0
	4	0	0	0	0	0	0	0	1.0	0
52	1	0	25	37	211	5	1	8	5.0	39
	2	1	25	37	318	8	<1	12	5.0	58
	3	1	<1	36	0	0	0	0	1.0	0
	4	1	<1	64	0	0	0	0	1.0	0
53	1	0	25	37	37	1	<1	1	1.0	1
	2	0	25	37	0	0	1	0	1.0	0
	3	0	<1	36	0	0	1	0	1.0	0
	4	1	<1	58	0	0	1	0	1.0	0
61	1	5	4	59	445	2	6	26	1.0	26
	2	1	<1	66	2282	1	2	151	1.2	186
	3	0	0	0	0	0	0	0	1.0	0
	4	1	110	<1	175	19	11	0	1.0	0
62	1	4	4	126	1031	4	65	130	1.0	130
	2	3	1	35	386	1	4	13	2.5	34
	3	0	0	0	0	0	0	0	1.0	0
	4	0	110	<1	701	77	41	1	1.4	1
63	1	2	42	111	531	23	30	59	1.4	83
	2	0	1	35	678	1	9	24	1.4	33
	3	0	0	0	0	0	0	0	1.0	0
	4	0	110	<1	35	4	4	0	10.3	0
TOTAL/ MEAN		20	3	44	6830	146	178	425	1.4	591

Table 38. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1995: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	3	<1	14	52	<1	<1	1	1.0	1
	2	1	<1	2	97	<1	5	0	1.0	0
	3	0	25	<1	23	1	6	<1	1.0	<1
	4	0	<1	45	11	0	0	0	1.0	0
52	1	6	735	3	438	322	201	1	1.0	1
	2	4	97	21	313	30	25	6	1.0	6
	3	1	25	<1	81	2	3	0	1.0	0
	4	1	<1	45	1	0	<1	0	1.0	0
53	1	3	1245	1	1111	1380	431	1	1.0	1
	2	5	293	6	1180	346	184	7	1.1	8
	3	9	494	1	1429	706	423	2	1.0	2
	4	9	213	2	822	175	326	1	1.0	1
61	1	10	1304	27	951	1229	869	25	1.0	25
	2	14	93	9	807	75	292	7	1.0	7
	3	20	27	7	945	26	319	7	1.0	7
	4	13	118	7	552	65	190	4	1.0	4
62	1	12	1047	32	847	882	748	27	1.0	27
	2	12	141	6	204	29	70	1	1.0	1
	3	25	104	31	209	22	71	6	1.0	6
	4	8	399	30	629	251	341	19	1.0	19
63	1	3	621	68	100	68	114	7	1.0	7
	2	1	1005	5	23	23	9	<1	1.0	<1
	3	0	0	0	0	0	0	0	1.0	0
	4	2	703	16	314	221	190	5	1.0	5
TOTAL/ MEAN		162	140	8	11139	5855	4819	129		130

Table 39. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1995: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	0	0	1	0	<1	0	1.0	0
	2	0	0	0	0	0	0	0	1.0	0
	3	0	0	0	0	0	0	0	1.0	0
	4	1	38	<1	0	0	0	0	1.0	0
52	1	1	29	<1	14	<1	<1	0	1.0	0
	2	0	<1	126	0	0	0	0	1.0	0
	3	1	<1	33	4	0	0	0	1.0	0
	4	2	0	75	0	0	1	0	1.0	0
53	1	0	29	<1	191	6	0	0	1.0	0
	2	1	<1	126	<1	0	0	0	1.0	0
	3	0	0	0	0	0	0	0	1.0	0
	4	0	<1	76	5	0	0	<1	1.0	<1
61	1	8	16	21	496	8	9	10	1.2	12
	2	5	9	38	472	4	3	18	1.5	27
	3	0	7	112	45	0	0	5	1.0	5
	4	2	7	112	411	3	18	46	1.6	74
62	1	6	5	61	654	3	34	40	1.3	51
	2	3	3	55	257	1	4	14	2.3	33
	3	0	0	0	0	0	0	0	1.0	0
	4	1	30	<1	345	10	9	0	1.0	0
63	1	0	5	61	55	0	11	3	1.3	4
	2	1	<1	29	65	0	1	2	2.3	4
	3	0	0	0	0	0	0	0	1.0	0
	4	0	30	<1	13	0	0	0	1.0	0
TOTAL/ MEAN		32	5	25	3029	36	92	139		212

Table 40. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1996: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	12	38	1	0	1	0	1.0	0
	2	0	32	4	55	2	2	0	1.0	0
	3	0	242	7	36	9	4	<1	3.0	<1
	4	0	0	0	0	0	0	0	3.0	0
52	1	3	12	38	189	2	87	7	1.0	7
	2	1	32	4	981	31	105	4	1.0	4
	3	0	242	7	229	55	13	2	3.9	6
	4	0	0	0	0	0	0	0	3.0	0
53	1	0	2051	87	750	1539	411	65	1.0	65
	2	14	156	2	1030	160	236	2	1.0	2
	3	9	242	7	1898	459	348	13	1.0	13
	4	5	4	106	329	1	23	35	1.6	56
61	1	4	2051	87	937	1922	469	81	1.0	91
	2	11	143	12	561	82	210	7	1.0	7
	3	21	99	5	968	96	439	5	1.0	5
	4	16	1	37	98	0	25	4	1.6	6
62	1	4	688	45	619	426	611	28	1.0	28
	2	12	19	25	117	2	50	3	1.0	3
	3	9	183	13	164	30	261	2	1.0	2
	4	9	30	53	326	10	268	17	1.0	17
63	1	1	1307	124	84	110	72	10	1.0	10
	2	2	1964	54	23	46	28	1	1.0	1
	3	1	<1	6	2	0	0	0	1.0	0
	4	0	30	53	10	0	15	1	1.0	1
TOTAL/ MEAN		122	36	12	9407	4982	3678	288		319

Table 41. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1996: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	0	0	0	0	0	0	1.0	0
	2	0	0	0	0	0	0	0	1.0	0
	3	0	0	0	0	0	0	0	1.0	0
	4	0	0	0	0	0	0	0	1.0	0
52	1	0	0	0	0	0	0	0	1.0	0
	2	9	<1	68	43	0	0	3	2.0	6
	3	0	0	0	0	0	0	0	1.0	0
	4	0	0	0	0	0	0	0	1.0	0
53	1	0	0	0	0	0	0	0	1.0	0
	2	0	0	0	0	0	0	0	1.0	0
	3	0	0	0	0	0	0	0	1.0	0
	4	0	0	0	0	0	0	0	1.0	0
61	1	5	23	44	95	2	5	4	2.0	9
	2	6	2	46	51	<1	0	2	9.5	22
	3	6	1	67	0	0	0	<1	2.3	<1
	4	0	0	0	0	0	0	0	1.0	0
62	1	3	93	85	116	11	10	10	1.8	18
	2	3	1	56	115	<1	7	6	7.3	46
	3	0	0	0	0	0	0	0	1.0	0
	4	1	<1	11	393	<1	6	4	1.0	4
63	1	2	201	126	131	26	12	16	1.8	30
	2	0	0	0	0	0	0	0	1.0	0
	3	0	0	0	0	0	0	0	1.0	0
	4	0	0	0	0	0	0	0	1.0	0
TOTAL/ MEAN		35	2	53	944	42	40	46		135

Table 42. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1997: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	48	7	1	0	0	0	1.2	0
	2	0	14	<1	38	0	6	0	1.0	0
	3	0	85	22	24	2	10	1	1.6	1
	4	0	<1	36	3	0	0	0	5.1	1
52	1	5	48	7	285	14	29	2	1.0	2
	2	1	14	<1	253	4	10	0	1.0	0
	3	0	85	22	135	11	6	3	1.0	3
	4	0	<1	36	19	0	0	1	1.1	1
53	1	14	131	15	852	112	306	13	1.0	13
	2	9	66	5	1293	85	286	6	1.0	6
	3	0	85	22	1223	104	348	27	1.0	27
	4	0	<1	36	769	0	58	27	1.1	30
61	1	20	81	11	1027	83	385	11	1.0	11
	2	2	396	25	739	293	245	18	1.0	18
	3	8	85	22	584	50	287	13	1.0	13
	4	1	<1	36	367	0	29	13	1.2	16
62	1	6	182	55	185	34	113	10	1.0	10
	2	0	396	25	187	74	109	5	1.0	5
	3	0	85	22	139	12	153	3	1.0	3
	4	0	<1	416	201	0	286	83	1.0	86
63	1	3	2578	56	684	1761	1279	38	1.2	45
	2	0	396	25	17	7	13	1	1.0	1
	3	0	85	22	5	0	0	0	1.0	0
	4	1	<1	416	17	0	11	7	1.0	7
TOTAL/ MEAN		70	44	10	9047	2646	3969	282		299

Table 43. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1997: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	2	1	34	0	0	0	0	1.0	0
	2	0	1	34	0	0	0	0	3.1	0
	3	0	9	19	0	0	0	0	4.5	0
	4	0	9	19	0	0	0	0	1.0	0
52	1	0	1	34	0	0	0	0	1.0	0
	2	5	1	65	148	0	0	10	3.1	30
	3	0	9	19	15	0	0	0	4.5	0
	4	0	9	19	0	0	0	0	1.0	0
53	1	0	1	34	0	0	0	0	1.0	0
	2	0	1	65	9	0	0	1	1.0	1
	3	0	9	19	0	0	0	0	1.0	0
	4	0	9	19	0	0	0	0	1.0	0
61	1	7	5	67	244	1	3	16	1.0	16
	2	4	11	43	857	10	15	37	1.2	43
	3	3	9	19	0	0	0	0	4.5	0
	4	0	9	19	563	5	6	11	1.5	16
62	1	4	8	58	16	0	0	1	1.0	1
	2	2	1	27	30	0	1	1	1.2	1
	3	0	9	19	0	0	0	0	4.5	0
	4	0	9	19	46	1	0	0	1.0	0
63	1	0	8	58	0	0	0	0	1.0	0
	2	0	1	27	0	0	0	0	3.1	0
	3	0	9	19	0	0	0	0	4.5	0
	4	0	9	19	0	0	0	0	1.0	0
TOTAL/ MEAN		27	2	39	1928	17	25	77		108

Table 44. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1998: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	45	158	21	1	3	4	1.0	4
	2	0	180	13	204	37	8	3	1.0	3
	3	0	42	268	6	0	6	2	1.4	3
	4	0	10	26	1	0	0	0	13.4	0
52	1	2	45	158	134	6	30	21	1.0	21
	2	0	180	13	449	81	35	6	1.6	9
	3	2	42	268	42	2	6	11	1.0	12
	4	0	10	26	140	1	1	4	1.0	4
53	1	8	287	19	1281	368	362	24	1.0	24
	2	4	180	13	1354	243	345	16	1.0	16
	3	0	237	7	1299	308	286	9	1.1	10
	4	0	10	26	1078	11	40	29	1.3	36
61	1	10	159	29	743	118	373	22	1.0	22
	2	2	351	20	731	257	235	15	1.0	15
	3	1	237	7	1037	245	335	8	1.0	8
	4	19	10	26	324	3	45	8	1.3	11
62	1	9	123	11	518	64	530	5	1.0	5
	2	2	463	74	370	171	131	27	1.0	27
	3	0	237	7	184	44	200	1	1.0	1
	4	0	10	26	441	5	353	11	1.0	11
63	1	4	1471	51	1091	1604	963	56	1.0	56
	2	0	351	20	54	19	22	1	1.0	1
	3	0	237	7	28	7	6	0	1.6	0
	4	0	10	26	715	7	715	19	1.0	19
TOTAL/ MEAN		63	59	18	12245	3602	5030	302		318

Table 45. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1998: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	1	22	0	0	0	0	1.0	0
	2	0	1	22	0	0	0	0	1.5	0
	3	0	1	56	0	0	0	0	1.0	0
	4	0	1	44	0	0	0	0	6.6	0
52	1	0	1	22	16	0	1	1	1.0	1
	2	1	1	22	228	0	1	5	1.5	8
	3	2	1	56	0	0	0	0	1.0	0
	4	4	1	44	0	0	0	0	6.6	0
53	1	0	1	22	0	0	2	0	1.0	0
	2	0	1	22	54	0	2	1	1.0	1
	3	0	1	56	0	0	0	0	1.0	0
	4	0	1	44	0	0	1	0	1.0	0
61	1	0	23	90	158	4	3	14	1.3	19
	2	3	14	20	379	5	6	7	2.2	16
	3	3	46	31	173	8	3	5	3.7	19
	4	5	92	9	113	10	2	1	1.0	1
62	1	1	23	90	240	5	8	22	1.0	22
	2	5	4	16	320	1	4	5	1.0	5
	3	0	46	31	662	30	2	21	1.0	21
	4	1	2	81	165	1	4	13	1.0	13
63	1	0	23	90	437	10	7	40	1.1	42
	2	0	4	16	77	1	1	1	1.0	1
	3	0	46	31	0	0	0	0	1.0	0
	4	0	2	81	0	0	3	0	1.0	0
TOTAL/ MEAN		25	5	21	3022	75	50	136		169

Table 46. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 1999: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	288	160	37	11	17	6	1	6
	2	0	9	10	12	0	0	0	1	0
	3	0	9	10	6	0	3	0	4.2	0
	4	0	1	24	9	0	0	1	37.2	8
52	1	2	288	160	359	103	45	57	1	58
	2	6	9	10	300	3	10	3	1.1	3
	3	0	9	10	24	0	2	1	1.4	1
	4	1	1	24	29	0	3	1	2.3	2
53	1	5	95	80	1009	96	317	81	1	81
	2	12	106	11	2682	285	283	30	1	30
	3	4	1203	217	1170	1406	390	254	1	257
	4	4	61	19	529	32	71	10	1.1	11
61	1	5	462	205	462	214	374	95	1	98
	2	9	52	31	827	43	234	26	1	27
	3	4	11	7	623	7	215	4	1	4
	4	7	102	11	371	37	188	4	1	4
62	1	0	462	205	694	321	618	142	1	142
	2	1	99	493	300	30	147	148	1	148
	3	0	99	493	121	12	101	60	1	60
	4	5	2416	289	831	2008	413	240	1	240
63	1	8	1000	84	1279	1279	1098	107	1	107
	2	0	99	493	42	4	13	21	1	21
	3	0	99	493	20	2	1	10	1	10
	4	0	2416	289	547	1321	219	158	1	158
TOTAL/ MEAN		73	91	23	12283	7214	4762	1459		1476

Table 47. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 1999: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	1	237	0	0	0	0	1	0
	2	0	1	237	0	0	0	0	1	0
	3	0	1	125	0	0	0	0	1	0
	4	0	1	125	0	0	0	0	1	0
52	1	0	1	237	0	0	0.1	0	1	0
	2	0	1	237	0	0	0	0	1	0
	3	1	1	125	0	0	0	0	1	0
	4	0	1	125	0	0	0	0	1	0
53	1	0	1	237	20	1	0.1	5	1	5
	2	1	1	237	0	0	0.4	0	1	0
	3	0	1	125	0	0	0	0	1	0
	4	0	1	125	0	0	0	0	1	0
61	1	0	38	46	189	7	3	8	1.3	11
	2	2	38	46	1549	59	3	71	2.8	196
	3	3	28	113	52	1	2	6	2.8	16
	4	2	1	87	142	0	3	12	1	13
62	1	0	28	46	2468	95	14	113	1.3	144
	2	1	1	14	3519	1	16	51	1	51
	3	1	1	262	32	0	0.6	8	1	8
	4	2	64	19	158	10	5	3	1	3
63	1	0	28	46	197	8	8	9	1.3	11
	2	0	1	14	61	0	1	1	1	1
	3	0	1	262	0	0	0	0	1	0
	4	0	64	19	0	0	2	0	1	0
TOTAL/ MEAN		13	3	64	8387	182	58	287		459

Table 48. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 2000: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	104	1	1	0	1	0	1.1	0
	2	1	1	4	41	0	2	0	1.5	0
	3	0	5	241	1	0	1	0	36.8	9
	4	2	1	6	0	0	0	0	10.1	0
52	1	3	104	1	443	46	62	1	1	1
	2	4	27	8	327	9	13	3	1	3
	3	3	5	241	115	1	10	28	1.1	30
	4	4	14	129	71	1	3	9	1.3	12
53	1	4	344	194	1104	380	305	214	1	214
	2	20	91	59	1314	119	259	78	1.1	82
	3	6	1034	191	717	742	376	137	1	141
	4	10	90	56	593	54	129	33	1	34
61	1	11	343	32	550	189	518	18	1	18
	2	10	204	16	752	154	225	12	1	12
	3	12	28	20	409	11	294	8	1.1	9
	4	3	35	217	207	7	38	45	1.1	49
62	1	19	617	24	1270	784	785	30	1	31
	2	4	126	4	411	52	181	2	1	2
	3	1	708	55	134	95	139	7	1	7
	4	7	1723	15	269	464	350	4	1	4
63	1	9	2584	65	1209	3125	1001	78	1	78
	2	0	126	4	25	3	19	0	1	0
	3	0	708	55	2	2	1	0	1	0
	4	0	1723	15	250	430	358	4	1	4
TOTAL/ MEAN		133	128	25	10215	6668	5070	711		740

Table 49. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 2000: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	2	1	45	0	0	0	0	1.8	0
	2	0	54	9	0	0	0	0	1.8	0
	3	0	92	64	0	0	0	0	3.8	0
	4	0	2	141	0	0	0	0	3.8	0
52	1	0	1	53	0	0	0	0	1.8	0
	2	0	54	9	4	0	0	0	1.8	0
	3	0	92	64	0	0	0	0	3.8	0
	4	0	2	141	0	0	0	0	3.8	0
53	1	0	1	53	0	0	0	0	1.8	0
	2	0	54	9	0	0	0	0	1.8	0
	3	0	92	64	0	0	0	0	3.8	0
	4	0	2	141	0	0	0	0	3.8	0
61	1	4	1	53	48	0	1	3	1.8	5
	2	5	54	9	299	16	3	3	1.8	5
	3	4	92	64	34	3	1	2	3.8	8
	4	6	2	141	80	0	1	11	3.8	43
62	1	3	14	31	225	3	4	7	5	35
	2	1	85	1	123	10	5	0	5	0
	3	0	92	64	0	0	0	0	2.2	0
	4	0	2	141	234	1	8	33	2.2	71
63	1	0	14	31	0	0	0	0	5	0
	2	0	85	1	6	1	0	0	5	0
	3	0	92	64	0	0	0	0	2.2	0
	4	0	2	141	0	0	0	0	2.2	0
TOTAL/ MEAN		25	6	33	1053	34	23	59		167

Table 50. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 2001: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	1	15	7	0	1	0	1	0
	2	0	3	13	6	0	1	0	2.5	0
	3	0	1	71	1	0	1	0	1	0
	4	2	1	60	0	0	0	0	1	0
52	1	2	1	15	336	0	31	5	1	5
	2	4	3	13	309	1	25	4	1.1	5
	3	2	1	72	316	0	18	23	1	23
	4	5	3	76	91	0	8	7	1	7
53	1	9	76	41	779	59	254	32	1	32
	2	10	62	14	1295	81	258	18	1	18
	3	16	624	21	1022	638	290	22	1	22
	4	4	207	32	463	96	187	15	1	15
61	1	17	56	118	646	36	442	76	1	76
	2	17	35	4	711	25	169	3	1	3
	3	7	30	4	412	13	340	2	1	2
	4	13	177	17	532	94	158	9	1	9
62	1	9	323	42	478	154	559	20	1.2	23
	2	3	38	14	297	11	160	4	1	4
	3	27	330	23	48	16	103	1	1	1
	4	8	18	7	569	10	649	4	1	4
63	1	0	323	42	819	264	962	35	1	36
	2	0	38	14	17	1	46	0	1	0
	3	0	330	23	21	7	4	1	1	1
	4	0	18	7	158	3	206	1	1	1
TOTAL/ MEAN		155	69	16	9333	1509	4872	282		287

Table 51. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 2001: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	0	113	0	0	0	0	1	0
	2	0	0	113	0	0	0	0	1	0
	3	0	0	113	0	0	0	0	1	0
	4	0	0	113	0	0	0	0	1	0
52	1	0	0	113	0	0	0	0	1	0
	2	1	0	113	0	0	0	0	1	0
	3	0	0	113	0	0	0	0	1	0
	4	0	0	113	0	0	0	0	1	0
53	1	0	0	113	0	0	0	0	1	0
	2	0	0	113	0	0	0	0	1	0
	3	0	0	113	0	0	0	0	1	0
	4	0	0	113	0	0	0	0	1	0
61	1	2	2	53	154	0.5	2	8	10	82
	2	19	1	26	135	0.1	1	4	13	44
	3	6	1	42	0	0	0	0	1	0
	4	9	2	94	551	1	7	52	1	52
62	1	0	2	53	390	1	17	21	3	68
	2	30	1	30	135	0.1	1	4	3	13
	3	2	65	13	0	0	1	0	1	0
	4	17	1	53	723	0.6	15	38	1	38
63	1	0	2	53	0	0	0	0	3	0
	2	0	1	30	0	0	0	0	3	0
	3	0	65	13	0	0	0	0	1	0
	4	1	1	11	0	0	0	0	1	0
TOTAL/ MEAN		87	1	77	2088	3.3	44	127		297

Table 52. Summary of TRAWL GEAR ('05') fishery observer data for summer flounder by NAFO division and quarter for 2002: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	1	1	18	0	0	0	0	1	0
	2	0	1	18	17	0	4	0	1	0
	3	2	1	77	0	0	1	0	1	0
	4	13	1	14	0	0	0	0	1	0
52	1	1	186	128	670	125	67	86	1	86
	2	7	8	7	682	6	40	5	1	5
	3	12	75	20	335	25	36	7	1	7
	4	22	1	17	80	0	1	1	1	1
53	1	1	3402	245	608	2067	358	149	1	149
	2	10	60	11	1048	63	407	11	1	11
	3	9	559	31	818	458	356	26	1	26
	4	16	294	60	391	115	132	24	1	24
61	1	4	2069	5	543	1124	317	3	1	3
	2	12	205	17	650	133	327	11	1	11
	3	15	279	8	613	171	495	5	1	5
	4	4	117	5	511	60	265	2	1	2
62	1	11	720	9	789	568	1163	7	1	7
	2	1	34	46	236	8	172	11	1	11
	3	31	420	21	72	30	162	1	1	1
	4	2	813	9	679	552	789	6	1	6
63	1	8	1182	34	681	804	1040	23	1	23
	2	0	34	46	49	2	47	2	1	2
	3	0	420	21	0	0	0	0	1	0
	4	0	813	9	187	152	194	2	1	2
TOTAL/ MEAN		182	72	15	9659	6463	6373	382		382

Table 53. Summary of SCALLOP DREDGE ('13') fishery observer data for summer flounder by NAFO division and quarter for 2002: number of observed trips (OBTRIPS; trips in more than one statistical area are split) kept and discard rates (K_DF, D_DF; kg per day fished), NEFSC vessel trip report (VTR) database prorated days fished on trips landing any summer flounder (VTR DF), estimate of landings calculated from observed kept rates and NEFSC VTR database prorated days fished (OB EST LAND MT), prorated landings as recorded in the NEFSC dealer (DEAL) database (DEAL LAND MT), and the fishery observer estimate of discard in mt (OB EST DISCARD).

DIV	QTR	OBTRIPS	K_DF	D_DF	VTR DF	OB EST LAND MT	DEAL LAND MT	OB EST DISC 1	NO KEPT RATIO	OB EST DISC MT
51	1	0	2	95	0	0	0	0	1	0
	2	0	1	42	0	0	0	0	1	0
	3	0	0	93	0	0	0	0	1	0
	4	0	0	52	0	0	0	0	1	0
52	1	0	2	95	0	0	0	0	1	0
	2	0	1	42	0	0	0	0	1	0
	3	5	0	93	0	0	0	0	1	0
	4	4	0	52	0	0	0	0	1	0
53	1	0	2	95	0	0	0	0	1	0
	2	0	1	42	0	0	0	0	1	0
	3	0	0	93	0	0	0	0	1	0
	4	0	0	52	0	0	0	0	1	0
61	1	8	2	95	813	1.6	4	77	1	77
	2	19	1	42	102	0.1	1	4	1	4
	3	10	2	19	0	0	1	0	1	0
	4	20	2	81	275	0.4	5	23	1	23
62	1	9	1	84	643	0.9	5	54	1	54
	2	14	1	47	20	0	3	1	1	1
	3	4	4	10	0	0	1	0	1	0
	4	16	1	40	482	0.6	14	19	1	19
63	1	0	1	84	0	0	0	0	1	0
	2	0	1	47	0	0	0	0	1	0
	3	0	4	10	0	0	0	0	1	0
	4	0	1	40	0	0	0	0	1	0
TOTAL/ MEAN		109	1	47	2335	3.6	34	178		178

Table 54. Summary of Northeast Region fishery observer data to estimate summer flounder discard at age in the commercial fishery. Estimates developed using fishery observer length samples, age-length data, and estimates of total discard in mt. An 80% discard mortality rate is assumed. 1994-2002 lengths converted to age using 1994-2002 NEFSC trawl survey age-length keys; n/a = not available.

