Mid-Atlantic Fishery Management Council
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Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: September 25, 2019

To: Council and Board

From: Kiley Dancy, Staff

Subject: Summer Flounder Specifications Review for 2020

The Council and Board will review previously adopted 2020 specifications for summer flounder on Tuesday, October 8. Materials listed below are provided for the Council and Board's consideration of this agenda item.

Please note that some materials are behind other tabs.

1) Monitoring Committee recommendation summary *(behind Tab 11)*
2) September 2019 Scientific and Statistical Committee meeting report *(behind Tab 18)*
3) Staff memo on 2020 summer flounder specifications dated August 26, 2019
4) Summer Flounder Data Update for 2019
5) August 2019 Advisory Panel Fishery Performance Report (*behind Tab 11)*
6) Additional written comments from advisors related to summer flounder, scup, and black sea bass Fishery Performance Reports *(behind Tab 11)*
7) Additional public (non-advisor) comments received on summer flounder as of September 25, 2019
8) 2019 Summer Flounder Fishery Information Document

An Advisory Panel meeting summary from their September 24, 2019 webinar, as well as additional written comments related to this meeting, will be added to the supplemental meeting materials on the October meeting page on the Council's website.

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MEMORANDUM

DATE: August 26, 2019

TO: Chris Moore, Executive Director

FROM: Kiley Dancy, Staff

SUBJECT: Review of Summer Flounder Specifications for 2020

Executive Summary

In 2019, specifications for summer flounder were revised mid-year based on the results of a new benchmark stock assessment, which was developed and peer reviewed in 2018 through the 66th Stock Assessment Workshop/Stock Assessment Review Committee (SAW/SARC 66; NEFSC 2019).[1] The assessment incorporates data through 2017, including the recently revised time series (1981-2017) of recreational catch provided by the Marine Recreational Information Program (MRIP).[2]

The November 2018 stock assessment indicates that the summer flounder stock was not overfished, and overfishing was not occurring in 2017. Spawning stock biomass (SSB) was estimated to be 98.22 million lb (44,552 mt) in 2017, 78% of SSB at maximum sustainable yield (SSB_{MSY} = 126.01 million lb/57,159 mt). The fishing mortality rate (F) in 2017 was 0.334, 25% below the fishing mortality threshold reference point ($F_{MSY\ PROXY} = F_{35\%} = 0.448$).

Peer review and assessment summary reports were made available in February 2019, and in March 2019, the Council and the Atlantic States Marine Fisheries Commission's (Commission's) Summer Flounder, Scup, and Black Sea Bass Board (Board) approved constant three-year catch and landings limits for 2019-2021 based on a three-year averaging approach. These specifications were implemented via interim final rule on May 17, 2019 (84 FR 22392).

The measures currently implemented include an Acceptable Biological Catch (ABC) for 2019-2021 of 25.03 million lb or 11,354 mt. This ABC and the corresponding sector-specific catch and landings limits for 2020 may remain unchanged if the Scientific and Statistical Committee (SSC), Council, and Board determine that no changes are warranted. Alternatively, after reviewing the July 2019 data update for

[1] Northeast Fisheries Science Center (NEFSC). 2019. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 19-01; 40 p. Available from: https://www.nefsc.noaa.gov/publications/crd/crd1908/.

[2] In July 2018, MRIP released revisions to their time series of recreational catch and landings estimates based on adjustments for a revised angler intercept methodology and a new effort estimation methodology (i.e., a transition from a telephone-based effort survey to a mail-based effort survey). The revised estimates of catch and landings for most years are several times higher than the previous estimates for shore and private boat modes.

summer flounder (updated catch, landings, and fishery independent survey indices through 2018), the SSC may determine that a revised ABC is warranted, or request additional information to consider revisions to the 2020 ABC.

Similarly, the Monitoring Committee will review recent fishery performance and make a recommendation to the Council and Board regarding any potential modifications to the implemented 2020 commercial and recreational Annual Catch Limits (ACLs) and Annual Catch Targets (ACTs) as well as the set of commercial management measures that can be modified through specifications.

The currently implemented 2020 catch and landings limits are shown in Table 1. The methods used to derive these measures are described in more detail later in this memo.

Table 1: Currently implemented catch and landings limits for summer flounder for 2020. These measures are identical to those implemented for 2019 and 2021, with the exception of the OFL which varies slightly in each year. The sector-specific catch and landings limits are initial limits prior to any deductions for past overages.

Measure	2020		Basis
	mil lb	mt	
OFL	30.94	14,034	Stock projections
ABC	25.03	11,354	SSC recommendation for averaged approach with projections sampling from recent 7-year recruitment series
ABC Landings Portion	19.21	8,715	Stock projections
ABC Discards Portion	5.82	2,639	Stock projections
Expected Commercial Discards	2.00	907	34% of ABC discards portion, based on 2015-2017 average % discards by sector (using new MRIP data)
Expected Recreational Discards	3.82	1,732	66% of ABC discards portion, based on 2015-2017 average % discards by sector (using new MRIP data)
Commercial ACL	13.53	6,136	60% of ABC landings portion (FMP allocation) + expected commercial discards
Commercial ACT	13.53	6,136	No deduction from ACL for management uncertainty
Commercial Quota	11.53	5,229	Commercial ACT, minus expected commercial discards
Recreational ACL	11.51	5,218	40% of ABC landings portion (FMP allocation) + expected recreational discards
Recreational ACT	11.51	5,218	No deduction from ACL for management uncertainty
RHL	7.69	3,486	Recreational ACT, minus expected recreational discards

As described below, staff recommend no changes to the currently implemented catch and landings limits for 2020. Staff also recommend no changes to the commercial minimum size or mesh exemption requirements for 2020. As described below in "Commercial Management Measures," staff preliminarily recommend consideration of phasing out the 6" square minimum mesh size regulation, leaving the 5.5" diamond minimum mesh size in place. Staff will seek Advisory Panel input on this subject prior to the Monitoring Committee discussion.

Introduction

The Magnuson-Stevens Act requires the Council's SSC to provide ongoing scientific advice for fishery management decisions, including recommendations for ABCs, preventing overfishing, and achieving maximum sustainable yield. The Council's catch limit recommendations for the upcoming fishing year(s) cannot exceed the ABC recommendation of the SSC. In addition, the Monitoring Committee established by the Fishery Management Plan (FMP) is responsible for developing recommendations for management measures designed to achieve the recommended catch limits. The SSC is responsible for recommending ABCs that address scientific uncertainty, while the Monitoring Committee recommends ACTs that address management uncertainty and management measures to constrain landings to the ACTs.

In early 2019, the SSC recommended revised 2019 and new 2020-2021 specifications based on the 2018 benchmark stock assessment results. The Council and Board adopted three-year specifications for 2019-2021 based on an averaged ABC approach, where the initial catch and landings limits in each of the three years are identical.

The SSC is asked to review the 2020 ABC and recommend changes or request additional information if necessary. Similarly, the Monitoring Committee will review the previously implemented 2020 ACL and ACT recommendations, as well as the commercial quota and recreational harvest limit, recommending any changes as needed. The Monitoring Committee will also consider whether any revisions are needed to the commercial management measures (minimum fish size, minimum mesh size, and mesh exemption programs). The Council will meet jointly with the Atlantic States Marine Fisheries Commission's Summer Flounder, Scup, and Black Sea Bass Board (Board) in October 2019 to review the SSC, Monitoring Committee, and Advisory Panel recommendations. In this memorandum, information is presented to assist the SSC and Monitoring Committee in developing recommendations for the Council and Board to consider for the 2020 fishing year for summer flounder.

Additional relevant information about the fishery and past management measures is presented in the Fishery Performance Report for summer flounder developed by the Council and Commission Advisory Panels, as well as in the corresponding Summer Flounder Fishery Information Document prepared by Council staff.[3]

[3] The Fishery Information Document is available at: http://www.mafmc.org/ssc-meetings/2019/september-9-11. The Fishery Performance Report will be developed by advisors during their meeting on August 29, 2019 and will be posted to the same website once it is finalized.

Recent Catch and Landings

Reported 2018 landings in the commercial fishery were approximately 6.14 million lb (2,787 mt), about 95% of the adjusted commercial quota of 6.44 million lb (2,567 mt). The 2018 commercial ACL (7.51 million pounds or 3,404 mt) was exceeded by about 11%, with 2018 commercial catch estimated at 8.34 million pounds (3,784 mt) according to the 2019 data update.

Recreational harvest in 2018 was 7.60 million (3,447 mt), based on revised MRIP estimates. These estimates cannot fairly be compared to the 2018 RHL, which was set using the old assessment that incorporated old MRIP estimates. 2018 recreational landings back-calibrated to the previous MRIP methodology show that 2018 harvest would have been estimated at 3.35 million pounds under the old methodology, about 76% of the 2018 recreational harvest limit (4.42 million lb or 2,004 mt). Back-calibrated estimates of total dead recreational catch are not currently available for comparison to the 2018 recreational ACL, or for inclusion in a comparison of total catch relative to the ABC. NMFS will perform their own 2018 ACL overage evaluations as part of the rulemaking for 2020 specifications. The overage amounts calculated by NMFS may vary from those shown here.

The 2019 commercial landings as of the week ending August 10, 2019, indicate that 48% of the 2019 coastwide commercial quota has been landed (Table 2). Last year, 67% of the 2018 commercial quota had been landed as of August 11. The 2019 percentage of quota landed is lower than average likely due to the mid-year increase in commercial quota.

Table 2: The 2019 state-by-state commercial quotas and the amount of summer flounder landed by commercial fishermen, in each state as of week ending August 10, 2019.

State	Cumulative Landings (lb)	Quota (lb)[a]	Percent of Quota (%)
ME	0	5,224	0
NH	0	51	0
MA	297,361	745,407	40
RI	1,250,983	1,722,462	73
CT	170,452	247,895	69
NY	528,330	839,869	63
NJ	578,955	1,840,176	31
DE	0		0
MD	52,749	223,954	24
VA	1,086,930	2,378,210	46
NC	1,329,010	2,970,242	45
Other	0	0	0
Totals	**5,294,770**	**10,973,490**	**48**

[a]Quotas adjusted for overages. Source: NMFS Weekly Quota Report for week ending August 10, 2019.

As of this memo, preliminary recreational estimates for 2019 are available through wave 3 (May/June). Preliminary estimates indicate that through June 2019, approximately 1.80 million pounds of summer flounder have been landed, about 23% of the 2019 RHL (Table 3).

Table 3: Preliminary summer flounder recreational harvest through wave 3 (June 2019) by state.

State	Preliminary Harvest (lb)
MASSACHUSETTS	11,613
RHODE ISLAND	402,311
CONNECTICUT	73,945
NEW YORK	586,433
NEW JERSEY	522,033
DELAWARE	32,961
MARYLAND	36,706
VIRGINIA	116,161
NORTH CAROLINA	21,915
Total	**1,804,078**

Stock Status and Biological Reference Points

The recent benchmark stock assessment was developed through the 66th SAW process, and peer reviewed at the 66th SARC from November 27-30, 2018. The assessment incorporated the revised time series of recreational catch from MRIP, which is 30% higher on average compared to the previous summer flounder estimates for 1981-2017. The MRIP estimate revisions account for changes in both the angler intercept survey and recreational effort survey methodologies. While fishing mortality rates were not strongly affected by incorporating these revisions, increased recreational catch resulted in increased estimates of stock size compared to past assessments.

The biological reference points for summer flounder as revised through the SAW/SARC 66 process include a fishing mortality threshold of F_{MSY} = $F_{35\%}$ (as the F_{MSY} proxy) = 0.448, and a biomass reference point of SSB_{MSY} = $SSB_{35\%}$ (as the SSB_{MSY} proxy) = 126.01 million lb = 57,159 mt. The minimum stock size threshold (1/2 SSB_{MSY}), is estimated to be 63.01 million lb (28,580 mt; Figure 1).

Assessment results indicate that the summer flounder stock was not overfished and overfishing was not occurring in 2017 relative to the biological reference points. Fishing mortality on the fully selected age 4 fish ranged between 0.744 and 1.622 during 1982-1996 and then decreased to 0.245 in 2007. Since 2007 the fishing mortality rate (F) has increased, and in 2017 was estimated at 0.334, below the SAW 66 F_{MSY} proxy of $F_{35\%}$ = 0.448 (Figure 2). The 90% confidence interval for F in 2017 was 0.276 to 0.380.

SSB decreased from 67.13 million lb (30,451 mt) in 1982 to 16.33 million lb (7,408 mt) in 1989, and then increased to 152.46 million lb (69,153 mt) in 2003. SSB has decreased since 2003 and was estimated to be 98.22 million lb (44,552 mt) in 2017, about 78% of SSB_{MSY} = 126.01 million lb (57,159 mt), and 56% above the ½ SSB_{MSY} proxy = ½ $SSB_{35\%}$ = 63.01 million lb (28,580 mt; Figure 1). The 90% confidence interval for SSB in 2017 was 39,195 to 50,935 mt.

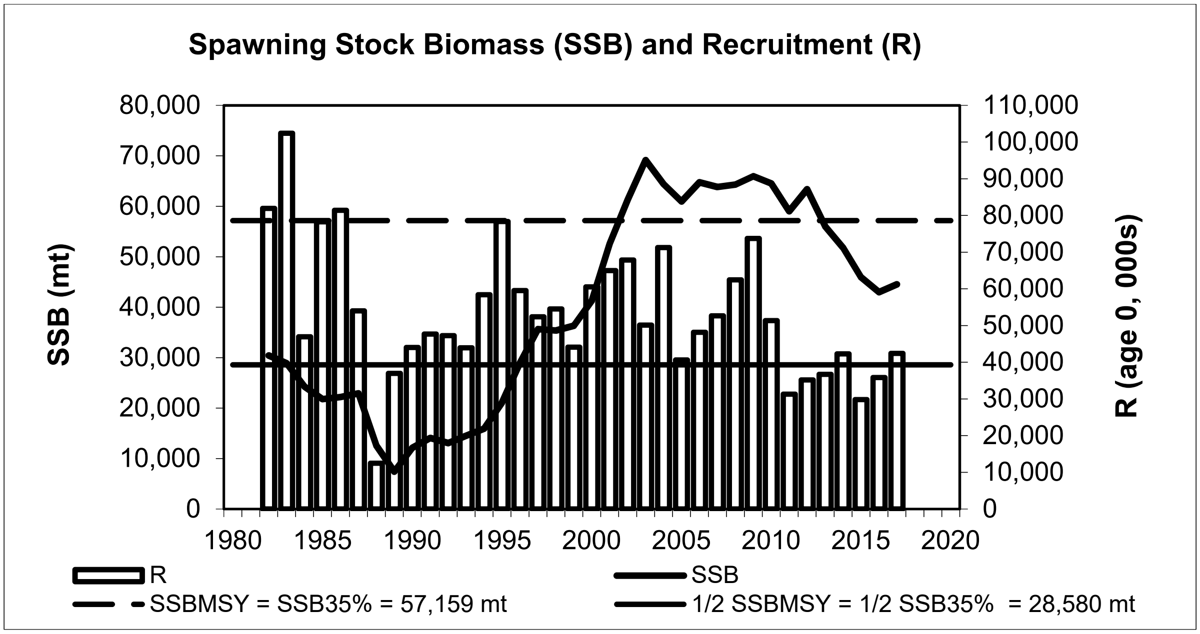

Figure 1: Summer flounder spawning stock biomass (SSB; solid line) and recruitment at age 0 (R; vertical bars) 1980-2017. The horizontal dashed line is the 2018 SAW66 recommended target biomass reference point proxy, SSB_{MSY} = $SSB_{35\%}$ = 57,159 mt. The horizontal solid line is the 2018 SAW66 recommended threshold biomass reference point proxy ½ SSB_{MSY} = ½ $SSB_{35\%}$ = 28,580 mt. Source: NEFSC 2019.

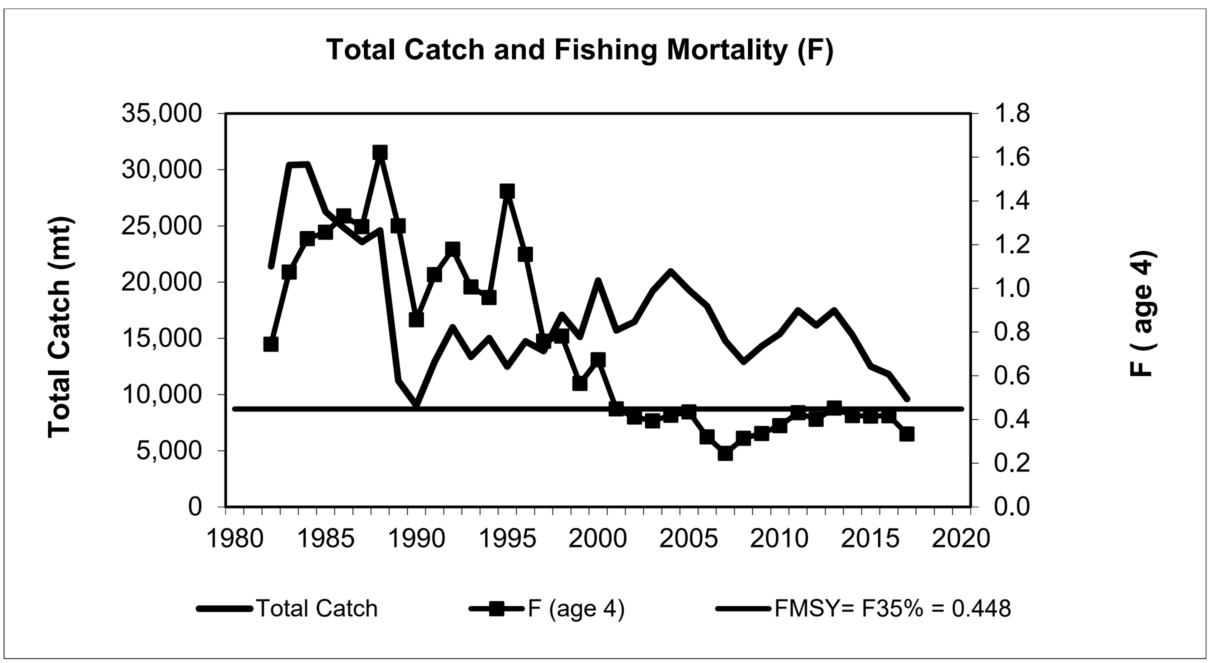

Figure 2: Total fishery catch (mt; solid line) and fully-recruited fishing mortality (F, peak at age 4; squares) of summer flounder. The horizontal solid line is the 2018 SAW66 recommended fishing mortality reference point proxy FMSY = F35% = 0.448. Source: NEFSC 2019.

Recruitment of juvenile summer flounder has been below-average since about 2011, although the driving factors behind this trend have not been identified. Bottom trawl survey data also indicate a recent trend of decreasing length and weight at age, which implies slower growth and delayed maturity. These factors affected the change in biological reference points used to determine stock status.

In July 2019, Northeast Fisheries Science Center (NEFSC) provided a data update for 2019[4], including updated catch and landings information as well as survey indices through 2018. The fishery independent survey data indicates that aggregate stock size increased from 2017 to 2018, and that recruitment in 2018 was estimated to be above average. Most state and federal survey indices of abundance increased slightly to moderately between 2017 and 2018. The Delaware index peaked again in 2018, approximately doubling from the next highest estimate from 2017.

Review of Prior SSC Recommendations

In February 2019, the SSC recommended, and the Council and Board adopted, three-year ABCs for summer flounder for 2019-2021, based on new stock status information and projections from the 2018 assessment. The recommendations for 2019 replaced the SSC's prior 2019 recommendations (from July 2018), which were intended to be implemented on an interim basis.

As requested by the Council, the SSC recommended two alternative sets of three-year ABCs based on the SAW66 assessment: ABCs for 2019-2021 fishing years derived by the "typical" approach resulting in ABCs varying each year, and a constant ABC for all three fishing years derived by averaging the three ABCs resulting from the "typical" approach. The Council and Board ultimately adopted ABCs based on the three-year averaging approach.

The SSC indicated that the approach to estimating uncertainty in the OFL had not changed since the previous benchmark (SAW/SARC 57). Accordingly, the SSC maintained its determination that the assessment should be assigned an "SSC-modified OFL (overfishing limit) probability distribution." In this type of assessment, the SSC provides its own estimate of uncertainty in the distribution of the OFL. The SSC continued the application of a 60% OFL CV, because: (1) the latest benchmark assessment did not result in major changes to the quality of the data and model that the SSC has previously determined to meet the criteria for a 60% CV; (2) the summer flounder assessment continues to be a data rich assessment with many fishery independent surveys incorporated and with relatively good precision of the fishery dependent data; (3) several different models and model configurations were considered and evaluated by SAW-66, most of which showed similar stock trends and stock status; and (4) no major persistent retrospective patterns were identified in the most recent model. The SSC noted that significant improvements in quality of data and exhaustive investigations of alternate model structures affirm the specification of the 60% OFL CV by the SSC.

The SSC accepted the OFL proxy ($F_{35\%}$ = 0.448) used in the assessment. Given recent trends in recruitment for summer flounder, the SSC recommended the use of the most recent 7-year recruitment series for OFL projections, because near-term future conditions are more likely to reflect recent recruitment patterns than those in the entire 36-year time series.

At the time of the SSC meeting, OFLs under the averaged approach could not be developed due to the need to further develop the methodology; however, NEFSC staff provided these OFLs following the meeting after receiving input from the SSC on their calculation. The OFLs for both the annually varying

[4] Available at http://www.mafmc.org/s/Summer_flounder_2019_Data_Update.pdf.

and averaged approaches are shown in Table 4, along with the ABCs resulting from the application of the Council's risk policy using a 60% CV and a projected SSB/SSB_{MSY} below 100% . The probability of overfishing (P*) in each year is also shown.

Table 4: SSC-recommended OFLs, ABCs, and P* values for both the averaged and annually varying approaches.

	3-Year Averaged Approach (adopted by Council and Board)			Annually Varying Approach		
Year	OFL	ABC	P*	OFL	ABC	P*
2019	30.00 mil lb (13,609 mt)	25.03 mil lb (11,354 mt)	0.372	30.00 mil lb (13,609 mt)	23.52 mil lb (10,667 mt)	0.330
2020	30.94 mil lb (14,034 mt)		0.351	31.36 mil lb (14,226 mt)	25.48 mil lb (11,559 mt)	0.354
2021	31.67 mil lb (14,367 mt)		0.336	31.96 mil lb (14,496 mt)	26.10 mil lb (11,837 mt)	0.357

The SSC considered the following to be the most significant sources of uncertainty associated with the determination of the OFL and/or ABC:

- Changes in life history are apparent in the population; for example, declining growth rates.
- Potential changes in productivity of the stock, which may affect estimates of biological reference points. Changes in size-at-age, growth, and recruitment may be environmentally mediated, but mechanisms are unknown.
- Potential changes in availability of fish to some surveys and to the fishery as a result of changes in the distribution of the population.

Staff Recommendation for 2020 ABC

Staff recommend maintaining the previously implemented specifications for summer flounder for the 2020 fishing year, as described in Table 1, including a 2020 ABC of 25.03 million pounds (11,354 mt). The 2019 data update indicates little evidence to suggest that stock condition has changed substantially from what was indicated in the 2018 benchmark assessment. Another data update will be requested in 2020 to review specifications implemented for 2021. In 2021, an assessment update is expected in order to inform specifications for 2022-2023.

Sector-Specific Catch and Landings Limits

Recreational and Commercial Annual Catch Limits

The summer flounder ABC includes both landings and discards, and is divided into the commercial and recreational ACLs for summer flounder (Figure 3). Based on the allocation percentages in the FMP, 60% of the amount of the ABC expected to be landed are allocated to the commercial fishery, and 40% to the recreational fishery. Discards are apportioned based on the discards contribution from each fishing sector using a 3-year moving average percentage.

This requires the assumption that patterns in landings and discards will be similar in future years as in past years. Changes in regulations, availability, year class strength, market demand, and other factors can impact patterns in landings and discards from one year to the next. The Monitoring Committee should discuss the methodology for calculating expected discards during their September 2019 meeting.

When 2019-2021 specifications were set in early 2019, the most recent three-year period of available data was 2015-2017. The discard percentages by sector were calculated using the revised MRIP data, which increased both the recreational harvest and discards, modifying the percent of discards attributable to the recreational sector. Using revised MRIP data, the proportion of discards from 2015-2017 are estimated at 66% from the recreational fishery and 34% from the commercial fishery (Table 1).

With the 2019 data update now available, discard information can be evaluated through 2018. The three-year average of discards by sector from 2016-2018 is estimated at 64% from the recreational fishery and 36% from the commercial fishery. The Monitoring Committee could consider modifying the sector-specific ACLs accordingly (slightly modifying the expected discards for each sector); however, staff recommend maintaining the current distribution of projected discards given that the differences are minor.

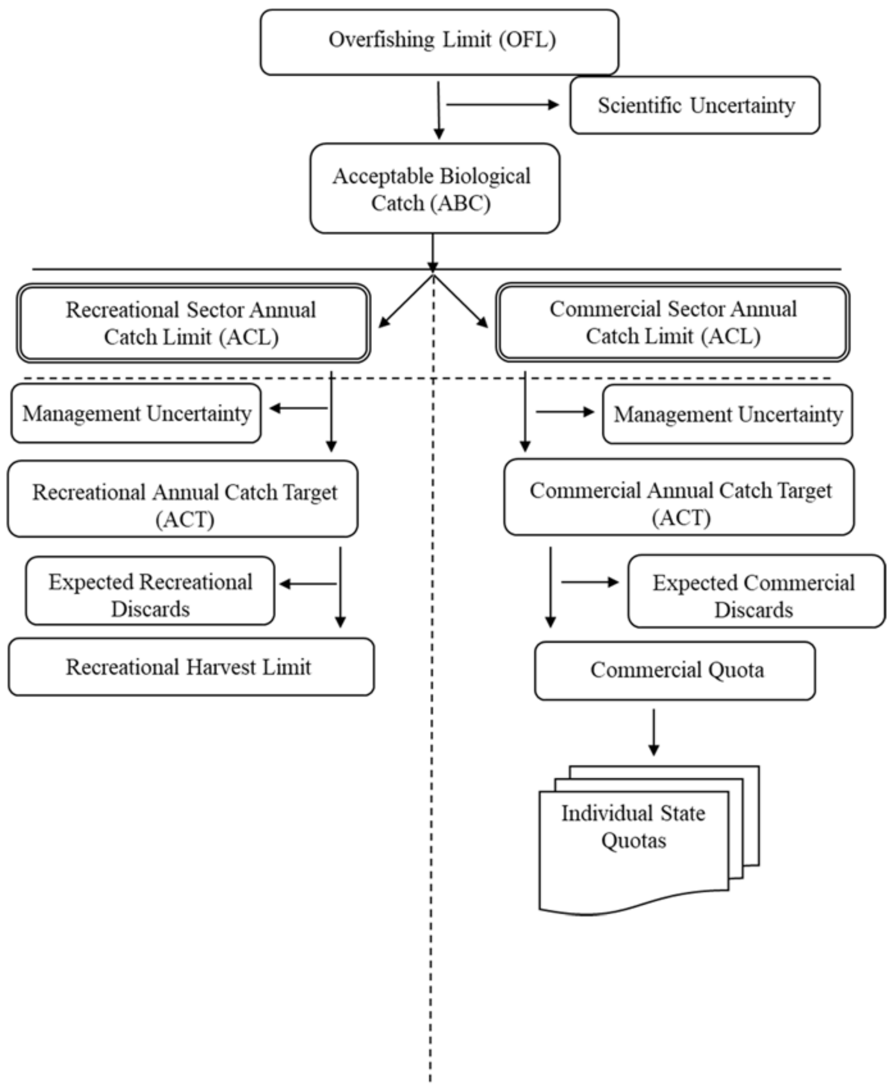

Figure 3: Flowchart for summer flounder catch and landings limits.