Year	Gear	Lengths	Ages	Fishery observer Discard Estimate (mt)	Sampling Intensity (mt per 100 lengths)	Raised Discard Estimate (mt)	Raised Estimate with 80% mortality rate (mt)
1989	All	2,337	54	642	27	886	709
1990	All	3,891	453	1,121	29	1,517	1,214
1991	All	5,326	190	993	19	1,315	1,052
1992	All	9,626	331	755	8	862	690
1993	All	3,410	406	817	24	1,057	846
1994	Trawl	2,338	---	429	18	542	434
	Scallop	660	---	590	89	590	472
	All	2,998	354	1,019	34	1,132	906
1995	Trawl	1,822	---	130	7	173	138
	Scallop	731	---	212	29	212	170
	All	2,553	n/a	342	13	385	308
1996	Trawl	1,873	---	319	17	444	355
	Scallop	854	---	135	16	135	108
	All	2,727	n/a	454	17	579	463
1997	Trawl	839		299	36	299	239
	Scallop	556		108	19	108	86
	All	1,395	n/a	407	29	407	326

Table 54 continued.

Year	Gear	Lengths	Ages	Fishery Observer Discard Estimate (mt)	Sampling Intensity (mt per 100 lengths)	Raised Discard Estimate (mt)	Raised Estimate with 80% mortality rate (mt)
1998	Trawl	721		318	44	318	254
	Scallop	150		169	113	169	135
	All	871	n/a	487	56	487	389
1999	Trawl	1,145		1,476	129	1,476	1,181
	Scallop	216		459	213	459	367
	All	1,361	n/a	1,935	142	1,935	1,548
2000	Trawl	1,470		740	50	740	592
	Scallop	2,611		167	6	167	134
	All	4,081	n/a	907	22	907	726
2001	Trawl	1,528		287	19	287	230
	Scallop	705		297	42	297	238
	All	2,233	n/a	584	26	584	468
2002	Trawl	3,402		382	11	382	306
	Scallop	2,952		178	6	178	142
	All	6,177	n/a	560		560	448

Table 55. Estimated summer flounder discard at age in the in the commercial fishery. 1994-2002 lengths converted to age using 1994-2002 NEFSC trawl survey age-length keys. Includes an assumed 80% discard mortality rate.

Discard numbers at age (000s)

Year	Gear	0	1	2	3+	Total
1989	All	775	1,628	94	0	2,497
1990	All	1,441	2,755	67	0	4,263
1991	All	891	3,424	<1	0	4,315
1992	All	1,155	1,544	36	3	2,738
1993	All	1,041	1,532	179	1	2,753
1994	Trawl	571	1,014	95	0	1,680
	Scallop	0	663	398	36	1,098
	All	571	1,677	493	36	2,778
1995	Trawl	141	294	58	2	495
	Scallop	0	114	148	20	282
	All	141	408	206	22	777
1996	Trawl	23	417	167	56	663
	Scallop	<1	221	72	5	298
	All	23	638	239	61	961
1997	Trawl	8	215	203	50	476
	Scallop	0	34	98	22	154
	All	8	249	301	72	630
1998	Trawl	26	132	146	95	399
	Scallop	1	42	73	52	168
	All	27	174	219	157	567
1999	Trawl	95	1,159	1,012	255	2,521
	Scallop	1	64	239	176	479
	All	96	1,223	1,251	431	3,001
2000	Trawl	20	118	378	303	819
	Scallop	2	46	82	49	179
	All	22	164	460	352	998
2001	Trawl	11	86	56	128	281
	Scallop	0	13	50	142	205
	All	11	99	106	270	486
2002	Trawl	11	88	120	109	329
	Scallop	1	30	84	62	177
	All	12	118	203	172	505

Table 56. Estimated summer flounder discard mean length at age in the commercial fishery. 1994-2002 lengths converted to age using 1994-2002 NEFSC trawl survey age-length keys.

Discard mean length (cm) at age

Year	Gear	0	1	2	3+	All
1989	All	25.9	31.5	44.2		30.2
1990	All	29.0	31.7	38.9		30.9
1991	All	24.0	30.9	37.0		29.5
1992	All	29.3	30.0	36.6	51.2	29.8
1993	All	30.0	32.5	34.8	55.0	31.7
1994	Trawl	26.0	31.3	34.5		29.7
	Scallop		30.8	38.2	52.1	34.2
	All	26.0	31.1	37.5	52.1	31.5
1995	Trawl	29.6	29.4	37.0	50.9	30.4
	Scallop		30.7	40.6	52.4	37.4
	All	29.6	29.8	39.6	52.5	33.0
1996	Trawl	28.9	32.0	38.1	55.8	35.5
	Scallop	31.4	30.7	38.2	48.5	32.8
	All	29.0	31.6	38.1	55.2	34.7
1997	Trawl	26.9	32.1	37.8	46.6	36.0
	Scallop		32.5	37.2	45.9	37.5
	All	26.9	32.2	37.6	46.3	36.4
1998	Trawl	26.0	32.5	37.5	48.3	37.7
	Scallop	30.0	35.0	39.7	48.9	41.3
	All	26.1	33.1	38.2	48.5	38.8
1999	Trawl	25.8	32.0	35.9	48.5	34.9
	Scallop	31.0	33.2	36.3	48.8	40.5
	All	25.9	32.1	36.0	48.6	35.9
2000	Trawl	17.2	32.6	37.7	46.3	39.5
	Scallop	26.8	34.4	39.5	47.6	40.3
	All	18.1	33.2	38.0	46.5	39.6
2001	Trawl	22.9	33.7	39.6	47.7	40.8
	Scallop		37.1	40.6	49.1	46.3
	All	22.9	34.2	40.1	48.5	43.1
2002	Trawl	27.7	32.4	37.5	55.1	41.3
	Scallop	27.7	35.1	39.1	48.1	41.5
	All	27.7	33.1	38.2	51.9	41.4

Table 57. Estimated summer flounder discard mean weight at age in the in the commercial fishery. 1994-2002 lengths converted to age using 1994-2002 NEFSC trawl survey age-length keys.

Discard mean weight (kg) at age

Year	Gear	0	1	2	3+	All
1989	All	0.182	0.296	0.909		0.284
1990	All	0.235	0.304	0.559		0.285
1991	All	0.124	0.275	0.491		0.244
1992	All	0.238	0.256	0.498	1.450	0.252
1993	All	0.253	0.332	0.413		0.307
1994	Trawl	0.177	0.291	0.392		0.258
	Scallop		0.287	0.565	1.565	0.430
	All	0.177	0.289	0.532	1.565	0.326
1995	Trawl	0.244	0.242	0.522	1.505	0.280
	Scallop		0.281	0.702	1.604	0.595
	All	0.244	0.253	0.651	1.597	0.395
1996	Trawl	0.226	0.312	0.586	2.004	0.521
	Scallop	0.305	0.274	0.572	1.254	0.363
	All	0.227	0.299	0.582	1.937	0.472
1997	Trawl	0.178	0.327	0.560	1.088	0.504
	Scallop		0.331	0.553	1.044	0.558
	All	0.178	0.328	0.558	1.075	0.517
1998	Trawl	0.158	0.332	0.533	1.346	0.637
	Scallop	0.247	0.421	0.651	1.357	0.808
	All	0.161	0.353	0.572	1.350	0.688
1999	Trawl	0.156	0.317	0.462	1.300	0.468
	Scallop	0.275	0.355	0.478	1.310	0.767
	All	0.157	0.319	0.465	1.304	0.516
2000	Trawl	0.055	0.355	0.555	1.114	0.722
	Scallop	0.174	0.412	0.643	1.023	0.741
	All	0.066	0.371	0.571	1.138	0.725
2001	Trawl	0.114	0.373	0.642	1.210	0.797
	Scallop		0.510	0.692	1.339	1.127
	All	0.114	0.391	0.665	1.278	0.936
2002	Trawl	0.193	0.329	0.540	1.891	0.921
	Scallop	0.195	0.429	0.608	1.235	0.795
	All	0.194	0.354	0.568	1.652	0.877

Table 58. Estimated total landings (catch types A + B1, [000s]) of summer flounder by recreational fishermen. SHORE mode includes fish taken from beach/bank and man-made structures. P/C indicates catch taken from party/charter boats, while P/R indicates fish taken from private/rental boats.

	YEAR										
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
North											
Shore	167	144	62	10	70	39	42	4	16	9	26
P/C Boat	138	201	5	3	48	7	1	1	1	8	1
P/R Boat	1,293	747	568	382	2,562	648	379	137	99	173	211
TOTAL	1,598	1,092	635	395	2,680	694	422	142	116	190	238
Mid											
Shore	682	3,296	977	272	478	251	594	84	96	505	200
P/C Boat	5,745	3,321	2,381	1,068	1,541	1,143	1,164	141	412	589	374
P/R Boat	5,731	12,345	11,764	8,454	5,924	5,499	7,271	1,141	2,658	4,573	3,983
TOTAL	12,158	18,962	15,122	9,794	7,943	6,893	9,029	1,366	3,166	5,667	4,557
South											
Shore	272	523	316	504	689	115	306	91	150	51	50
P/C Boat	53	52	110	81	20	1	1	1	1	1	1
P/R Boat	1,392	367	1,292	292	289	162	355	117	361	159	156
TOTAL	1,717	942	1,718	877	998	278	662	209	512	211	207
All											
Shore	1,121	3,963	1,355	786	1,237	405	942	179	262	565	276
P/C Boat	5,936	3,574	2,496	1,152	1,609	1,151	1,166	143	414	598	376
P/R Boat	8,416	13,459	13,624	9,128	8,775	6,309	8,005	1,395	3,118	4,905	4,350
TOTAL	15,473	20,996	17,475	11,066	11,621	7,865	10,113	1,717	3,794	6,068	5,002

Table 58 continued.

	YEAR									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
North										
Shore	36	49	19	22	27	44	34	57	5	18
P/C Boat	10	24	6	7	22	26	19	45	14	21
P/R Boat	250	596	449	717	669	970	769	1,355	555	401
TOTAL	296	669	474	746	718	1,040	822	1,457	574	440
Mid										
Shore	176	195	175	137	195	243	157	445	199	124
P/C Boat	872	773	267	1,167	907	333	281	557	316	238
P/R Boat	3,969	4,372	2,312	4,999	5,059	4,972	2,610	4,565	3,878	2,248
TOTAL	5,017	5,340	2,754	6,303	6,161	5,548	3,048	5,567	4,393	2,610
South										
Shore	113	180	48	46	32	30	23	38	23	14
P/C Boat	1	2	1	5	2	2	<1	1	<1	3
P/R Boat	236	197	100	274	247	360	214	312	304	172
TOTAL	350	379	149	325	281	391	237	351	327	189
All										
Shore	325	424	242	205	254	317	214	540	227	156
P/C Boat	883	799	274	1,179	931	361	301	603	331	262
P/R Boat	4,455	5,165	2,861	5,990	5,975	6,302	3,593	6,232	4,737	2,821
TOTAL	5,663	6,388	3,377	7,374	7,160	6,979	4,107	7,375	5,294	3,239

Table 59. Estimated total landings (catch types A + B1, [mt]) of summer flounder by recreational fishermen. SHORE mode includes fish taken from beach/bank and man-made structures. P/C indicates catch taken from party/charter boats, while P/R indicates fish taken from private/rental boats.

	YEAR										
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
North											
Shore	87	59	17	7	25	21	32	2	16	6	20
P/C Boat	85	87	4	2	45	4	<1	<1	<1	6	<1
P/R Boat	875	454	388	328	2,597	582	289	141	89	150	175
TOTAL	1,047	600	409	337	2,667	607	322	144	106	162	196
Mid											
Shore	295	1,254	399	140	293	129	329	52	56	306	126
P/C Boat	3,112	2,196	1,426	609	1,093	1,098	799	125	264	364	267
P/R Boat	3,085	8,389	5,686	4,187	3,521	3,596	5,003	985	1,665	2,673	2,536
TOTAL	6,492	11,839	7,511	4,936	4,907	4,823	6,131	1,162	1,985	3,343	2,929
South											
Shore	87	134	98	230	425	34	113	57	76	25	25
P/C Boat	12	12	23	20	7	1	<1	<1	<1	<1	<1
P/R Boat	629	102	471	142	96	54	166	71	161	80	91
TOTAL	728	248	592	392	528	89	280	129	238	106	117
All											
Shore	469	1,447	514	377	743	184	474	111	148	337	171
P/C Boat	3,209	2,295	1,453	631	1,145	1,103	801	127	266	371	269
P/R Boat	4,589	8,945	6,545	4,657	6,214	4,232	5,458	1,197	1,915	2,903	2,802
TOTAL	8,267	12,687	8,512	5,665	8,102	5,519	6,733	1,435	2,329	3,611	3,242

Table 59 continued.

	YEAR									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
North										
Shore	25	30	14	15	17	56	27	69	6	20
P/C Boat	7	14	5	13	17	22	18	40	16	29
P/R Boat	181	424	371	531	445	833	738	1,454	695	559
TOTAL	213	468	390	559	479	911	783	1,563	717	608
Mid										
Shore	88	112	108	80	127	160	136	346	187	136
P/C Boat	534	478	185	746	712	274	286	611	349	274
P/R Boat	2,453	2,849	1,699	3,155	3,898	4,096	2,461	4,373	3,842	2,494
TOTAL	3,075	3,439	1,992	3,981	4,737	4,530	2,883	5,330	4,378	2,904
South										
Shore	59	100	29	24	18	18	13	22	15	9
P/C Boat	<1	1	<1	2	1	1	<1	<1	<1	1
P/R Boat	136	103	84	138	143	199	115	174	168	88
TOTAL	196	204	114	164	162	218	129	197	183	98
All										
Shore	172	242	151	119	162	234	176	437	208	165
P/C Boat	542	493	191	761	730	297	305	652	366	304
P/R Boat	2,770	3,376	2,154	3,824	4,486	5,128	3,314	6,001	4,705	3,141
TOTAL	3,484	4,111	2,496	4,704	5,378	5,659	3,795	7,090	5,278	3,610

Table 60. Recreational fishery sampling intensity for summer flounder by subregion.

Year	Subregion	Landings (A+B1; mt)	Number of Summer Flounder Measured	mt/100 Lengths
1982	North	1,047	231	453
	Mid	6,492	2,896	224
	South	728	576	126
	TOTAL	8,267	3,703	223
1983	North	600	311	192
	Mid	11,839	4,712	251
	South	248	170	146
	TOTAL	12,687	5,193	244
1984	North	409	168	243
	Mid	7,511	2,195	342
	South	592	283	209
	TOTAL	8,512	2,646	322
1985	North	337	78	432
	Mid	4,936	1,934	255
	South	392	274	143
	TOTAL	5,665	2,286	248
1986	North	2,667	266	1,003
	Mid	4,907	1,808	271
	South	528	288	183
	TOTAL	8,102	2,362	343
1987	North	607	217	280
	Mid	4,823	1,897	254
	South	89	445	20
	TOTAL	5,519	2,559	216

Table 60 continued.

Year	Subregion	Landings (A+B1; mt)	Number of Summer Flounder Measured	mt/100 Lengths
1988	North	322	310	104
	Mid	6,131	2,865	214
	South	280	743	38
	TOTAL	6,733	3,918	172
1989	North	144	107	135
	Mid	1,162	1,582	73
	South	129	358	36
	TOTAL	1,435	2,047	70
1990	North	106	110	96
	Mid	1,985	2,667	74
	South	238	1,293	18
	TOTAL	2,329	4,070	57
1991	North	162	189	86
	Mid	3,343	4,648	72
	South	106	820	13
	TOTAL	3,611	5,657	64
1992	North	196	425	46
	Mid	2,929	4,504	65
	South	117	566	21
	TOTAL	3,242	5,495	59
1993	North	213	338	63
	Mid	3,075	4,174	74
	South	196	995	20
	TOTAL	3,484	5,507	63
1994	North	468	621	75
	Mid	3,439	3,834	90
	South	204	1,467	14
	TOTAL	4,111	5,922	69

Table 60 continued.

Year	Subregion	Landings (A+B1; mt)	Number of Summer Flounder Measured	mt/100 Lengths
1995	North	390	501	78
	Mid	1,992	1,470	136
	South	114	485	24
	TOTAL	2,496	2,456	102
1996	North	559	919	61
	Mid	3,981	3,373	118
	South	164	1,188	14
	TOTAL	4,704	5,480	86
1997	North	480	786	61
	Mid	4,736	2,988	159
	South	162	1,026	16
	TOTAL	5,378	4,800	112
1998	North	911	857	106
	Mid	4,530	3,205	141
	South	218	1,259	17
	TOTAL	5,659	5,321	106
1999	North	783	442	177
	Mid	2,883	1,584	182
	South	129	564	23
	TOTAL	3,795	2,590	147
2000	North	1,563	707	221
	Mid	5,330	1,892	282
	South	197	722	27
	TOTAL	7,090	3,321	213
2001	North	717	351	204
	Mid	4,378	2,963	148
	South	183	933	20
	TOTAL	5,278	4,247	124

Table 60 continued.

Year	Subregion	Landings (A+B1; mt)	Number of Summer Flounder Measured	mt/100 Lengths
2002	North	608	366	166
	Mid	2,904	2,267	128
	South	98	596	16
	TOTAL	3,610	3,229	112

Table 61. Estimated recreational landings at age of summer flounder (000s), (catch type A + B1).

	AGE									
Year	0	1	2	3	4	5	6	7	8+	Total
1982	2,750	8,445	3,498	561	215	<1	4	0	0	15,473
1983	2,302	11,612	4,978	1,340	528	220	0	16	0	20,996
1984	2,282	9,198	4,831	1,012	147	5	<1	0	0	17,745
1985	1,002	5,002	4,382	473	148	59	0	0	0	11,066
1986	1,169	6,404	2,784	1,088	129	15	28	0	0	11,621
1987	466	4,674	2,083	448	182	1	5	0	0	7,865
1988	434	5,855	3,345	386	90	3	0	0	0	10,113
1989	74	539	946	135	16	2	5	0	0	1,717
1990	353	2,770	529	118	23	<1	1	0	0	3,794
1991	86	3,611	2,251	79	40	1	0	0	0	6,068
1992	82	3,183	1,620	90	<1	27	0	0	0	5,002
1993	71	3,470	1,981	139	<1	2	0	0	0	5,663
1994	765	3,872	1,549	171	26	<1	5	0	0	6,388
1995	235	1,557	1,426	117	26	16	<1	0	0	3,377
1996	115	3,093	3,664	372	129	1	0	0	0	7,374
1997	4	1,147	4,183	1,464	274	88	0	0	0	7,160
1998	0	768	2,915	2,714	515	63	3	0	0	6,979
1999	0	201	1,982	1,520	325	60	19	0	0	4,107
2000	0	544	3,897	2,161	609	160	4	0	0	7,375
2001	0	838	1,975	1,781	539	121	36	4	0	5,294
2002	1	194	1,321	1,201	408	91	20	1	2	3,239

Table 62. Estimated summer flounder recreational landings (catch types A + B1), live discard (catch type B2), and total catch (catch types A + B1 + B2) in numbers (000s), and live discard (catch type B2) as a proportion of total catch.

	Numbers (000s)			
Year	A+B1	B2	A+B1+B2	B2 / (A+B1+B2)
1982	15,473	8,089	23,562	0.343
1983	20,996	11,066	32,062	0.345
1984	17,475	12,310	29,785	0.413
1985	11,066	2,460	13,526	0.182
1986	11,621	13,672	25,293	0.541
1987	7,865	13,159	21,024	0.626
1988	10,113	7,249	17,362	0.418
1989	1,717	960	2,677	0.359
1990	3,794	5,307	9,101	0.583
1991	6,068	10,007	16,075	0.623
1992	5,002	6,907	11,909	0.580
1993	5,663	14,321	19,984	0.717
1994	6,388	10,345	16,733	0.618
1995	3,377	12,860	16,237	0.792
1996	7,374	12,368	19,742	0.626
1997	7,160	12,860	20,020	0.642
1998	6,979	15,107	22,086	0.684
1999	4,107	17,271	21,378	0.808
2000	7,375	16,712	24,087	0.694
2001	5,294	22,894	28,188	0.812
2002	3,239	13,386	16,625	0.805

Table 63. Estimated recreational fishery discard at age of summer flounder (catch type B2). Discards during 1982-1996 allocated to age groups in same relative proportions as ages 0 and 1 in the subregional catch. Discards during 1997-2000 allocated to age groups in same relative proportions as fish less than the annual EEZ minimum size in the subregional catch. Discards in 2001-2002 allocated to age groups in the same relative proportion as fish less than the minimum size in the respective state catch. All years assume 10% release mortality.

	Numbers at age (000s)					Metric Tons at age				
Year	0	1	2	3+	Total	0	1	2	3+	Total
1982	172	636	0	0	808	39	257	0	0	296
1983	175	932	0	0	1,107	31	345	0	0	376
1984	210	1,020	0	0	1,230	43	372	0	0	415
1985	40	206	0	0	246	10	82	0	0	92
1986	150	1,217	0	0	1,367	34	544	0	0	578
1987	106	1,210	0	0	1,316	24	498	0	0	522
1988	56	669	0	0	725	16	326	0	0	342
1989	13	83	0	0	96	3	42	0	0	45
1990	60	470	0	0	530	18	216	0	0	234
1991	24	977	0	0	1,001	6	423	0	0	429
1992	17	674	0	0	691	4	340	0	0	344
1993	22	1,410	0	0	1,432	6	730	0	0	736
1994	177	857	0	0	1,034	77	500	0	0	577
1995	170	1,116	0	0	1,286	72	642	0	0	714
1996	24	1,213	0	0	1,237	8	645	0	0	653
1997	18	752	495	21	1,286	4	296	206	9	515
1998	0	548	833	130	1,511	0	129	330	58	517
1999	84	569	954	122	1,729	11	215	407	55	688
2000	0	510	1,001	161	1,672	0	244	524	87	855
2001	0	1,166	869	254	2,289	0	550	495	171	1,216
2002	258	332	590	158	1,338	37	137	375	127	676

Table 64. Estimated recreational catch at age of summer flounder ('000; catch type A + B1 + B2). Includes catch type B2 (fish released alive) with 10% release mortality.

	AGE									
Year	0	1	2	3	4	5	6	7	8+	Total
1982	2,922	9,081	3,498	561	215	<1	4	0	0	16,281
1983	2,477	12,544	4,978	1,340	528	220	0	16	0	22,103
1984	2,492	10,218	4,831	1,012	147	5	<1	0	0	18,705
1985	1,042	5,208	4,382	473	148	59	0	0	0	11,312
1986	1,319	7,621	2,784	1,088	129	15	28	4	0	12,988
1987	572	5,884	2,083	448	182	1	5	6	0	9,181
1988	490	6,524	3,345	386	90	3	0	0	0	10,838
1989	87	622	946	135	16	2	5	0	0	1,813
1990	413	3,240	529	118	23	<1	1	0	0	4,324
1991	110	4,588	2,251	79	40	1	0	0	0	7,069
1992	99	3,857	1,620	90	<1	27	0	0	0	5,693
1993	93	4,880	1,981	139	<1	2	0	0	0	7,095
1994	942	4,729	1,549	171	26	<1	5	0	0	7,422
1995	405	2,673	1,426	117	26	16	<1	0	0	4,664
1996	139	4,306	3,664	372	129	1	0	0	0	8,611
1997	22	1,899	4,678	1,485	274	88	0	0	0	8,446
1998	0	1,316	3,748	2,844	515	63	4	0	0	8,490
1999	84	769	2,935	1,642	325	60	19	0	0	5,834
2000	0	1,054	4,898	2,322	609	160	4	0	0	9,047
2001	0	2,004	2,844	2,018	556	121	36	4	0	7,583
2002	259	526	1,911	1,348	417	93	20	1	2	4,577

Table 65. Mean weight (kg) at age of summer flounder catch in the recreational fishery.

	AGE									
Year	0	1	2	3	4	5	6	7	8+	ALL
1982	0.22	0.40	0.57	1.33	1.84	1.89	2.98			0.46
1983	0.18	0.37	0.63	0.93	1.19	1.40				0.47
1984	0.21	0.36	0.62	0.97	1.77	2.20	4.17			0.45
1985	0.24	0.40	0.63	1.10	1.75	2.44				0.53
1986	0.23	0.45	0.75	1.29	1.74	2.72	3.48	5.96		0.58
1987	0.23	0.41	0.76	1.34	1.84	3.05	4.81	4.64		0.56
1988	0.29	0.49	0.71	1.11	1.92	2.32				0.58
1989	0.26	0.51	0.81	1.23	1.78	3.33	1.58			0.73
1990	0.30	0.46	0.97	1.44	1.68	2.90	6.46			0.54
1991	0.27	0.43	0.67	1.31	1.37	2.45				0.52
1992	0.23	0.50	0.72	1.62	2.28	3.34				0.59
1993	0.25	0.52	0.72	1.87	2.44	3.03				0.60
1994	0.44	0.58	0.69	1.44	1.92	2.83	3.90			0.61
1995	0.43	0.58	0.82	1.46	2.60	2.93	3.54			0.68
1996	0.34	0.53	0.62	1.34	1.34	2.36				0.61
1997	0.23	0.45	0.65	0.90	1.15	2.38				0.68
1998		0.41	0.61	0.81	1.26	2.51	2.79			0.70
1999	0.13	0.41	0.62	0.91	1.55	2.33	2.60			0.74
2000		0.52	0.71	0.95	1.31	2.39	3.48			0.83
2001		0.53	0.79	0.99	1.52	2.09	2.29	3.74		0.86
2002	0.14	0.44	0.82	1.06	1.51	2.28	2.60	3.20	4.21	0.91

Table 66. Total catch at age of summer flounder (000s), ME-NC.

	AGE										
Year	0	1	2	3	4	5	6	7	8	9+	Total
1982	5,344	19,423	10,149	935	328	116	67	26	4	0	36,392
1983	4,925	28,441	10,911	2,181	693	323	16	36	5	2	47,533
1984	4,802	26,582	15,454	3,180	829	95	4	5	1	4	50,956
1985	2,078	14,623	17,979	1,767	496	252	30	5	2	1	37,233
1986	1,942	17,140	11,055	3,782	316	140	58	12	3	0	34,448
1987	1,137	17,212	10,838	1,648	544	25	29	33	11	0	31,477
1988	795	20,557	14,562	2,137	644	121	19	15	6	0	38,856
1989	960	4,790	7,306	1,692	353	55	9	3	1	0	15,169
1990	1,856	8,808	2,187	995	221	30	8	2	1	0	14,108
1991	1,001	12,149	7,148	742	217	32	3	1	0	0	21,293
1992	1,368	11,197	6,026	1,125	151	70	2	1	0	0	19,940
1993	1,285	11,235	5,601	566	73	45	20	2	1	0	18,828
1994	1,638	10,362	6,996	982	205	26	14	0	5	0	20,227
1995	592	5,828	7,303	1,239	397	77	2	1	0	0	15,440
1996	162	6,925	9,278	1,785	417	71	16	1	3	0	18,658
1997	30	2,545	8,046	3,149	553	160	11	4	0	0	14,498
1998	45	2,233	6,380	5,243	980	138	19	1	0	0	15,039
1999	181	2,185	6,260	4,018	1,161	358	55	14	0	0	14,232
2000	22	1,480	7,690	4,538	1,495	360	73	19	8	2	15,687
2001	11	2,888	4,760	3,737	1,293	363	123	26	4	3	13,208
2002	272	1,231	5,382	3,222	1,024	355	165	39	7	1	11,698

Table 67. Mean length (cm) at age of summer flounder catch, ME-NC.

	AGE										
Year	0	1	2	3	4	5	6	7	8	9+	ALL
1982	29.4	34.5	38.8	50.7	55.3	61.0	60.7	68.0	71.2		35.7
1983	28.8	34.5	40.9	46.5	48.8	51.6	60.7	60.9	69.3	72.0	36.3
1984	29.4	33.8	39.1	45.9	51.3	57.9	66.8	68.4	74.0	70.7	36.1
1985	30.6	34.8	38.8	46.8	53.9	58.6	61.5	74.5	73.3	75.0	37.5
1986	29.7	35.6	39.9	47.5	54.0	56.2	65.8	66.4	72.8		38.2
1987	29.9	35.3	39.7	46.9	55.8	63.3	65.9	63.2	73.5		37.7
1988	32.4	35.8	39.1	46.6	53.1	60.2	69.6	68.5	72.7		37.9
1989	27.1	35.7	40.8	45.5	50.6	58.5	59.1	63.1	59.0		39.1
1990	29.6	35.1	41.9	46.8	51.4	57.4	66.4	71.7	75.2		36.6
1991	24.8	34.5	40.4	47.1	54.3	61.0	61.7	68.1			36.7
1992	29.6	36.0	41.2	46.9	49.7	61.0	58.8	72.2			37.9
1993	30.3	36.5	40.6	50.4	52.9	54.7	62.6	70.6	75.5		37.9
1994	32.2	37.1	39.3	49.6	57.3	63.4	66.3		68.5		38.3
1995	33.7	37.1	39.9	44.9	52.4	62.2	70.5	71.9			39.4
1996	32.6	36.9	38.3	45.7	51.3	54.4	58.5	63.0	66.0		38.8
1997	28.5	36.2	39.8	43.4	48.3	58.1	60.8	66.3			40.4
1998	28.7	37.2	40.0	43.4	49.5	59.3	60.9	71.1			41.6
1999	25.3	33.6	38.8	43.9	50.7	55.5	62.2	67.1	67.0		40.8
2000	18.1	37.2	40.9	44.2	49.3	58.0	60.8	60.3	66.1	67.7	42.8
2001	21.1	37.8	41.9	45.0	50.4	57.2	60.4	66.4	68.9	73.8	43.4
2002	25.3	35.5	41.9	46.1	52.1	59.3	63.5	69.9	79.0	64.0	43.8

Table 68. Mean weight (kg) at age of summer flounder catch, ME-NC.

	AGE										
Year	0	1	2	3	4	5	6	7	8	9+	ALL
1982	0.255	0.419	0.616	1.447	1.907	2.795	2.673	3.758	4.408	4.370	0.504
1983	0.243	0.419	0.716	1.075	1.257	1.495	2.572	2.594	3.849	4.030	0.521
1984	0.251	0.398	0.632	1.046	1.500	2.163	3.302	3.620	4.640	4.800	0.518
1985	0.290	0.429	0.613	1.109	1.726	2.297	2.671	4.682	4.780		0.575
1986	0.256	0.453	0.668	1.160	1.739	1.994	3.311	4.000	4.432		0.613
1987	0.263	0.446	0.651	1.140	1.941	2.855	3.326	3.314	4.140		0.581
1988	0.319	0.462	0.624	1.130	1.739	2.485	3.888	3.545	4.316		0.588
1989	0.207	0.459	0.723	1.044	1.479	2.249	2.399	2.861	2.251		0.668
1990	0.250	0.429	0.810	1.169	1.538	2.121	3.461	3.951	5.029		0.540
1991	0.140	0.404	0.702	1.186	1.811	2.527	2.837	3.586			0.537
1992	0.246	0.467	0.749	1.222	1.390	2.696	2.302	4.479			0.595
1993	0.264	0.480	0.699	1.461	1.659	1.859	2.816	4.136	5.199		0.571
1994	0.342	0.521	0.628	1.353	2.096	2.736	3.437		3.703		0.605
1995	0.375	0.527	0.678	1.056	1.639	2.628	3.750	4.047			0.675
1996	0.327	0.504	0.570	1.080	1.545	1.957	2.546	3.200	3.164		0.621
1997	0.212	0.452	0.639	0.866	1.233	2.252	2.572	3.429			0.697
1998	0.259	0.490	0.648	0.859	1.321	2.410	2.577	3.983			0.759
1999	0.143	0.371	0.594	0.896	1.439	1.998	2.716	3.496	3.904		0.755
2000	0.066	0.509	0.692	0.924	1.331	2.214	2.586	2.728	3.359	3.532	0.850
2001	0.114	0.544	0.766	0.968	1.449	2.145	2.597	3.459	3.915	4.935	0.903
2002	0.147	0.466	0.733	1.003	1.557	2.325	2.889	3.804	4.847	2.983	0.929

Table 69. Commercial and recreational fishery landings, estimated discard, and total catch statistics (metric tons) as used in the assessment of summer flounder, Maine to North Carolina.

	Commercial			Recreational			Total		
Year	Landings	Discard	Catch	Landings	Discard	Catch	Landings	Discard	Catch
1982	10,400	n/a	10,400	8,267	296	8,563	18,667	296	18,963
1983	13,403	n/a	13,403	12,687	376	13,063	26,090	376	26,466
1984	17,130	n/a	17,130	8,512	415	8,927	25,642	415	26,057
1985	14,675	n/a	14,675	5,665	92	5,757	20,340	92	20,432
1986	12,186	n/a	12,186	8,102	578	8,680	20,288	578	20,866
1987	12,271	n/a	12,271	5,519	522	6,041	17,790	522	18,312
1988	14,686	n/a	14,686	6,733	342	7,075	21,419	342	21,761
1989	8,125	709	8,834	1,435	45	1,480	9,560	754	10,314
1990	4,199	1,214	5,413	2,329	234	2,563	6,528	1,448	7,976
1991	6,224	1,052	7,276	3,611	429	4,040	9,835	1,481	11,316
1992	7,529	690	8,219	3,242	344	3,586	10,771	1,034	11,805
1993	5,715	846	6,561	3,484	736	4,220	9,199	1,582	10,781
1994	6,588	906	7,494	4,111	577	4,688	10,699	1,483	12,182
1995	6,977	308	7,285	2,496	714	3,210	9,473	1,022	10,495
1996	5,861	463	6,324	4,704	615	5,319	10,565	1,078	11,643
1997	3,994	326	4,320	5,378	627	6,005	9,372	953	10,325
1998	5,076	389	5,465	5,659	517	6,176	10,735	906	11,641
1999	4,820	1,548	6,368	3,795	688	4,483	8,615	2,236	10,851
2000	5,085	726	5,811	7,090	855	7,945	12,175	1,581	13,756
2001	4,970	468	5,438	5,278	1,216	6,494	10,248	1,684	11,932
2002	6,407	448	6,855	3,610	676	4,286	10,017	1,124	11,141
Mean	8,396	721	8,877	5,319	519	5,838	13,716	999	14,715

Table 70. NEFSC research trawl survey indices of abundance. Indices are stratified mean numbers (n) and weight (kg) per tow. Spring indices are for offshore strata 1-12 61-76; autumn indices are for offshore strata 1-2, 5-6, 9-10, 61, 65, 69, and 73. Winter indices (1992 and later) are for NEFSC offshore strata 1-3, 5-7, 9-11, 13-14, 16-17, 61-63, 65-67, 69-71, and 73-75. n/a = not available due to incomplete coverage.

Year	Spring (n)	Spring (kg)	Autumn (n)	Autumn (kg)
1967	n/a	n/a	1.35	1.25
1968	0.15	0.16	1.10	1.00
1969	0.19	0.16	0.59	0.61
1970	0.09	0.09	0.15	0.13
1971	0.22	0.28	0.42	0.27
1972	0.47	0.21	0.39	0.27
1973	0.76	0.54	0.87	0.63
1974	1.37	1.26	1.70	1.86
1975	1.97	1.61	3.00	2.48
1976	2.83	2.00	1.14	0.85
1977	2.84	1.74	2.17	1.75
1978	2.55	1.40	0.32	0.40
1979	0.40	0.35	1.17	0.94
1980	1.30	0.78	0.94	0.57
1981	1.50	0.80	0.91	0.72
1982	2.27	1.11	1.57	0.90
1983	0.95	0.53	0.90	0.47
1984	0.66	0.38	0.99	0.65
1985	2.38	1.20	1.24	0.87
1986	2.14	0.82	0.68	0.45
1987	0.93	0.38	0.26	0.28
1988	1.50	0.68	0.11	0.11
1989	0.32	0.24	0.20	0.08
1990	0.72	0.27	0.27	0.19
1991	1.08	0.35	0.51	0.17

Table 70 continued.

Year	Winter (n)	Winter (kg)	Spring (n)	Spring (kg)	Autumn (n)	Autumn (kg)
1992	12.30	4.90	1.20	0.46	0.85	0.49
1993	13.60	5.50	1.27	0.48	0.11	0.04
1994	12.05	6.03	0.93	0.46	0.60	0.35
1995	10.93	4.81	1.09	0.46	1.13	0.83
1996	31.25	12.35	1.76	0.67	0.71	0.45
1997	10.28	5.54	1.06	0.61	1.32	0.92
1998	7.76	5.13	1.19	0.76	2.32	1.58
1999	11.06	7.99	1.60	1.01	2.42	1.66
2000	15.76	12.59	2.14	1.70	1.90	1.82
2001	18.59	15.68	2.69	2.16	1.56	1.55
2002	22.68	18.43	2.47	2.29	1.32	1.40
2003	35.62	27.48	2.91	2.42		

Table 71. NEFSC spring trawl survey (offshore strata 1-12, 61-76) stratified mean number of summer flounder per tow at age.

	AGE										
Year	1	2	3	4	5	6	7	8	9	10+	ALL
1976	0.03	1.77	0.71	0.29	0.01	0.01	0.01				2.83
1977	0.61	1.31	0.71	0.10	0.09	0.01		0.01			2.84
1978	0.68	0.93	0.64	0.19	0.04	0.03	0.03			0.01	2.55
1979	0.06	0.18	0.08	0.04	0.03			0.01			0.40
1980	0.01	0.70	0.31	0.14	0.02	0.06	0.03	0.02		0.01	1.30
1981	0.60	0.54	0.17	0.08	0.05	0.03	0.02	0.01			1.50
1982	0.70	1.43	0.12	0.02							2.27
1983	0.32	0.39	0.19	0.03	0.01				0.01		0.95
1984	0.17	0.33	0.09	0.05		0.01	0.01				0.66
1985	0.55	1.56	0.21	0.04	0.02						2.38
1986	1.48	0.43	0.20	0.02	0.01						2.14
1987	0.47	0.43	0.02	0.01							0.93
1988	0.60	0.81	0.07	0.02							1.50
1989	0.06	0.23	0.02	0.01							0.32
1990	0.63	0.03	0.06								0.72
1991	0.79	0.27		0.02							1.08
1992	0.77	0.41	0.01		0.01						1.20
1993	0.73	0.50	0.04								1.27
1994	0.35	0.53	0.04	0.01							0.93
1995	0.79	0.27	0.02				0.01				1.09
1996	1.08	0.56	0.12								1.76
1997	0.29	0.67	0.09	0.01							1.06
1998	0.27	0.52	0.32	0.06	0.01	0.01					1.19
1999	0.22	0.74	0.48	0.13	0.02	0.01					1.60
2000	0.19	1.03	0.63	0.12	0.15	0.02					2.14
2001	0.48	0.89	1.02	0.20	0.05	0.04	0.01				2.69
2002	0.35	0.87	0.75	0.31	0.09	0.05	0.02	0.01	0.01	0.01	2.47
2003	0.54	1.29	0.59	0.29	0.13	0.06	0.01	0.01			2.91
Mean	0.49	0.70	0.29	0.10	0.05	0.03	0.02	0.01	0.01	0.01	1.60

Table 72. NEFSC spring trawl survey (offshore strata 1-12, 61-76) summer flounder mean length (cm) at age.

	AGE											
Year	1	2	3	4	5	6	7	8	9	10	11	12
1976	25.9	36.0	43.1	53.5	60.8	70.0	72.0					
1977	25.2	35.0	43.4	51.7	59.6	63.0		74.0				
1978	27.3	34.8	40.9	46.9	53.3	59.5	64.0				65.0	75.0
1979	25.1	37.0	43.2	51.5	54.8			77.0				
1980	29.0	28.8	38.1	44.2	51.1	53.0	67.7	77.0		81.0		
1981	25.3	32.2	39.8	48.9	55.7	62.9	67.8	74.0				
1982	28.6	36.2	47.3	46.7								
1983	25.5	37.7	43.4	53.3	61.4				77.0			
1984	27.1	33.9	41.8	56.7		63.0	56.0					
1985	26.8	36.1	42.8	57.2	54.5							
1986	28.6	36.3	46.0	56.0	63.0							
1987	27.8	37.7	47.3	58.0								
1988	27.7	36.3	47.8	45.0								
1989	30.4	39.2	51.5	60.0								
1990	28.3	47.7	48.6									
1991	27.0	38.8		42.1								
1992	27.9	37.7	57.0		72.0							
1993	27.5	37.9	51.9									
1994	33.0	36.8	48.0	53.1								
1995	29.4	40.0	46.4				72.0					
1996	29.8	36.2	47.2									
1997	29.4	38.3	49.4	54.1								
1998	27.6	39.1	42.7	50.5	50.0	60.0						
1999	28.5	35.8	42.9	49.1	57.7	64.0						
2000	29.5	37.9	44.3	49.4	55.4	60.5						
2001	29.6	39.1	44.9	53.4	60.5	63.8	55.0					
2002	29.7	39.3	45.8	52.7	58.1	63.5	62.1	66.0	54.0	68.0		
2003	32.4	39.3	46.5	51.4	57.5	65.2	51.0	65.0				
Mean	28.2	37.2	45.6	51.5	57.8	62.4	63.1	72.2	65.5	74.5	65.0	75.0

Table 73. NEFSC autumn trawl survey (inshore strata 1-61, offshore strata <= 55 m (1,5,9,61,65,69,73)) mean number of summer flounder per tow at age.

				AGE					
Year	0	1	2	3	4	5	6	7+	ALL
1982	0.55	1.52	0.40	0.03					2.50
1983	0.96	1.46	0.34	0.12	0.01	0.01			2.90
1984	0.18	1.39	0.43	0.07	0.01	0.01	<0.01		2.09
1985	0.59	0.80	0.46	0.05		0.02			1.92
1986	0.39	0.83	0.11	0.11		<0.01			1.44
1987	0.07	0.58	0.20	0.03	0.02				0.90
1988	0.06	0.62	0.18	0.03					0.89
1989	0.31	0.21	0.05						0.57
1990	0.44	0.38	0.03	0.04		<0.01			0.89
1991	0.76	0.84	0.09		0.01	<0.01	<0.01		1.70
1992	0.99	1.04	0.25	0.03	0.01	<0.01			2.32
1993	0.23	0.80	0.03	0.01			<0.01		1.07
1994	0.75	0.67	0.09	0.01	0.01				1.53
1995	0.93	1.16	0.28	0.02	0.01				2.40
1996	0.11	1.24	0.57	0.04					1.96
1997	0.17	1.29	1.14	0.29	0.02	0.01	0.01	<0.01	2.93
1998	0.38	2.13	1.63	0.33	0.04	0.01			4.52
1999	0.21	1.73	1.49	0.31	0.04	0.01			3.79
2000	0.22	1.20	1.22	0.40	0.15	0.06	0.03	0.04	3.32
2001	0.12	1.36	0.93	0.37	0.11	0.10		0.01	3.00
2002	0.06	1.17	0.86	0.35	0.11	0.03	0.03	0.02	2.63
Mean	0.40	1.07	0.51	0.14	0.04	0.02	0.02	0.02	2.16

Table 74. NEFSC autumn trawl survey (inshore strata 1-61, offshore strata <= 55 m (1,5,9,61,65,69,73)) summer flounder mean length (cm) at age.

	AGE							
Year	0	1	2	3	4	5	6	7+
1982	28.2	35.1	43.3	47.1				
1983	24.5	33.5	42.7	52.3	60.0	58.0		
1984	23.5	33.6	41.1	46.5	62.6	65.0	70.0	
1985	25.5	35.4	43.1	53.0		63.0		
1986	23.1	35.7	40.8	53.5		57.0		
1987	27.4	34.4	46.0	53.6	47.7			
1988	30.1	35.9	43.4	61.7				
1989	25.8	35.8	48.2	60.0				
1990	24.8	36.0	45.2	54.9	60.0	68.0		
1991	23.2	34.7	43.7	59.0	61.2	67.0	69.0	
1992	25.3	34.4	42.7	51.3	58.8	68.0		
1993	29.9	35.1	44.0	58.1	59.0		70.0	
1994	27.5	38.0	44.3	61.5	57.0			
1995	26.5	36.7	47.4	59.0	65.0			
1996	26.6	35.4	41.6	56.1				
1997	28.4	35.1	40.3	46.5	51.7	59.3	56.0	63.0
1998	24.0	34.7	42.6	50.2	58.2	68.6		
1999	24.1	34.7	40.0	48.5	55.6	56.8		
2000	25.2	35.7	42.1	48.6	53.5	59.9	68.0	66.5
2001	21.8	36.3	42.6	50.0	54.0	62.1		67.0
2002	25.4	36.8	43.8	49.5	55.3	61.4	67.9	69.9
Mean	25.8	35.4	43.3	53.4	57.3	62.6	66.8	66.6

Table 75. NEFSC Winter trawl survey (offshore strata from 27-185 meters (15-100 fathoms): 1-3, 5-7, 9-11, 13-14, 16-17, 61-63, 65-67, 69-71, 73-75; Southern Georges Bank to Cape Hatteras): mean number and mean weight (kg) per tow.

Year	Stratified mean number per tow	Coefficient of variation	Stratified mean weight (kg) per tow	Coefficient of variation
1992	12.30	15.6	4.90	15.4
1993	13.60	15.2	5.50	11.9
1994	12.05	17.8	6.03	16.1
1995	10.93	12.0	4.81	11.6
1996	31.25	24.2	12.35	22.0
1997	10.28	24.0	5.54	16.6
1998	7.76	20.7	5.13	16.6
1999	11.06	13.3	7.99	11.4
2000	15.76	13.0	12.59	12.8
2001	18.59	11.4	15.68	13.2
2002	22.55	15.6	18.71	15.7
2003	35.62	18.7	27.48	19.1

Table 76. NEFSC Winter trawl survey (offshore strata from 27-185 meters (15-100 fathoms): 1-3, 5-7, 9-11, 13-14, 16-17, 61-63, 65-67, 69-71, 73-75; Southern Georges Bank to Cape Hatteras) : mean number at age per tow.

Year	AGE												
	1	2	3	4	5	6	7	8	9	10	11	12+	Total
1992	7.15	4.74	0.33	0.04	0.01	0.03							12.29
1993	6.50	6.70	0.31	0.05	0.02	0.02							13.60
1994	3.76	7.20	0.82	0.26			0.01						12.05
1995	6.07	4.59	0.25	0.02									10.93
1996	22.17	8.33	0.60	0.12	0.03								31.25
1997	3.86	4.80	1.04	0.43	0.11	0.04							10.28
1998	1.68	3.25	2.29	0.42	0.10	0.01				0.01			7.76
1999	2.11	4.80	2.90	0.84	0.28	0.06	0.04	0.02		0.01			11.06
2000	0.70	6.52	4.96	2.51	0.78	0.17	0.08	0.04	0.01				15.76
2001	3.06	5.36	6.40	2.44	0.80	0.37	0.09	0.05	0.01		0.01	0.01	18.59
2002	2.77	10.74	5.58	2.26	0.85	0.32	0.13	0.02	0.01				22.68
2003	8.17	14.36	8.48	2.67	1.04	0.39	0.32	0.15	0.05		0.01		35.62
Mean	5.64	6.76	2.86	1.01	0.40	0.16	0.11	0.05	0.02	0.01	0.01	0.01	16.81

Table 77. NEFSC Winter trawl survey (offshore strata from 27-185 meters (15-100 fathoms): 1-3, 5-7, 9-11, 13-14, 16-17, 61-63, 65-67, 69-71, 73-75; Southern Georges Bank to Cape Hatteras): summer flounder mean length (cm) at age.