Annual Catch Targets and Accountability Measures

The Monitoring Committee is responsible for recommending ACTs, which are intended to account for management uncertainty. The Monitoring Committee should consider all relevant sources of management uncertainty in the summer flounder fishery and provide the technical basis, including any formulaic control rules, for any reduction in catch when recommending an ACT. ACTs may be reduced upon implementation in some cases if an Accountability Measure (AM) is triggered for a given fishery, as described below.

Management uncertainty is comprised of two parts: uncertainty in the ability of managers to control catch and uncertainty in quantifying the true catch (i.e., estimation errors). Management uncertainty can occur because of a lack of sufficient information about the catch (e.g., due to late reporting, underreporting, and/or misreporting of landings or bycatch) or because of a lack of management precision (i.e., the ability to constrain catch to desired levels).

Commercial landings have generally been near the commercial quotas for the last five years (2014-2018; Table 5). The NMFS Regional Administrator has in-season closure authority for the commercial summer flounder fishery, and commercial quota monitoring systems in place are typically effective in allowing timely reactions to landings levels that approach quotas.

<u>Staff recommend maintaining commercial ACTs set equal to the ACLs for 2019-2021, such that no reduction in catch is taken for management uncertainty</u>.

For 2019, a commercial AM was triggered based on an overage of the commercial ACL in 2017. For the commercial fishery, ACL overages caused by higher than projected discards result in a payback amount scaled based on estimates of stock biomass relative to the biomass target. The revised 2019 commercial ACT was reduced by approximately 547,000 pounds based on the biomass estimate from the most recent assessment. For 2020, a commercial AM may be triggered based on an evaluation of commercial catch in 2018 compared to the commercial ACL. While 2018 catch estimates are available from the NEFSC data update, GARFO estimates of commercial catch used in the ACL evaluation may differ and are still being finalized for 2018. Thus, it is not known at this time what the magnitude of any reductions would be for the 2020 commercial ACT.

Because commercial discards resulted in the commercial ACL being exceeded in 2017 and likely in 2018 as well, trends in commercial discards should continue to be monitored closely for potential future incorporation into ACT recommendations. However, commercial catch and landings limits were increased substantially in 2019 and will be maintained at this higher level for 2020 and 2021. In 2017 and 2018, a large proportion of discards were likely the result of below-average quotas. Observer data for observed trawl hauls from 2014-2018 supports this conclusion (Table 6). Given that the commercial quota is now around 50% higher compared to 2018, commercial discards would be expected to decrease due to availability of more quota.

Recreational performance relative to past RHLs cannot be evaluated using the revised MRIP data, since past harvest limits were set based on assessments that used the old data. A performance evaluation for 2014-2018 using old MRIP data is provided in Table 5 (2014-2017 uses pre-calibration MRIP data; 2018 back-calibrated data is not available on the MRIP query website but was provided by MRIP staff). Compared to the commercial fishery, recreational performance has been much more variable relative to the RHLs given the difficulty forecasting recreational effort and catch rates in any given year. Between 2014-2018, recreational harvest was below the recreational harvest limits in three of the five years, notably in 2015 when the recreational fishery experienced a large underage, with landings 36% below the recreational harvest limit.

The Monitoring Committee should continue its ongoing work to incorporate estimates of uncertainty in the recreational data and more fully consider various factors that may influence recreational catch and harvest. For example, the impacts of management changes on recreational discards and the impacts of year class size and trends in biomass projections should be more thoroughly considered with the goal of better predicting impacts of management measure changes. The Council and Board are currently considering both short-term and long-term modifications to the recreational management system to address some of these uncertainties in recreational management, and achieve a balance of flexibility and stability in the recreational measures.

The Council and Board recently received a report on a Council-funded study that evaluates management of the recreational summer flounder fishery using a Management Strategy Evaluation (MSE) framework. This project also involved the development of a recreational fleet dynamics model that can be used to more accurately forecast harvest and discards resulting from a particular set of management measures. Staff recommend using this tool in conjunction with typical methods when developing recreational measures for 2020 in late 2019, including accounting for the effects of management measures on both harvest and discards, which should improve performance relative to the recreational ACL.

Recreational AMs are evaluated based on a three-year moving average of recreational catch compared to the average recreational ACL over the same time period. These are typically evaluated in the fall during the setting of recreational measures for the upcoming fishing year. Given summer flounder stock status, and old MRIP harvest estimates being under the RHL in 2017 and 2018, it is unlikely that a recreational AM will be triggered for summer flounder in 2020; however, this will be re-evaluated later this fall.

For 2020, staff recommend maintaining the previously implemented ACTs set equal to the ACLs, such that no reduction in catch is taken for management uncertainty.

Table 5: Summer flounder commercial and recreational fishery performance relative to quotas and harvest limits, 2014-2018. Recreational data shows pre-revision MRIP estimates in order to allow comparison to past RHLs.

Year	Commercial Landings (mil lb)[a]	Commercial Quota (mil lb)[b]	Percent Overage(+)/ Underage(-)	Recreational Landings - OLD MRIP (mil lb)[c]	Recreational Harvest Limit (mil lb)	Percent Overage(+)/ Underage(-)
2014	11.07	10.51	+5%	7.39	7.01	+5%
2015	10.68	11.07	-4%	4.72	7.38	-36%
2016	7.81	8.12	-4%	6.18	5.42	+14%
2017	5.83	5.66	+3%	3.19	3.77	-15%
2018	6.14	6.44	-5%	3.35	4.42	-24%
5-yr Avg.	-	-	+1%	-	-	-11%

[a] Source: NMFS dealer data, as of June 2019.
[b] Commercial quotas are post-deduction for past landings and discard overages.
[c] Source: 2014-2017 pre-calibration MRIP data from NMFS MRIP calibration comparison query accessed June 27, 2019. 2018 back-calibrated data is from personal communication with NMFS. Recreational landings are from Massachusetts through North Carolina.

Table 6: Percent of observed trawl hauls with discarded summer flounder by discard reason, 2014-2018.

Recorded Discard Reason	2014	2015	2016	2017	2018	Avg
Regulations; too small	48%	46%	45%	31%	40%	42%
Regulations; quota filled	36%	37%	40%	50%	45%	42%
High graded	9%	8%	8%	7%	7%	8%
Market; too small	3%	1%	2%	4%	2%	2%
Poor quality	2%	1%	1%	1%	<1%	1%
No market	<1%	2%	1%	3%	2%	2%
Market, will spoil	<1%	4%	1%	1%	1%	2%
Other	2%	4%	1%	1%	1%	2%

Commercial Quotas and Recreational Harvest Limits

Projected discards are removed from the sector-specific ACTs to derive landings limits, which include annual commercial quotas and RHLs (Table 1). The commercial quota is divided amongst the states based on the allocation percentages in the FMP, shown in Table 7. The Council and Board recently approved modifications to the commercial allocations through a Summer Flounder Commercial Issues Amendment (see: http://www.mafmc.org/actions/summer-flounder-amendment). A summary of the commercial allocation changes is available at: http://www.mafmc.org/s/SF-Allocation-Revisions-Fact-Sheet-March-2019.pdf. These changes are pending implementation by the National Marine Fisheries Service, and if approved, are expected to take effect on January 1, 2021.

Table 7: The summer flounder quota allocations for the commercial fisheries in each state. These allocations are expected to be revised for the 2021 fishing year as a result of the Summer Flounder Commercial Issues Amendment.

State	Allocation (%)
ME	0.04756
NH	0.00046
MA	6.82046
RI	15.68298
CT	2.25708
NY	7.64699
NJ	16.72499
DE	0.01779
MD	2.03910
VA	21.31676
NC	27.44584
Total	100

Specific management measures that will be used to achieve the RHL for the recreational fishery in 2020 will not be determined until later in 2019. Typically, the Council and Board review data through Wave 4 (July-August) in the current year to set specifications in the upcoming year. The Monitoring Committee meets in November to review these data and make recommendations regarding any necessary changes in the recreational management measures (i.e., bag limit, minimum size, and season). As discussed above, the Monitoring Committee should consider the use of new approaches to recreational summer flounder measures in 2020, including the use of the previously mentioned fleet dynamics model to predict management outcomes.

Commercial Management Measures

Commercial Gear Regulations and Minimum Fish Size

Management measures in the commercial fishery other than quotas (i.e., minimum fish size, gear requirements, etc.) have remained generally constant since 1999.

The current commercial minimum fish size is 14 inches total length (TL). The 14-inch minimum size was implemented in 1997 and represented an increase from the previous minimum size of 13 inches TL.

Current trawl gear regulations require a 5.5-inch diamond or 6.0-inch square minimum mesh in the entire net for vessels possessing more than the threshold amount of summer flounder, i.e., 200 lb in the winter (November 1-April 30) and 100 lb in the summer (May 1-October 31). The minimum fish size and mesh requirements may be changed through specifications based on the recommendations of the Monitoring Committee. The 5.5-inch diamond or 6.0-inch square minimum mesh size requirements were first implemented in 1993 under Amendment 2 to the FMP, but at the time applied only to the net's codend. Under Amendment 10 to the FMP, effective in 1998, the minimum mesh requirements were modified to apply throughout the whole net.

Staff recommend no changes to the current 14-inch minimum fish size, or seasonal possession thresholds triggering the minimum mesh size at this time.

The Monitoring Committee reviewed the results of a study by Hasbrouck et al. (2018)[5] during their July 2018 meeting. The Monitoring Committee agreed that this study provides valuable contemporary information on the mesh selectivities for all three species, and that this information could be useful for future stock assessments. The results suggest that, in general, the current minimum mesh sizes are effective at releasing catch of most undersized and immature fish.

The Monitoring Committee noted that the summer flounder selectivity curve for 6.0" square mesh does not appear to be equivalent to that of the 5.5" diamond. Instead, the 6.0" square is much more similar to a 5.0" diamond mesh. The 6.0" square mesh releases less than 50% of minimum size fish. The Monitoring Committee had some concerns with the amount of undersized summer flounder caught with the 6.0" square mesh and recommended further exploring the impacts of this mesh size. Phasing out the use of 6.0" square mesh for summer flounder could reduce discards of undersized fish. The Monitoring Committee noted that further analysis should be done on how many vessels are currently using 6.0" square vs. 5.5" diamond mesh.

The Monitoring Committee emphasized that fishing industry feedback should be sought, and additional analysis should be completed before pursuing specific changes. Staff is currently soliciting input from the Summer Flounder, Scup, and Black Sea Bass Advisory Panel on mesh size issues prior to the September Monitoring Committee meeting, and may provide additional analysis on mesh size use if available.

For summer flounder, staff preliminarily recommend further consideration of phasing out the 6.0" square mesh size over a period of several years, in favor of either a 5.5" diamond mesh requirement alone, or adjusting the square mesh requirement to a larger size. If the Monitoring Committee agrees that this should be explored, the group should consider whether there is enough technical justification for selecting a larger square mesh size requirement.

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[5] Available at: http://www.mafmc.org/s/Tab08_SFSBSB-Mesh-Selectivity-Study-Apr2018.pdf

Minimum Mesh Size Exemption Programs

Small Mesh Exemption Area

Vessels landing more than 200 lb of summer flounder, east of longitude 72° 30.0'W, from November 1 through April 30, and using mesh smaller than 5.5-inch diamond or 6.0-inch square are required to obtain a small mesh exemption program (SMEP) permit from NMFS. The exemption is designed to allow vessels to retain a bycatch of summer flounder while operating in other small-mesh fisheries.

The FMP requires that observer data be reviewed annually to determine whether vessels fishing seaward of the SMEP line with smaller than the required minimum mesh size and landing more than 200 lb of summer flounder are discarding more than 10% (by weight) of their summer flounder catch per trip. Typically, staff evaluate the Northeast Fisheries Observer Program (NEFOP) data for the period from November 1 in the previous year to April 30 in the current year. However, when this analysis is conducted each summer, complete observer data is not yet available through the end of April in the current year. As such, a year-long lag in the analysis is used.

Staff evaluated NEFOP data for November 1, 2017 through April 30, 2018. These data indicate that a total of 724 trips with at least one tow were observed east of 72° 30.0'W and 364 of these trips used small mesh (Table 8). Of those 364 trips, 135 trips reported landing more than 200 lb of summer flounder. Of those 135 trips, 47 trips discarded more than 10% of their summer flounder catch. The percentage of trips that met all these criteria relative to the total number of observed trips east of 72° 30.0'W is 6.5% (47/724 trips). The prior year percentage of trips that met the criteria, also shown in Table 8, was also 6.5%. The Monitoring Committee should continue to closely monitor the use of this exemption program. If the rate of trips meeting these criteria increases, the Monitoring Committee should consider modifications to this program.

For an unrelated action in 2017, GARFO staff compiled the number of vessels issued a letter of authorization (LOA) for the small mesh exemption program in recent years, shown in Table 9, indicating that an average of 64 summer flounder permit holders have requested this LOA from 2013 through 2017.

<u>Based on the information described above, staff recommend no change in the SMEP program, however, the rates of summer flounder discarding should continue to be closely tracked by the Monitoring Committee.</u>

Table 8: Numbers of trips that meet specific criteria based on observed trips from November 1, 2016 to April 30, 2017, and November 1, 2017 to April 30, 2018.

Criteria		Nov. 1, 2016 – April 30, 2017	Nov. 1, 2017 – April 30, 2018
A	Observed trips with at least one catch record east of 72° 30' W Longitude	555	724
B	That met the criteria in row A and used small mesh at some point during their trip	376	364
C	That met the criteria in rows A-B and landed more than 200 pounds summer flounder on whole trip	150	135
D	That met the criteria in rows A-C and discarded >10% of summer flounder catch east of 72° 30' W Longitude	36	47
E	% of observed trips with catch east of 72° 30' W Longitude that also used small mesh, landed >200 pounds of summer flounder, and discarded >10% of summer flounder catch (row D/row A)	6.5%	6.5%
F	Total summer flounder discards (pounds) from trips meeting criteria in A-D	14,640	33,868
G	Total summer flounder landings (pounds) from trips meeting criteria in A-D	25,472	76,780
H	Total catch (pounds) from trips meeting criteria in A-D	40,113	110,648

Table 9: Number of vessels issued the small mesh LOA from fishing year 2013-2017.

Year	Vessels Enrolled
2013	71
2014	55
2015	65
2016	61
2017	69

Flynet Exemption Program

Vessels fishing with a two-seam otter trawl flynet are also exempt from the minimum mesh size requirements. Exempt flynets have large mesh in the wings that measure 8 to 64 inches, the belly of the net has 35 or more meshes that are at least 8 inches, and the mesh decreases in size throughout the body of the net, sometimes to 2 inches or smaller. Only North Carolina has a flynet fishery at present. The supplemental memo from T.D. VanMiddlesworth dated August 13, 2019 (see Attachment) indicates that no summer flounder were landed in the North Carolina flynet fishery in 2013, 2015, 2016, 2017, or 2018. In 2015, as part of the review of commercial measures, the Monitoring and Technical Committees reviewed information indicating that summer flounder landings in this fishery have generally declined since 2007, and have been under 2,000 lb since 2010. Based on this information, staff recommend no change to the summer flounder flynet exemption program. Staff had previously noted that scup and black sea bass were landed in the North Carolina flynet fishery in recent years, and that the Monitoring Committee should consider whether similar exemptions should be explored for these species. Based on the additional information provided in the attached memo, flynets used to land these species appear to be generally compliant with the minimum mesh requirements for scup and black sea bass, and therefore an exemption for these species is likely not needed.

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

STEPHEN W. MURPHEY
Director

Memorandum

To: Kiley Dancy, MAFMC

From: Todd Daniel VanMiddlesworth, NCDMF

Date: August 13, 2019

Subject: Species composition and landings from the 2018 North Carolina fly net fishery

The 2018 North Carolina fly net fishery landed 40,460 pounds of finfish consisting of four species including Atlantic croaker, black sea bass, scup, and longfin squid. All 2018 North Carolina fly net fishery landings are not reported within a table because the data are confidential and cannot be distributed to sources outside the North Carolina Division of Marine Fisheries (North Carolina General Statute 113-170.3 (c)). Confidential data can only be released in a summarized format that does not allow the user to track landings or purchases to an individual. Summer flounder were not landed in the 2013, 2015, 2016, 2017, and 2018 fly net fisheries. Fly net landings and trips for most species were lower in 2018 than in 2017. Total fly net landings in 2018 were much lower than those in 2017 (131,104 pounds), which may be the result of reduced fishing effort on targeted fish species and increased shoaling at Oregon Inlet resulting in limited access of fly net boats to North Carolina ports.

Historically, the North Carolina fly net fishery targeted species such as Atlantic croaker, kingfish, bluefish, striped bass, and weakfish. Other species such as black sea bass and scup have also been targeted. Fly net landings for these species has greatly declined over the years. Although fly nets are used to land black sea bass and scup, flounder trawls are responsible for most of the landings. As of 2018, approximately 93% of black sea bass and 99% of scup commercial landings in North Carolina were from flounder trawls. The North Carolina Division of Marine Fisheries (NCDMF) collects data from all commercial fisheries including the fly net fishery. Data that is collected includes gear, effort, and biological information. The captains are interviewed while they offload their catch to obtain gear and effort information. If the captain is not present or does not wish to be interviewed, we do not obtain this information. In order to address concerns of fly nets using correct mesh sizes for landing black sea bass (4.5 inch minimum mesh size throughout codend of the net) and scup (5.0 inch minimum mesh size throughout codend of the net), ten years (2009-2018) of North Carolina Division of Marine Fisheries commercial fish house sampling data was used to determine minimum mesh size used in the codends of fly nets that landed black sea bass and scup. During 2009-2018, all fly nets sampled that were targeting black sea bass used the minimum mesh size of 4.5 inch or greater. There was only one fly net sampled that was using a smaller mesh size than 4.5 inches to land Atlantic croaker and landed ~2 pounds of black sea bass. As for fly nets sampled that were

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252-726-7021

targeting scup, all used the minimum mesh size of 5.0 inch or greater. There were only three fly nets sampled that were using smaller mesh sizes than 5.0 inches to land black sea bass and Atlantic croaker and landed less than 100 pounds of scup per trip.

State of North Carolina | Division of Marine Fisheries
3441 Arendell Street | P.O. Box 769 | Morehead City, North Carolina 28557
252-726-7021

Summer flounder Data Update for 2019

National Marine Fisheries Service
Northeast Fisheries Science Center
166 Water St.
Woods Hole, MA 02543

Fishery and Survey Data

Reported 2018 landings in the commercial fishery were 2,787 mt = 6.144 million lbs. Estimated 2018 landings in the recreational fishery were 3,447 mt = 7.599 million lbs. Total commercial and recreational landings in 2018 were 6,234 mt = 13.744 million lbs. Estimated 2018 discards in the commercial fishery (80% mortality rate) were 997 mt = 2.198 million lbs. Estimated 2018 discards in the recreational fishery (10% mortality rate) were 1,003 mt = 2.211 million lbs. Estimated total commercial and recreational discards were 2,000 mt = 4.409 million lbs. The total catch of summer flounder in 2018 was 8,234 mt = 18.153 million lbs, the lowest since 1982 (Table 1, Figure 1).

State and Federal survey indices of summer flounder stock size are presented in Figures 2-9. Indices of summer flounder recruitment (age 0 fish) are presented in Figures 10-16. The surveys indicate that aggregate stock size increased from 2017 to 2018 (Figure 9) and that recruitment in 2018 was above average (Figure 16).

Some notable fish were collected in the Northeast Fisheries Science Center (NEFSC) commercial fishery sampling in 2018. The oldest summer flounder collected to date was sampled, a 57 cm fish (likely a male) estimated to be age 20. Also sampled were two age 17 fish, at 52 cm (likely a male) and at 72 cm (likely a female). Two large (likely female) fish at 80 and 82 cm were both estimated to be age 9, from the 2009 year class (the 6^{th} largest of the 36 year modeled time series). These samples indicate that increased survival of summer flounder over the last two decades has allowed fish of both sexes to grow to the oldest ages estimated to date.

Table 1. Commercial (comm) and recreational (recr) fishery landings, estimated commercial and recreational dead discard, and total catch (metric tons) as used in the assessment of summer flounder, Maine to North Carolina. Includes 'New' Marine Recreational Information Program (MRIP) estimates of recreational catch.

Year	Comm Landings	Comm Discard	Comm Catch	Recr Landings	Recr Discard	Recr Catch	Total Landings	Total Discard	Total Catch
1982	10,400	n/a	10,400	10,758	250	11,008	21,158	250	21,408
1983	13,403	n/a	13,403	16,665	356	17,022	30,068	356	30,425
1984	17,130	n/a	17,130	12,803	537	13,340	29,933	537	30,470
1985	14,675	n/a	14,675	11,405	184	11,589	26,080	184	26,264
1986	12,186	n/a	12,186	12,005	646	12,651	24,191	646	24,837
1987	12,271	n/a	12,271	10,638	668	11,306	22,909	668	23,577
1988	14,686	n/a	14,686	9,429	483	9,912	24,115	483	24,598
1989	8,125	456	8,581	2,566	84	2,650	10,691	540	11,231
1990	4,199	898	5,097	3,517	414	3,931	7,716	1,312	9,028
1991	6,224	219	6,443	5,854	617	6,470	12,078	836	12,914
1992	7,529	2,151	9,680	5,746	559	6,305	13,275	2,710	15,985
1993	5,715	701	6,416	6,228	703	6,931	11,943	1,404	13,347
1994	6,588	1,539	8,127	6,481	409	6,889	13,069	1,947	15,016
1995	6,977	827	7,804	4,090	589	4,679	11,067	1,415	12,482
1996	5,861	1,436	7,297	6,813	624	7,437	12,674	2,060	14,734
1997	3,994	807	4,801	8,403	663	9,066	12,397	1,470	13,867
1998	5,076	638	5,714	10,368	997	11,365	15,444	1,635	17,079
1999	4,820	1,666	6,486	7,573	1,078	8,651	12,393	2,744	15,138
2000	5,085	1,620	6,705	12,259	1,182	13,441	17,344	2,802	20,146
2001	4,970	411	5,381	8,417	1,897	10,314	13,387	2,308	15,695
2002	6,573	948	7,521	7,388	1,564	8,952	13,961	2,512	16,473
2003	6,450	1,160	7,610	9,746	1,867	11,614	16,196	3,028	19,224
2004	7,880	1,628	9,508	9,616	1,833	11,449	17,496	3,461	20,958
2005	7,671	1,499	9,170	8,412	1,711	10,123	16,083	3,210	19,293
2006	6,316	1,518	7,834	8,452	1,583	10,034	14,768	3,100	17,868
2007	4,544	2,128	6,672	6,300	1,801	8,101	10,844	3,929	14,773
2008	4,179	1,162	5,341	5,597	1,970	7,567	9,776	3,132	12,909
2009	5,013	1,522	6,535	5,288	2,484	7,771	10,301	4,006	14,307
2010	6,078	1,478	7,556	5,142	2,710	7,852	11,220	4,188	15,408
2011	7,517	1,143	8,660	6,116	2,711	8,827	13,633	3,854	17,487
2012	5,918	754	6,672	7,318	2,172	9,490	13,236	2,927	16,163
2013	5,696	863	6,559	8,806	2,119	10,925	14,502	2,981	17,483
2014	4,989	830	5,819	7,364	2,092	9,456	12,353	2,922	15,275
2015	4,858	703	5,561	5,366	1,572	6,938	10,224	2,274	12,498
2016	3,537	772	4,309	6,005	1,482	7,487	9,542	2,254	11,796
2017	2,644	906	3,550	4,565	1,496	6,061	7,209	2,402	9,611
2018	2,787	997	3,784	3,447	1,003	4,450	6,234	2,000	8,234

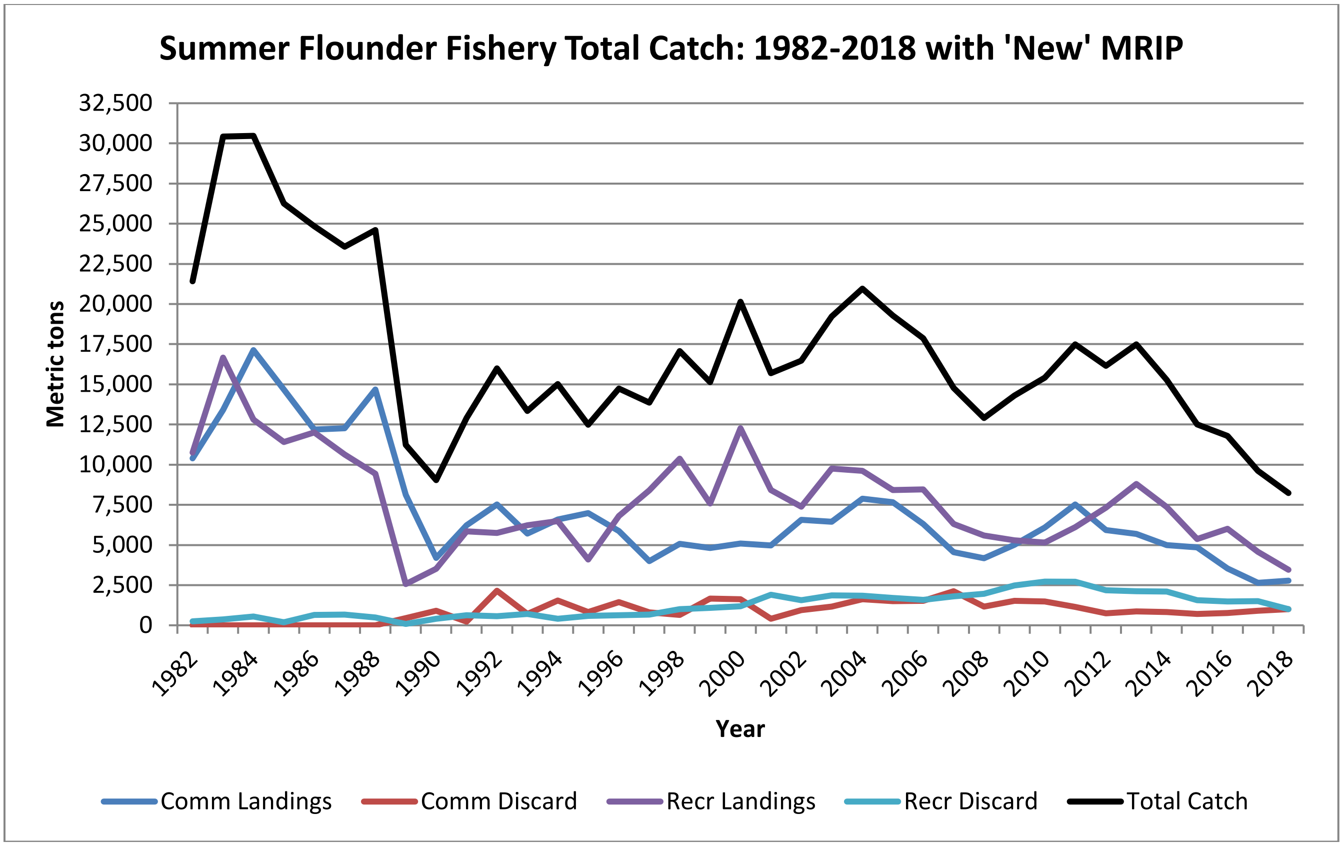

Figure 1. Summer flounder fishery total catch (includes ‘New’ Marine Recreational Information Program [MRIP] estimates of recreational catch).