	AGE											
Year	1	2	3	4	5	6	7	8	9	10	11	12+
1992	28.0	38.4	48.8	60.0	70.0	69.0						
1993	27.9	37.3	49.4	58.7	58.5	65.0						
1994	28.0	37.5	46.1	56.4			69.0					
1995	27.4	40.2	50.8	59.6								
1996	30.9	38.2	51.4	61.2	63.6							
1997	29.2	37.8	44.5	50.0	57.3	62.5						
1998	28.4	38.0	43.3	52.2	59.7	66.3				64.0		
1999	28.4	36.9	44.5	51.6	59.2	64.1	70.2	68.8		78.0		
2000	28.2	35.9	41.4	49.0	56.3	62.2	68.2	67.1	77.0			
2001	28.3	37.3	43.6	50.2	56.3	61.0	65.3	69.4	58.6		70.0	74.0
2002	30.0	38.5	44.5	51.4	58.1	62.2	66.4	62.7	75.0			
2003	30.8	39.2	45.2	51.4	55.9	61.0	65.6	67.8	67.1		67.0	
Mean	28.8	37.9	46.1	54.3	59.5	63.7	67.5	67.1	69.4	71.0	68.5	74.0

Table 78. MADMF Spring survey cruises: stratified mean number per tow at age.

Year	Age									
	0	1	2	3	4	5	6	7	8+	Total
1978		0.097	0.520	0.274	0.221		0.042			1.154
1979			0.084	0.087	0.147	0.048	0.011			0.377
1980		0.055	0.061	0.052	0.075	0.053	0.055	0.011		0.362
1981		0.405	0.558	0.074	0.031	0.043	0.060		0.031	1.202
1982		0.376	1.424	0.118	0.084	0.020		0.010		2.032
1983		0.241	1.304	0.544	0.021	0.009	0.003			2.122
1984		0.042	0.073	0.063	0.111	0.010				0.299
1985		0.142	1.191	0.034	0.042					1.409
1986		0.966	0.528	0.140	0.008					1.642
1987		0.615	0.583	0.012			0.011			1.221
1988		0.153	0.966	0.109	0.012					1.240
1989			0.338	0.079			0.010			0.427
1990		0.247	0.021	0.079	0.012					0.359
1991		0.029	0.048	0.010						0.087
1992		0.274	0.320	0.080		0.011	0.011			0.696
1993		0.120	0.470	0.060	0.010		0.020			0.680
1994		1.770	1.160	0.050	0.020		0.020			3.020
1995		0.089	1.245	0.050						1.384
1996		0.072	0.641	0.110	0.012					0.835
1997		0.512	1.212	0.169	0.109		0.005			2.007
1998		0.137	1.144	0.630	0.041	0.047				1.999
1999		0.073	0.814	1.042	0.286	0.028		0.015		2.258
2000		0.224	1.566	1.137	0.296	0.202	0.049		0.012	3.486
2001		0.172	0.963	0.687	0.216	0.054				2.092
2002		0.142	1.400	0.362	0.098	0.061	0.023	0.012	0.018	2.116
Mean		0.302	0.745	0.242	0.093	0.049	0.025	0.012	0.020	1.380

Table 79. MADMF Autumn survey cruises: stratified mean number per tow at age.

Year	Age								
	0	1	2	3	4	5	6	7	8+	Total
1978		0.011	0.124	0.024		0.007				0.166
1979			0.047	0.101		0.019				0.167
1980		0.114	0.326	0.020	0.020	0.010				0.490
1981	0.009	0.362	0.367	0.011						0.749
1982		0.255	1.741	0.016						2.012
1983		0.026	0.583	0.140	0.004					0.753
1984	0.033	0.453	0.249	0.120	0.008					0.863
1985	0.051	0.108	1.662	0.033						1.854
1986	0.128	2.149	0.488	0.128						2.893
1987		1.159	0.598	0.010	0.004					1.771
1988		0.441	0.414	0.018						0.873
1989			0.286	0.024						0.310
1990		0.108		0.012						0.120
1991	0.021	0.493	0.262	0.010						0.786
1992		1.110	0.170							1.280
1993	0.010	0.300	0.430	0.020	0.020					0.780
1994	0.050	2.130	0.070							2.250
1995	0.032	0.401	0.323	0.013						0.769
1996	0.020	0.709	1.165	0.082	0.039	0.004				2.019
1997		0.462	1.399	0.323	0.018	0.030				2.232
1998		0.011	0.553	0.248	0.016	0.011				0.839
1999	0.058	0.325	0.878	0.359	0.035					1.655
2000	0.071	1.300	2.129	0.443	0.085	0.084	0.012	0.015		4.139
2001	0.011	1.166	1.000	0.271	0.025	0.000	0.010	0.012		2.494
2002	0.272	2.529	1.195	0.158	0.044	0.033				4.231
Mean	0.059	0.701	0.686	0.112	0.027	0.022	0.011	0.013		1.460

Table 80. MADMF seine survey: total catch of age-0 summer flounder.

Year	Total catch
1982	3
1983	3
1984	1
1985	19
1986	5
1987	4
1988	2
1989	3
1990	11
1991	4
1992	0
1993	2
1994	1
1995	13
1996	7
1997	0
1998	12
1999	13
2000	10
2001	1
2002	70
Mean	9

Table 81. CTDEP spring trawl survey: summer flounder index of abundance, geometric mean number per tow at age.

Year	Age								
	0	1	2	3	4	5	6	7	Total
1984	0.000	0.314	0.271	0.044	0.000	0.000	0.000	0.000	0.629
1985	0.000	0.015	0.325	0.040	0.058	0.003	0.000	0.000	0.441
1986	0.000	0.753	0.100	0.082	0.008	0.006	0.000	0.000	0.949
1987	0.000	0.951	0.086	0.014	0.004	0.001	0.000	0.001	1.057
1988	0.000	0.232	0.223	0.035	0.009	0.001	0.000	0.000	0.500
1989	0.000	0.013	0.049	0.024	0.016	0.000	0.000	0.000	0.102
1990	0.000	0.304	0.022	0.013	0.006	0.001	0.000	0.001	0.347
1991	0.000	0.392	0.189	0.029	0.028	0.001	0.000	0.000	0.639
1992	0.000	0.319	0.188	0.021	0.004	0.023	0.000	0.000	0.555
1993	0.000	0.320	0.151	0.015	0.018	0.003	0.000	0.001	0.508
1994	0.000	0.496	0.314	0.025	0.018	0.005	0.000	0.002	0.860
1995	0.000	0.199	0.051	0.020	0.005	0.000	0.000	0.006	0.281
1996	0.000	0.578	0.266	0.086	0.023	0.004	0.000	0.004	0.961
1997	0.000	0.391	0.507	0.057	0.036	0.004	0.002	0.002	0.999
1998	0.000	0.064	0.594	0.503	0.116	0.006	0.025	0.002	1.310
1999	0.000	0.245	0.593	0.385	0.139	0.053	0.025	0.000	1.440
2000	0.000	0.321	0.726	0.524	0.074	0.111	0.034	0.000	1.790
2001	0.000	0.841	0.340	0.365	0.120	0.043	0.032	0.007	1.748
2002	0.000	1.057	1.264	0.465	0.233	0.087	0.044	0.035	3.185
Mean	0.000	0.411	0.329	0.145	0.048	0.019	0.009	0.003	0.963

Table 82. CTDEP autumn trawl survey: summer flounder index of abundance, geometric mean number per tow at age.

Year	Age								
	0	1	2	3	4	5	6	7	Total
1984	0.000	0.571	0.331	0.072	0.014	0.004	0.004	0.003	0.999
1985	0.240	0.339	0.528	0.075	0.001	0.008	0.000	0.000	1.191
1986	0.172	1.170	0.298	0.072	0.006	0.001	0.000	0.000	1.719
1987	0.075	1.067	0.223	0.033	0.003	0.000	0.000	0.000	1.401
1988	0.015	0.884	0.481	0.037	0.002	0.001	0.000	0.000	1.420
1989	0.000	0.029	0.095	0.015	0.001	0.000	0.000	0.000	0.140
1990	0.032	0.674	0.110	0.042	0.007	0.005	0.000	0.000	0.870
1991	0.036	0.826	0.340	0.036	0.013	0.005	0.004	0.000	1.260
1992	0.013	0.570	0.366	0.046	0.016	0.009	0.000	0.000	1.020
1993	0.084	0.827	0.152	0.039	0.003	0.001	0.002	0.001	1.109
1994	0.132	0.300	0.085	0.024	0.009	0.000	0.000	0.000	0.550
1995	0.023	0.384	0.117	0.012	0.002	0.001	0.000	0.002	0.541
1996	0.069	0.887	1.188	0.042	0.005	0.000	0.000	0.000	2.191
1997	0.033	0.681	1.373	0.373	0.021	0.014	0.004	0.001	2.500
1998	0.000	0.269	1.054	0.321	0.054	0.021	0.000	0.000	1.719
1999	0.044	0.679	1.484	0.346	0.114	0.011	0.002	0.000	2.680
2000	0.112	0.395	0.871	0.341	0.124	0.043	0.011	0.013	1.910
2001	0.021	2.689	1.137	0.436	0.110	0.018	0.005	0.001	4.417
2002	0.442	3.087	1.930	0.479	0.123	0.031	0.024	0.005	6.121
Mean	0.081	0.859	0.640	0.150	0.033	0.009	0.003	0.001	1.777

Table 83. RIDFW autumn trawl survey summer flounder index of abundance. RIDFW lengths aged with NEFSC autumn trawl survey age-length keys.

Year	Age										
	0	1	2	3	4	5	6	7	8	9	Total
1980	0.131	0.203	0.392	0.074	0.013	0.000	0.000	0.000	0.000	0.000	0.813
1981	0.304	0.971	1.740	0.199	0.013	0.003	0.002	0.002	0.001	0.001	3.236
1982	0.024	0.209	0.516	0.071	0.005	0.000	0.000	0.000	0.000	0.001	0.826
1983	0.030	0.135	0.420	0.110	0.014	0.001	0.000	0.001	0.000	0.001	0.712
1984	0.122	0.424	0.701	0.092	0.013	0.003	0.000	0.000	0.000	0.000	1.355
1985	0.342	0.218	0.338	0.048	0.004	0.001	0.000	0.001	0.000	0.000	0.952
1986	0.547	1.183	1.518	0.179	0.012	0.000	0.002	0.001	0.001	0.001	3.444
1987	0.135	0.503	0.579	0.121	0.014	0.001	0.003	0.003	0.001	0.000	1.360
1988	0.014	0.167	0.351	0.036	0.003	0.000	0.000	0.000	0.000	0.000	0.571
1989	0.000	0.001	0.037	0.030	0.003	0.000	0.000	0.000	0.000	0.000	0.071
1990	0.051	0.262	0.475	0.042	0.003	0.000	0.000	0.000	0.000	0.000	0.833
1991	0.002	0.060	0.128	0.034	0.007	0.000	0.000	0.000	0.000	0.000	0.231
1992	0.065	0.394	0.685	0.185	0.033	0.003	0.004	0.001	0.001	0.000	1.371
1993	0.024	0.152	0.396	0.139	0.021	0.002	0.000	0.001	0.000	0.000	0.735
1994	0.005	0.045	0.126	0.013	0.001	0.000	0.000	0.000	0.000	0.000	0.190
1995	0.031	0.175	0.393	0.140	0.013	0.005	0.000	0.004	0.000	0.001	0.762
1996	0.193	0.704	1.346	0.171	0.012	0.001	0.000	0.001	0.000	0.001	2.429
1997	0.080	0.557	1.053	0.174	0.012	0.003	0.000	0.002	0.000	0.000	1.881
1998	0.008	0.087	0.359	0.087	0.004	0.001	0.000	0.001	0.000	0.001	0.548
1999	0.241	0.931	1.888	0.254	0.020	0.005	0.000	0.002	0.000	0.000	3.341
2000	0.365	0.506	1.305	0.654	0.054	0.035	0.000	0.000	0.000	0.000	2.919
2001	0.080	0.550	0.640	0.800	0.053	0.013	0.002	0.001	0.000	0.000	2.139
2002	0.440	2.420	1.370	0.390	0.060	0.000	0.030	0.000	0.000	0.000	4.710
Mean	0.141	0.472	0.729	0.176	0.017	0.003	0.002	0.001	0.000	0.000	1.540

Table 84. RIDFW monthly fixed station trawl survey summer flounder index of abundance.

Year	Mean number/tow	Mean kg/tow	Mean age 0 number/tow	Mean age 1 number/tow	Mean age 2+ number/tow
1990	0.29	0.29	0.00	0.14	0.15
1991	0.16	0.11	0.01	0.10	0.04
1992	0.34	0.30	0.01	0.26	0.18
1993	0.26	0.36	0.01	0.04	0.21
1994	0.17	0.14	0.01	0.08	0.08
1995	0.45	0.41	0.00	0.17	0.27
1996	0.96	0.72	0.05	0.42	0.48
1997	0.73	0.62	0.01	0.31	0.40
1998	0.43	0.39	0.00	0.12	0.31
1999	0.89	0.71	0.07	0.40	0.42
2000	2.61	2.07	0.14	1.00	1.44
2001	0.98	0.85	0.07	0.39	0.52
2002	2.02	1.54	0.10	0.91	1.00
Mean	0.79	0.65	0.04	0.33	0.42

Age 0: Proportion of catch < 30 cm
Age 1: Proportion of 30 cm ≤ catch ≤ 39 cm
Age 2+: Proportion of fish > 39 cm

Table 85. NJBMF trawl survey, April - October: index of summer flounder abundance.

Year	Age					
	0	1	2	3	4+	Total
1988	0.29	4.22	1.19	0.01	0.00	5.71
1989	1.25	0.54	0.40	0.01	0.01	2.21
1990	1.88	1.89	0.15	0.05	0.00	3.97
1991	1.50	3.11	0.32	0.02	0.01	4.96
1992	1.34	3.76	0.76	0.08	0.05	5.99
1993	3.52	6.95	0.27	0.04	0.02	10.80
1994	2.22	1.46	0.13	0.01	0.03	3.85
1995	4.95	2.93	0.28	0.05	0.16	8.37
1996	1.65	5.16	2.71	0.18	0.05	9.75
1997	1.64	8.25	5.25	1.02	0.18	16.34
1998	0.67	5.80	2.67	0.29	0.03	9.46
1999	1.03	6.12	3.46	0.65	0.18	11.44
2000	0.95	3.91	1.82	0.45	0.22	7.35
2001	0.62	3.32	1.18	0.41	0.14	5.67
2002	1.51	9.11	4.13	1.28	0.81	16.84
Mean	1.67	4.44	1.65	0.30	0.13	8.18

Table 86. DEDFW 16 foot trawl survey: index of summer flounder recruitment at age-0 in the Delaware Estuary.

Year	Geometric Mean number per tow
1980	0.12
1981	0.06
1982	0.11
1983	0.03
1984	0.08
1985	0.06
1986	0.10
1987	0.14
1988	0.01
1989	0.12
1990	0.23
1991	0.07
1992	0.31
1993	0.02
1994	0.29
1995	0.17
1996	0.03
1997	0.02
1998	0.03
1999	0.05
2000	0.18
2001	0.07
2002	0.07
Mean	0.10

Table 87. DEDFW 16 foot trawl survey: index of summer flounder recruitment at age-0 in the Delaware Inland Bays.

Year	Geometric Mean number per tow
1986	0.01
1987	0.00
1988	0.00
1989	0.15
1990	0.02
1991	0.94
1992	0.06
1993	0.04
1994	0.70
1995	0.23
1996	0.05
1997	0.33
1998	0.99
1999	0.62
2000	0.70
2001	0.05
2002	0.04
Mean	0.29

Table 88. DEDFW Delaware Bay 30 foot trawl survey: index of summer flounder abundance.

Year	Age					
	0	1	2	3	4+	Total
1991	1.44	1.13	0.18	0.04	0.00	2.79
1992	0.47	0.28	0.08	0.00	0.00	0.83
1993	0.04	1.56	0.73	0.07	0.00	2.40
1994	2.28	0.14	0.22	0.08	0.00	2.72
1995	0.94	1.00	0.28	0.10	0.09	2.41
1996	0.46	0.73	0.48	0.10	0.02	1.79
1997	0.03	0.12	0.49	0.47	0.16	1.27
1998	0.11	0.31	0.83	0.29	0.12	1.66
1999	0.20	0.06	0.77	0.47	0.19	1.69
2000	0.79	0.24	0.30	0.28	0.23	1.84
2001	0.34	1.55	0.49	0.26	0.13	2.77
2002	0.04	0.23	0.09	0.00	0.03	0.39
Mean	0.60	0.61	0.41	0.18	0.08	1.88

Table 89. MD DNR Coastal Bays trawl survey: index of summer flounder recruitment at age-0.

Year	Geometric mean	Lower 95% CI	Upper 95% CI
1972	12.3	6.5	21.8
1973	4.2	3.0	5.7
1974	5.1	3.9	6.6
1975	2.1	1.6	2.6
1976	1.9	1.4	2.6
1977	2.4	1.8	3.2
1978	3.2	2.4	4.1
1979	2.9	2.0	4.1
1980	4.2	2.6	6.2
1981	3.9	2.6	5.4
1982	2.0	0.8	3.7
1983	10.6	6.0	17.9
1984	5.4	3.1	8.7
1985	5.6	3.6	8.1
1986	16.2	10.1	25.2
1987	4.6	2.4	7.8
1988	0.5	0.3	0.8
1989	1.3	0.9	1.9
1990	2.1	1.6	2.7
1991	3.1	2.4	3.9
1992	3.5	2.5	4.7
1993	1.6	1.2	2.1
1994	8.2	6.5	10.3
1995	5.0	4.0	6.2
1996	2.6	2.0	3.2
1997	3.3	2.5	4.3
1998	5.2	4.2	6.6
1999	3.4	2.6	4.2
2000	4.1	3.1	5.2
2001	5.3	4.1	6.9
2002	2.1	1.6	2.7
Mean	4.4		

Table 90. VIMS juvenile fish trawl survey, VA rivers: index of summer flounder recruitment at age-0.

Year	Geometric mean catch per trawl	Lower 95% confidence limit	Upper 95% confidence limit	Number of samples
1979	1.0	0.6	1.6	48
1980	7.6	5.0	11.3	58
1981	5.1	3.5	7.3	61
1982	4.3	2.8	6.4	60
1983	5.2	3.7	7.1	62
1984	1.9	1.2	2.9	45
1985	1.1	0.6	1.9	27
1986	1.3	0.8	1.8	53
1987	0.4	0.2	0.8	52
1988	0.5	0.2	1.0	36
1989	1.0	0.6	1.4	36
1990	2.6	1.7	3.8	36
1991	1.4	0.9	2.1	36
1992	0.5	0.2	0.8	36
1993	0.5	0.3	0.8	36
1994	1.1	0.5	1.9	36
1995	0.7	0.4	1.2	36
1996	0.6	0.3	1.0	36
1997	0.7	0.4	1.1	36
1998	0.2	0.0	0.3	36
1999	0.4	0.2	0.6	36
2000	0.5	0.2	0.9	36
2001	0.5	0.2	1.0	36
2002	0.4	0.2	0.9	36
Mean	1.7			

Table 91. North Carolina Division of Marine Fisheries (NCDMF) Pamlico Sound trawl survey: June index of summer flounder recruitment at age-0.

Year	Mean number per tow
1987	19.86
1988	2.61
1989	6.63
1990	4.27
1991	5.85
1992	9.14
1993	5.13
1994	8.17
1995	5.59
1996	30.67
1997	14.14
1998	9.96
1999	n/a
2000	3.94
2001	22.03
2002	18.28
Mean	11.08

Table 92. Summary of age-0 summer flounder recruitment indices from NEFSC and state surveys, Massachusetts to North Carolina.

	YEAR CLASS																						
Survey	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CT Autumn					0.00	0.24	0.17	0.08	0.02	0.00	0.03	0.04	0.01	0.08	0.13	0.02	0.07	0.03	0.00	0.04	0.11	0.02	0.44
RI Autumn	0.13	0.31	0.02	0.03	0.12	0.34	0.55	0.14	0.01	0.00	0.05	0.01	0.07	0.02	0.01	0.03	0.17	0.08	0.01	0.24	0.37	0.08	0.44
RI Monthly Fixed											0.00	0.00	0.02	0.02	0.02	0.00	0.14	0.03	0.00	0.14	0.26	0.07	0.10
MA Seine			3	3	1	19	5	4	2	3	11	4	0	2	1	13	7	0	12	13	10	1	70
NJ Trawl									0.29	1.25	1.88	1.50	1.34	3.52	2.22	4.95	1.65	1.64	0.67	1.03	0.95	0.62	1.51
DE: 16 ft Trawl: Estuary	0.12	0.06	0.11	0.03	0.08	0.06	0.10	0.14	0.01	0.12	0.23	0.07	0.31	0.02	0.29	0.17	0.03	0.02	0.03	0.05	0.18	0.07	0.07
DE: 16 ft Trawl: Bays							0.01	0.00	0.00	0.15	0.02	0.94	0.06	0.04	0.70	0.23	0.05	0.33	0.99	0.62	0.70	0.05	0.04
DE: 30ft Trawl												1.44	0.47	0.04	2.28	0.94	0.46	0.03	0.11	0.20	0.79	0.34	0.04
MD	4.2	3.9	2.0	10.6	5.4	5.6	16.2	4.6	0.5	1.3	2.1	3.1	3.5	1.6	8.2	5.0	2.6	3.3	5.2	3.4	4.1	5.3	2.1
VIMS Rivers only	7.6	5.1	4.3	5.2	1.9	1.1	1.3	0.4	0.5	1.0	2.6	1.4	0.5	0.5	1.1	0.7	0.6	0.7	0.2	0.4	0.5	0.5	0.4
NC Pamlico								19.86	2.61	6.63	4.27	5.85	9.14	5.13	8.17	5.59	30.67	14.14	9.96	n/a	3.94	22.03	18.28
NEFSC Autumn			0.55	0.96	0.18	0.59	0.39	0.07	0.06	0.31	0.44	0.76	0.99	0.23	0.75	0.93	0.11	0.17	0.38	0.21	0.22	0.08	0.06

Table 93. Summary of 1982-2002 NFT VPA trial runs for summer flounder.

	F03_1	F03_ALL	F03_NEC	F03_STATE
Indices	Same as SAW 35	All	NEFSC Survey Indices Only	State Survey Indices Only
Number	41	50	14	36
MSR	0.499	0.628	0.437	0.694
2003 N; CV				
1	31168; 0.21	35519; 0.27	23208; 0.40	43644; 0.35
2	18816; 0.18	24346; 0.18	11329; 0.29	31865; 0.21
3	15346; 0.18	18484; 0.18	15312; 0.28	20019; 0.22
4	6047; 0.19	7205; 0.16	7024; 0.28	7274; 0.25
5	4785; 0.21	4548; 0.23	5866; 0.30	3911; 0.32
6	2466; 0.27	1833; 0.34	2774; 0.38	1331; 0.56
2002 F				
1	0.01	0.01	0.01	0.01
2	0.06	0.04	0.09	0.03
3	0.28	0.23	0.28	0.22
4	0.39	0.34	0.35	0.34
5	0.18	0.19	0.15	0.21
6	0.12	0.16	0.11	0.21
2002 F_{3-5}	0.23	0.23	0.20	0.26
2002 age-0	38369	43683	28647	53608

Table 94. Virtual Population Analysis (VPA) for summer flounder, 1982-2002.

```
NOAA Fisheries Toolbox VPA Version 2.1

Levenburg-Marquardt Algorithm Completed     5 Iterations
Residual Sum of Squares =     359.001

Number of Residuals     =    726
Number of Parameters    =      6
Degrees of Freedom      =    720
Mean Squared Residual   =     0.498612
Standard Deviation      =     0.706125


Number of Years =    21
Number of Ages  =     8
First Year      =  1982
Youngest Age    =     0
Oldest True Age =     6

Number of Survey Indices Available       =    50
Number of Survey Indices Used in Estimate =    41


VPA Classic Method - Auto Estimated Q's


Stock Numbers Predicted in Terminal Year Plus One (2003)
Age    Stock Predicted     Std. Error      CV

  1          31167.792   0.660292E+04   0.211851E+00
  2          18816.542   0.347992E+04   0.184939E+00
  3          15346.196   0.269593E+04   0.175674E+00
  4           6047.545   0.116991E+04   0.193452E+00
  5           4785.924   0.102450E+04   0.214066E+00
  6           2466.229   0.670810E+03   0.271998E+00

-- Non-Linear Least Squares Fit --

Default Tolerances Used

Scaled Gradient Tolerance      =    6.055454E-06
Scaled Step Tolerance          =    3.666853E-11
Relative Function Tolerance    =    3.666853E-11
Absolute Function Tolerance    =    4.930381E-32


VPA Method Options

- Pope Approximation Used in Cohort Solution
- Plus Group Backward Calculation Method Used
- Heincke Rule Used in F-Oldest Calculation
- F-Oldest Calculation in Years Prior to Terminal Year
  Uses Stock Sizes in Ages  3 to  6
- Calculation of Population of Age 0 In Year 2003
  =  CDF Using First Age Populations
     Year Range Applied =  1982 to  2002

Full F in Terminal Year              =   0.2310

F in Oldest True Age in Terminal Year =   0.2310

Full F Calculated Using Classic Method

Age  Input Partial  Calc Partial   Fishing     Used In
     Recruitment    Recruitment    Mortality   Full F    Comments

  0      0.010          0.020       0.0079      NO      Stock Estimate in T+1
  1      0.200          0.146       0.0575      NO      Stock Estimate in T+1
  2      0.800          0.701       0.2756      NO      Stock Estimate in T+1
  3      1.000          1.000       0.3934      YES     Stock Estimate in T+1
  4      1.000          0.450       0.1770      YES     Stock Estimate in T+1
  5      1.000          0.311       0.1224      YES     Stock Estimate in T+1
  6      1.000          0.587       0.2310              Input PR * Full F
```

JAN-1 Population Numbers

AGE	1982	1983	1984	1985	1986
0	74269.	80323.	48380.	48579.	53444.
1	42907.	55970.	61306.	35265.	37893.
2	16205.	17555.	20090.	26141.	15641.
3	2203.	4085.	4500.	2465.	5134.
4	807.	957.	1371.	807.	419.
5	161.	364.	157.	372.	212.
6	152.	27.	6.	42.	77.
7	68.	71.	14.	11.	20.
Total	136772.	159352.	135824.	113683.	112841.

AGE	1987	1988	1989	1990	1991
0	43921.	13033.	27270.	30352.	28687.
1	41999.	34931.	9951.	21458.	23171.
2	15515.	18812.	9998.	3813.	9599.
3	2803.	2896.	2226.	1575.	1143.
4	782.	804.	438.	291.	389.
5	57.	148.	75.	39.	38.
6	47.	24.	11.	12.	5.
7	71.	27.	5.	4.	2.
Total	105195.	70675.	49974.	57545.	63033.

AGE	1992	1993	1994	1995	1996
0	32319.	33190.	35402.	39232.	29468.
1	22581.	25223.	26011.	27503.	31585.
2	7978.	8356.	10485.	11920.	17244.
3	1391.	1079.	1773.	2254.	3151.
4	264.	121.	372.	563.	724.
5	122.	80.	33.	119.	102.
6	3.	37.	25.	3.	28.
7	1.	6.	9.	2.	5.
Total	64660.	68091.	74110.	81596.	82307.

AGE	1997	1998	1999	2000	2001
0	34942.	38731.	29993.	40759.	29745.
1	23980.	28581.	31670.	24393.	33351.
2	19593.	17330.	21379.	23952.	18632.
3	5723.	8761.	8416.	11840.	12652.
4	965.	1836.	2429.	3255.	5587.
5	216.	290.	617.	938.	1312.
6	19.	32.	112.	181.	442.
7	7.	2.	29.	72.	119.
Total	85445.	95563.	94645.	105389.	101840.

JAN-1 Population Numbers

AGE	2002	2003
0	38369.	35402.
1	24343.	31168.
2	24692.	18817.
3	10947.	15346.
4	6977.	6048.
5	3405.	4786.
6	746.	2466.
7	250.	647.
Total	109729.	114680.

Fishing Mortality Calculated

AGE	1982	1983	1984	1985	1986
0	0.0829	0.0702	0.1162	0.0484	0.0410
1	0.6937	0.8246	0.6524	0.6130	0.6929
2	1.1781	1.1613	1.8980	1.4276	1.5192
3	0.6332	0.8918	1.5187	1.5711	1.6825
4	0.5963	1.6093	1.1037	1.1376	1.7873
5	1.6001	3.9505	1.1075	1.3793	1.3116
6	0.6553	1.0601	1.3963	1.4385	1.6732
7	0.6553	1.0601	1.3963	1.4385	1.6732

AGE	1987	1988	1989	1990	1991
0	0.0290	0.0698	0.0397	0.0700	0.0393
1	0.6032	1.0510	0.7592	0.6045	0.8662
2	1.4784	1.9344	1.6481	1.0047	1.7317
3	1.0491	1.6899	1.8336	1.1978	1.2637
4	1.4666	2.1666	2.2217	1.8237	0.9574
5	0.6550	2.3629	1.6410	1.9213	2.5093
6	1.1170	1.7931	1.8802	1.2830	1.1948
7	1.1170	1.7931	1.8802	1.2830	1.1948

AGE	1992	1993	1994	1995	1996
0	0.0479	0.0437	0.0525	0.0168	0.0061
1	0.7941	0.6778	0.5803	0.2668	0.2775
2	1.8004	1.3501	1.3372	1.1304	0.9029
3	2.2436	0.8665	0.9466	0.9351	0.9835
4	0.9969	1.1023	0.9411	1.5084	1.0110
5	1.0007	0.9739	2.0783	1.2622	1.4643
6	1.8128	0.8930	0.9560	1.0349	0.9984
7	1.8128	0.8930	0.9560	1.0349	0.9984

AGE	1997	1998	1999	2000	2001
0	0.0009	0.0013	0.0067	0.0006	0.0004
1	0.1248	0.0903	0.0793	0.0694	0.1006
2	0.6048	0.5223	0.3910	0.4382	0.3318
3	0.9367	1.0828	0.7500	0.5509	0.3952
4	1.0035	0.8911	0.7512	0.7085	0.2954
5	1.7111	0.7478	1.0258	0.5517	0.3649
6	0.9629	1.0376	0.7633	0.5810	0.3636
7	0.9629	1.0376	0.7633	0.5810	0.3636

Table 94 continued.

Fishing Mortality Calculated

AGE	2002
0	0.0079
1	0.0575
2	0.2756
3	0.3934
4	0.1770
5	0.1224
6	0.2310
7	0.2310

Average Fishing Mortality For Ages 3- 5

Year	Average F	N Weighted	Biomass Wtd	Catch Wtd
1982	0.9432	0.6728	0.7023	0.7058
1983	2.1505	1.2248	1.4284	1.3564
1984	1.2433	1.4136	1.3781	1.4254
1985	1.3627	1.4555	1.4141	1.4664
1986	1.5938	1.6765	1.6665	1.6780
1987	1.0569	1.1325	1.1663	1.1471
1988	2.0732	1.8153	1.8822	1.8238
1989	1.8988	1.8903	1.9096	1.8938
1990	1.6476	1.3083	1.3467	1.3263
1991	1.5768	1.2183	1.2189	1.2369
1992	1.4137	1.9726	1.8435	2.0391
1993	0.9809	0.8954	0.9045	0.8987
1994	1.3220	0.9628	0.9776	0.9700
1995	1.2352	1.0583	1.1288	1.0827
1996	1.1529	1.0009	1.0133	1.0036
1997	1.2171	0.9703	1.0064	0.9784
1998	0.9072	1.0416	1.0221	1.0460
1999	0.8424	0.7651	0.7776	0.7681
2000	0.6037	0.5830	0.5910	0.5878
2001	0.3518	0.3646	0.3578	0.3692
2002	0.2310	0.2794	0.2494	0.3244

Table 94 continued.

Back Calculated Partial Recruitment

AGE	1982	1983	1984	1985	1986
0	0.0518	0.0178	0.0612	0.0308	0.0229
1	0.4335	0.2087	0.3437	0.3902	0.3877
2	0.7363	0.2940	1.0000	0.9087	0.8500
3	0.3957	0.2258	0.8002	1.0000	0.9414
4	0.3727	0.4074	0.5815	0.7241	1.0000
5	1.0000	1.0000	0.5835	0.8780	0.7339
6	0.4095	0.2683	0.7357	0.9156	0.9362
7	0.4095	0.2683	0.7357	0.9156	0.9362

AGE	1987	1988	1989	1990	1991
0	0.0196	0.0295	0.0179	0.0364	0.0157
1	0.4080	0.4448	0.3417	0.3146	0.3452
2	1.0000	0.8187	0.7418	0.5230	0.6901
3	0.7096	0.7152	0.8253	0.6235	0.5036
4	0.9920	0.9169	1.0000	0.9492	0.3815
5	0.4430	1.0000	0.7386	1.0000	1.0000
6	0.7555	0.7588	0.8463	0.6678	0.4761
7	0.7555	0.7588	0.8463	0.6678	0.4761

AGE	1992	1993	1994	1995	1996
0	0.0214	0.0324	0.0253	0.0111	0.0042
1	0.3539	0.5021	0.2792	0.1769	0.1895
2	0.8025	1.0000	0.6434	0.7494	0.6167
3	1.0000	0.6418	0.4555	0.6200	0.6717
4	0.4443	0.8165	0.4528	1.0000	0.6904
5	0.4460	0.7213	1.0000	0.8368	1.0000
6	0.8080	0.6614	0.4600	0.6861	0.6818
7	0.8080	0.6614	0.4600	0.6861	0.6818

AGE	1997	1998	1999	2000	2001
0	0.0006	0.0012	0.0065	0.0008	0.0010
1	0.0729	0.0834	0.0773	0.0980	0.2546
2	0.3535	0.4824	0.3811	0.6185	0.8396
3	0.5474	1.0000	0.7311	0.7776	1.0000
4	0.5864	0.8229	0.7323	1.0000	0.7475
5	1.0000	0.6907	1.0000	0.7786	0.9235
6	0.5627	0.9583	0.7441	0.8201	0.9202
7	0.5627	0.9583	0.7441	0.8201	0.9202

Back Calculated Partial Recruitment

AGE	2002
0	0.0200
1	0.1462
2	0.7005
3	1.0000
4	0.4498
5	0.3112
6	0.5870
7	0.5870

Table 94 continued.

JAN-1 Biomass

AGE	1982	1983	1984	1985	1986
0	14720.	15004.	9134.	11212.	10229.
1	13705.	18218.	18901.	11489.	13710.
2	7557.	9604.	10314.	12880.	8363.
3	3420.	3324.	3894.	2064.	4330.
4	1738.	1291.	1741.	1084.	583.
5	468.	615.	259.	691.	393.
6	416.	71.	13.	102.	212.
7	262.	185.	56.	53.	81.
Total	42285.	48313.	44312.	39575.	37900.

AGE	1987	1988	1989	1990	1991
0	8508.	3413.	3940.	6019.	2309.
1	14045.	12097.	3794.	6425.	7422.
2	8425.	9880.	5785.	2328.	5280.
3	2446.	2484.	1796.	1448.	1120.
4	1173.	1132.	566.	369.	566.
5	128.	324.	149.	69.	76.
6	120.	82.	28.	33.	11.
7	249.	102.	14.	20.	6.
Total	35094.	29513.	16072.	16710.	16791.

AGE	1992	1993	1994	1995	1996
0	5624.	6197.	10217.	13378.	8310.
1	5896.	8704.	9712.	12008.	14087.
2	4405.	4790.	5793.	7132.	9541.
3	1288.	1129.	1725.	1836.	2697.
4	340.	172.	650.	839.	925.
5	270.	128.	70.	279.	183.
6	6.	101.	62.	11.	71.
7	6.	14.	33.	7.	15.
Total	17834.	21235.	28262.	35489.	35829.

AGE	1997	1998	1999	2000	2001
0	4871.	8381.	2273.	937.	1615.
1	9261.	9212.	9818.	6581.	6320.
2	11186.	9379.	11534.	12136.	11634.
3	4021.	6491.	6413.	8771.	10354.
4	1113.	1964.	2701.	3555.	6465.
5	403.	499.	1002.	1675.	2217.
6	43.	77.	287.	411.	1061.
7	21.	7.	100.	203.	394.
Total	30919.	36011.	34128.	34270.	40061.

Table 94 continued.

JAN-1 Biomass

AGE	2002	2003
0	3419.	1965.
1	5823.	7256.
2	15539.	11042.
3	9672.	12495.
4	8626.	7026.
5	6061.	8383.
6	1826.	5852.
7	863.	2070.
Total	51827.	56088.

Table 94 continued.

Spawning Stock Biomass

AGE	1982	1983	1984	1985	1986
0	5668.	5854.	3507.	4341.	4207.
1	6150.	7180.	8615.	5534.	5890.
2	2862.	3655.	2003.	3735.	2257.
3	1596.	1774.	1130.	629.	1248.
4	795.	268.	697.	459.	140.
5	101.	17.	115.	230.	120.
6	200.	24.	5.	29.	54.
7	129.	65.	15.	14.	17.
Total	17501.	18837.	16087.	14972.	13934.

AGE	1987	1988	1989	1990	1991
0	3574.	1251.	1767.	2323.	1296.
1	6863.	4123.	1487.	3415.	2802.
2	2257.	1797.	1403.	1023.	1220.
3	1133.	682.	430.	577.	402.
4	380.	196.	87.	84.	270.
5	81.	44.	37.	14.	10.
6	52.	18.	5.	12.	4.
7	83.	19.	2.	6.	2.
Total	14424.	8130.	5217.	7454.	6007.

AGE	1992	1993	1994	1995	1996
0	2449.	2720.	3873.	4857.	3114.
1	3348.	4259.	5174.	7218.	7803.
2	1022.	1452.	1655.	2411.	3541.
3	224.	651.	926.	928.	1274.
4	136.	68.	302.	224.	410.
5	122.	56.	14.	93.	50.
6	1.	42.	33.	5.	26.
7	1.	6.	13.	2.	6.
Total	7304.	9253.	11989.	15737.	16225.

AGE	1997	1998	1999	2000	2001
0	2382.	3225.	1373.	865.	1091.
1	5960.	7924.	6709.	7148.	10178.
2	5777.	5549.	6998.	8783.	8261.
3	1929.	2595.	3427.	5866.	7473.
4	438.	981.	1587.	2038.	5367.
5	99.	318.	445.	1113.	1761.
6	19.	29.	137.	245.	720.
7	8.	2.	45.	106.	247.
Total	16614.	20625.	20723.	26164.	35098.

Spawning Stock Biomass

AGE	2002
0	1804.
1	6596.
2	10976.
3	6710.
4	7945.
5	6057.
6	1507.
7	564.
Total	42158.

Table 95. VPA Bootstrap results: precision of estimates.

VPA Version 2.1

Bootstrap Summary Report

Number of Bootstrap Repetitions Requested = 500
Number of Bootstrap Repetitions Completed = 500
Bootstrap Output Variable: Stock Estimates (2003)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
N 1	31168.	31517.	6651.	0.2110
N 2	18817.	19218.	3453.	0.1797
N 3	15346.	15514.	2503.	0.1613
N 4	6048.	6028.	1108.	0.1839
N 5	4786.	4789.	975.	0.2036
N 6	2466.	2468.	641.	0.2598

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
N 1	349.	298.	1.1195	30819.	0.2158
N 2	401.	155.	2.1336	18415.	0.1875
N 3	167.	112.	1.0909	15179.	0.1649
N 4	-19.	50.	-0.3173	6067.	0.1827
N 5	3.	44.	0.0644	4783.	0.2039
N 6	1.	29.	0.0571	2465.	0.2601

	LOWER 80. % CI	UPPER 80. % CI
N 1	23438.	40316.
N 2	14634.	23870.
N 3	12356.	18634.
N 4	4628.	7451.
N 5	3618.	6025.
N 6	1697.	3308.

Table 95 continued.

Bootstrap Output Variable: Fishing Mortality (2002)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
AGE 0	0.0079	0.0081	0.001712	0.2106
AGE 1	0.0575	0.0582	0.010624	0.1827
AGE 2	0.2756	0.2785	0.039951	0.1434
AGE 3	0.3934	0.4039	0.062750	0.1554
AGE 4	0.1770	0.1833	0.035937	0.1961
AGE 5	0.1224	0.1303	0.035616	0.2733
AGE 6	0.2310	0.2392	0.027873	0.1165
AGE 7	0.2310	0.2392	0.027873	0.1165

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
AGE 0	0.000260	0.000077	3.3045	0.0076	0.2250
AGE 1	0.000641	0.000476	1.1152	0.0569	0.1868
AGE 2	0.002942	0.001792	1.0673	0.2727	0.1465
AGE 3	0.010472	0.002845	2.6616	0.3830	0.1638
AGE 4	0.006324	0.001632	3.5732	0.1707	0.2106
AGE 5	0.007892	0.001632	6.4461	0.1145	0.3109
AGE 6	0.008229	0.001300	3.5632	0.2227	0.1251
AGE 7	0.008229	0.001300	3.5632	0.2227	0.1251

	LOWER 80. % CI	UPPER 80. % CI
AGE 0	0.006080	0.010445
AGE 1	0.045594	0.073181
AGE 2	0.232087	0.331920
AGE 3	0.330172	0.488230
AGE 4	0.142719	0.226952
AGE 5	0.092269	0.173241
AGE 6	0.205880	0.276844
AGE 7	0.205880	0.276844

Bootstrap Output Variable: Average F (2002) AGES 3 - 5

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
AVG F	0.2310	0.2392	0.027873	0.1165
N WTD	0.2794	0.2840	0.032947	0.1160
B WTD	0.2494	0.2535	0.029311	0.1156
C WTD	0.3244	0.3337	0.045602	0.1367

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
AVG F	0.008229	0.001300	3.5632	0.2227	0.1251
N WTD	0.004656	0.001488	1.6666	0.2747	0.1199
B WTD	0.004145	0.001324	1.6621	0.2452	0.1195
C WTD	0.009350	0.002082	2.8825	0.3150	0.1448

	LOWER 80. % CI	UPPER 80. % CI
AVG F	0.205880	0.276844
N WTD	0.244167	0.327873
B WTD	0.217744	0.293639
C WTD	0.279495	0.394141

Table 95 continued.

Bootstrap Output Variable: Biomass

JAN-1 Biomass (2003) Mean Biomass & SSB (2002)

	NLLS Estimate	Bootstrap Mean	Bootstrap Std Error	C.V. For NLLS Soln.
JAN-1	56088.	56717.	4761.	0.0839
MEAN	56001.	56367.	4489.	0.0796
SSB	42158.	42399.	3763.	0.0888

	Bias Estimate	Bias Std. Error	Per Cent Bias	NLLS Estimate Corrected For Bias	C.V. For Corrected Estimate
JAN-1	629.	215.	1.1213	55459.	0.0858
MEAN	366.	201.	0.6540	55635.	0.0807
SSB	241.	169.	0.5716	41917.	0.0898

	LOWER 80. % CI	UPPER 80. % CI
JAN-1	50648.	62792.
MEAN	50469.	61735.
SSB	37405.	47048.

Table 96. VPA Retrospective analysis for summer flounder.

Retrospective Summary

Average Fishing Mortality: Ages = 3 - 5

	1982	1983	1984	1985	1986
1998	0.9432	2.1505	1.2433	1.3627	1.5938
1999	0.9432	2.1505	1.2433	1.3627	1.5938
2000	0.9432	2.1505	1.2433	1.3627	1.5938
2001	0.9432	2.1505	1.2433	1.3627	1.5938
2002	0.9432	2.1505	1.2433	1.3627	1.5938

	1987	1988	1989	1990	1991
1998	1.0569	2.0732	1.8988	1.6475	1.5766
1999	1.0569	2.0732	1.8988	1.6475	1.5766
2000	1.0569	2.0732	1.8988	1.6475	1.5767
2001	1.0569	2.0732	1.8988	1.6476	1.5768
2002	1.0569	2.0732	1.8988	1.6476	1.5768

	1992	1993	1994	1995	1996
1998	1.4131	0.9795	1.3167	1.2162	1.0911
1999	1.4131	0.9794	1.3165	1.2156	1.0901
2000	1.4134	0.9802	1.3193	1.2265	1.1284
2001	1.4136	0.9806	1.3213	1.2324	1.1443
2002	1.4137	0.9809	1.3220	1.2352	1.1529

	1997	1998	1999	2000	2001
1998	1.0481	0.6130			
1999	1.0416	0.6149	0.4112		
2000	1.1293	0.7374	0.6101	0.3640	
2001	1.1955	0.8695	0.7540	0.4964	0.2769
2002	1.2171	0.9072	0.8424	0.6037	0.3518

	2002
1998	
1999	
2000	
2001	
2002	0.2310

Table 96 continued.

Spawning Stock Biomass

	1982	1983	1984	1985	1986
1998	17501.	18837.	16087.	14972.	13934.
1999	17501.	18837.	16087.	14972.	13934.
2000	17501.	18837.	16087.	14972.	13934.
2001	17501.	18837.	16087.	14972.	13934.
2002	17501.	18837.	16087.	14972.	13934.

	1987	1988	1989	1990	1991
1998	14424.	8130.	5217.	7454.	6008.
1999	14424.	8130.	5217.	7454.	6008.
2000	14424.	8130.	5217.	7454.	6007.
2001	14424.	8130.	5217.	7454.	6007.
2002	14424.	8130.	5217.	7454.	6007.

	1992	1993	1994	1995	1996
1998	7310.	9279.	12262.	16860.	18404.
1999	7310.	9281.	12256.	16826.	18482.
2000	7307.	9271.	12047.	16324.	17714.
2001	7304.	9260.	12014.	15794.	16647.
2002	7304.	9253.	11989.	15737.	16225.

	1997	1998	1999	2000	2001
1998	19151.	21458.			
1999	19968.	24392.	24791.		
2000	18976.	24184.	25245.	31256.	
2001	17465.	22044.	22608.	28500.	37694.
2002	16614.	20625.	20723.	26164.	35098.

	2002
1998	
1999	
2000	
2001	
2002	42158.

Table 96 continued.

Age 0 Population

	1982	1983	1984	1985	1986
1998	74269.	80323.	48380.	48579.	53444.
1999	74269.	80323.	48380.	48579.	53444.
2000	74269.	80323.	48380.	48579.	53444.
2001	74269.	80323.	48380.	48579.	53444.
2002	74269.	80323.	48380.	48579.	53444.

	1987	1988	1989	1990	1991
1998	43921.	13033.	27270.	30355.	28697.
1999	43921.	13033.	27270.	30355.	28697.
2000	43921.	13033.	27270.	30354.	28688.
2001	43921.	13033.	27270.	30353.	28687.
2002	43921.	13033.	27270.	30352.	28687.

	1992	1993	1994	1995	1996
1998	32347.	33339.	37276.	43531.	33278.
1999	32351.	33354.	37177.	43409.	34493.
2000	32342.	33312.	35537.	43143.	32915.
2001	32321.	33250.	35468.	39352.	32649.
2002	32319.	33190.	35402.	39232.	29468.

	1997	1998	1999	2000	2001
1998	25481.	26291.	33339.		
1999	34491.	31253.	25997.	34493.	
2000	37060.	39500.	27304.	35493.	35537.
2001	35424.	39918.	29760.	39296.	28065.
2002	34942.	38731.	29993.	40759.	29745.

	2002
1998	
1999	
2000	
2001	35468.
2002	38369.

Table 97. Input parameters and short term stochastic projection results for summer flounder. Starting stock sizes on January 1, 2003 are as estimated by VPA bootstrap procedure. Age-0 recruitment levels in 2003-2005 are estimated as the median of a cumulative density function fitted to VPA estimated numbers at age 0 (000s) during 1982-2002. Fishing mortality was apportioned among landings and discard based on the proportion of F associated with landings and discards at age during 2000-2002. Mean weights at age (landings and discards) are weighted (by fishery) geometric means of 2000-2002 values. Total stock biomass is the product of January 1 numbers at age and January 1 mean weights at age estimated from total catch (landings plus discards) weights. Proportion of F and M before spawning = 0.83 (spawning peak at 1 November).