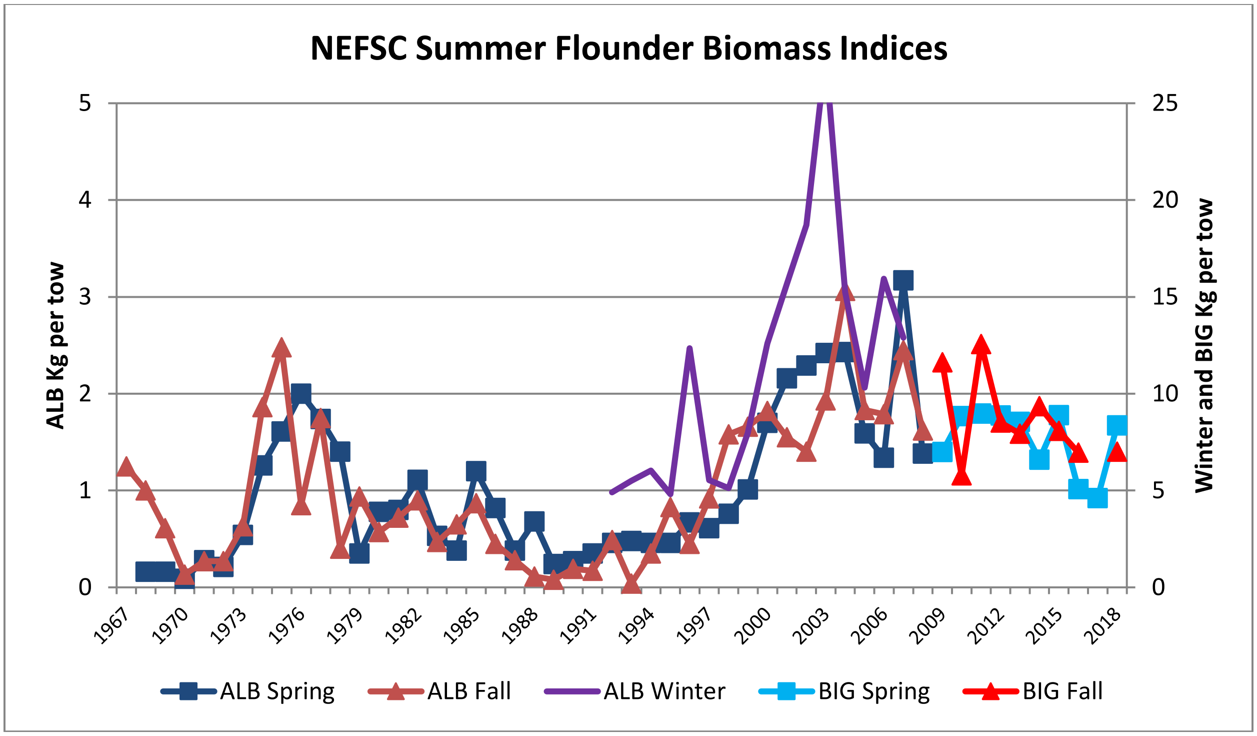

Figure 2. Northeast Fisheries Science Center (NEFSC) trawl survey aggregate biomass indices for summer flounder. ALB indices are FSV Albatross IV indices. BIG indices are FSV HB Bigelow indices. ALB spring and fall indices are plotted on the left-hand Y-axis. ALB winter and BIG spring and fall indices are plotted on the right-hand Y-axis. Note that the ALB and BIG indices are now independent series.

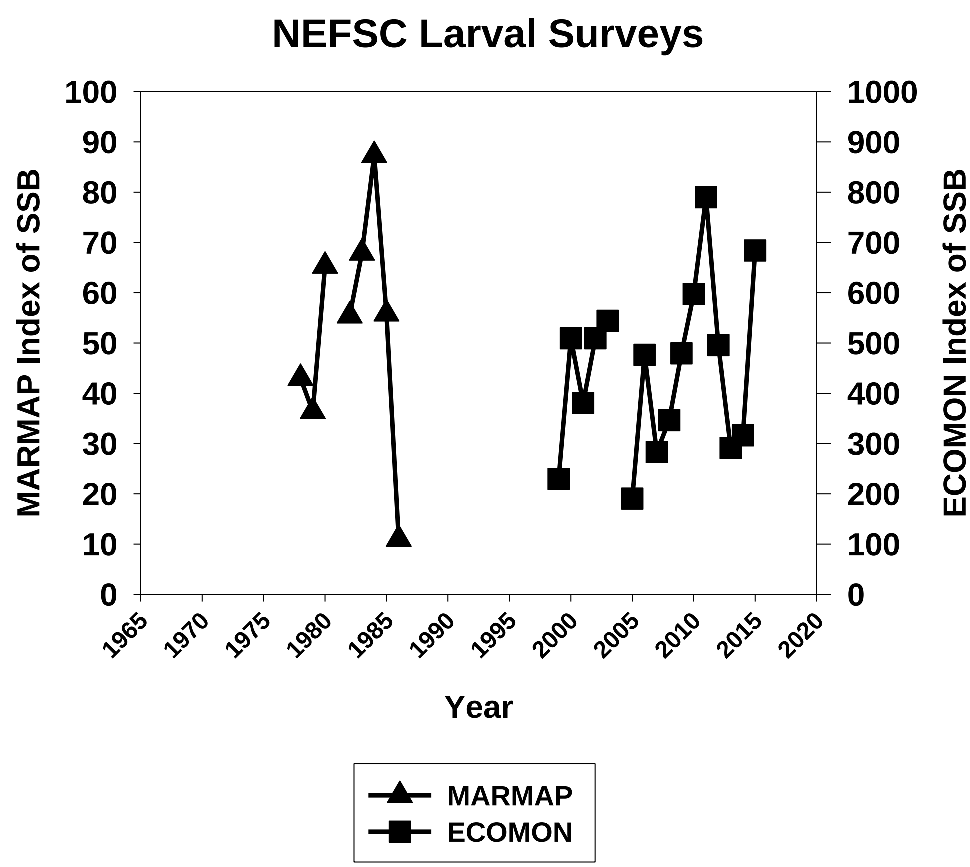

Figure 3. Northeast Fisheries Science Center (NEFSC) Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) and Ecological Monitoring Program (ECOMON) larval survey indices of summer flounder spawning stock biomass (SSB).

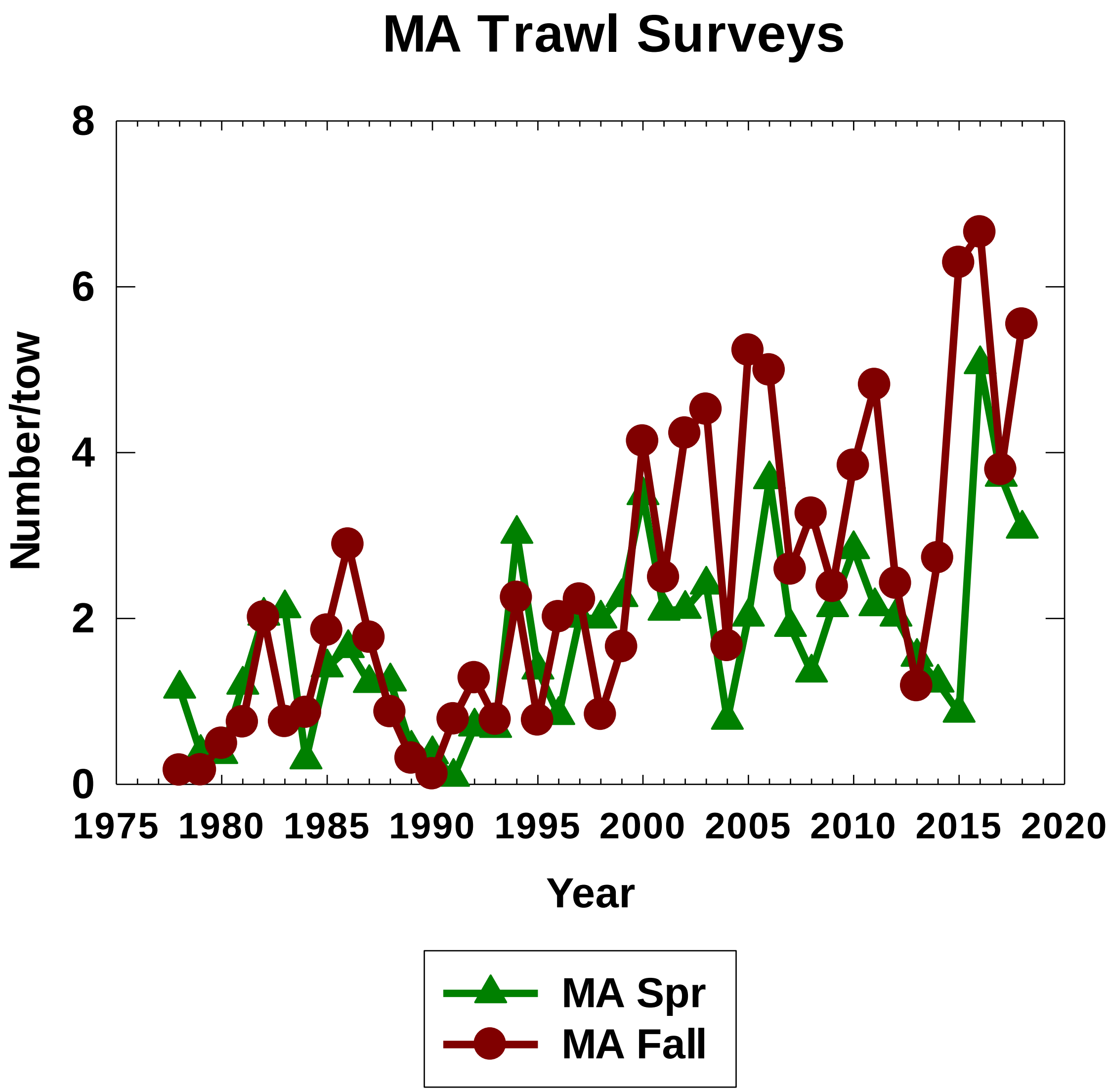

Figure 4. Massachusetts Division of Marine Fisheries (MA) spring and fall trawl survey aggregate numeric indices for summer flounder.

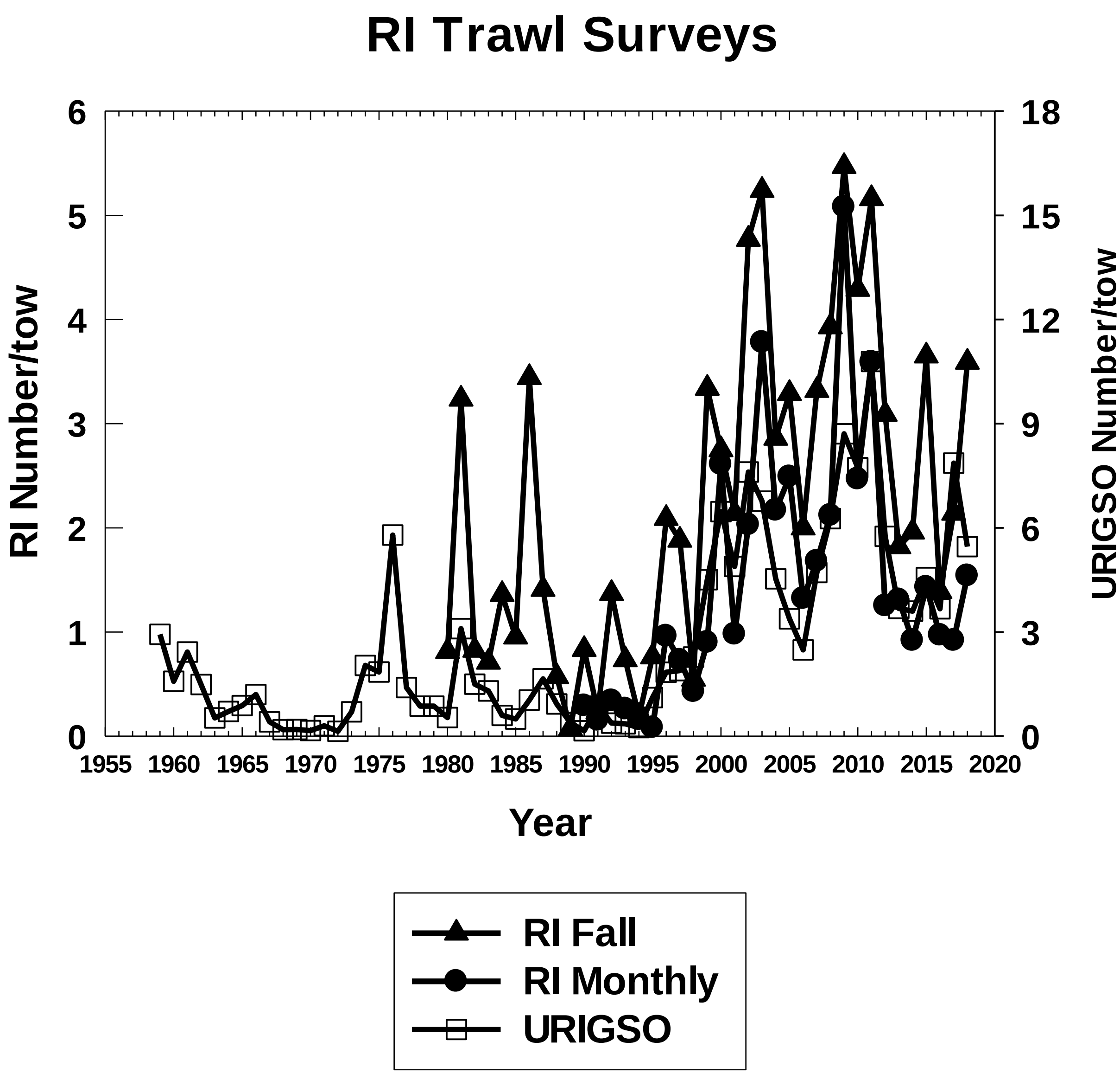

Figure 5. Rhode Island Division of Fish and Wildlife (RI) fall and monthly and University of Rhode Island Graduate School of Oceanography (URIGSO) annual trawl survey aggregate numeric indices for summer flounder.

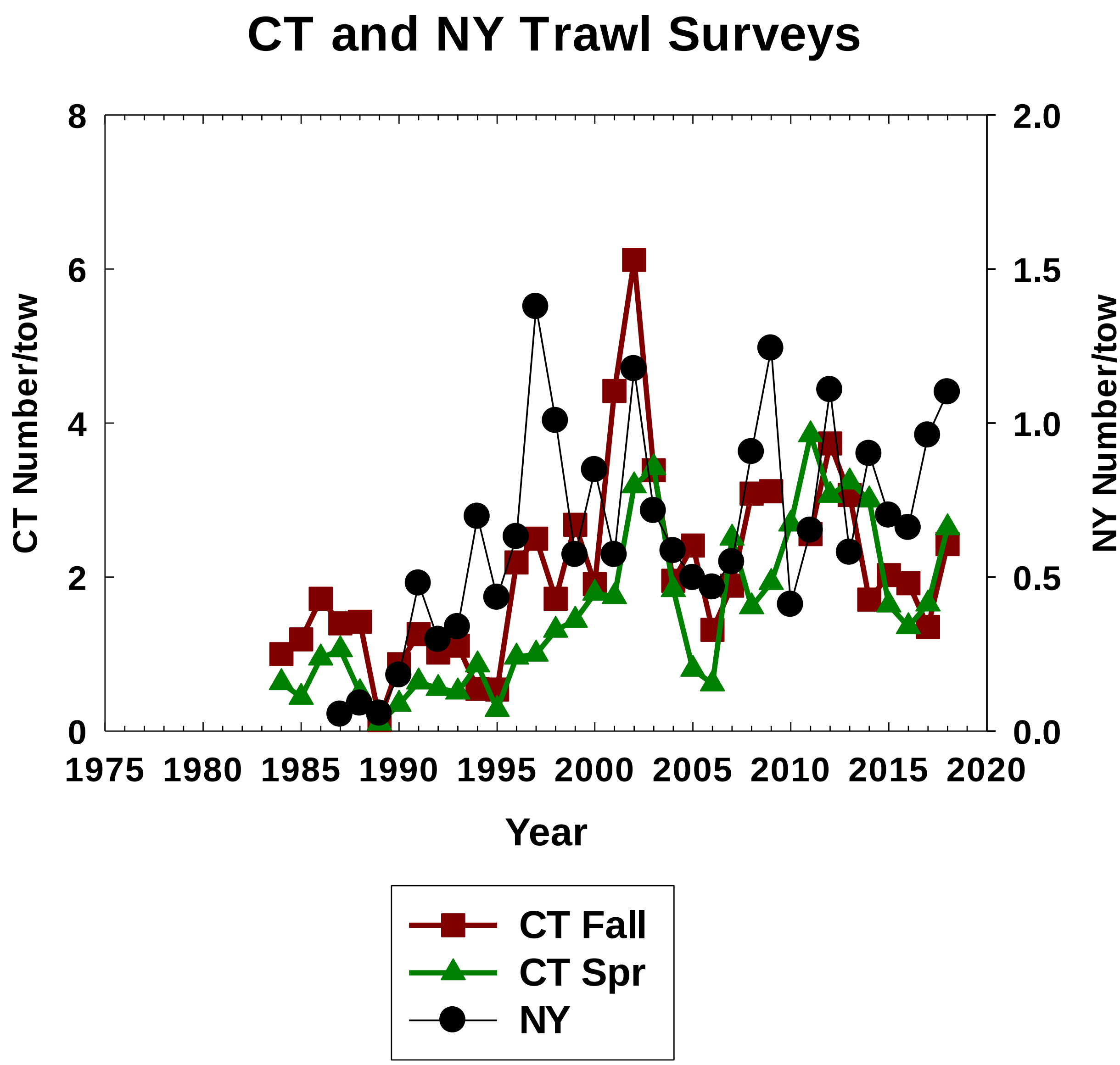

Figure 6. Connecticut Department of Energy and Environmental Protection (CT) spring and fall and New York Department of Environmental Conservation (NY) annual trawl survey aggregate numeric indices for summer flounder.

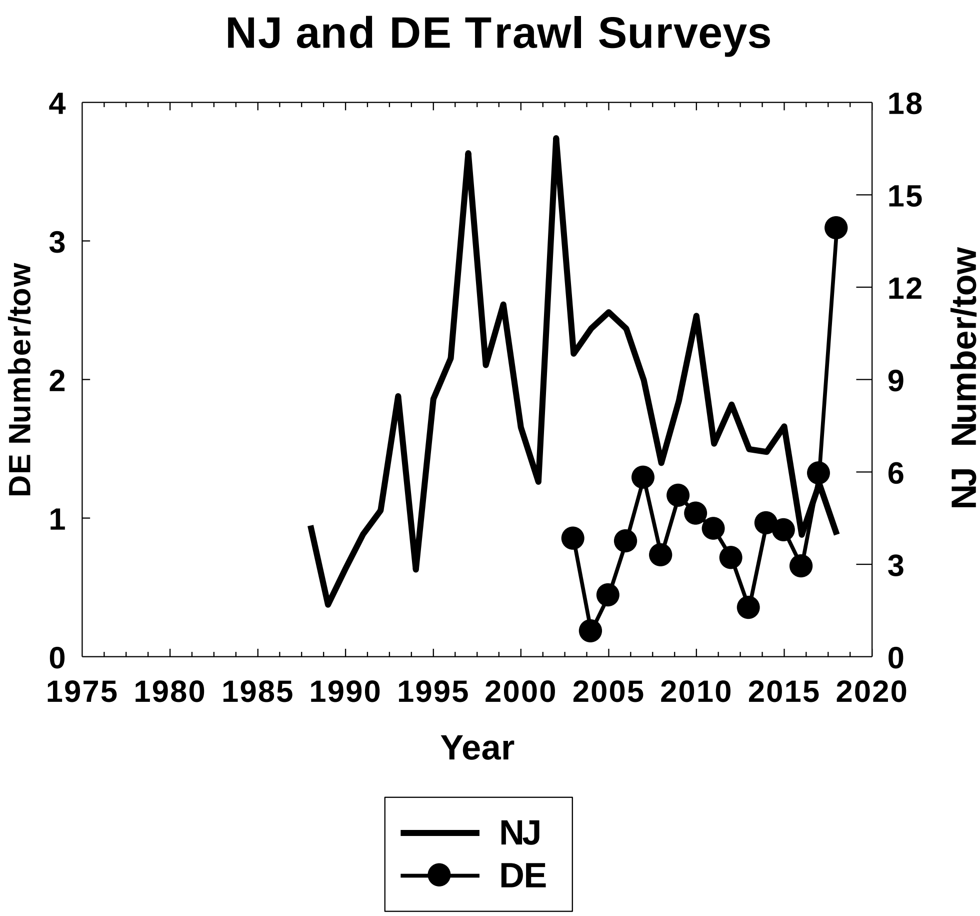

Figure 7. New Jersey Division of Fish and Wildlife (NJ) annual and Delaware Division of Fish and Wildlife (DE) annual trawl survey aggregate numeric indices for summer flounder.

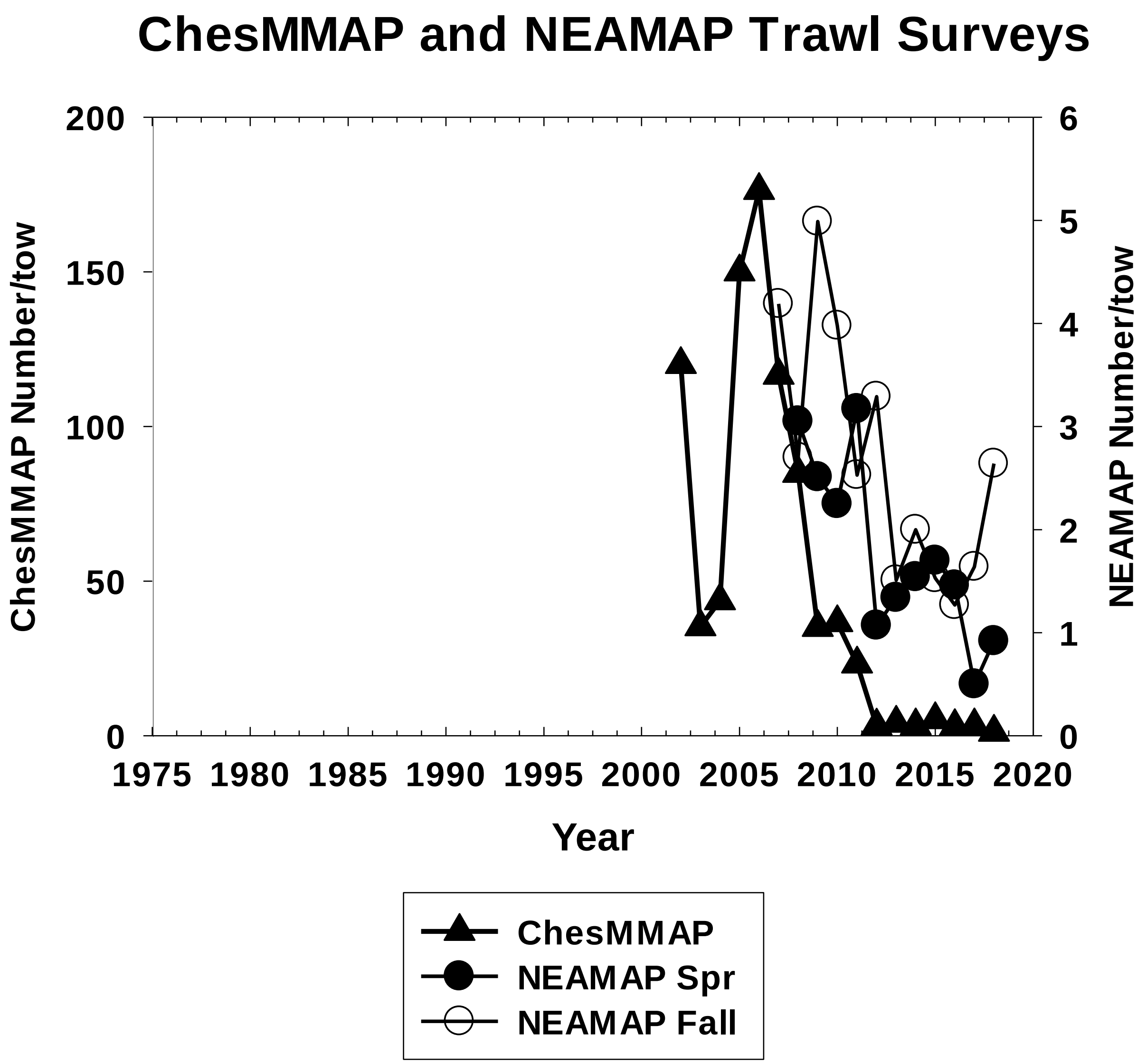

Figure 8. Virginia Institute of Marine Science Chesapeake Bay Multispecies Monitoring Assessment Program (ChesMMAP) annual and Northeast Area Monitoring and Assessment Program (NEAMAP) spring and fall trawl survey aggregate numeric indices for summer flounder.

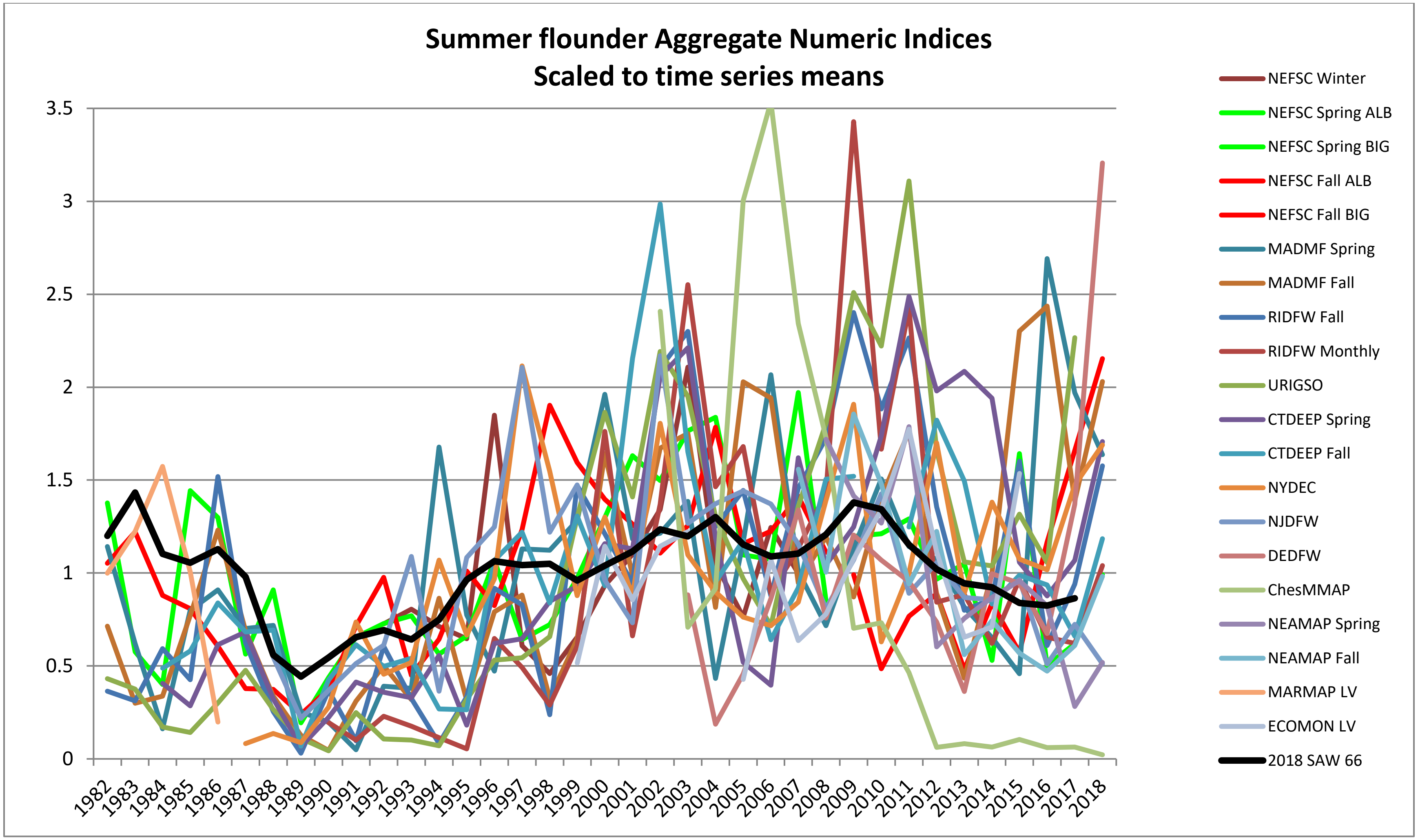

Figure 9. Summer flounder indices of aggregate numeric abundance. Indices are scaled to the means of their respective time series. 2018 SAW 66 is the total stock size estimate from the 2018 benchmark stock assessment.

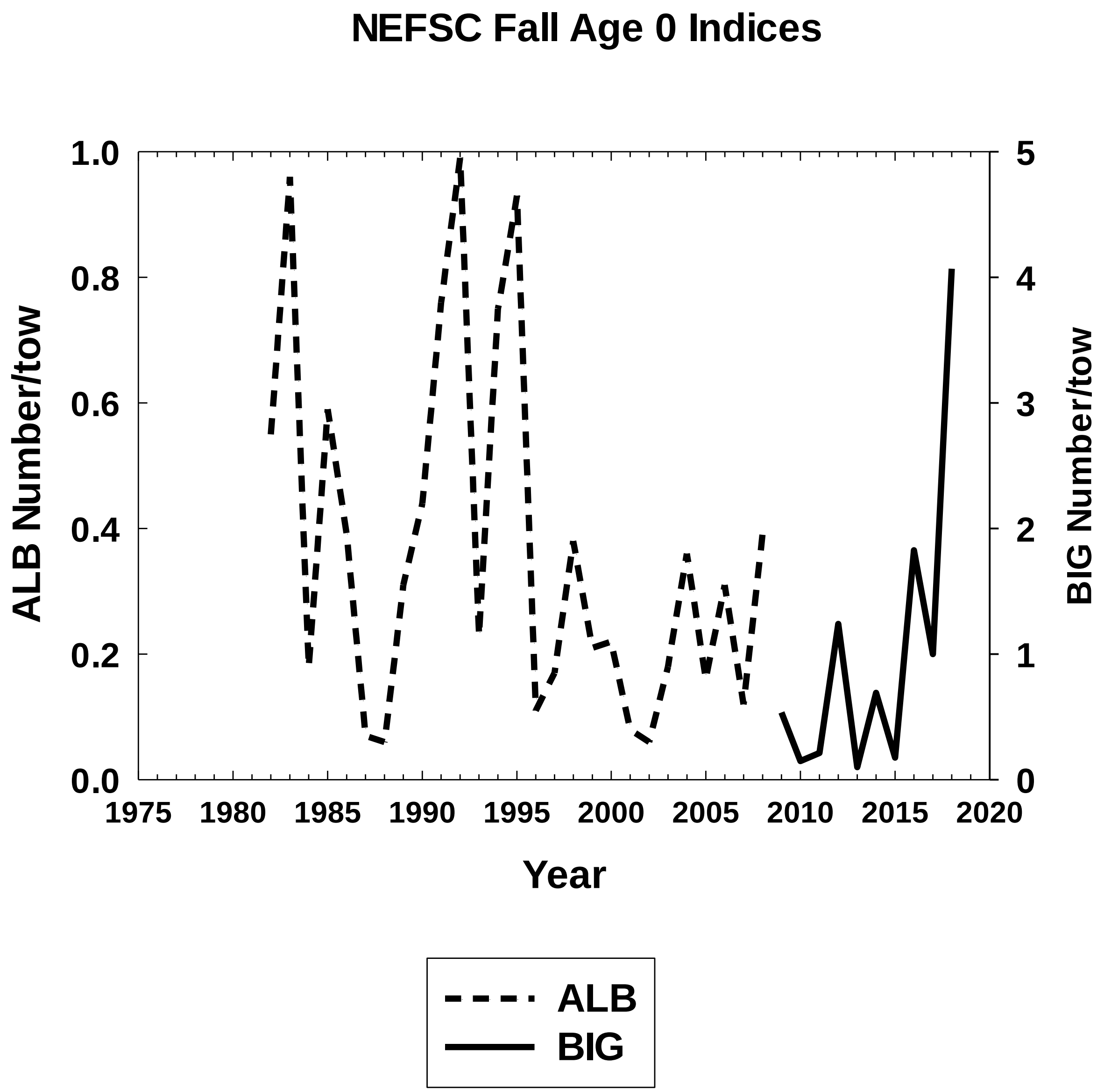

Figure 10. Northeast Fisheries Science Center (NEFSC) fall trawl survey age 0 abundance indices for summer flounder. ALB indices are FSV Albatross IV indices. BIG indices are FSV HB Bigelow indices. Note that the ALB and BIG indices are plotted on differently scaled y-axes and are now independent series.

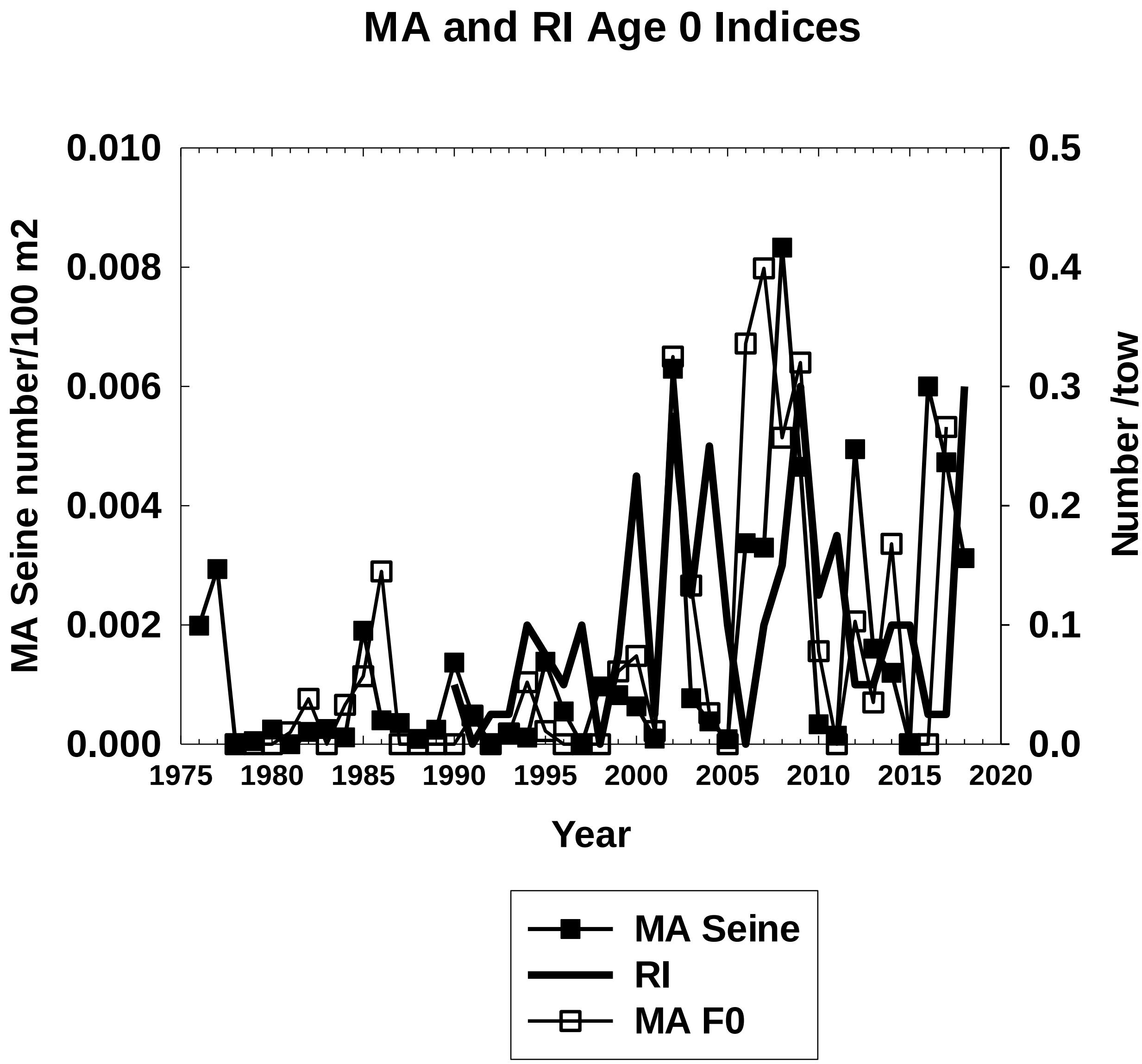

Figure 11. Massachusetts Division of Marine Fisheries (MA) annual seine and fall trawl survey and Rhode Island Division of Fish and Wildlife (RI) fall trawl survey age 0 abundance indices for summer flounder.

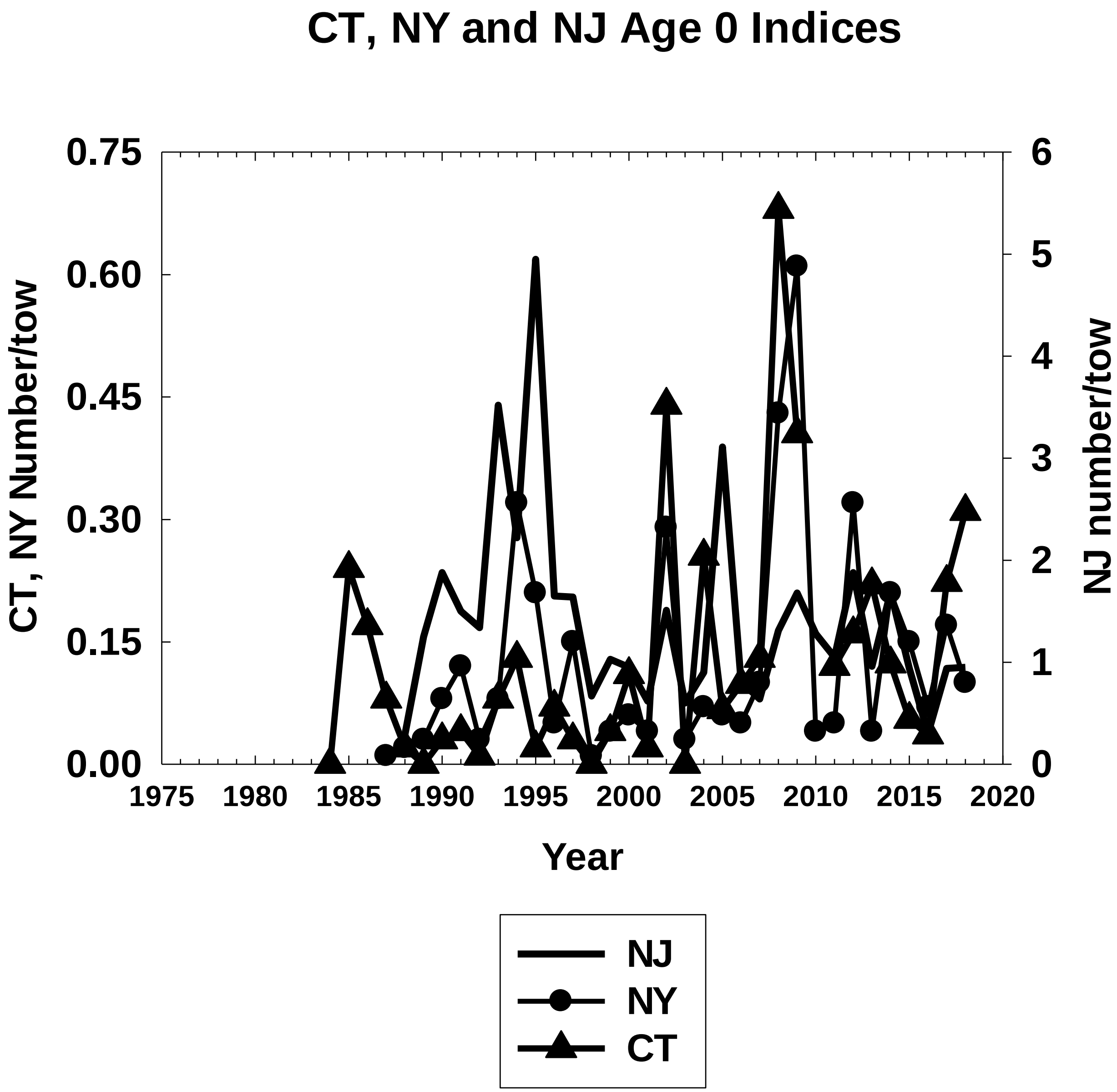

Figure 12. Connecticut Department of Energy and Environmental Protection (CT) fall, New York Department of Environmental Conservation (NY) annual, and New Jersey Division of Fish and Wildlife (NJ) annual age 0 abundance indices for summer flounder.

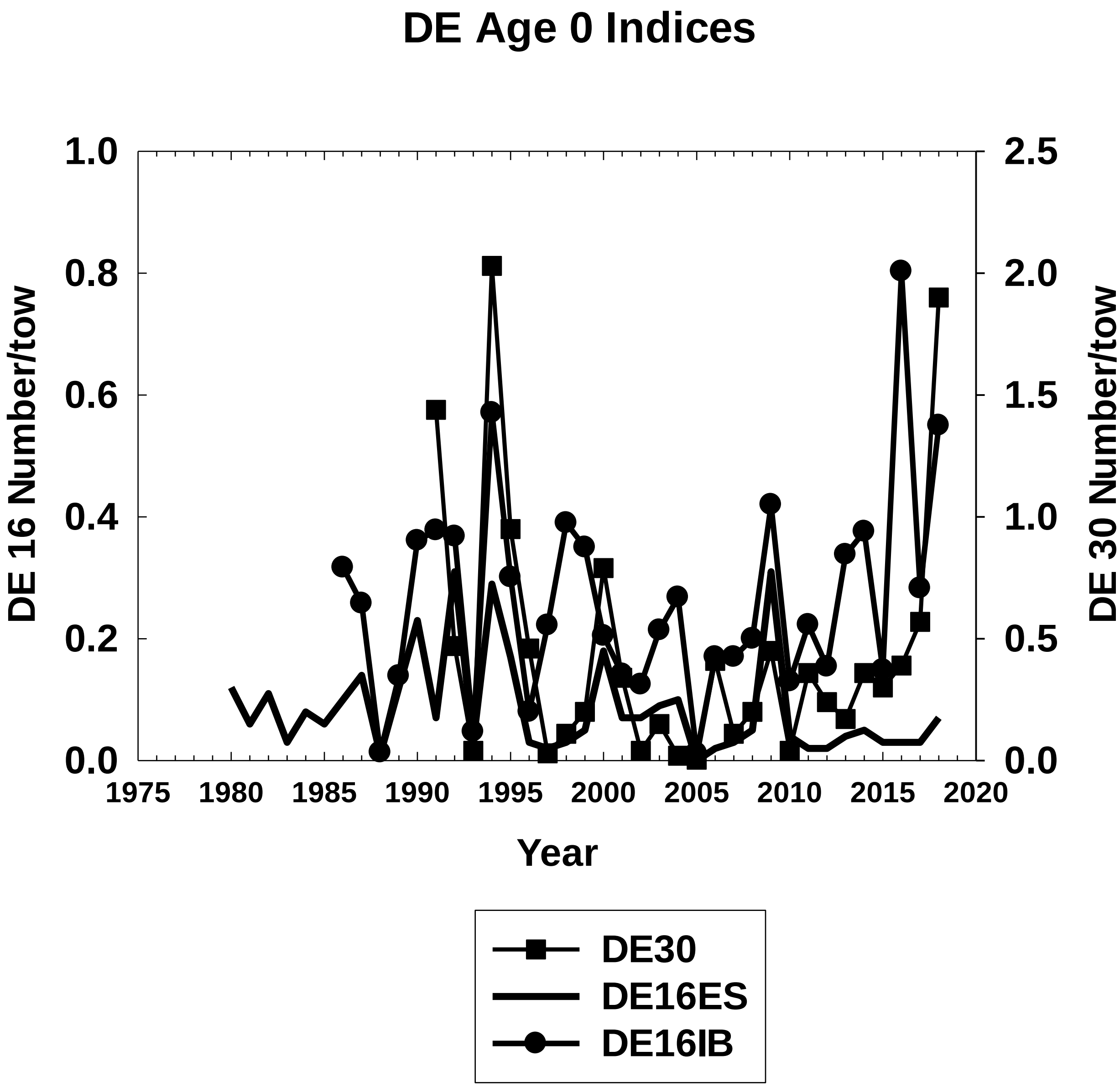

Figure 13. Delaware Division of Fish and Wildlife (DE) DEDFW annual 30-foot trawl (DE30), 16-foot estuarine (DE16ES), and 16-foot inland bays (DE16IB) trawl survey age 0 abundance indices for summer flounder.

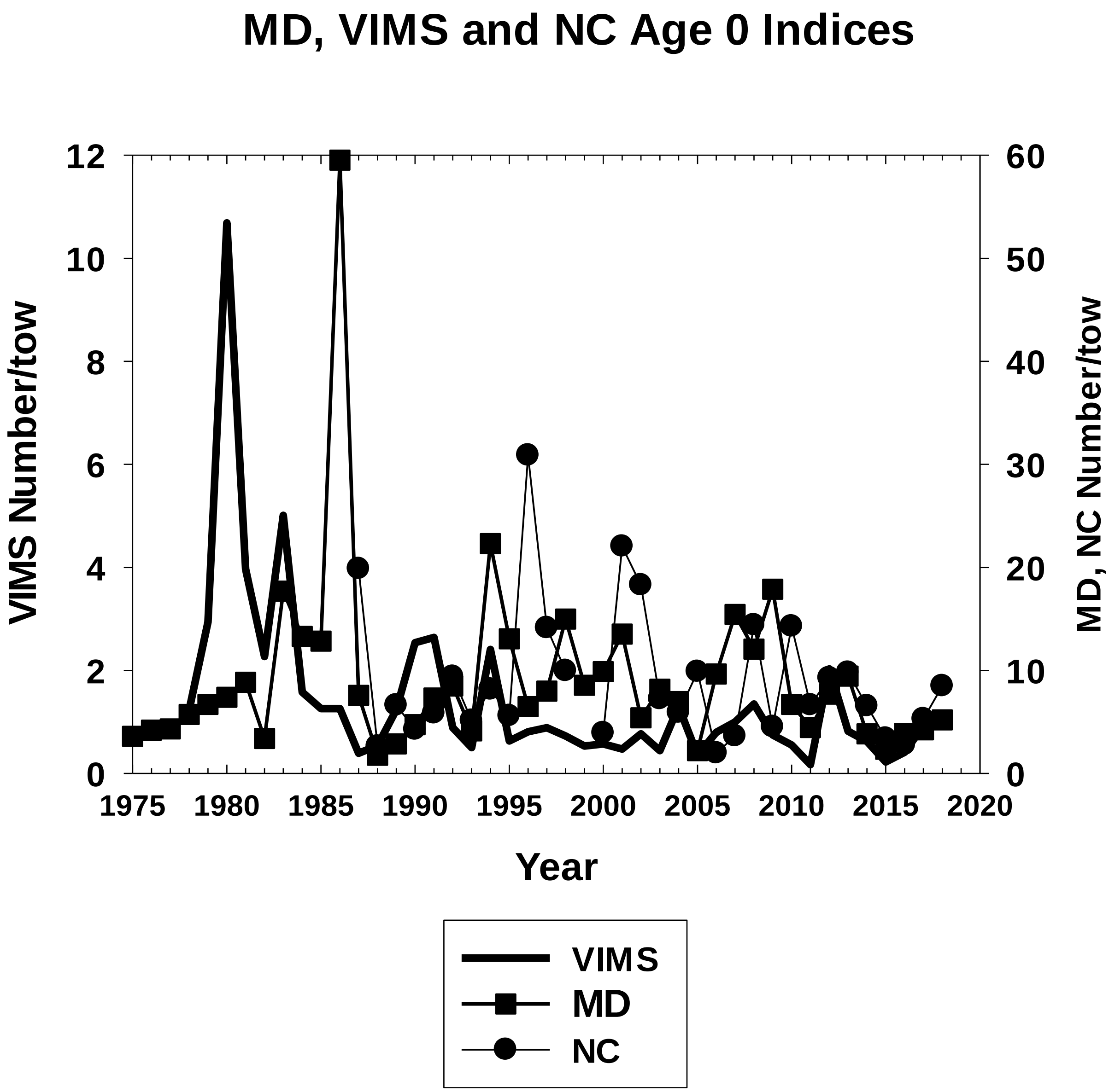

Figure 14. Maryland Department of Natural Resources (MD) annual trawl, Virginia Institute of Marine Science (VIMS) juvenile seine, and North Carolina Division of Marine Fisheries (NC) Pamlico Sound seine survey age 0 abundance indices for summer flounder.

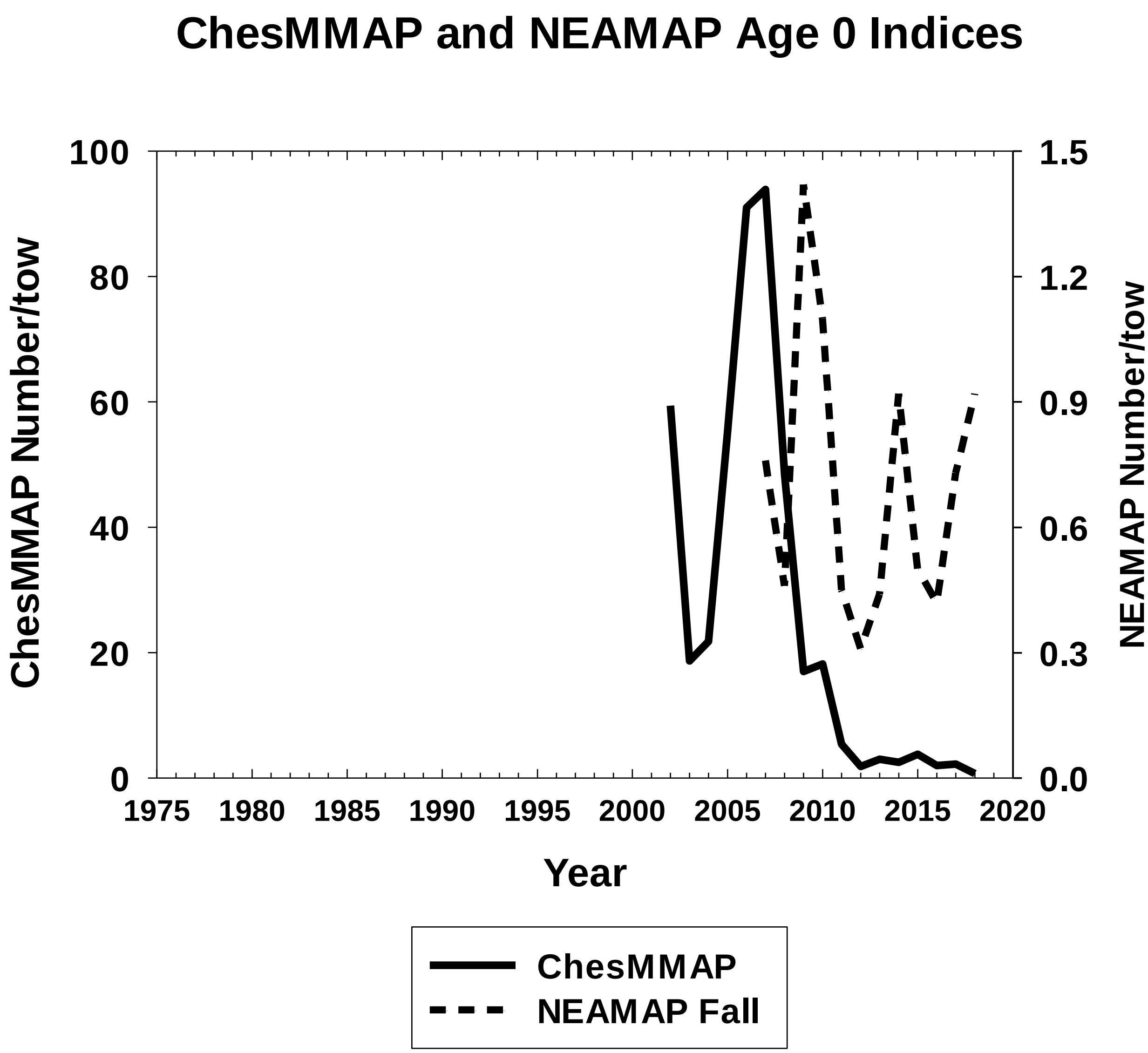

Figure 15. Virginia Institute of Marine Science Chesapeake Bay Multispecies Monitoring Assessment Program (ChesMMAP) annual and Northeast Area Monitoring and Assessment Program (NEAMAP) fall trawl survey age 0 abundance indices for summer flounder.