Age	Median Stock Size in 2003	Fishing Mortality Pattern	Proportion Landed	Proportion Mature	Mean Weights January 1 Total Biomass	Mean Weights Landings	Mean Weights Discards
0	35368	0.01	0.01	0.38	0.032	0.259	0.103
1	30964	0.17	0.57	0.72	0.212	0.547	0.448
2	19077	0.76	0.82	0.90	0.581	0.753	0.617
3	15375	1.00	0.91	1.00	0.791	0.974	0.857
4	5974	1.00	0.95	1.00	1.136	1.446	1.561
5	4694	1.00	0.95	1.00	1.723	2.233	2.216
6	2435	1.00	0.95	1.00	2.352	2.706	2.729
7+	642	1.00	0.95	1.00	3.115	3.256	3.311

2003 Landings = 10,570 mt; 2003-2005 median recruitment from 1982-2002 VPA estimates (35.4 million)

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

	2003				2004				2005			
Option	F	Land.	Disc.	B	F	Land.	Disc.	B	F	Land.	Disc.	B
1	**0.25**	**10.6**	**1.1**	**56.1**	**0.26**	**12.8**	**1.3**	**63.6**	**0.26**	**14.5**	**1.4**	**70.5**

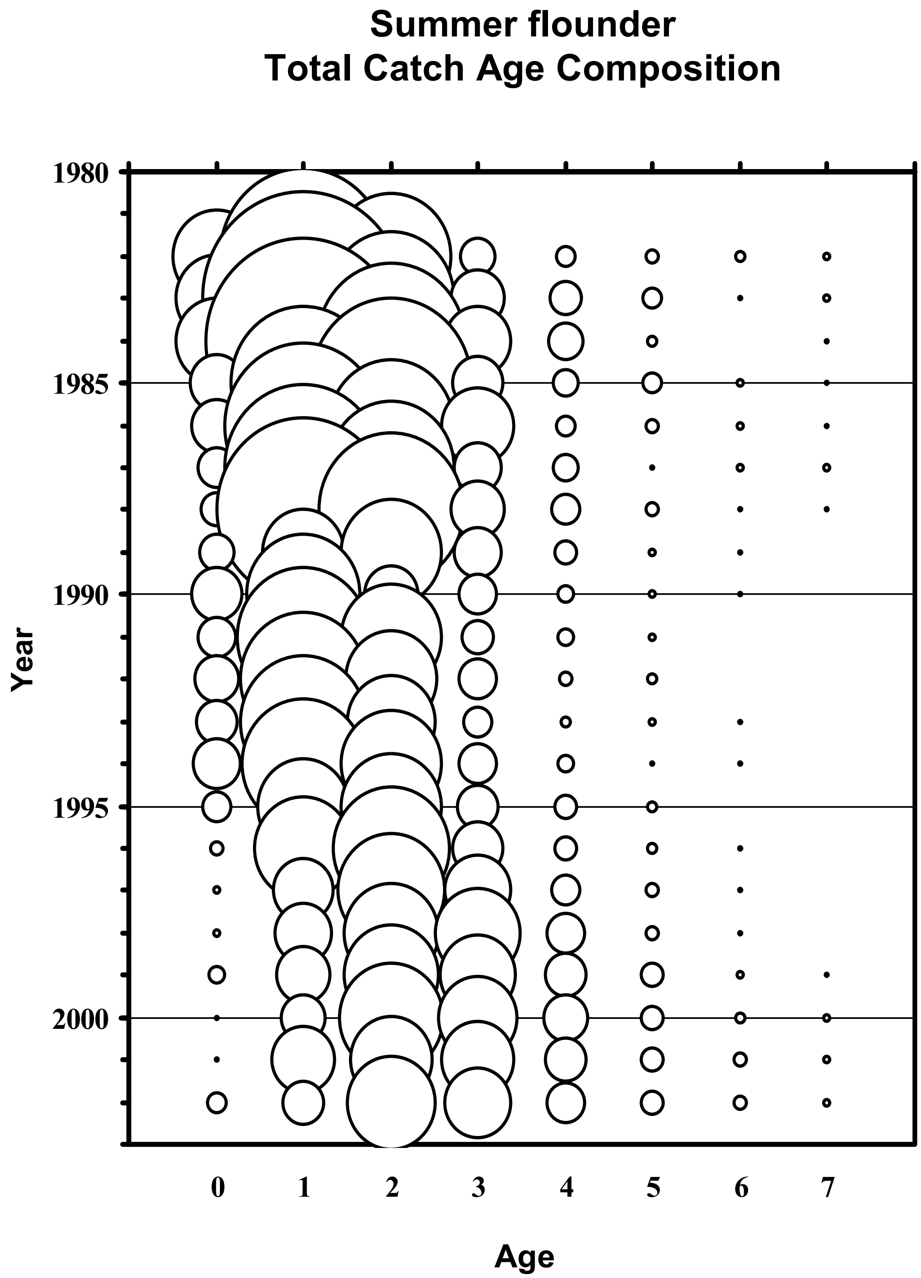

Figure 1. Total catch age composition for summer flounder: 1982-2002

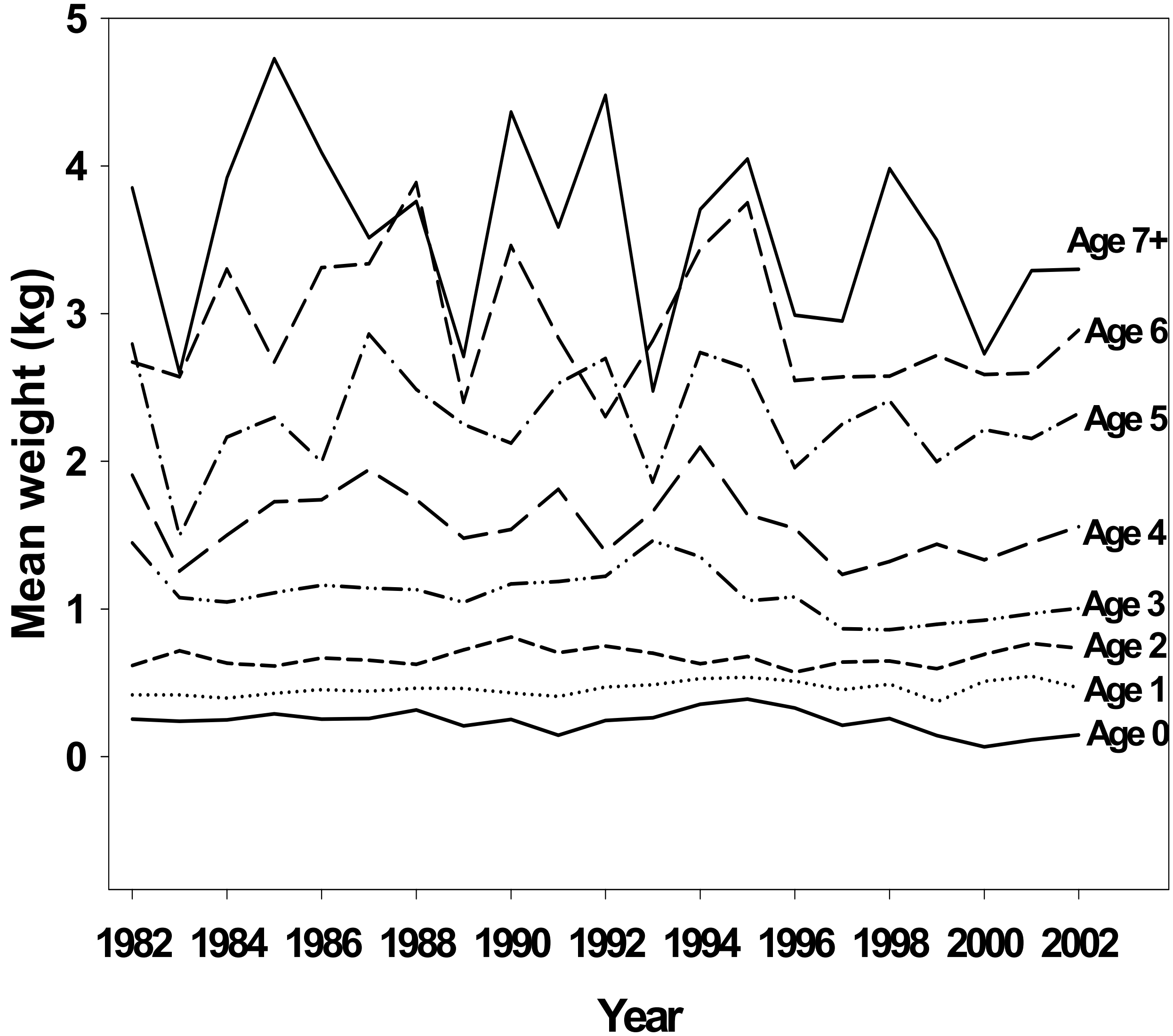

Figure 2. Trends in mean weight at age in the total catch of summer flounder.

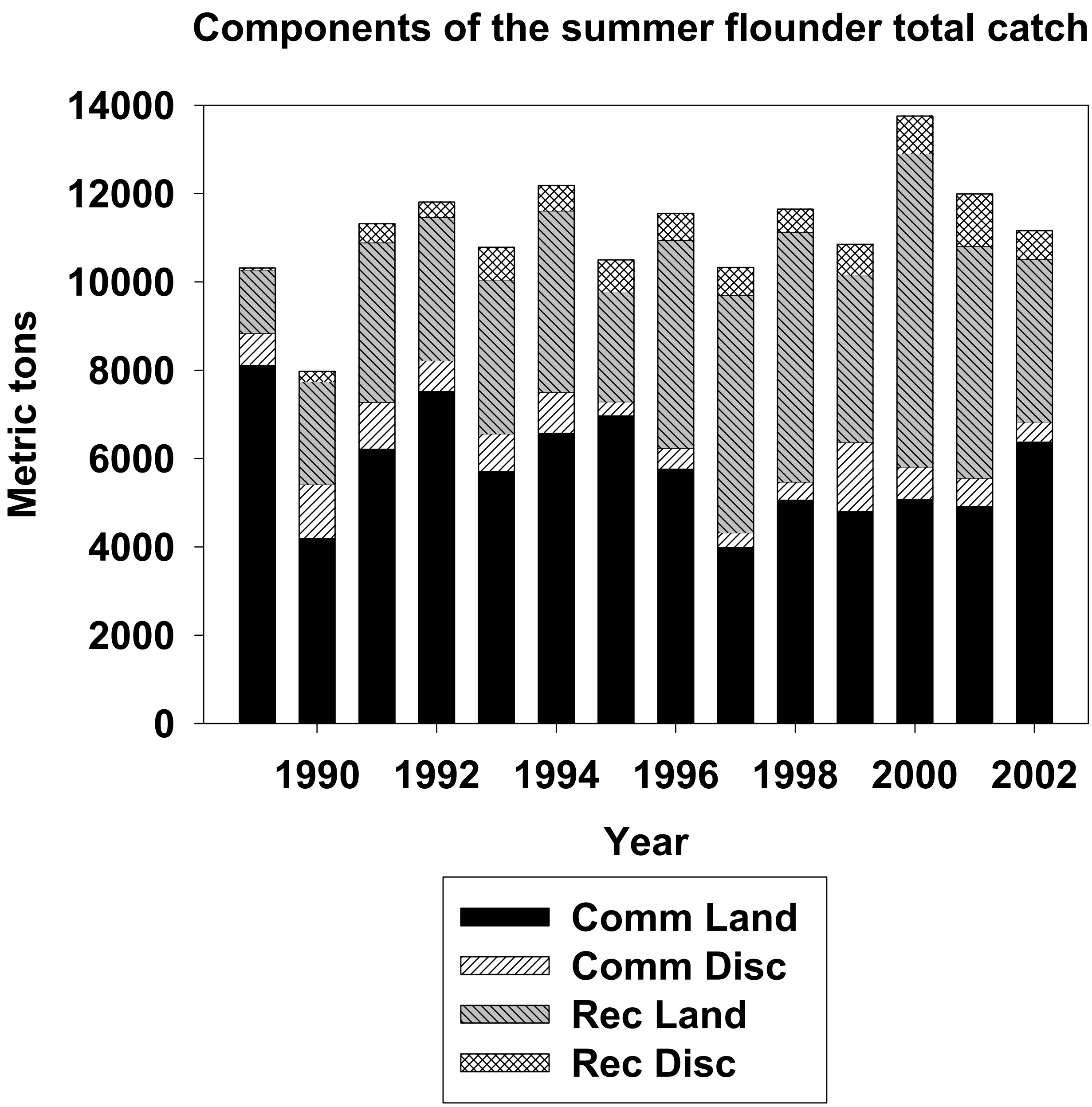

Figure 3. Components of the summer flounder total catch.

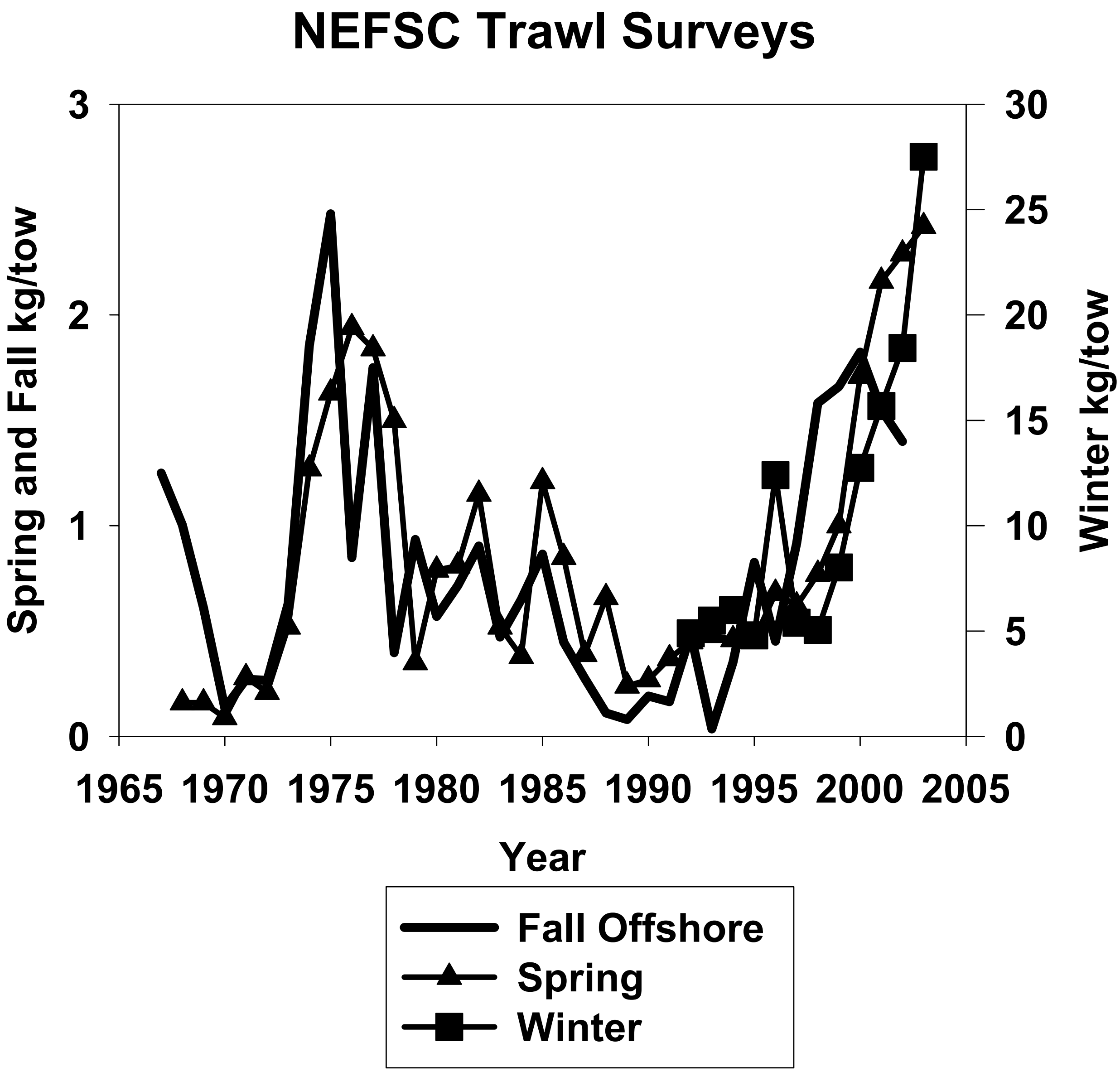

Figure 4. Trends in NEFSC trawl survey biomass indices for summer flounder.

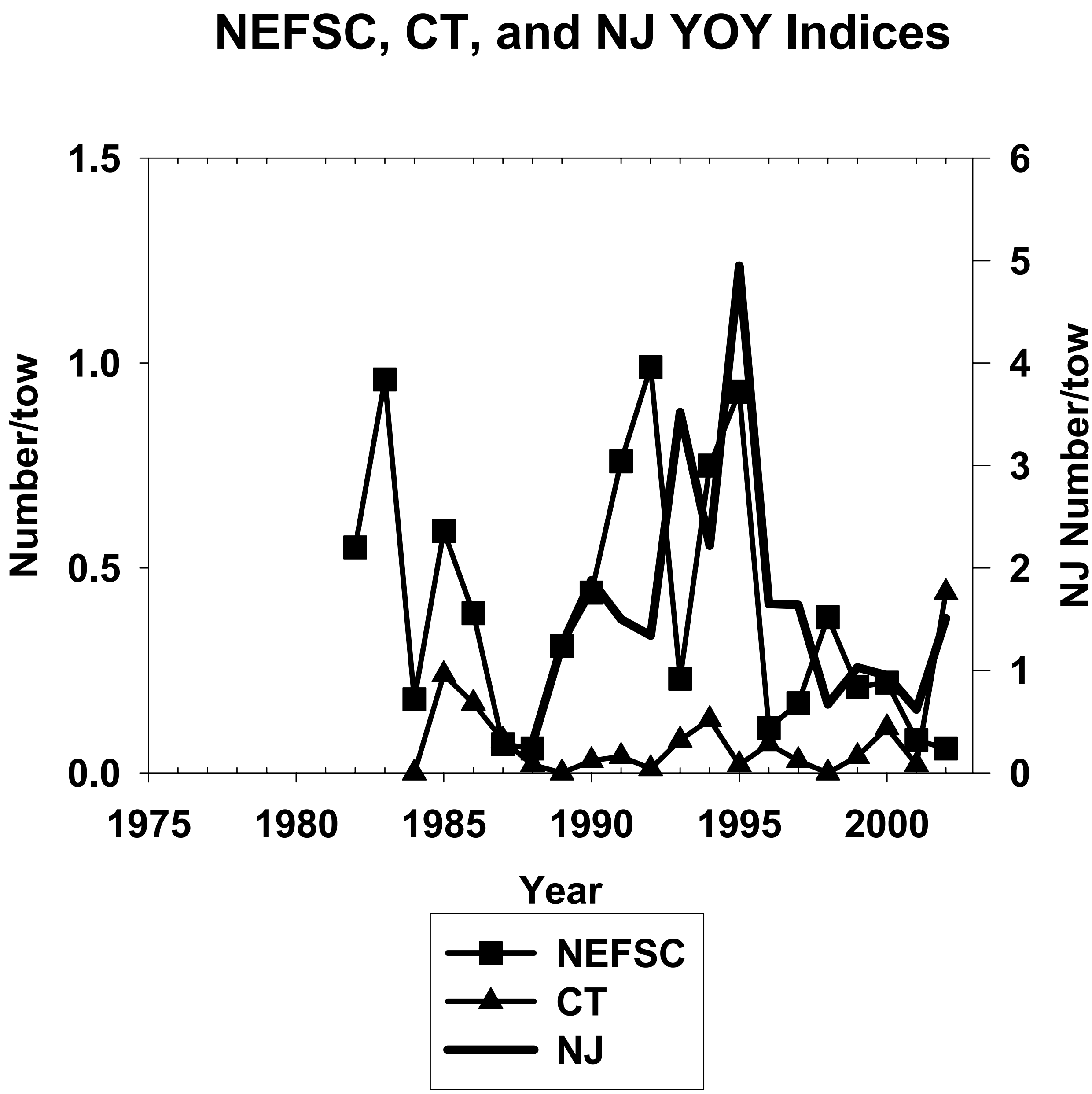

Figure 5. Trends in NEFSC, CT, and NJ trawl survey recruitment indices for summer flounder.

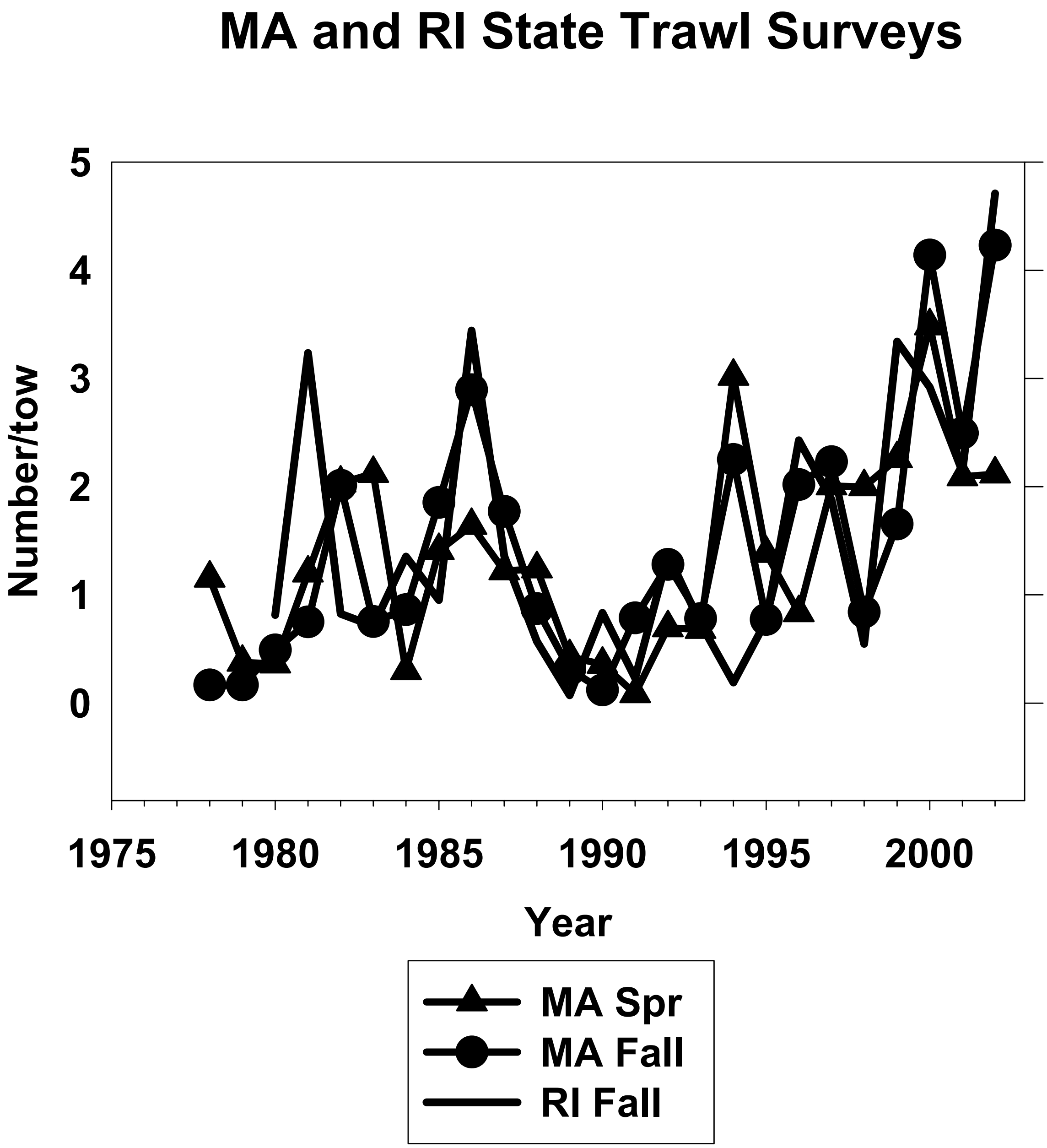

Figure 6. Trends in MA and RI trawl survey abundance indices for summer flounder.