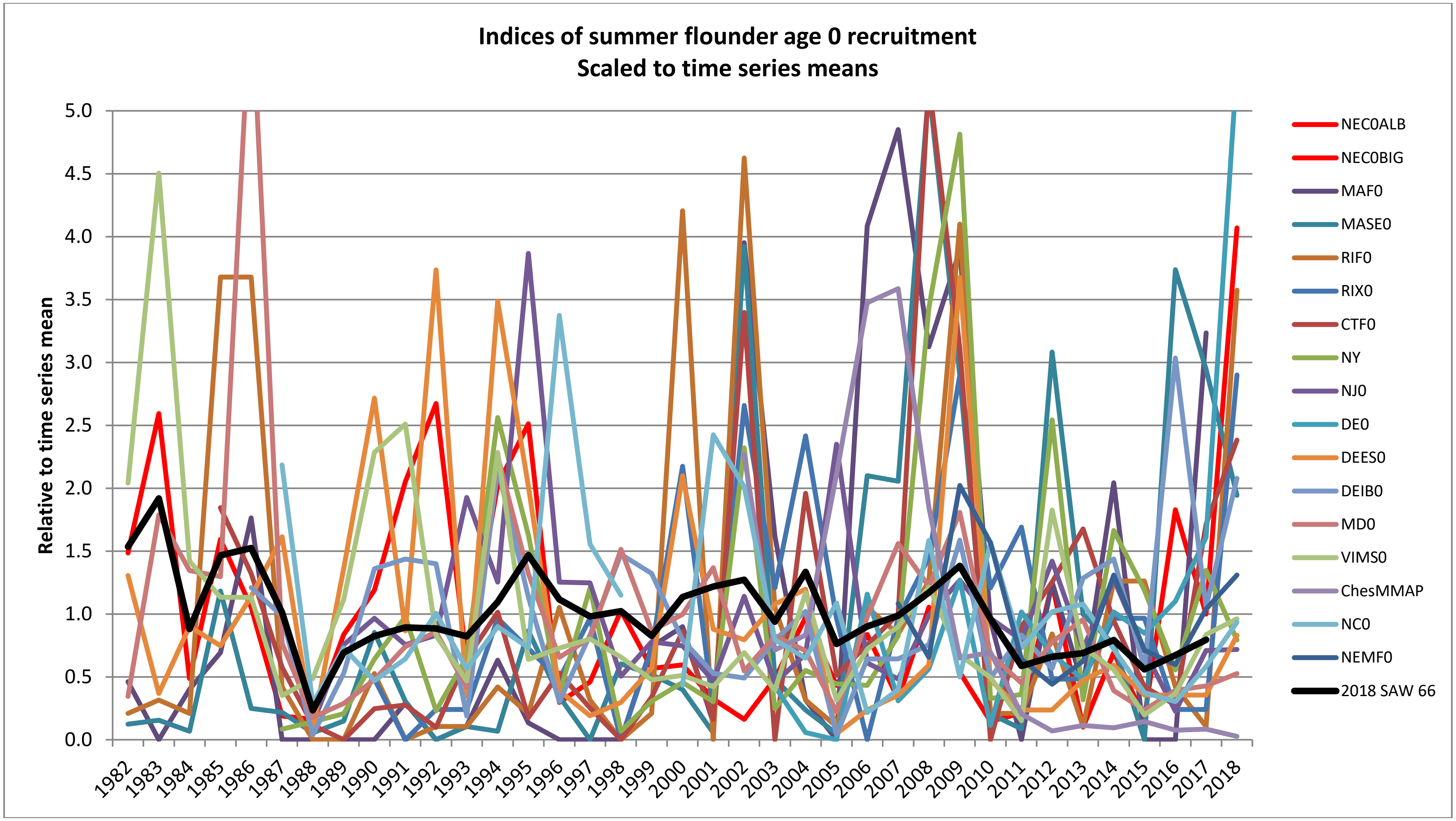

Figure 16. Summer flounder age 0 recruitment indices. Indices are scaled to the means of their respective time series. 2018 SAW 66 is the age 0 stock size estimate from the 2018 benchmark stock assessment.

Memo

To: Atlantic States Marine Fisheries Commission - Commissioners and Summer Flounder Board
Mid-Atlantic Fisheries Marine Council Members
Dustin Colson Leaning, Fishery Management Plan Coordinator ASMFC
Kiley Dancy Fishery Management Specialist MAFMC

From: Thomas B Smith

Date: September 15, 2019

Re: Executive Summary Summer Flounder Stock - Briefing Material Joint Meeting October 7, 2019 Durham Convention Center

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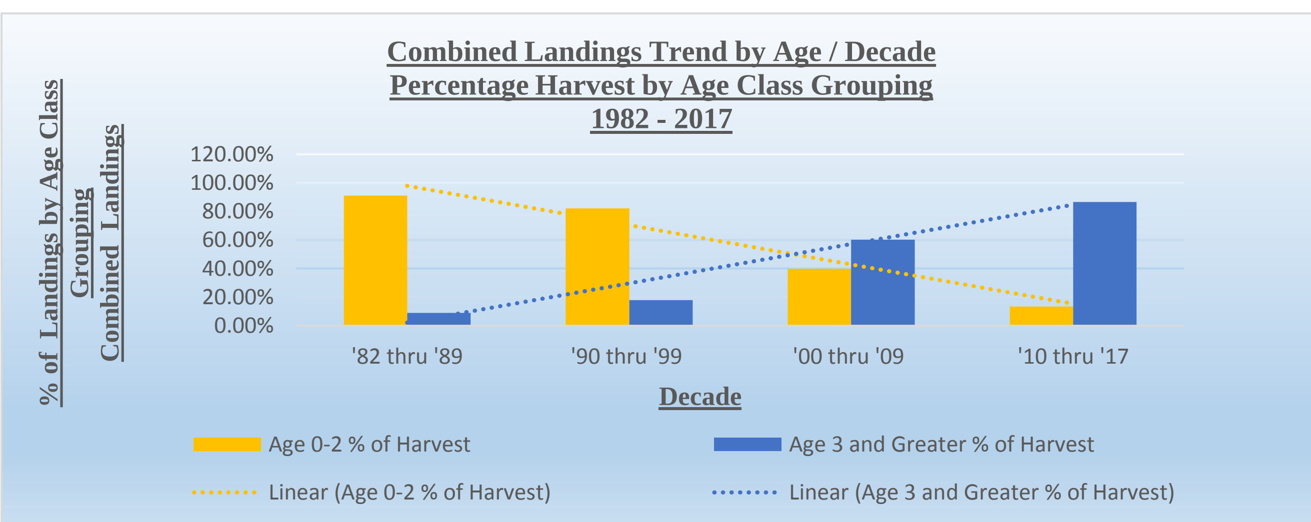
Executive Summary:

Following summation is predicated on data and analysis previously provided to various ASMFC and MAFMC personnel which can be found in this document as Exhibits 1 and 2 dated August 23, 2019 and September 5, 2019 respectively. The analysis, finding and conclusions mentioned in those previous memorandums are based on data extracted from the 66th and 57th Stock Assessment Reports.

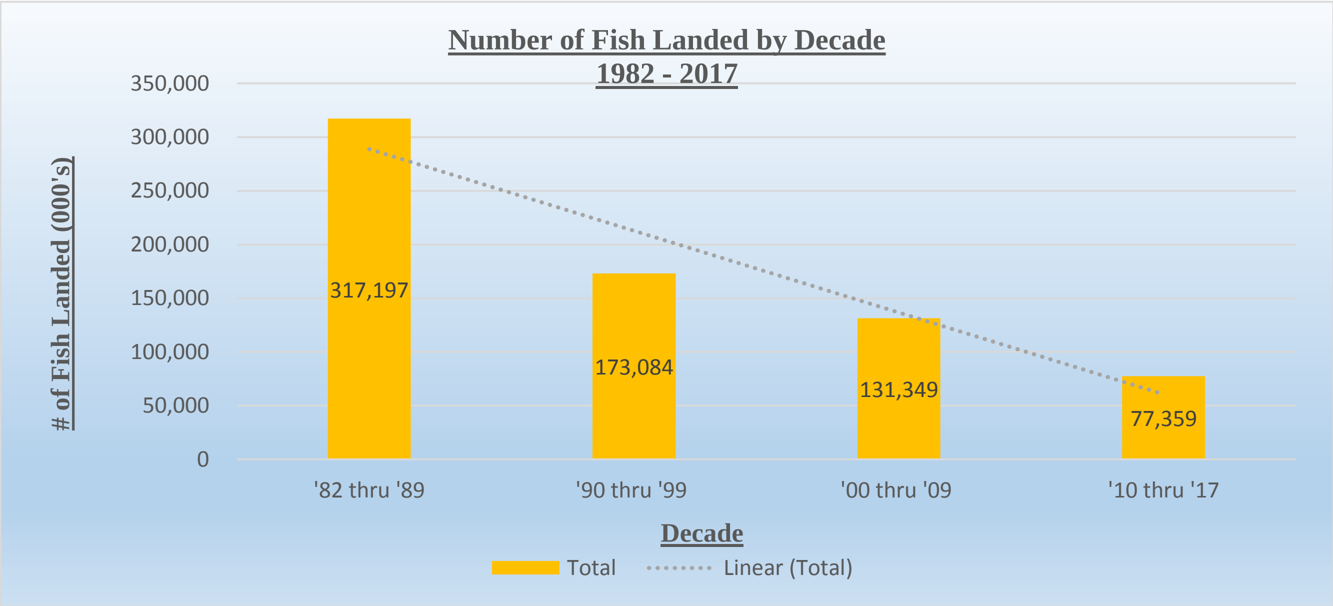
The intention of this summary is to elevate to the attention of the Commission and Council Members substantial changes and materially altering trends in the Summer Flounder Fishery leading to substantive declines in the fishery over the last 15 years. Declines caused by unintended consequences from past policy decisions which trend analysis all but guarantees will continue in the absence of a different philosophical approach to managing this fishery. The primary areas of concern are summarized below with further detail and support provided in Exhibits 1 and 2 of the document.

Primary Areas of Focus:

Combined catch composition (commercial and recreational) over the last four decades as it relates to age classes and number of fish harvested has experienced radical changes. Following charts illustrates that transformation.



- 91% of combined landings between the period 1982 to 1989 represented age classes 0 - 2. Safe to assume with a 13" or 14" minimum, most fish harvested within that period represented age classes 1 and 2.
- The trend of harvesting larger fish changed in the mid-nineties, accelerated over the following two decades of 2000 and continues today.
- For the period 2010 to 2017, ~87% of landings now consists of age classes 3 and above. Important to note that increase is not concentrated in any one age group, all age classes 3 and above have experienced substantial increases in harvest percentage-wise relative to the 80's and 90's.



- First and last decades represent 8-yr periods, 2nd and 3rd decades are 10-yr periods.
- Important to acknowledge the significant decrease in fish landed over this period of time and the corresponding effects on SSB and R
  - Average landings between 1982 – 1988 compared to landings between 1989 and 2017 with a 25% assumption for discard mortality factored in have decreased by more than **ONE BILLION** fish.
  - SSB grew between 1989 and 2003 by 900% as did R albeit at a lesser percentage. SSB reached its historical high in 2003 at ~68,000 metric tons "mt's".
  - From 2004 through 2017 SSB declined from 68,000 mt's to 43,000 mt's, a 37% decrease while R has declined from 71,270,000 to 42,415,000, a 40% decline. R in 2015 was 29,833,000, its lowest level since 1988 when SSB was a mere 9,000 metric tons.
  - **ONE BILLION** less fish landed over the last 28 years has translated to declines in the biomass, SSB and recruitment levels over the last 15 years.
  - Managing catch quotas is obviously an importat component of managing the fishery but catch in itself has been cut by over 75% over the last four decades and still the fishery is in a free fall decline over the last 16 years.

Gender Composition of SSB has been materially altered as catch levels have continued to focus on older age and predominantly sexually mature fish. Below chart illustrates the magnitude of that alteration.

Sex Ratio Table
Female Proportion by Age Group and Period

				Age				
Period	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7+**
'82 thru '17	33%							
'82 thru '99		55%	55%	90%	90%	80%	80%	90%
'00 thru '10		45%	45%	50%	50%	55%	55%	90%
'11 thru '17		30%	30%	45%	45%	55%	55%	70%

- Female composition of every age class comprising SSB has been weakened ranging from 22% to 50%. Absolutely material alteration in the gender composition of the spawning biomass.
- Recreational size limits mandates have caused the almost exclusive harvest of female summer flounder while commercial operators, albeit still allowed a 14" minimum, have elected to harvest older age fish to mitigate the economic impacts of 60% to 70% cuts in catch quotas since 1996.
- The regulations have materially altered the gender composition of SSB and as a result have caused significant damage to the relative recruitment strength of the stock.

Below table illustrates the above point causing a prolonged decline in recruitment, threatening the future viability and sustainability of the fishery.

Ratio Estimated Egg Production to R 1982 to 2017

Year	Projected Egg Production (000's)	Recruitment (000's)	R to Projected Egg Production Ratio	89 - '95 Average Ratio .00066%	Increased R at .00066% Ratio
1982	16,105,719,700	81,955	**0.00051%**	n/a	n/a
1983	20,266,944,900	102,427	**0.00051%**	n/a	n/a
1984	19,175,294,400	46,954	**0.00024%**	n/a	n/a
1985	15,058,322,300	78,263	**0.00052%**	n/a	n/a
1986	13,794,637,900	81,397	**0.00059%**	n/a	n/a
1987	13,342,443,400	53,988	**0.00040%**	n/a	n/a
1988	11,763,341,800	12,474	**0.00011%**	n/a	n/a
1989	6,282,419,900	36,963	**0.00059%**	n/a	n/a
1990	5,664,105,900	44,019	**0.00078%**	n/a	n/a
1991	7,223,653,000	47,704	**0.00066%**	n/a	n/a
1992	8,498,884,200	47,264	**0.00056%**	n/a	n/a
1993	7,780,877,800	43,928	**0.00056%**	n/a	n/a
1994	8,460,688,500	58,403	**0.00069%**	n/a	n/a
1995	9,923,683,000	78,348	**0.00079%**	n/a	n/a
1996	15,249,150,600	59,520	**0.00039%**	100,783	41,263
1997	20,908,251,400	52,374	**0.00025%**	138,185	85,811
1998	27,194,099,400	54,518	**0.00020%**	179,729	125,211
1999	27,367,751,200	44,100	**0.00016%**	180,876	136,776
2000	19,287,814,900	60,551	**0.00031%**	127,475	66,924
2001	19,544,092,300	64,979	**0.00033%**	129,169	64,190
2002	22,909,439,200	67,860	**0.00030%**	151,411	83,551
2003	26,921,143,000	50,131	**0.00019%**	177,925	127,794
2004	29,463,345,200	71,270	**0.00024%**	194,726	123,456
2005	31,034,259,000	40,634	**0.00013%**	205,109	164,475
2006	30,293,146,400	48,153	**0.00016%**	200,211	152,058
2007	32,232,028,500	52,646	**0.00016%**	213,025	160,379
2008	34,270,464,000	62,460	**0.00018%**	226,497	164,037
2009	37,500,208,300	73,747	**0.00020%**	247,843	174,096
2010	40,275,133,900	51,331	**0.00013%**	266,183	214,852
2011	35,047,836,100	31,296	**0.00009%**	231,635	200,339
2012	34,203,610,400	35,187	**0.00010%**	226,055	190,868
2013	32,301,264,900	36,719	**0.00011%**	213,483	176,764
2014	28,484,380,000	42,271	**0.00015%**	188,256	145,985
2015	26,389,524,600	29,833	**0.00011%**	174,411	144,578
2016	24,964,487,500	35,853	**0.00014%**	164,993	129,140
2017	24,131,440,800	42,415	**0.00018%**	159,487	117,072

The above table reflects the trend in the ratio of published recruitment statistics relative to estimated egg production from 1982 to 2017. Trend is alarming to put it mildly in terms of the drop off in egg production over the last decade and reduced ratio of new recruits relative to egg production between the years 1996 and 2017 (red shaded area). Projected egg production is in **TRILLIONS** and arrived at by taking biomass population by age group times percentage sexually mature fish times assumed percentage of females times an assumed number of eggs produced per female which is extremely conservative. Recruitment numbers are in **MILLIONS**. Again all based on data from the 66th SAW, details which can be found in Exhibit 2.

Estimated egg production began increasing in the 90's after catch levels were brought under control. This marked the beginning of the period 1989 to 2003 when SSB increased 900%. In 1996, there was a noticeable and significant decline in recruitment statistics relative to estimated egg production which has continued since and become substantially more extreme. 1996 coincides with the beginning of the trend harvesting larger fish and could very well be impacted by the higher percentage of the overall commercial harvest occurring during the fall and winter offshore seasons, the primary spawn period for summer flounder. Either way, this is a cataclysmic change in recruitment statistics based on a 35-yr trend and not a one-time anomaly. To add color, recruitment in 1983 was 102 million relative to estimated egg production of ~20 trillion and an SSB of 29,000 metric tons. In 2017, SSB was ~43,000 metric tons, estimated egg production was ~24 trillion while new recruits were a mere 42 million, an ~60% decrease in recruitment based on an ~48% increase in SSB. Until this trend is understood and corrected, the fishery will continue the path of decline it's been on since 2004. **If the above statistics are wrong, then recruitment levels are significantly higher than reported and the stock is in a much healthier condition than reported in the assessment. If the statistics are correct, there's a dire problem in the fishery not being addressed. My personal opinion is the later.**

If we're to believe the above data, this fishery will never recover with the current regulations. Below average recruitment levels are the result of material alterations in the gender composition of SSB due to the increased harvest of older age class fish. **But the data also reveals egg production in the absolute is up, yet recruitment levels as a percentage of that increased egg production have decreased by as much as 80% which points to a completely different problem. Egg production isn't translating into new recruits. At minimum you have to consider the consequences the offshore commercial fishery is having on the primary spawn of these fish as they migrate to their wintering grounds in the most highly concentrated schools on record.** The impacts of below average recruitment will be felt for years and since recruitment has been down significantly for the last 8 to 9 years not including 2018 and 2019, the fate of the fishery over the foreseeable future has already been determined. Even with draconian cuts in catch amounting to more than a billion less fish harvested in the last 28 years, recruitment which is the cornerstone of any fishery is in a free fall, an unexplained free fall based on comments made in the "Special Comments" section of the 66th SAW but one I believe to be very explainable based on what's been outlined above. Lower recruitment levels combined with the increased harvest of older age classes (compounded by this year's 40% increase in commercial catch quota) will result in further erosion in the gender and age composition of SSB causing continued damage to recruitment strength of SSB which will only exacerbate the current recruitment problem. This extremely vital fishery is in a downward spiral which won't correct itself without changes to the current regulations and a philosophically different approach managing the fishery.

Between 2005 - 2017, new recruits numbered approximately 582 million. For the same period, landings were 132 million meaning there were 450 million fish additive to the biomass. *The biomass population actually decreased over that period by ~62 million fish from 183 million to 121 million which means based on models approximately 500 million fish were removed from the biomass over that timeframe.* Mortality rates for new recruits are already factored into the above recruitment statistics. Dead discard rates since I'm addressing landings would make up some of the difference but even if I applied a 25% factor to the 132 million in landings it would only explain approximately 45 million of the difference. Question is "What happened to the other 465 million fish?" Answer I received is the difference relates to mortality caused by factors other than fishing including disease, predation, environmental etc. If that's true and 80% (465 million / 582 million) of the biomass population will succumb to non-fishing related mortality, it magnifies the need more than ever to protect the spawn otherwise it stands no chance of recovery.

Combine the above with the following excerpt from **TOR6** (Terms of Reference) from the 66th SAW *contributing factors. Regardless of cause, declines in survey indices suggest that current mortality from all sources is greater than current recruitment inputs to the stock. If recruitment improves, current catches may allow the stock to increase, but if recruitment remains low or decreases further, then reductions in catch will be necessary.*

66th SAW Assessment Report 22 A. Summer Flounder

along with Special Comments from page 17 of the 66th SAW

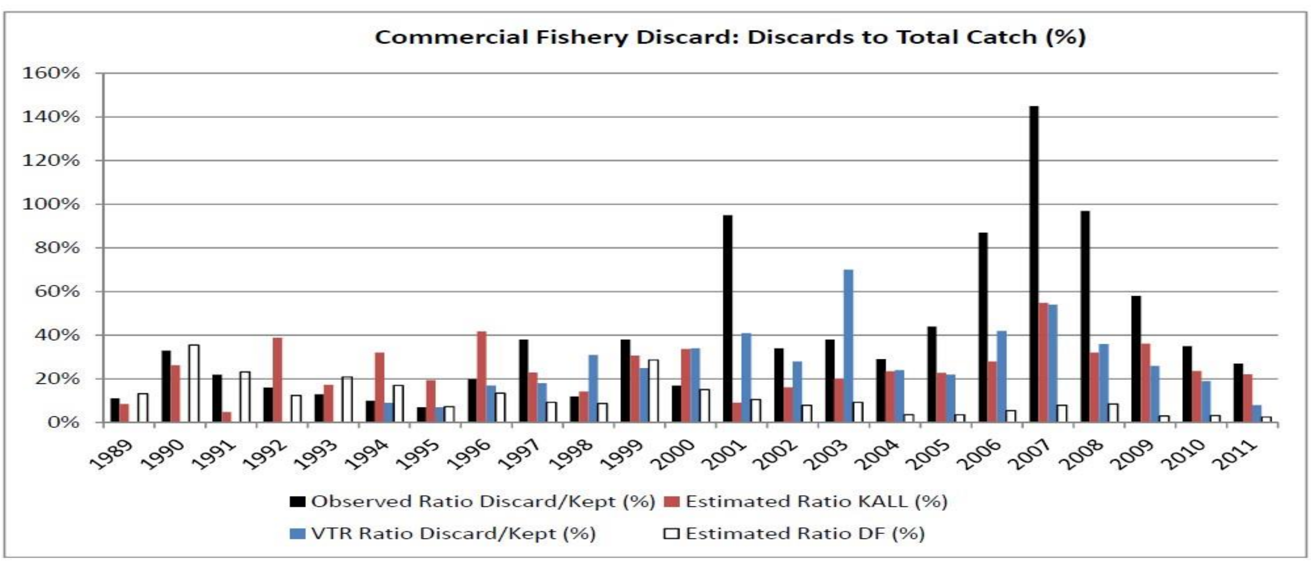
Special Comments

The assessment shows that current mortality from all sources is greater than recent recruitment inputs to the stock, which has resulted in a declining stock trend. Although recruitment indices have been below average in the most recent years, the driver of this pattern has not been identified, nor is it clear if this pattern will persist in the future.

66th SAW Assessment Summary Report 17 A. Summer Flounder

and it essentially summarizes the resulting impact of the chronology of events outlined above.

Please review Section 9 of Exhibit 1 titled "Commercial / Recreational Discard Rates" as well as the below graph from ***page 302, 57th SAW***. Comparable information was not included in the 66th SAW for years 2012 to 2017.



Revealing chart regarding commercial discard trends comparing percentages from observed trawls to percentages obtained from VTR's. The disparity between both is substantial and if observed trawl percentages were used in models it would have significant implications quantifying annual commercial catch levels. Post 2000, observe the spike and degree of difference in percentage discards between observed trawls and percentages submitted on VTR's. In all but one year (2003), observed discard percentages significantly exceed non-observed. In 2001, 2006, 2007 and 2008, percentages exceeded 80% of catch with a high of ~143% in 2007. 2009 was almost 60% itself. Compare these relationships to 1994, 1995 and 1996 when the percentages were substantially lower and relatively comparable.

When the "1997 Fishery Specifications", page 28 of the 66th SAW report, increased the commercial size limit from 13" to 14" and commercial landings plummeted from 15.4 million lbs. in 1995 to 8.8 million pounds in 1997, it's my opinion these were the critical factors and impetus leading to the trend in the commercial harvest of older age fish which has continued through today. A trend which resulted per the above chart in a catastrophic increase in dead discard mortality, by-catch mortality, the harvest of larger sexually mature summer flounder and a primary reason why recruitment levels have ultimately fallen.

Commercial discard rates in the 66th SAW report average ~17% for the period 2000 to 2017. The above graph for the same period reflects one year within that time frame (2000) where discard rates on observed trawls as a percentage of catch is below 20%. One year in eighteen! Every other year is considerably higher with the five years referenced above having a combined average of almost 100%. Why would the commercial rates used in the models be materially lower than rates from observed trawls which would significantly increase commercial catch statistics and discard amounts. At the same time, recreational discard rates have been increased based on the new MRIP model with information that the Technical Committees themselves characterized as having high degrees of uncertainty. Two completely opposing standards used in arriving at discard rates. Empirical evidence from commercial trawl activity is ignored while highly speculative data from MRIP is used in quantifying recreational catch.

Additionally, please review Section 8 of Exhibit 1 titled "Commercial / Recreational Access to Biomass" as size limit disparities between commercial and recreational groups have provided commercial interests with harvest access to an estimated 35% greater portion or approximately 27 million more fish of the harvestable biomass. Recreational discards are subsidizing the increased composition of commercial catch consisting of older age fish while creating unprecedented levels of dead discard mortality as evidenced by the above charts.

The above narrative outlines the road map and reasons causing a once thriving fishery two decades ago to reverse fortunes and begin a 15-yr decline which continues today and will continue until regulations are changed. Regulations have created an enormous imbalance in the fishery, in catch composition leading to an age and gender imbalance in SSB. **THOSE CHANGES HAVE DESTROYED THE RECRUITMENT STRENGTH OF THE FISHERY**. If changes aren't made in the management of this fishery, the decline will continue until the only options left are one's no one really wants to consider. Recreational size limits have to come down. Commercial catch sizes have to come down and discard percentages need to be dealt with. The primary spawn, today more than ever, needs to be protected and serious consideration needs to be given to closing the fishery during that time frame to commercial netting. I'm not advising reduced quotas; I'm suggesting re-allocating of existing quotas as to not coincide with the spawn. I know that recommendation will be met with tremendous resistance by some but we can ignore the facts and lose another valuable fishery or acknowledge the facts, make the tough decisions and save this fishery for the future benefit of both commercial and recreational constituencies. Those are the choices the Commission and Council need to make.

Commercial operators have as much right to harvest and make a living from this public resource as the hundreds of thousands if not millions of recreational anglers have the right to access the same resource. Neither party's rights can be at the health of the fishery or the expense of other constituent's rights and the countless businesses dependent on it. The answer for recreational is a slot limit needs to be introduced and size limits need to gradually be brought back to the sizes in place in the 90's and early 2000's when SSB grew by 900% and recruitment remained strong relative to today's levels. Commercial needs to have their ex-vessel values protected which legislation should be able to accomplish. The Federal government, the most powerful institution in the world, should be able to insure that happening. Make every lb. of summer flounder the same price so that small, medium, large and jumbo fish all demand the same price per lb. and the issue of high grading is immediately eliminated while dead discard and by-catch mortality levels should be materially reduced. Larger fish won't need to be harvested providing much needed relief to the older age groups which have all declined in population other than 7+ which comprises the smallest percentage of the overall biomass population. If retail summer flounder prices are in the $20/lb. plus range, commercial operators deserve a bigger piece of that pie. If it has to be absorbed by consumers or others involved in the distribution chain, make it happen but commercial operators who risk capital and safety harvesting the ocean's bounty deserve to be kept whole and fairly compensated. They assume the risks; they deserve to make a respectable profit, justify their investment and be able to carve out a comfortable living as generations before them have. But balance in the fishery needs to be restored otherwise like cod, whiting, mackerel, winter flounder, weakfish etc., everyone loses. As I mentioned, the decision and power rests in the hands of the Commission and Council to rebuild this fishery but future catch cuts or shortened recreational seasons without addressing age and gender composition of catch won't address the issues causing the fishery's 16-yr decline. If regulations aren't changed addressing the above mentioned problems which have absolutely decimated recruitment levels, it all but guarantees we'll lose this extremely important fishery and as I said earlier everyone loses.

Exhibit 1

Memo

Exhibit 1

To: Dustin Colson Leaning, Fishery Management Plan Coordinator ASMFC
Kiley Dancy Fishery Management Specialist MAFMC

From: Thomas B. Smith

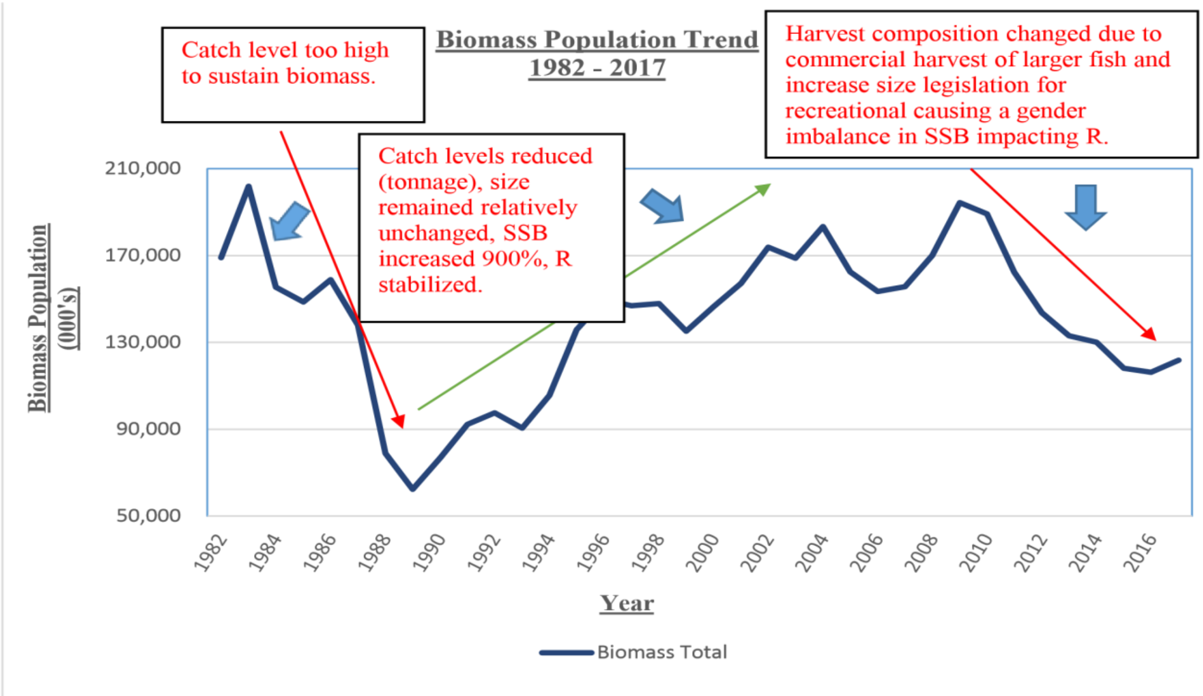
Date: August 23, 2019

Re: Status Summer Flounder Stock

TABLE OF CONTENT:

INTRODUCTION:

I've spent the better part of the last three years researching and analyzing data regarding the summer flounder fishery and reading extensive amounts of material provided in both the 57th and 66th SAW reports. A lot of information to work with, a lot of divergent theories and opinions being discussed. I'd like to share mine with the Commission and Council in the hopes it might add a different perspective on the issues holding the fishery back. Please review and reference the following with an objective perspective, the following analysis and observations were made to assist in the management of the fishery, return it to health and benefit the many who depend on it for their livelihood or recreational enjoyment.



SSB per the above illustration declined dramatically between the years 1982 to 1989, the result of overzealous catch levels disproportionate to the size of the biomass and SSB. Once catch levels were adjusted downward (per the below graph in Section 1), an absolute correct decision by fishery management, SSB embarked on a 15-yr increase from approximately 7,000 metric tons in 1989 to approximately 68,000 metric tons in 2003 or an almost 900% increase over that period. An increase associated with significantly higher recreational possession limits and significantly lower recreational size limits along with catch levels considerably greater than today for both recreational and commercial concerns. Obviously the regulations in place for a majority of that period were responsible for fueling the growth of the fishery.

What the facts will show which began in the mid-nineties and accelerated in subsequent decades, in my opinion changing the trajectory of the fishery, were two changes. First the harvest of larger older age class fish by commercial operators in spite of maintaining a 14" minimum along with a similar increase by recreational anglers due to the onset of increased size regulations addressed below completely altering the age and sex composition of catch over the last four decades. Second, the consequences of that alteration in catch composition led to an equally and conceivably more relevant imbalance in the gender composition of SSB ultimately causing a substantive decline in recruitment statistics. Reference to both matters are documented in the Catch and Recruitment sections of this document.

If we're in agreement the data, which is marine fisheries own data, is indeed illustrating the above, why would we deviate from regulations which promoted 900% growth in SSB, allowed higher harvest levels, maintained continuity in harvest sizes between recreational and commercial interests to regulations which over the last 14 years that have caused a 35% decline in SSB, an almost 30% reduction in the overall biomass population, lower recruitment levels, increased size limits and lower possession limits for recreational anglers, 50% cuts in catch levels, a completely disproportionate share of the biomass to harvest (~35% of population or ~35 million fish) available only to commercial with no new management methodologies on the foreseeable horizon which would provide hope or reason to believe these trends won't continue. Regulatory decisions since the early 2000's have caused a series of unintended consequences leading to the above. Until policy decisions are made which address catch composition, SSB will continue its decline as will recruitment levels and the fishery stands no chance of rebuilding. Reducing catch quotas, increasing or even maintaining size limits or shortening seasons recreationally will not change the trajectory the fishery is on, the last 15-years prove that. None of those change catch composition or the trend of harvesting larger sexually mature fish with higher proportions of females having higher degrees of fecundity which are the cornerstones of the decline we've been witnessing since 2004.

SECTION 1. – CATCH :

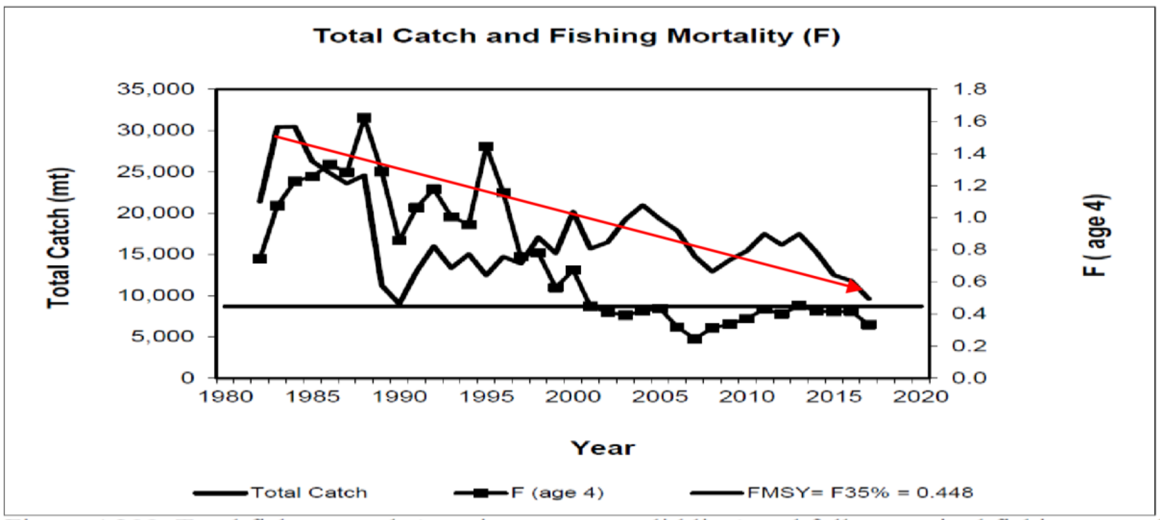
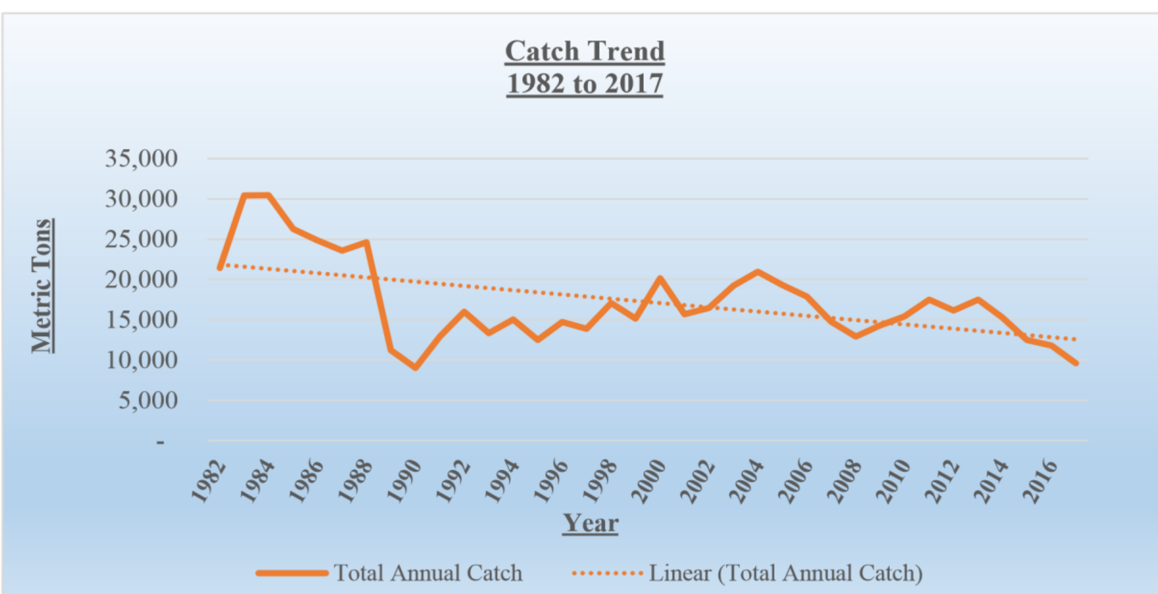


Figure A209. Total fishery catch (metric tons; mt; solid line) and fully-recruited fishing mortality (F, peak at age 4; squares) of summer flounder. The horizontal solid line is the 2018 SAW-66 recommended fishing mortality reference point proxy FMSY = F35% = 0.448.

Source 66th SAW Assessment Report - Page 448



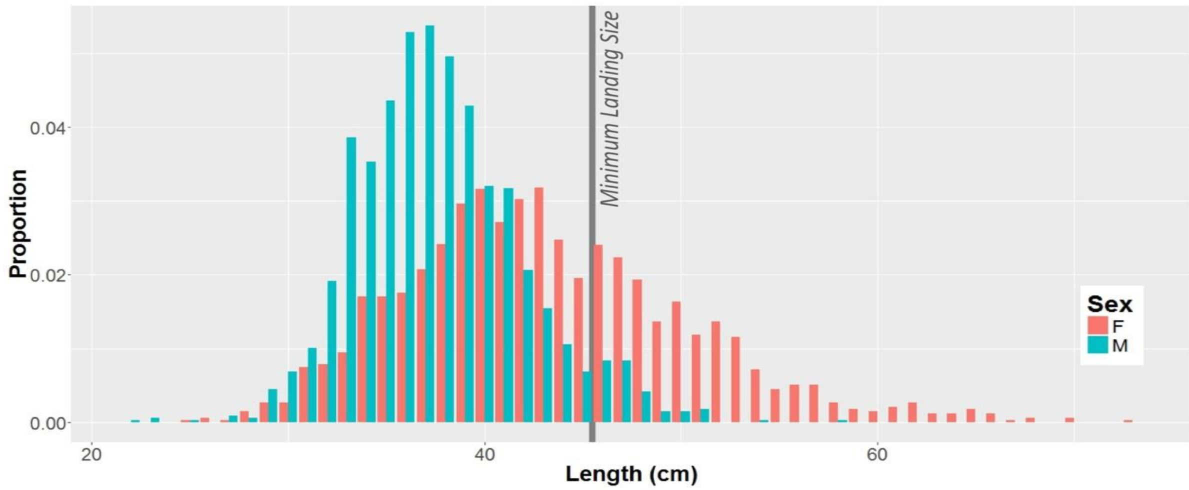
Catch per the above graph illustrates a declining trend over the last 35 years. Catch between the years 1982 to 1989 averaged ~24,000 metric tons annually while SSB averaged 21,000 metric tons a year. Too high a percentage of SSB was being harvested annually and SSB as a result declined from ~31,000 metric tons in 1982 to ~7,000 metric tons in 1989, its lowest level in the last 38 years. In 1989, fishery management made the right decision cutting catch levels by more than 50%, remained within that range over the ensuing years with modest increase through 2003 when SSB reached its highest level at ~68,000 metric tons, a 900% increase throughout that timeframe.

It's important to note when catch levels were cut by more than half from an average of 25,940 metric tons annually between 1982 to 1988 to 14,824 metric tons in 1989, tonnage was cut while size limits were left unchanged for both recreational and commercial concerns. At the time, size limits were either 13 or 14 inches, the same for both recreational and commercial. On the surface that might appear an innocuous point but I believe it's relevant when size limits began changing between groups which I touch on later in the document. It wasn't until 1997 recreational size limits increased above 14 inches to 14.50, 15 inches for 1998 to 1999, 15.50 inches for 2000 and 2001 and increased to 17.04 on a weighted average basis between NJ, NY, Ct and RI in 2002 when Framework 2 establishing state-specific conservation equivalency measures became effective. Recreational sizes continued increasing over the ensuing years to a high of 19.68 inches in 2009 to the current 18.82 inches today, again on a weighted average basis per the below table.

Analysis of State Recreational Size and Possession Limits
New Jersey, New York, Connecticut and Rhode Island
Years 2002 to 2019

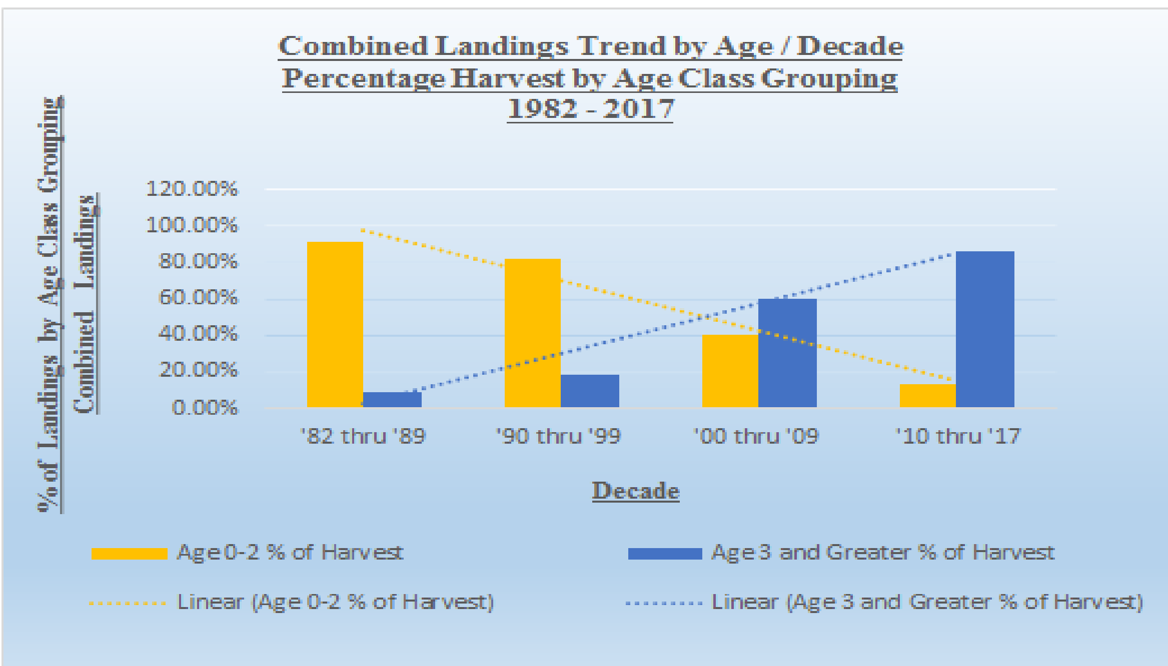
	- - - - - - - Size - - - - - - -				- - - - - - - Possession - - - - - - - -							
Year	**NJ**	**NY**	**Ct**	**RI**	**NJ**	**NY**	**Ct**	**RI**	**Total**	**Weighted Average Size**	**CM's**	**Average Possession**
2002	16.5	17	17	18	8	7	6	5	26	17.04	43.28	6.5
2003	16.5	17	17	17.5	8	7	6	5	26	16.94	43.03	6.5
2004	16.5	17.5	17	17.5	8	3	6	7	24	17.04	43.28	6.0
2005	16.5	17.5	17.5	17.5	8	5	6	7	26	17.19	43.66	6.5
2006	16.5	18	18	17.5	8	4	6	7	25	17.38	44.15	6.3
2007	17	19.5	18	19	8	4	8	7	27	18.19	46.20	6.8
2008	18	20.5	19.5	20	8	4	5	7	24	19.31	49.05	6.0
2009	18	21	19.5	21	6	2	3	6	17	19.68	49.99	4.3
2010	18	21	19.5	19.5	6	2	3	6	17	19.15	48.64	4.3
2011	18	20.5	18.5	18.5	8	3	3	7	21	18.60	47.24	5.3
2012	17.5	19.5	18	18.5	5	4	5	8	22	18.34	46.58	5.5
2013	17.5	19	17.5	18	5	4	5	8	22	17.95	45.59	5.5
2014	18	18	18	18	5	5	5	8	23	18.00	45.72	5.8
2015	18	18	18	18	5	5	5	8	23	18.00	45.72	5.8
2016	18	18	18	18	5	5	5	8	23	18.00	45.72	5.8
2017	18	19	19	19	3	3	3	4	13	18.77	47.68	3.3
2018	18	19	19	19	3	4	4	6	17	18.82	47.80	4.3
2019	18	19	19	19	3	4	4	6	17	18.82	47.80	4.3

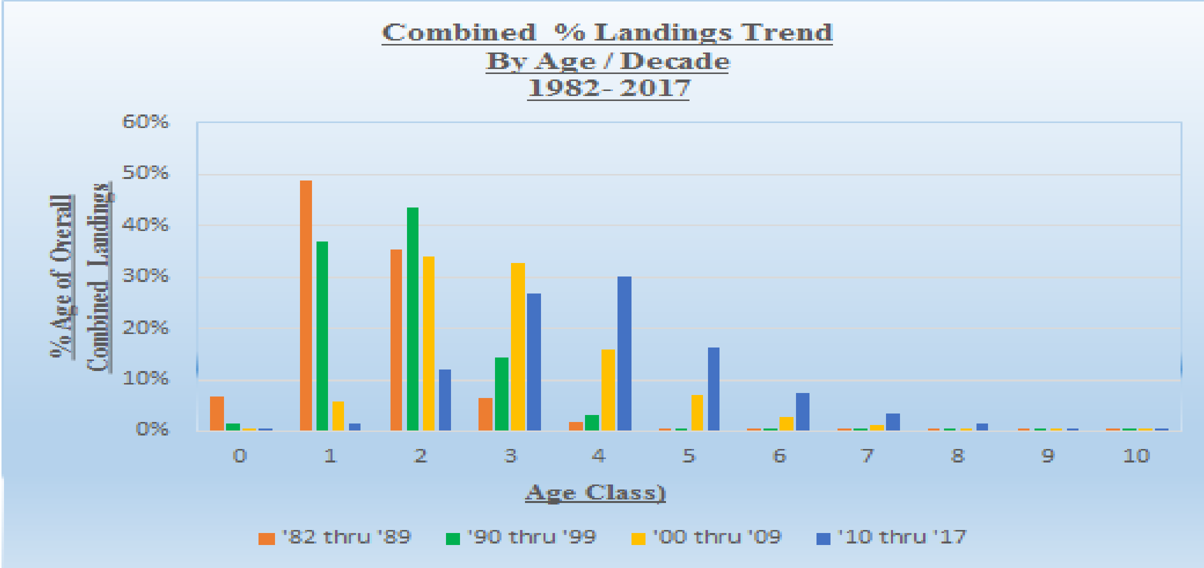
Note:
NY '04 had a season of May 15 - Sept 6. Size limit 17" through 7/30 and raised to 18" remainder of season. 17.5" used for analysis.
Ct. has ~46 designated shore sites with lower size limits, state-wide size limit used for analysis.
NJ has lower size limits in certain years for Delaware Bay and Long Beach Island, state-wide size limit used for analysis.
Above 4 states comprised 81% of average recreational landings for the years 2015 - 2017. Source Page 85 - 2019 Summer Flounder Specifications

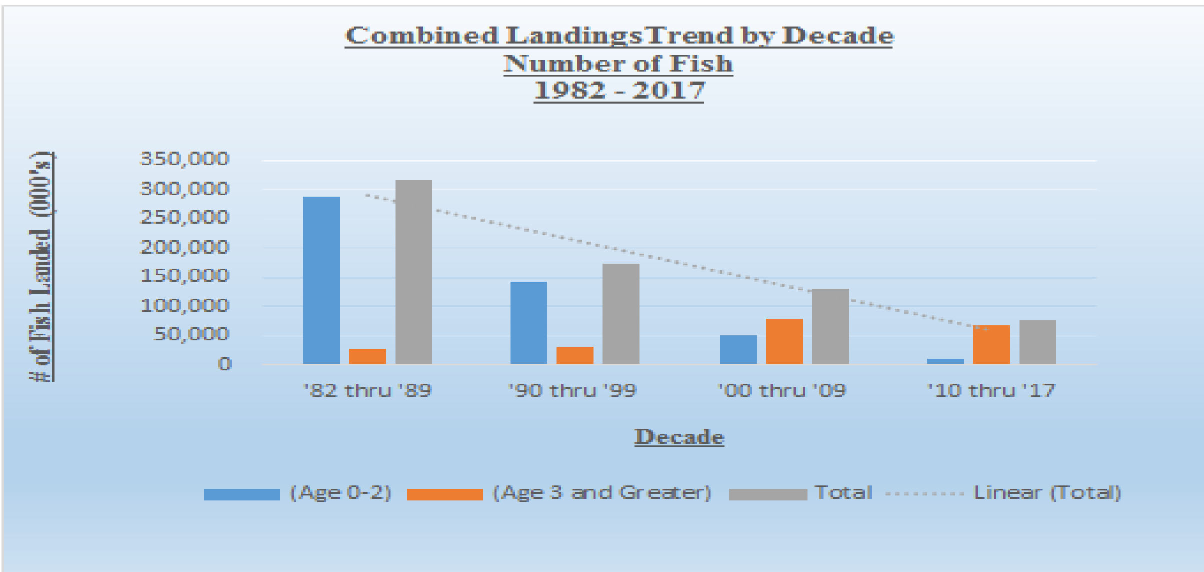


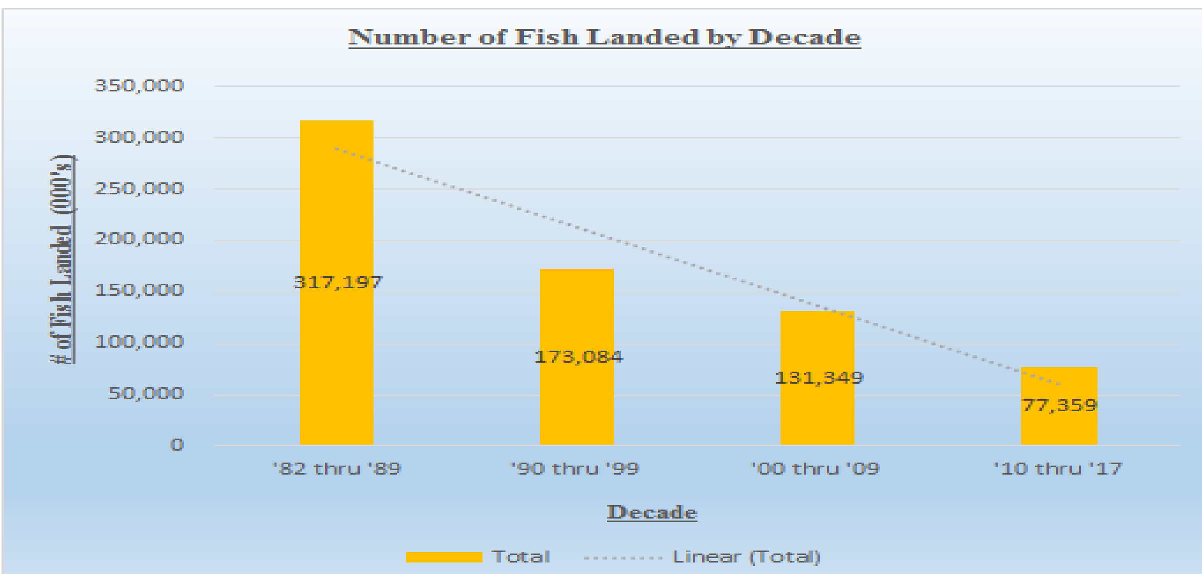
Source for above graph is **R*utgers Sex and Length Study*** and the minimum landing size bar is 18 inches or 45.72 centimeters. Observe the disproportionate change in gender mix based on increased sizes which begins at approximately 42 centimeters or 16.50 inches. In the above
"State Size and Possession Limit" table, there's not one year from 2002 forward which falls below that threshold. Pay special attention to how the composition intensifies as size increases.