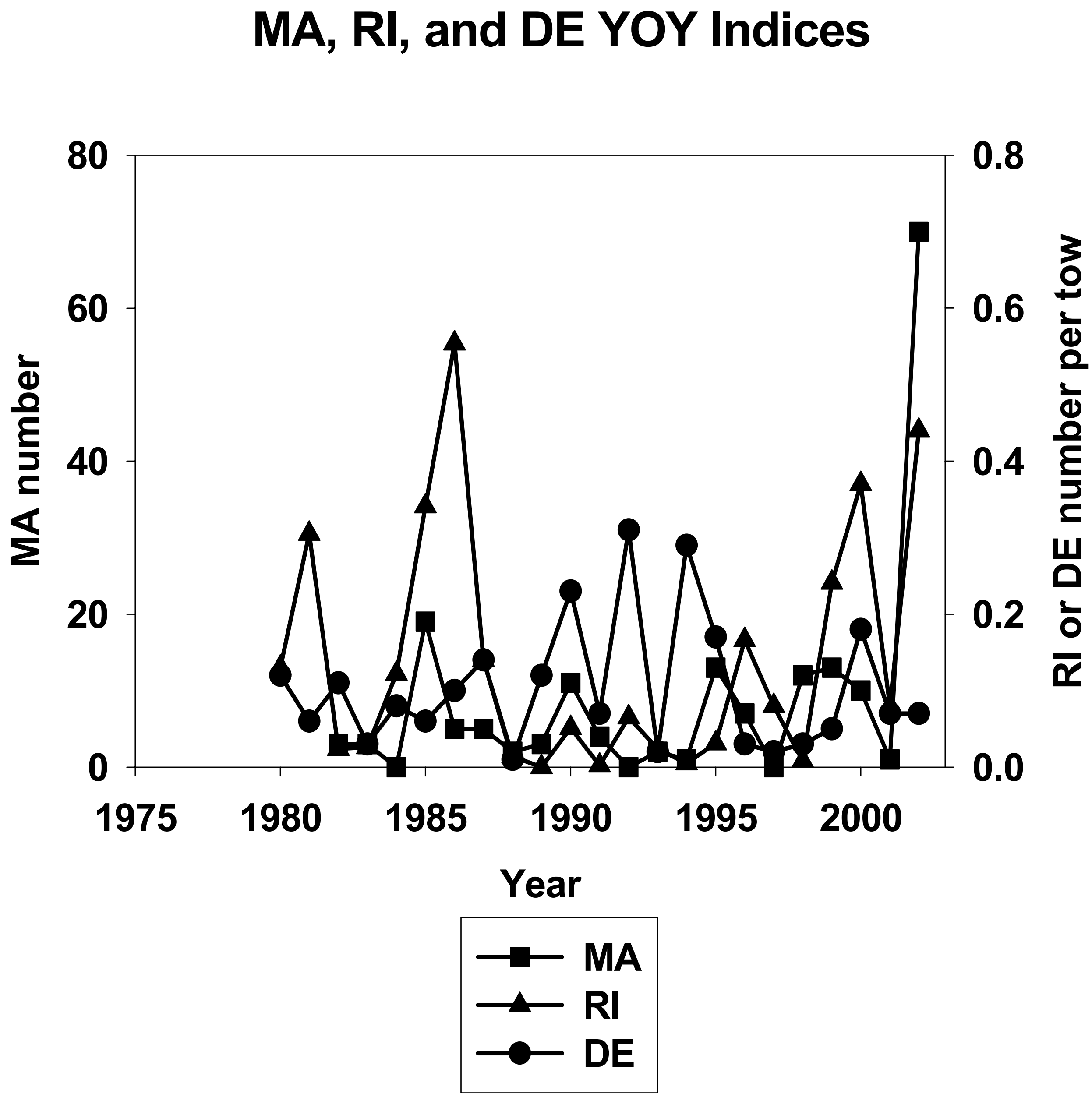

Figure 7. Trends in MA, RI, and DE survey recruitment indices for summer flounder.

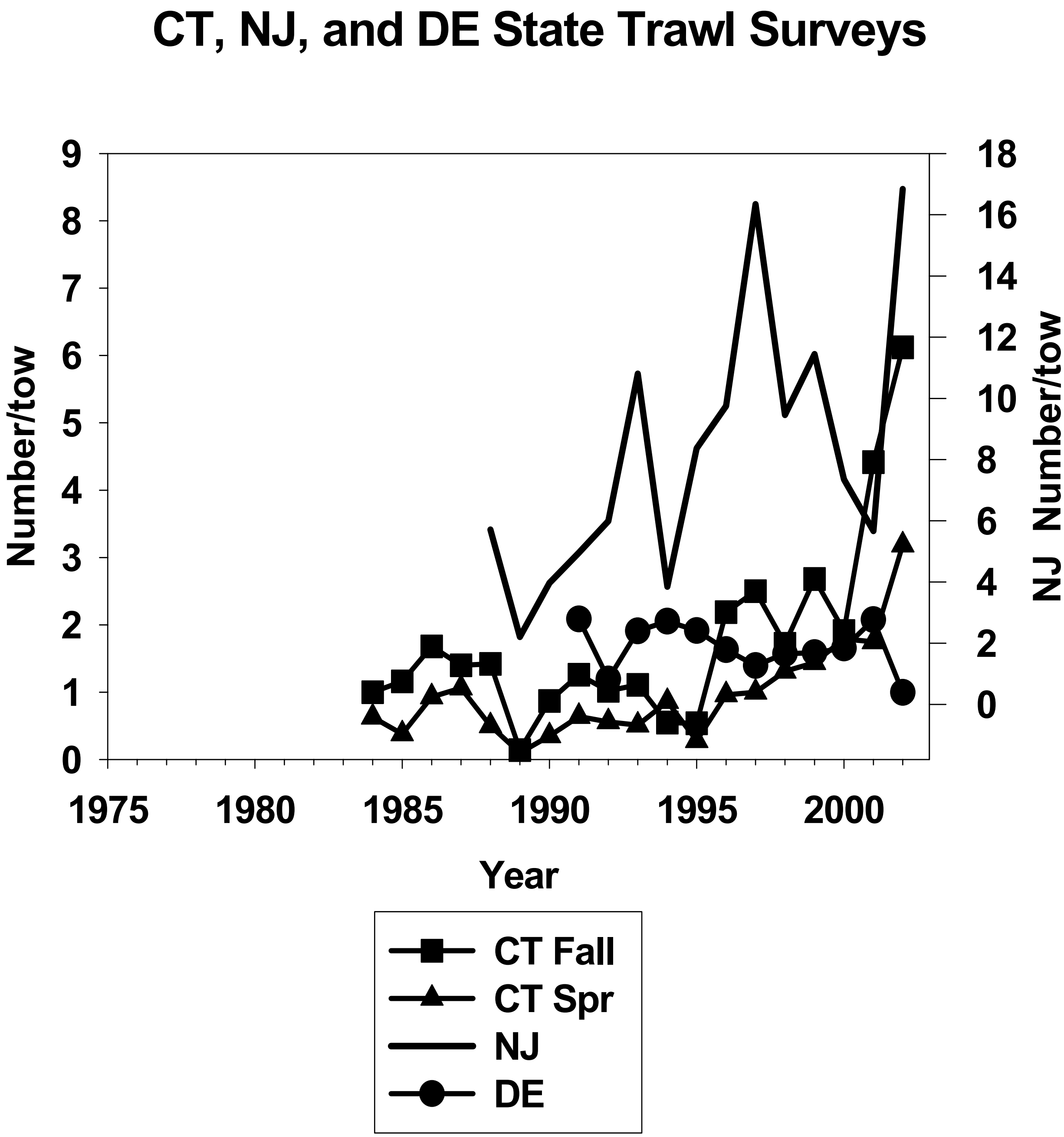

Figure 8. Trends in CT, NJ, and DE trawl survey abundance indices for summer flounder.

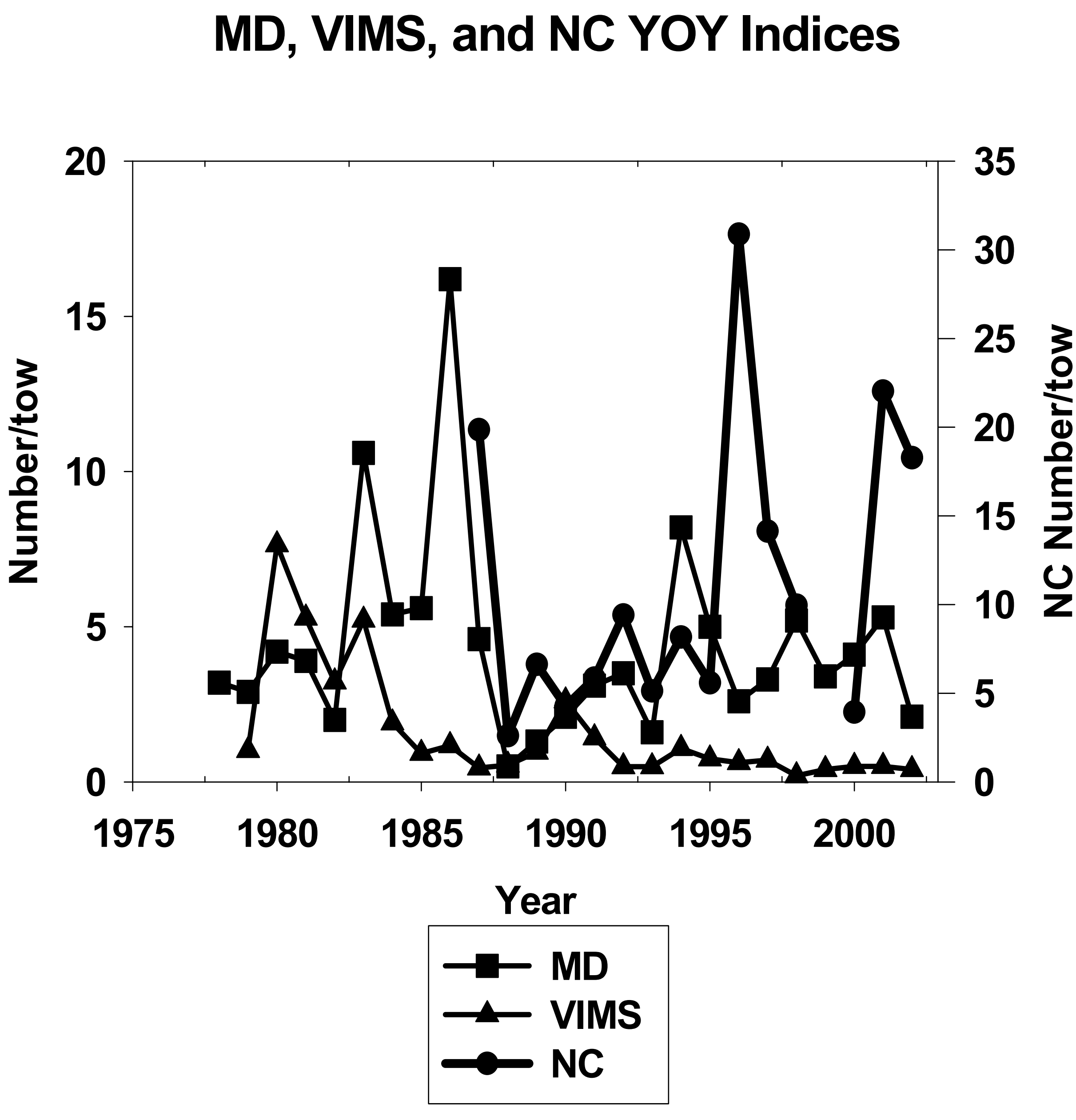

Figure 9. Trends in MD, VIMS, and NC trawl survey recruitment indices for summer flounder.

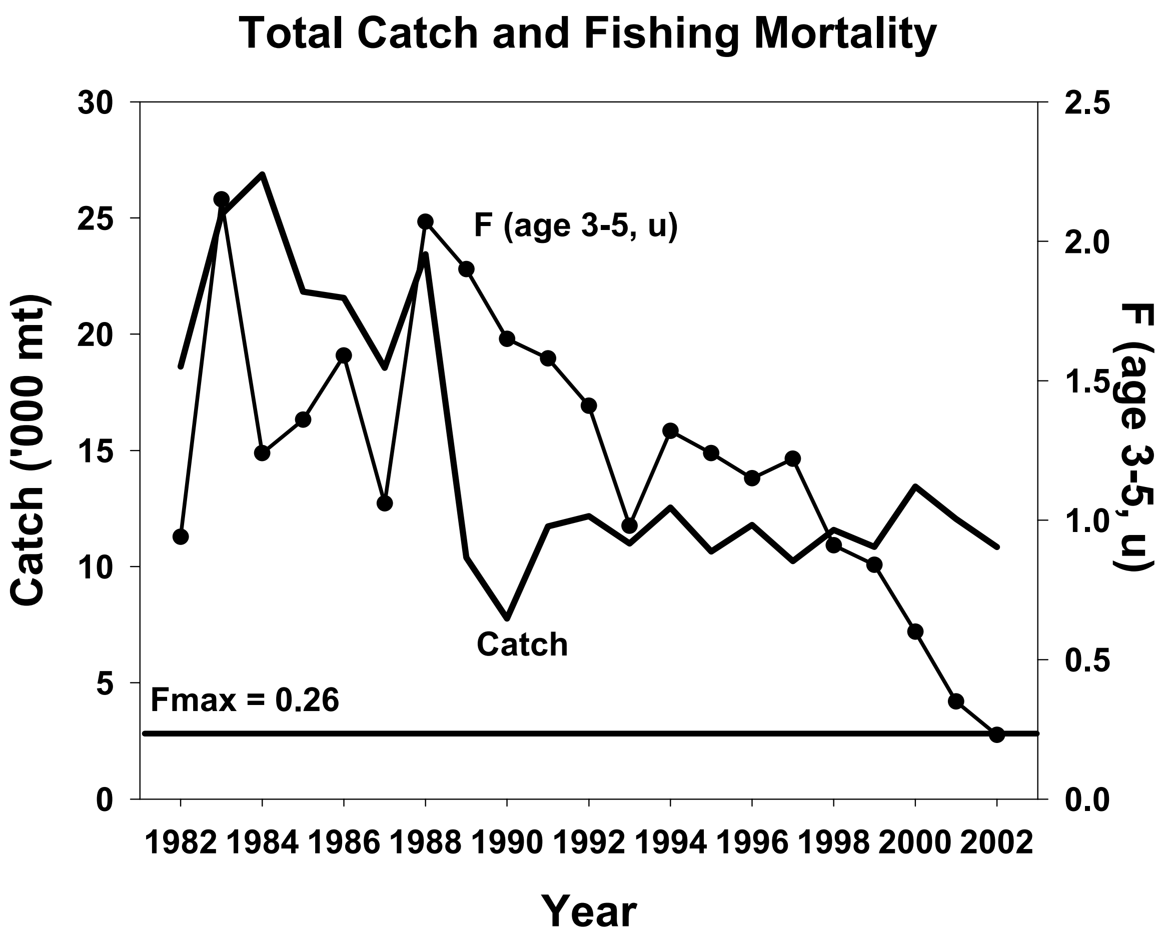

Figure 10. Total catch (landings and discards, thousands of metric tons) and fishing mortality rate (F, ages 3-5, unweighted) for summer flounder.

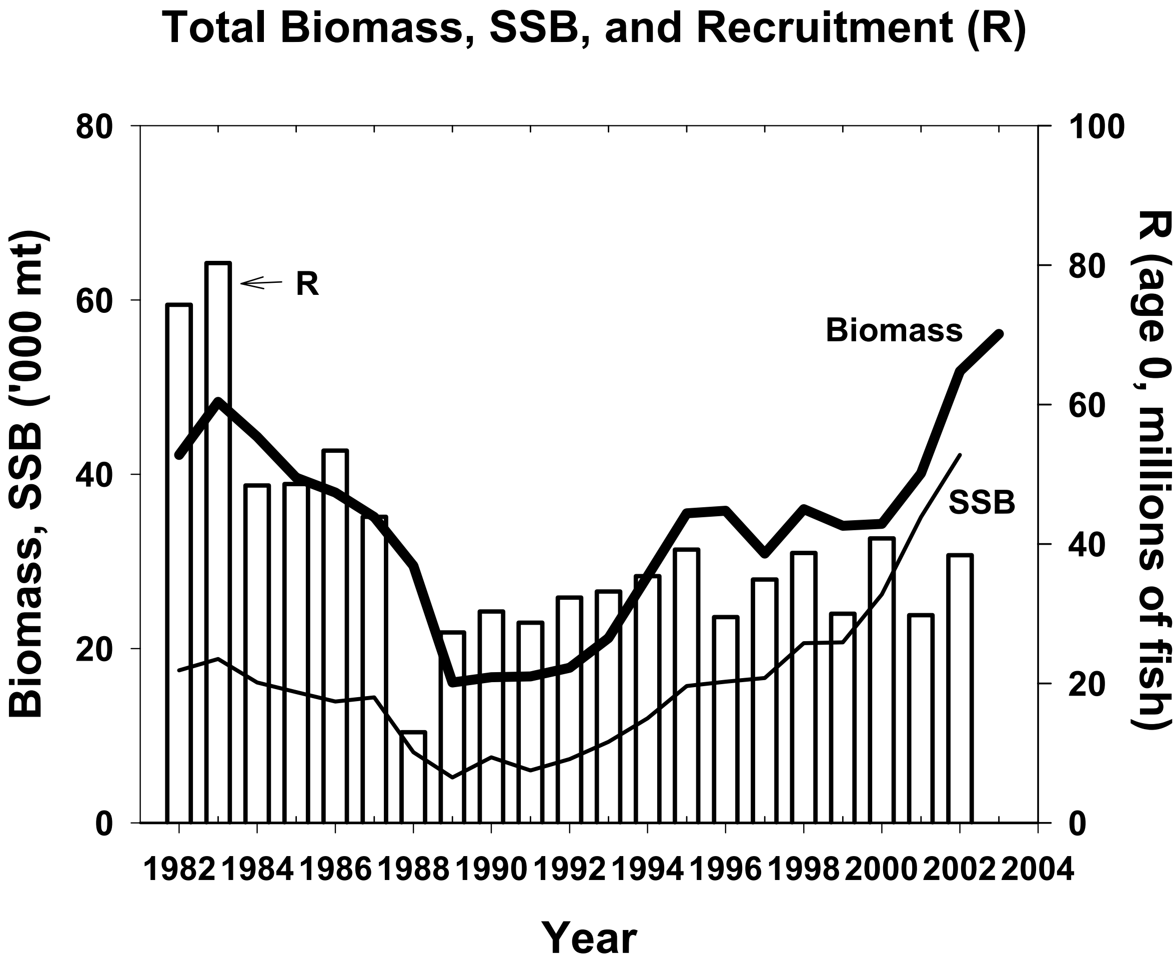

Figure 11. Total stock biomass ('000 mt; thick line), spawning stock biomass (SSB, '000 mt; thin line), and recruitment (millions of fish at age-0; bars) for summer flounder.

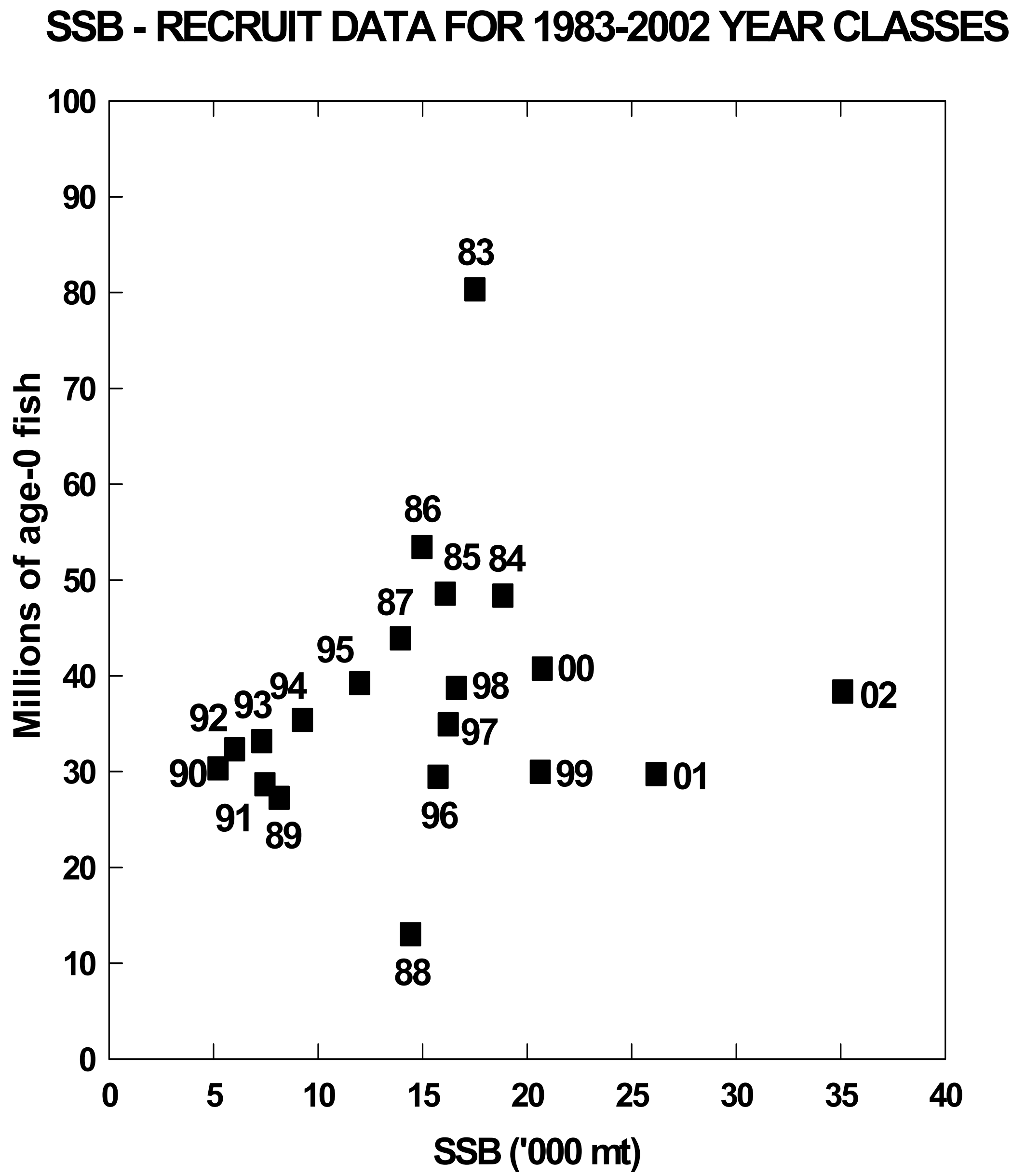

Figure 12. VPA spawning stock biomass and recruitment estimates for summer flounder.

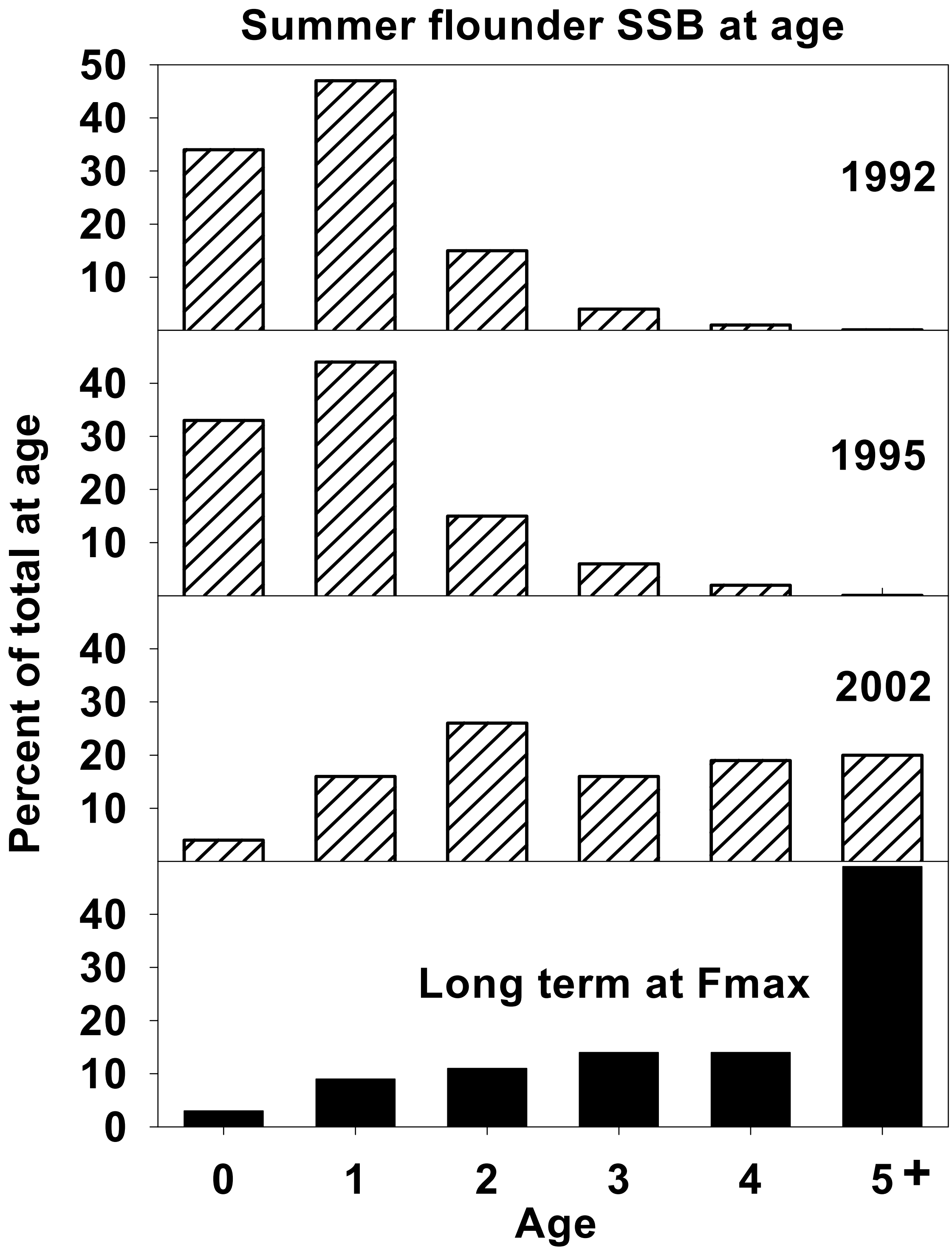

Figure 13. Percent of summer flounder spawning stock biomass (SSB) at age in 1992, 1995, 2002, and long-term at Fmax = 0.263.