SECTION 2 - LANDINGS COMPOSITION CHANGE:

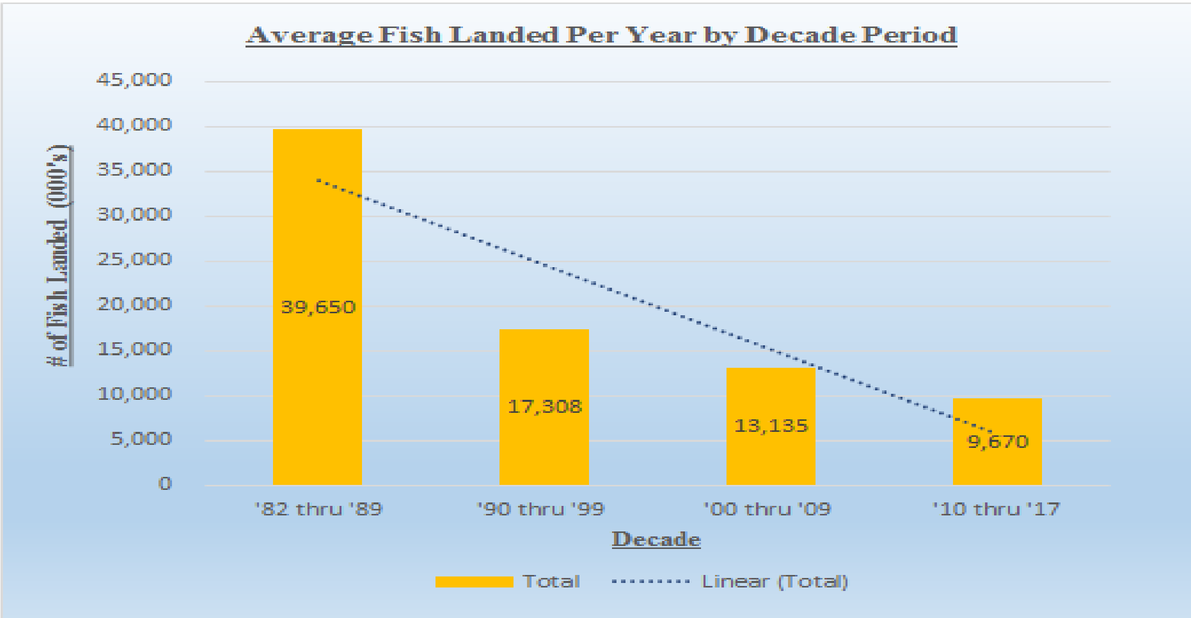



Combined % Landings Trend
By Age / Decade
1982- 2017
% Age of Overall Combined Landings
60%
50%
40%
30%
20%
10%
0%
0
1
2
3
4
5
6
7
8
9
10
Age Class)
'82 thru '89
'90 thru '99
'00 thru '09
'10 thru '17


Combined Landings Trend by Decade
Number of Fish
1982 - 2017
# of Fish Landed (000's)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
'82 thru '89
'90 thru '99
'00 thru '09
'10 thru '17
Decade
(Age 0-2)
(Age 3 and Greater)
Total
Linear (Total)

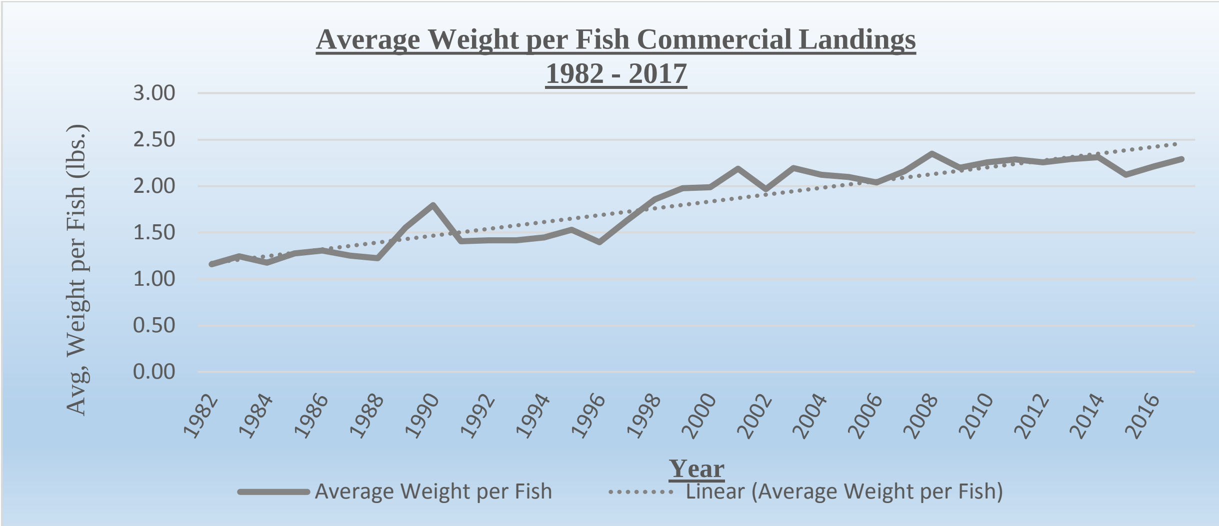

Number of Fish Landed by Decade
# of Fish Landed (000's)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
317,197
173,084
131,349
77,359
'82 thru '89
'90 thru '99
'00 thru '09
'10 thru '17
Decade
Total
Linear (Total)

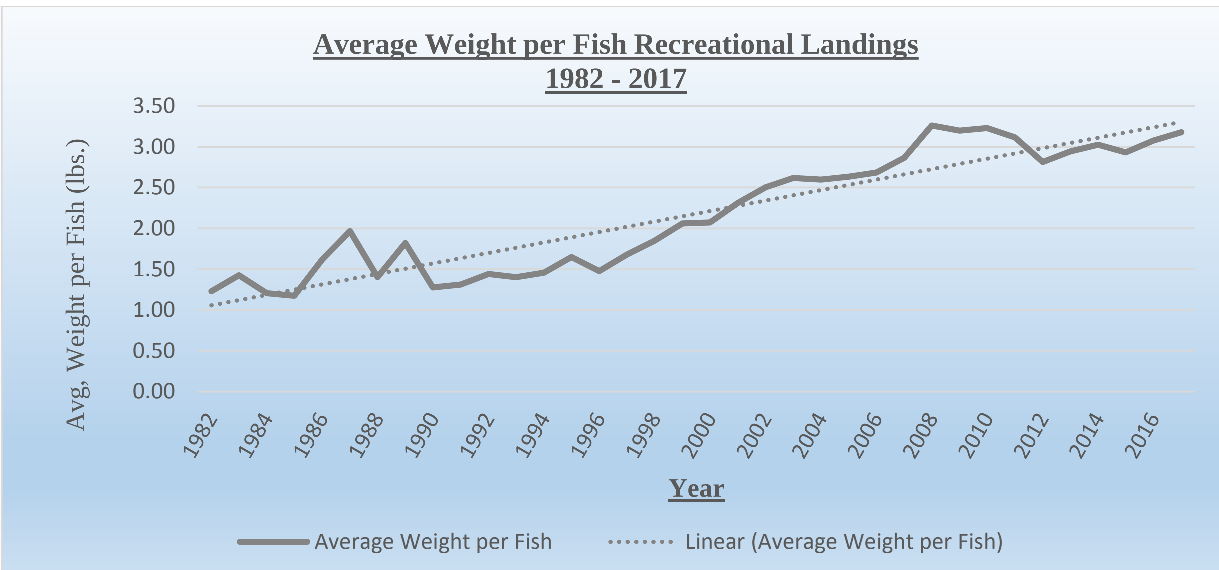
Keep in mind the data in the above landings graph for '82 thru '89 and '10 thru '17 represents 8 years in each of those decades compared to ten years in the 90's and first decade of 2000 based on the availability of data in the 66th SAW. That makes the decrease in landings between the 80's and today even more extreme and equates to approximately 300 million or 75% less fish being harvested in the current decade than the 80's, an amazing reduction in catch which has not been able to stem the decline of the biomass, SSB and recruitment. Primary reason I believe managing the fishery simply through reduced catch levels and or shortened seasons is not going to change the trajectory of the fishery or address the problems causing its decline.

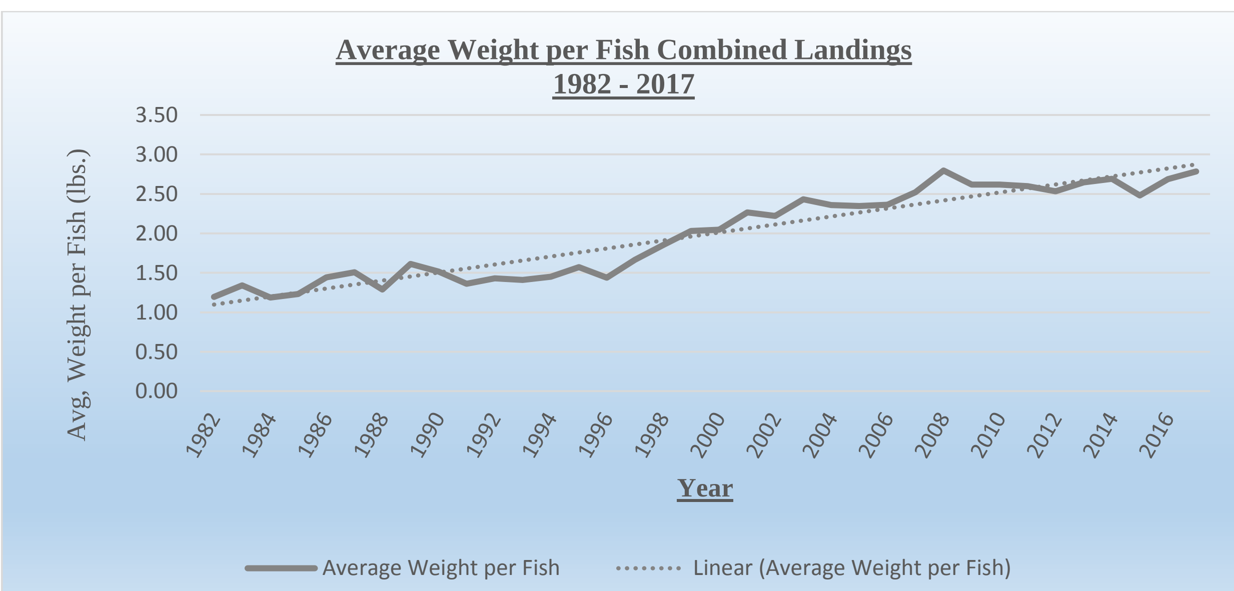


The above graph deals with the same information but to neutralize the disparity of months in each decade is presented in terms of average yearly fish landings. Trend and percentage reduction in landings over the last four decades would elicit the same conclusion as above.

SECTION 3 - AVERAGE WEIGHT OF LANDINGS TREND:

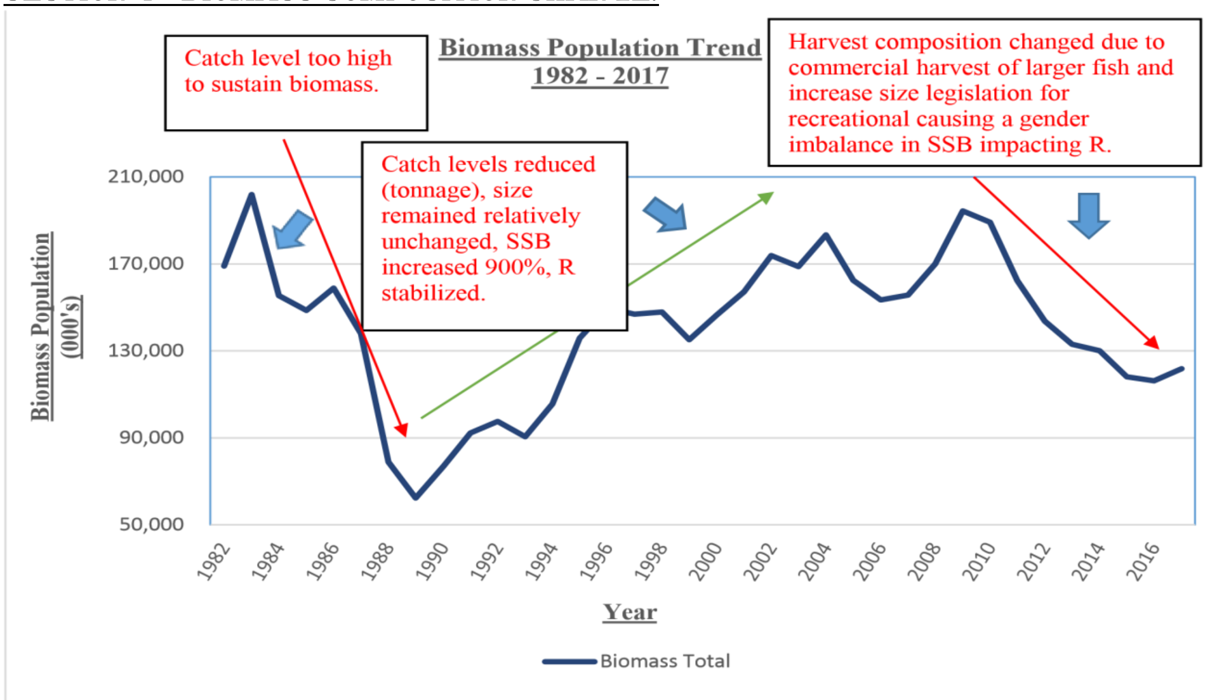






The above charts illustrate observations made in previous sections which is an on-going trend of harvesting larger sexually mature fish which can be extrapolated from the "Sex Ratio" excerpts on pages ***60 and 61 of the 66th SAW*** reflected in Section 6. A harvest consisting of a significantly higher proportion of older age class fish, disproportionately female with higher degrees of fecundity. The data is pretty unambiguous the average weight, and by default the average age, of fish being harvested today is greater and causing a composition change in the age and gender composition of SSB. Further data is provided in Section 4, "Biomass Composition Change" which illustrates that fact. The estimated impacts on recruitment statistics and SSB gender composition are further discussed in Section 5 and Section 6.

SECTION 4 - BIOMASS COMPOSITION CHANGE:



Decade	Average Annual Recruitment (000's)	Average Annual Landings (000's)	Ages 0-2 (000's)		Ages 3 and Greater (000's)		Total (000's)
'82 thru '89	61,803	39,650	133,581	96%	5,534	4%	139,115
'90 thru '99	53,018	17,308	110,339	94%	7,491	6%	117,830
'00 thru '09	59,243	13,135	132,256	79%	34,282	21%	166,538
'10 thru '17	38,113	9,670	95,647	69%	43,637	31%	139,284
Total			471,823		90,943		562,766

Points of Discussion / Observations:

- Overall biomass population from 80's to current remains virtually unchanged in spite of significant reduction in annual landings over the last four decades.
- Average annual R from 80's to current decade has declined by ~24 million fish annually or ~40%. Average annual landings for the same periods have decreased from ~40 million fish to less than 10 million, an ~75% decline.
- Modestly lower recruitment in the 90's and significantly lesser landings resulted in a ~22 million drop in the average biomass population. Modestly higher recruitment in the first decade of 2000 and slightly lower landings from the previous decade resulted in ~50 million more fish in the average biomass population. Results seem to be directionally opposite than what those statistics would suggest in each of those periods.
- Second decade of 2000 is equally confusing, average annual recruitment exceeds annual landings by ~28 million fish a year for 8 years (~225 million fish added to the biomass) yet the biomass decreased from the prior decade by ~27 million fish. I understand there's discard and natural mortality to consider but those issues would have to be significant to cause a decline in the population when in the prior decade it's resulted in a significant increase.
- Take note of the change in biomass composition percentages between classes. Age classes 0-2 represent 30% less of the overall biomass population today relative to the 80's even though those age classes represent a negligible percentage of today's landings, clearly a sign recruitment (age class 0 fish) has imploded relative to significantly lowers SSB levels in prior decades.

	Biomass Population				
Decade	**Age 0 (000's)**	**Age 1-2 (000's)**	**Age 3-6 (000's)**	**Age 7+ (000's)**	**Total (000's)**
82 thru '89	61,803	71,778	5,451	83	139,115
90 thru '99	53,018	57,322	7,476	15	117,830
00 thru '09	59,243	73,013	32,346	1,936	166,538
10 thru '17	38,113	57,534	38,860	4,776	139,284
Total	212,177	259,646	84,133	6,810	562,766

Points of Discussion / Observations:

- Same biomass information with further breakout of age classes.
- Clearly you can see the shift which occurred as a result of the shift in catch composition driving a biomass comprised of older age fish.

- Age 0 thru 2 classes are down ~30% in population today versus the 80's which will have prolonged impacts on the fishery as those age classes grow and continue to be harvested. Additionally, age classes 1 thru 7, per the excerpt in Section 6 under "Sex Ratio", have experienced a substantial decline in female composition meaning the recruitment capacity of SSB has been materially altered.
- These are the primary reasons SSB and recruitment are declining and further policy decisions which don't address changes in catch composition will undoubtedly secure the downward trend of this fishery.
- Harvesting younger, smaller, less sexually mature fish and allowing the larger sexually mature breeders to populate the stock resulted in a 900% increase to SSB between the years 1989 and 2003, we need to work our way back to the regulations in place at that time which promoted that level of growth.

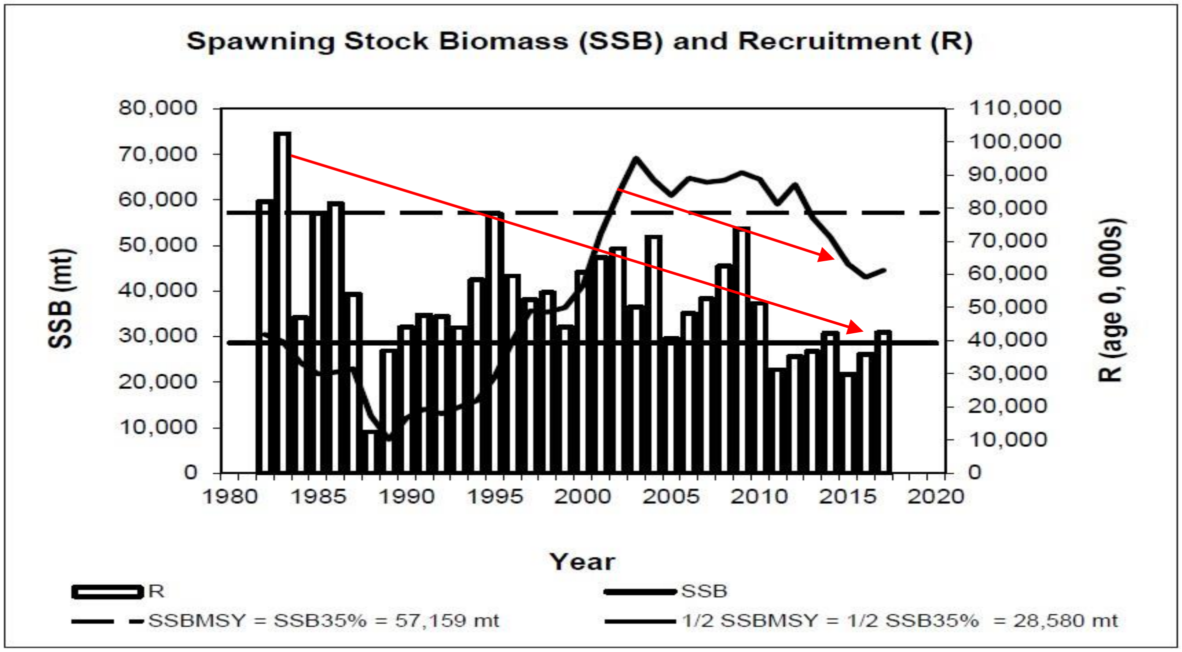
	Biomass Population				
Decade	**Age 0 (000's)**	**Age 1-2 (000's)**	**Age 3-6 (000's)**	**Age 7+ (000's)**	**Total (000's)**
'82 thru '89	44.43%	51.60%	3.92%	0.06%	100.00%
'90 thru '99	45.00%	48.65%	6.34%	0.01%	100.00%
'00 thru '09	35.57%	43.84%	19.42%	1.16%	100.00%
'10 thru '17	27.36%	41.31%	27.90%	3.43%	100.00%

Same information as above but age classes are represented in percentages as opposed to absolute numbers of fish. Again the significant shift in biomass composition jumps off the page and when combined with the decline in female composition of older age classes it's difficult not to question the impact size increase regulations have had on the recruitment strength of SSB, the ultimate driver of a sustainable fishery. Further proof of those impacts are illustrated in Section 5 "Recruitment".

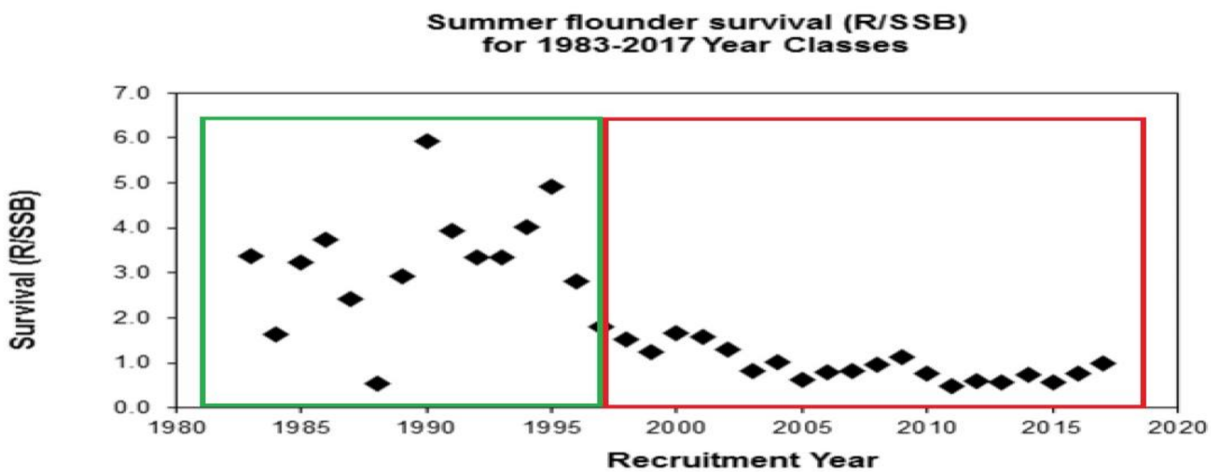
Table A89. 2018 SAW-66 assessment January 1 population number (000s) estimates at age; F2018_BASE_V2 model run.