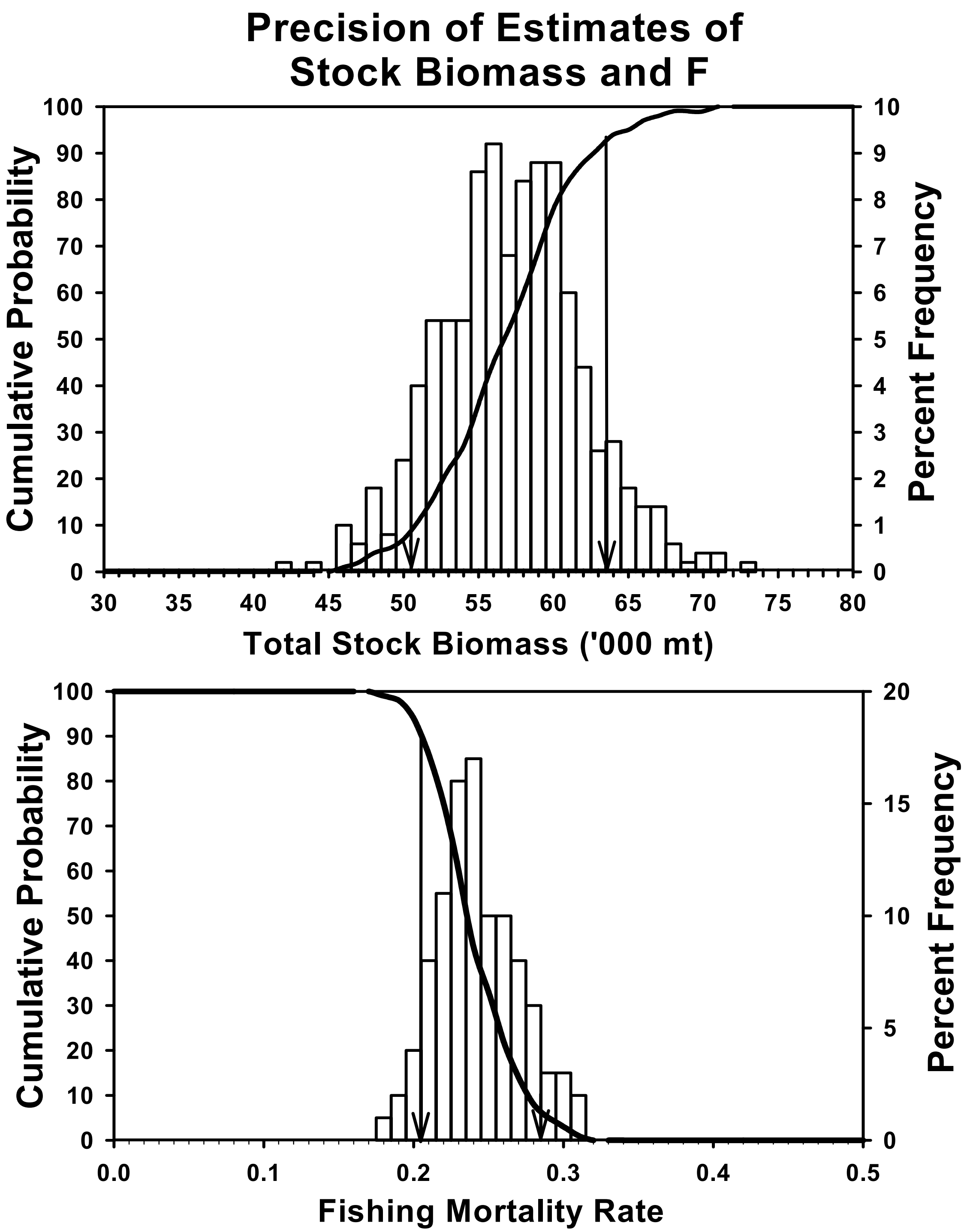

Figure 14. Precision of the estimates of January 1, 2003 total stock biomass (B) and fully recruited fishing mortality on age 3-5 (F) in 2002 for summer flounder.

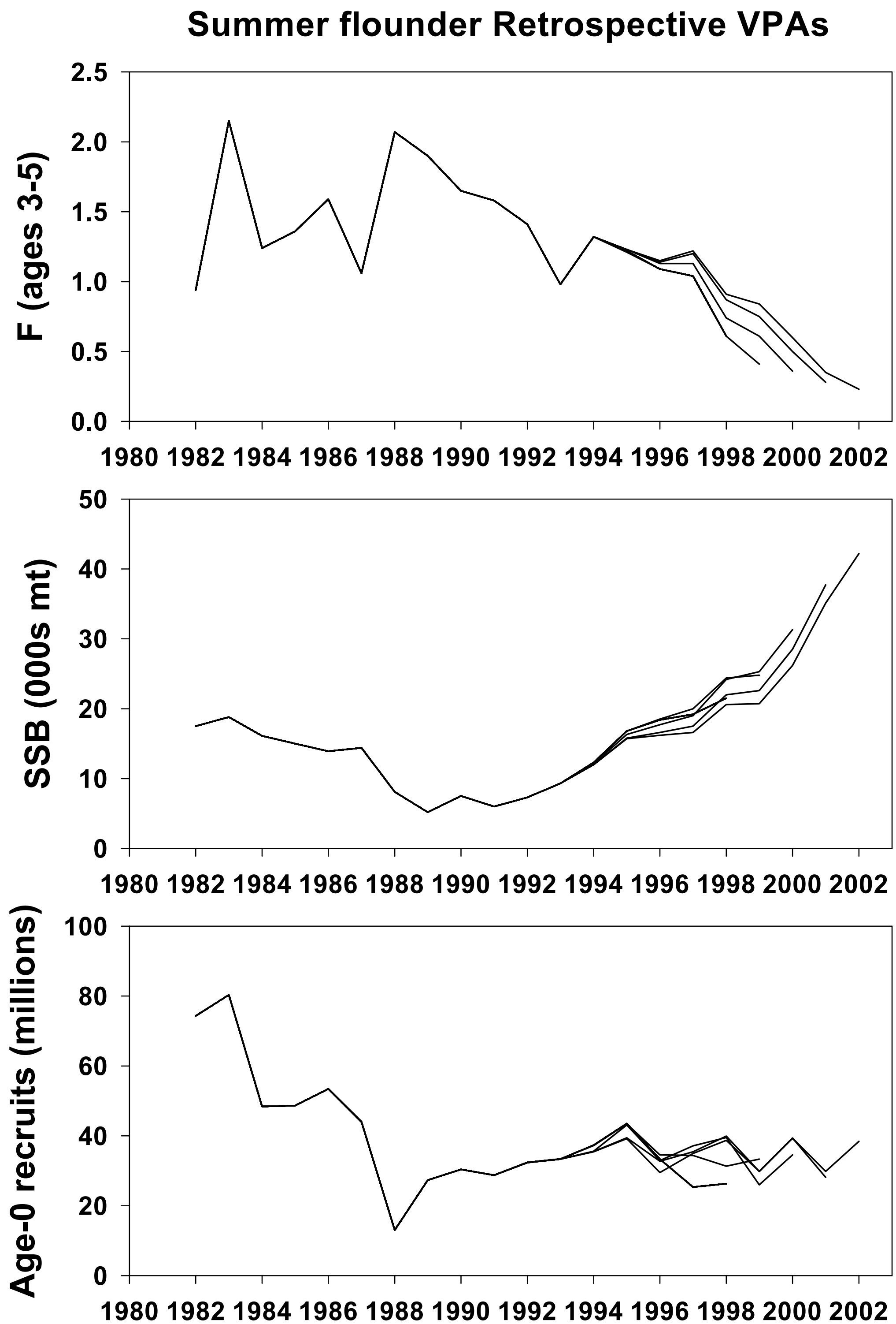

Figure 15. Retrospective VPAs for summer flounder.

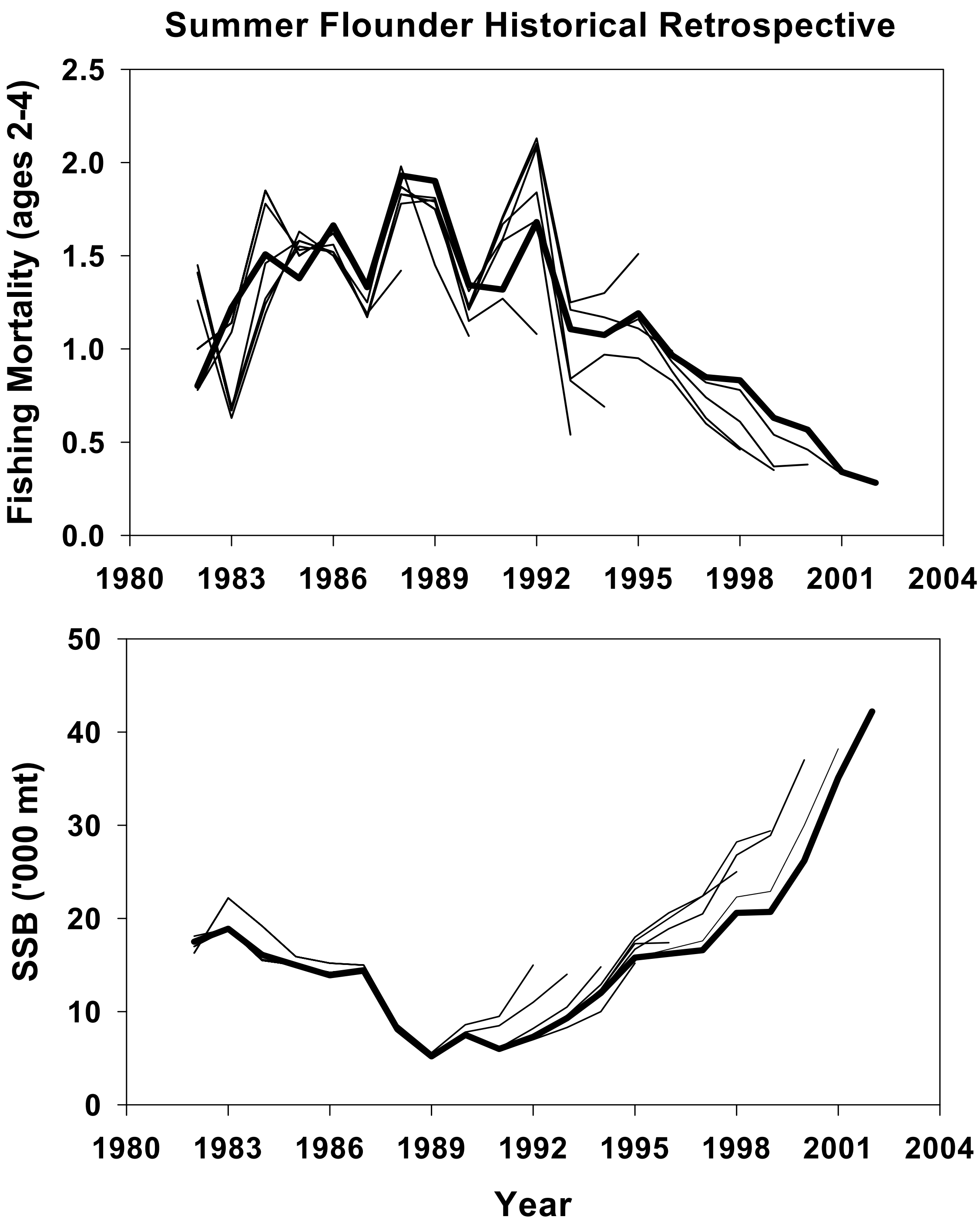

Figure 16. Historical retrospective for the 1990-2003 summer flounder stock assessments. Bold lines are the fishing mortality rate (ages 2-4, for comparability across assessments) and spawning stock biomass (SSB, '000 mt) estimates from the 2003 stock assessment .

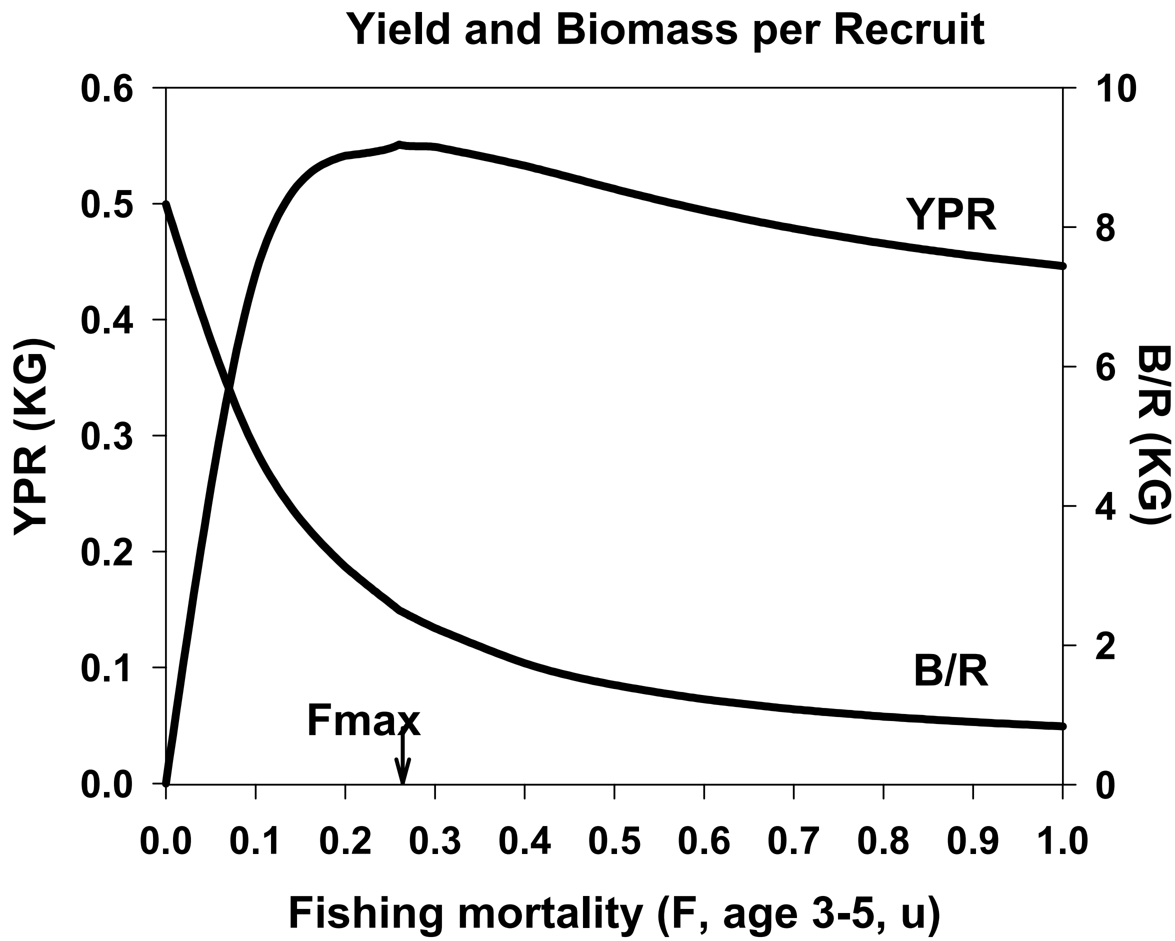

Figure 17. Yield per recruit (YPR) and biomass per recruit (B/R).

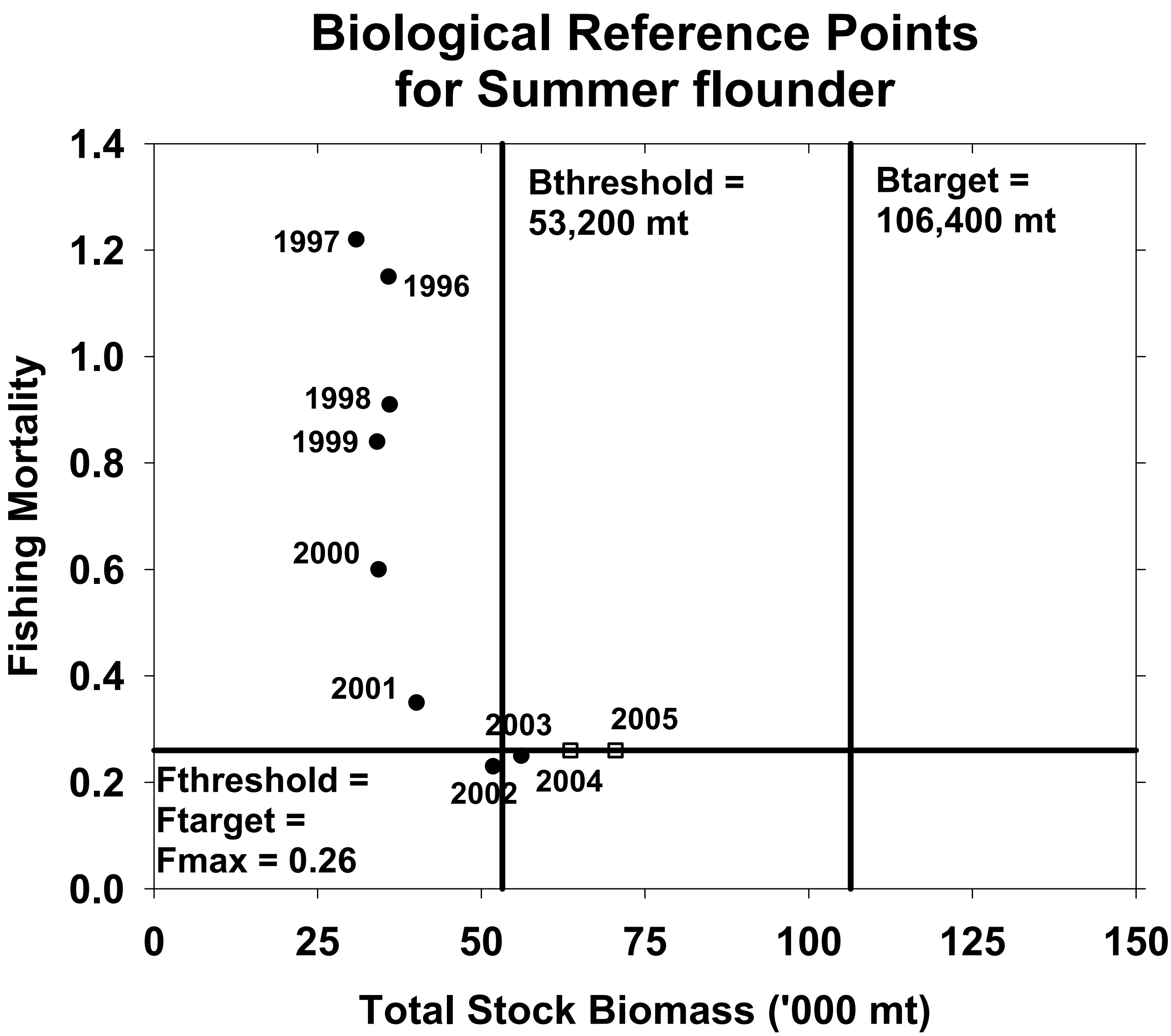

Figure 18. MAFMC FMP Amendment 12 SFA reference points for summer flounder, with 1996-2002/2003 VPA estimates of F and total stock biomass, and forecast estimates of F and total stock biomass through 2005.

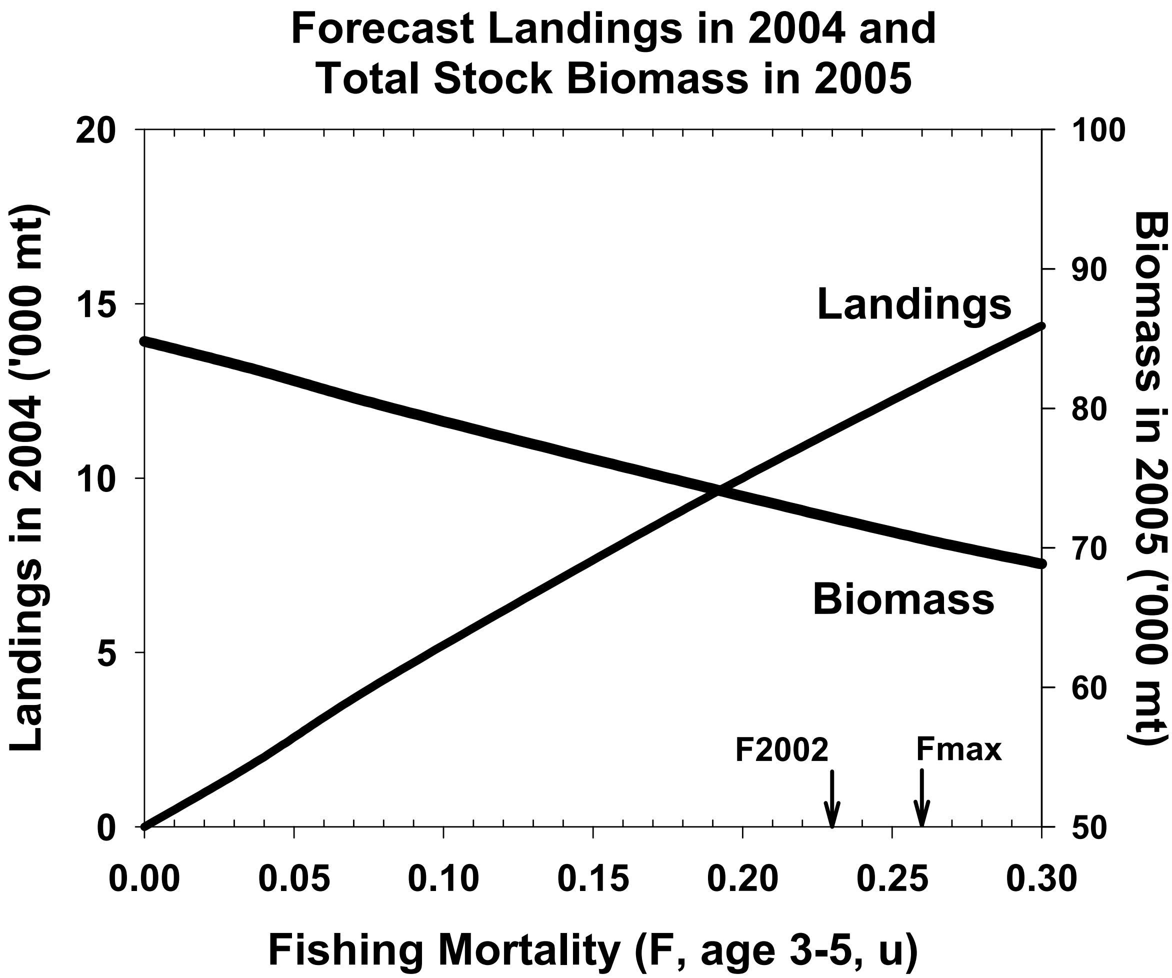

Figure 19. Forecast landings in 2004 and total stock biomass on Jan.1, 2005 over a range of fishing mortalities in 2004.

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