	Age								
	0	1	2	3	4	5	6	7+	Total
1982	81,955	56,043	25,826	3,204	1,102	370	222	252	168,973
1983	102,427	61,401	28,486	7,718	1,098	408	149	178	201,865
1984	46,954	75,541	25,145	5,436	1,840	292	123	87	155,417
1985	78,263	34,603	29,969	4,176	1,091	420	77	52	148,650
1986	81,397	57,712	13,745	4,815	811	242	109	31	158,861
1987	53,988	59,653	21,238	1,979	862	167	58	33	137,978
1988	12,474	39,674	22,770	3,300	374	186	42	22	78,842
1989	36,963	9,098	13,316	2,417	427	58	35	11	62,325
1990	44,019	26,825	3,426	2,009	442	92	15	12	76,839
1991	47,704	31,915	10,988	791	591	146	34	9	92,177
1992	47,264	34,992	12,775	2,154	190	159	45	13	97,591
1993	43,928	33,221	10,976	1,811	434	45	44	16	90,474
1994	58,403	31,857	12,529	2,199	458	123	15	18	105,602
1995	78,348	42,085	12,141	2,528	577	137	41	10	135,867
1996	59,520	59,020	26,897	3,740	445	106	30	12	149,771
1997	52,374	44,901	38,815	9,819	880	109	31	13	146,942
1998	54,518	39,840	31,214	18,434	3,497	321	45	19	147,889
1999	44,100	41,416	27,383	14,465	6,378	1,247	132	27	135,148
2000	60,551	33,485	28,640	14,065	6,151	2,824	605	79	146,399
2001	64,979	45,942	22,959	13,869	5,376	2,444	1,263	311	157,143
2002	67,860	49,508	32,263	12,752	6,661	2,674	1,306	855	173,881
2003	50,131	51,834	35,494	18,696	6,424	3,439	1,466	1,221	168,704
2004	71,270	38,248	36,908	20,554	9,533	3,374	1,922	1,540	183,349
2005	40,634	54,397	27,325	21,199	10,250	4,882	1,841	1,947	162,474
2006	48,153	30,983	38,583	15,435	10,373	5,171	2,624	2,107	153,429
2007	52,646	36,801	22,377	23,528	8,511	5,865	3,069	2,870	155,667
2008	62,460	40,214	26,566	14,106	13,919	5,188	3,708	3,810	169,971
2009	73,747	47,752	29,853	18,451	8,993	7,920	3,029	4,616	194,362
2010	51,331	56,339	35,276	20,465	11,526	5,006	4,541	4,663	189,147
2011	31,296	39,164	41,305	23,746	12,433	6,189	2,786	5,429	162,348
2012	35,187	23,863	28,729	27,637	14,014	6,294	3,239	4,678	143,640
2013	36,719	26,860	17,651	19,665	16,878	7,311	3,370	4,560	133,014
2014	42,271	27,983	19,726	11,882	11,664	8,365	3,739	4,393	130,023
2015	29,833	32,228	20,540	13,304	7,146	5,982	4,436	4,623	118,093
2016	35,853	22,759	23,727	13,886	7,981	3,672	3,169	5,123	116,170
2017	42,415	27,346	16,770	16,119	8,398	4,096	1,941	4,742	121,825

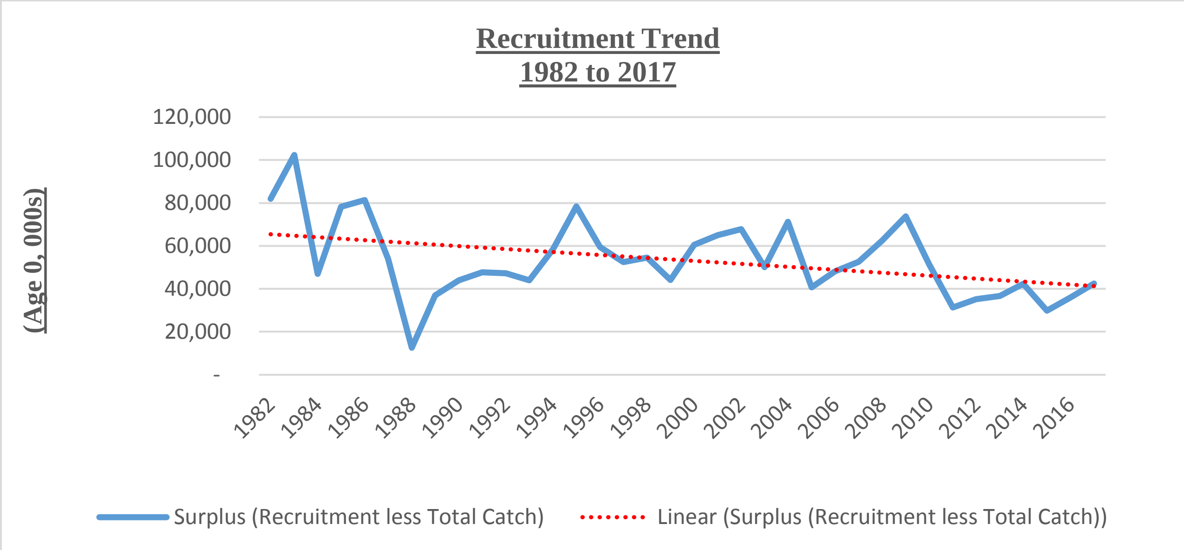
Age classes 7+ in the decades 80' and 90's averaged 45 thousand fish per above table. Statistics show on average 2,000 fish a year from these age groups being landed yet the biomass actually declined from 252,000 in 1982 to 27,000 in 1999. Not sure how that's possible. In the first two decades of 2000, the biomass population numbers increased from 79,000 to 4,742,000 in 2017 when larger fish are being harvested, recreational landings consist almost entirely of larger sexually mature fish due to regulations, recruitment levels continue to trend down, SSB continues to trend down, annual catch levels of age classes 7+ have increased 2800% for the current decade, commercial discard rates are quoted as being 80% with a higher proportion of older fish being discarded since 2002 as discussed in Section 9 yet these age classes have experienced explosive growth never before encountered. The data doesn't support the results.

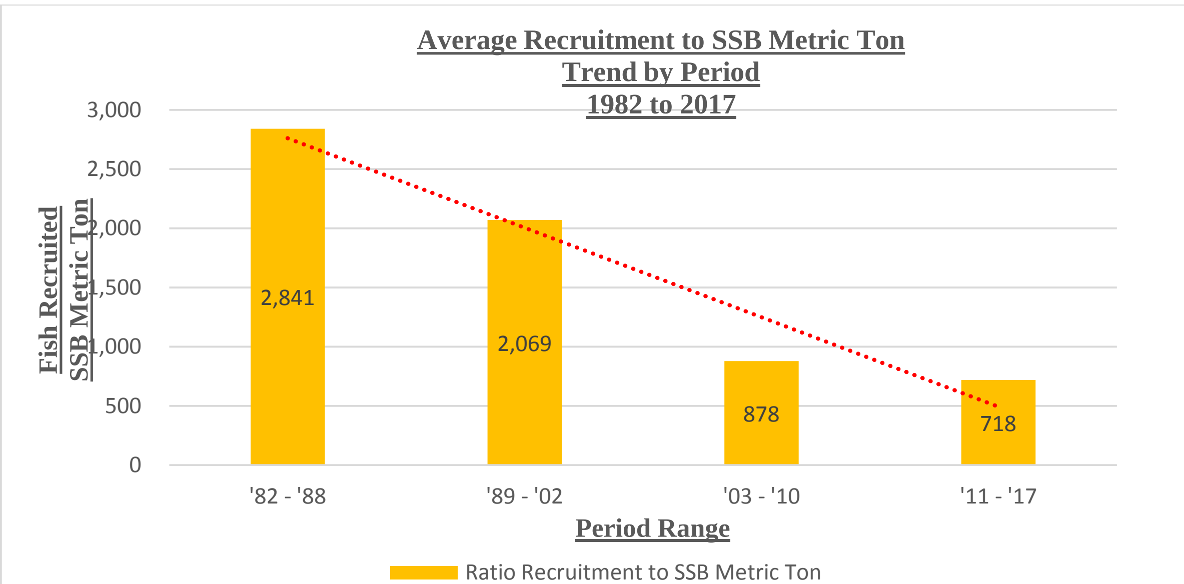


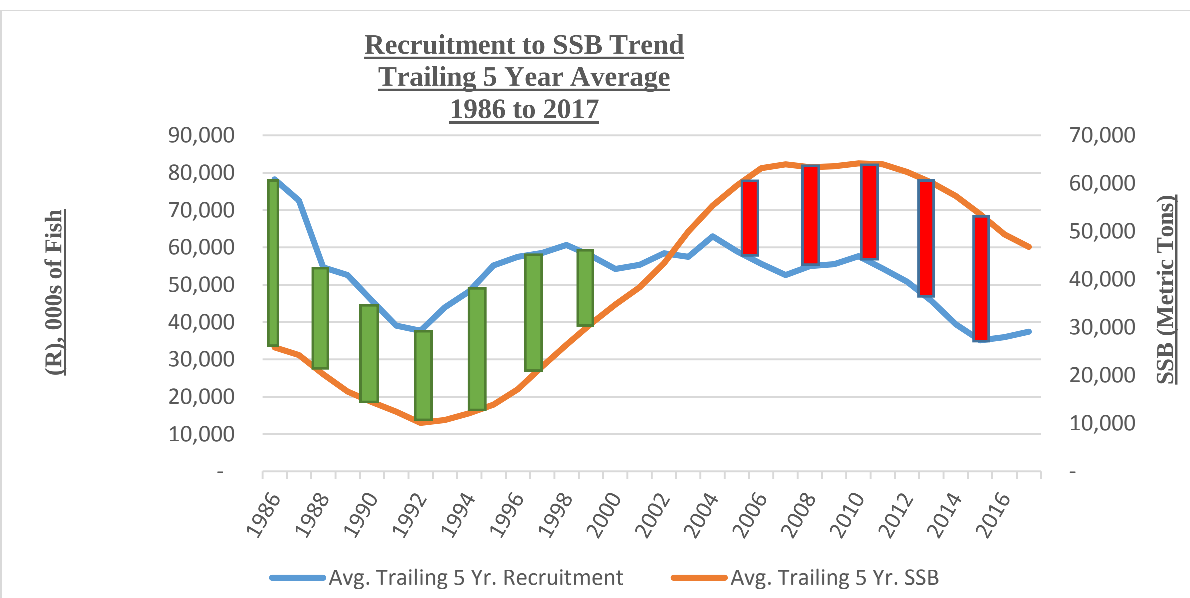
Source 66th SAW – Page 449



Source 66th SAW – Page 451


Recruitment Trend
1982 to 2017
(Age 0, 000s)
120,000
100,000
80,000
60,000
40,000
20,000
-
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Surplus (Recruitment less Total Catch)
Linear (Surplus (Recruitment less Total Catch))


Average Recruitment to SSB Metric Ton
Trend by Period
1982 to 2017
Fish Recruited
SSB Metric Ton
3,000
2,500
2,000
1,500
1,000
500
0
2,841
2,069
878
718
'82 - '88
'89 - '02
'03 - '10
'11 - '17
Period Range
Ratio Recruitment to SSB Metric Ton


Recruitment to SSB Trend
Trailing 5 Year Average
1986 to 2017
(R), 000s of Fish
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
SSB (Metric Tons)
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Avg. Trailing 5 Yr. Recruitment
Avg. Trailing 5 Yr. SSB

There's no better illustration than the above charts of the impact recreational size increases and the shift in catch composition of commercial landings of older age fish have had on recruitment trends. Catch levels have been cut by 75% over the last four decades, how much further can they be cut without essentially shutting the fishery down to both commercial and recreational interests. Harvesting older age fish with a disproportionately higher percentage of females (outlined in Section 6) has materially weakened both the relative recruitment capacity of SSB and taken its toll on absolute recruitment numbers in general. The biomass population for age classes 0 - 2 has drastically declined from a recent high of 152 million in 2009 to 86 million in 2017, an ~44% decrease in nine years. Since age classes 0 to 2 make up a negligible percentage of today's harvest, the majority of this decline is due to significantly lower levels of recruitment. A decline the fishery will feel for years as these age classes mature and are harvested and their weakened numbers will have long term implications of further suppressing future recruitment levels. The fishery in essence is in a downward spiral. Lower recruitment equates to lower SSB. With the continued onslaught on older age fish being harvested, the female portion of SSB will continue to decline as well. Shrinking SSB combined with a continued substantial decline in the female composition will insure recruitment continues to plummet. It has no choice. The cycle will continue until no other options remain than draconian options no one really wishes to discuss. You might say the fishery is currently in a death spiral brought on by regulations insuring its eventual collapse.

Let me add context to the above commentary. Recruitment in 1983 was 104 million fish relative to an SSB of ~29,000 metric tons. In 2017, after 35-years of management to improve the fishery, recruitment was 42 million fish relative to an SSB of ~43.000 metric tons. A 49% increase in SSB between those years resulted in a 77% decline in annual recruitment over a period of time when landings declined by ~75%. On the surface that sounds virtually impossible.

At the same time, the biomass population in 1983 was 202 million fish, in 2017 it's decreased to 122 million fish or a 40% decline after 35 years. There's no other way to read the data, the fishery is not only trending in the wrong direction, it's in a downward spiral it won't recover from until measures are adopted to address the failing recruitment strength of the fishery which can only be accomplished by stopping the harvest of larger sexually mature fish and rebuilding SSB not only in total but more important the female portion of SSB.

SECTION 6 – SSB GENDER COMPOSITION CHANGE

Sex Ratio in NEFSC stratified mean indices

NEFSC stratified mean abundance indices (numbers per tow) were calculated for the winter (1992-2007), spring and fall (1976-2016) series. The spring and fall BIG 2009-2016 indices were calibrated to ALB equivalents using calibration factors at length. The male and female indices generally follow similar trends over time (Figures A77-A78).

As in the raw sample data, the sex ratio in the NEFSC stratified indices has changed over the last decade, with generally decreasing proportions of females at ages 2 and older. In the winter indices, the proportion of females showed no trend for age 1 and the mean proportion was 46%. For ages 2, 3, and 4, the proportion has decreased from about 0.6-0.8 in the early 1990s to about 0.4-0.5 by 2007. For ages 5 and 6, the proportion has decreased from about 0.8-1.0 in the early 1990s to about 0.6-0.7 by 2007. For ages 7 and older that compose the 'plus group,' the proportion has ranged from 0.8 to 1.0 over the series (Figure A77).

In the spring indices, the proportion of females has an increasing trend for age 1 from about 0.3 to 0.5, and the mean proportion was 40%. For ages 2, 3, and 4, the proportion has decreased from about 0.6-0.7 in the late 1970s to about 0.3-0.5 since 2000. For ages 5 and older, the indices during the 1980s-1990s are generally very small values (often < 0.001 fish per tow, and so round to 0 and appear 'missing' in the figures) and the proportion of females over the

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series is variable without a strong trend. Most recently the proportion of females at ages 5 and older has decreased to less than 0.6 (Figure A79).

In the fall survey, the proportion of females shows no trend for age 0 and the mean proportion was 0.3. For ages 1-3 the proportion has decreased from about 0.5-0.6 in the 1980s to 0.4-0.5 by 2012-2016. The proportions at ages 4 to 7 have strongly decreased from about 0.8 through the late 1990s to about 0.3-0.8 by 2012-2016; proportions at age 8 are highly variable (Figure A80).

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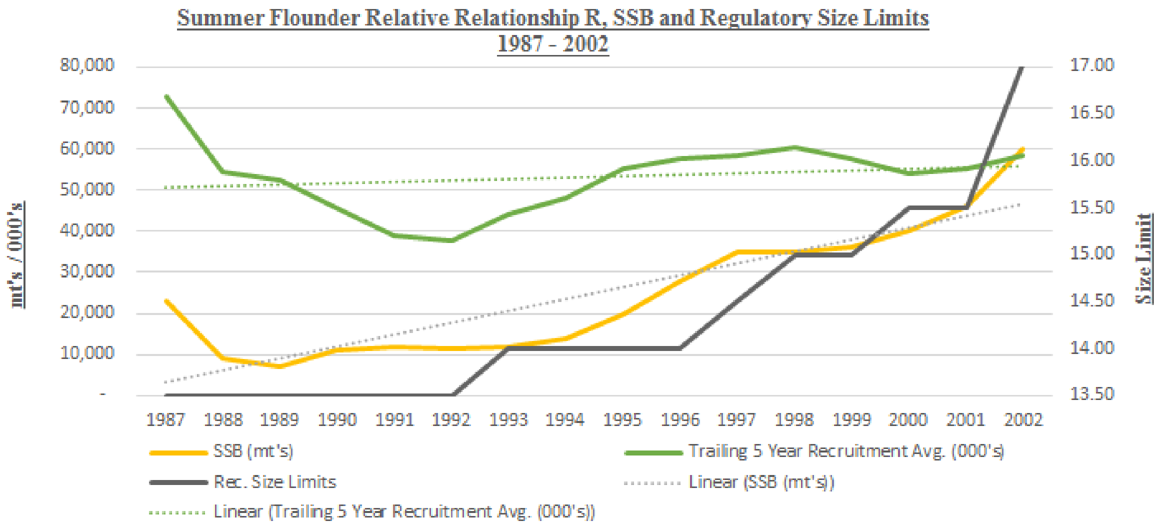
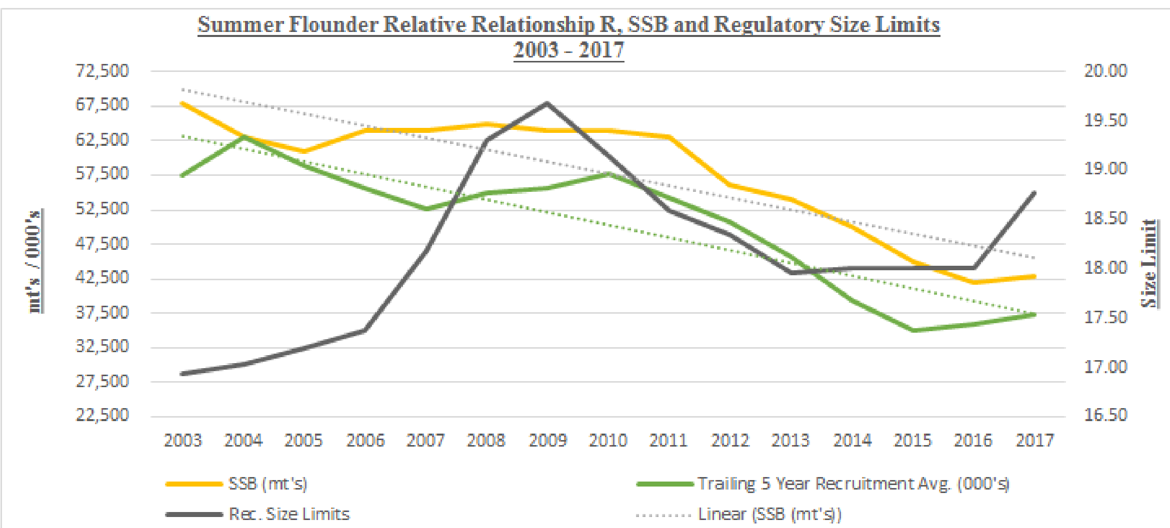
Points of Discussion / Observations:

- There's not much more I can add to the above narrative which isn't already mentioned in the above excerpts, both from the 66th SAW report.
- Gender composition, in particular the female portion, has been materially altered for the worse over the last two decades and as previously discussed in earlier sections is causing grave harm to annual recruitment levels.
- As mentioned earlier, this is a spiraling effect which I can't emphasize strongly enough won't reverse itself.
- I also wish to emphasize that shortened seasons or further reduced catch quotas, quotas which have already been slashed by ~75% over the last two decades without attaining their desired results, will also not remediate the damage done to SSB and R.

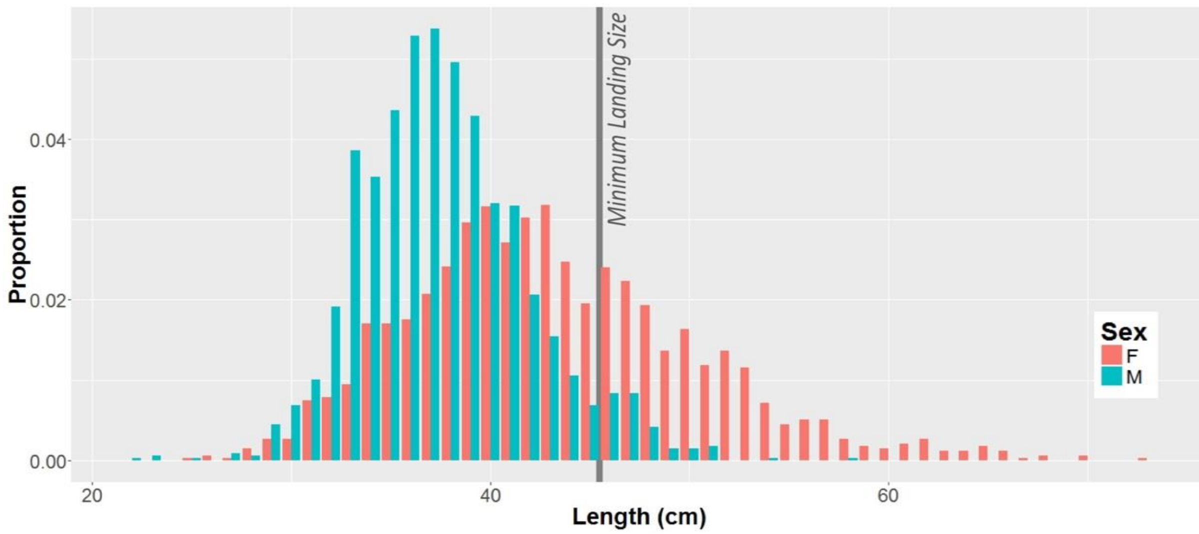
SECTION 7. - SIZE LIMIT INCREASES TO SSB / RECRUITMENT TRENDS:



Take note of the relationship and trends between 1989 and 2002 between recreational size limits and an improving SSB and R trend. SSB grew from approximately 7,000 metric tons in 1989 to approximately 68,000 metric tons in 2003 before significantly higher size limits were mandated. For a majority of that period, recreational limits ranged between 13.5 – 15,5 inches or 35 to 40 centimeters which as already touched upon resulted in the almost exclusive harvest recreationally and commercially of age class 1 to 2 yr. old fish.



When size limits continued to increase beyond that range, the above graph clearly illustrates the inverse effect those policy decisions had on SSB and R. Keep in mind these are "minimum" size limits, actual landings will obviously be larger and not unimaginable by a few inches or more.



Wish to reference the above chart again which first appeared in Section 1 "Catch". At 13.5 to 14 inches or 34.5 to 35.5 centimeters, you can see from the above chart the significantly greater percentage of male fish. When you eclipse 15.75 inches or approximately 40 centimeters, the balance is approximately 50 / 50. At the 18 to 19-inch range which is where we're at today, recreational harvest will consist almost exclusively of large female breeders. Translated 40% of the annual catch quota today being allocated to recreational anglers will be filled almost exclusively by sexually mature older aged spawning females being removed from SSB.

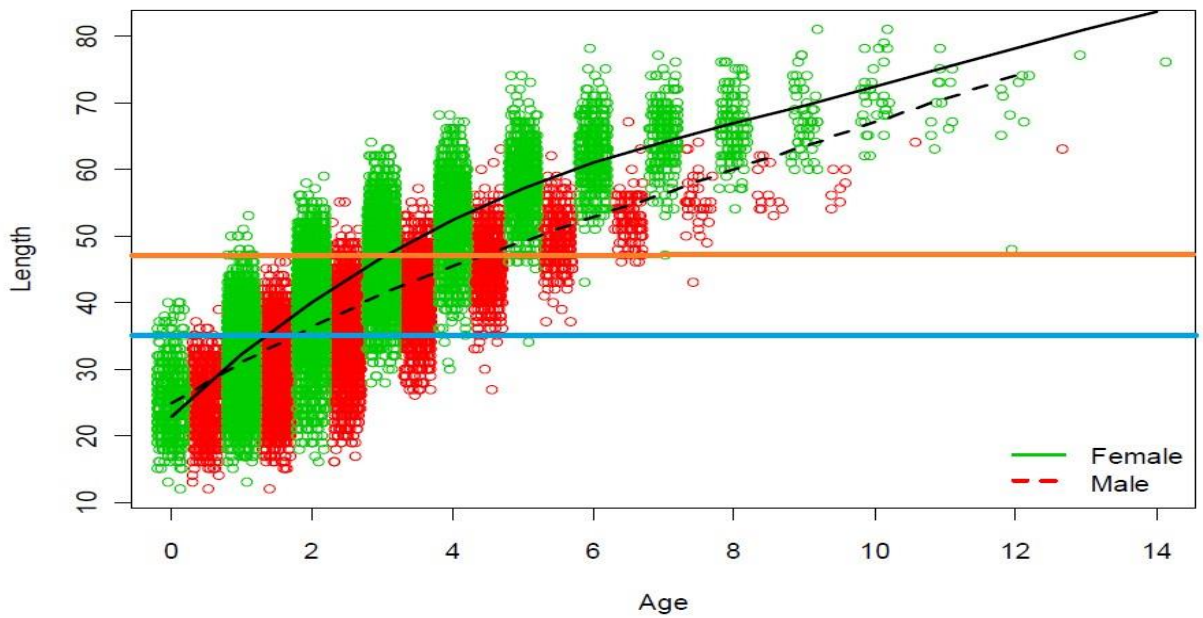


Figure A175. Model fit to sex stratification, i.e. female and male data. Female estimates: Linf = 83.6, k = 0.17, t0 = -1.9. Male estimates: Linf = 86.3, k = 0.10, t0 =-3.3

Weighted Average Recreational Size Limit 2019 – 18.73”

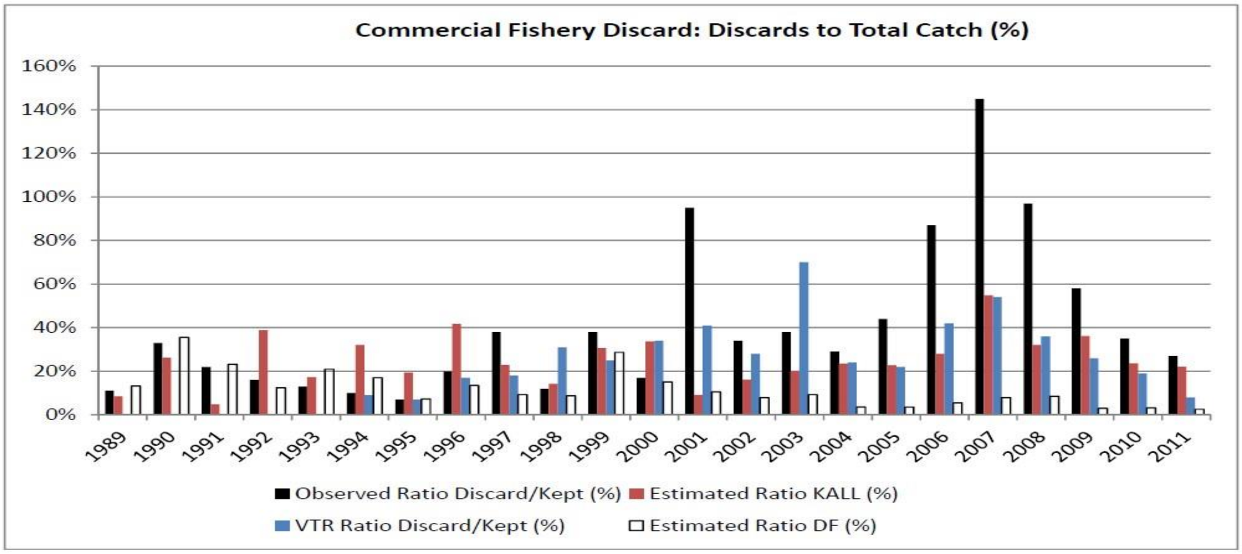
Commercial Size Limit – 14”

	0	1	2	3	4	5	6	7+			
% Available Commercial Harvest	15%	35%	57%	82%	95%	100%	100%	100%			
% Available Recreational Harvest	0%	4%	13%	34%	60%	87%	98%	100%			
Commercial # of fish accessible (000's)	6,362	9,571	9,559	13,218	7,978	4,096	1,941	4,742	51,105		**64.35%**
Recreational # of fish accessible (000's)	-	1,094	2,180	5,480	5,039	3,564	1,892	4,742	23,991		**30.21%**

The relationship of age, length and gender is further illustrated in the following chart ***Source 57th SAW, page 413.*** The chart illustrates the relationship among females and males relative to age and average lengths similar to ***Rutgers Sex and Length*** study. It clearly demonstrates the disproportionate ratio of a higher percentage of female summer flounder in older age groups. That relative relationship begins as early as age 1 and becomes more pronounced in older groups. A key statistic as to why the increase in catch composition this fishery has experienced over the years is a principle factor leading to the decline in this fishery.

The above chart shows the disproportionate share recreational anglers have harvest rights to relative to commercial concerns, the result of size increases over the years while commercial size limits remained unchanged at 14 inches. Commercial concerns can harvest ~65% of the biomass compared to ~30% for recreational. That equates to almost 30 million more fish commercial interests have harvest rights to which recreational don't. Recreational discards are subsidizing commercials catch quota yearly and a contributing factor of why commercial catch weights have increase substantially over the years as 14 inch to either 18 or 19-inch dependent on the state are being released and available for commercial operators to harvest. It's an issue which didn't exist when size limits were identical between both groups and along with the other undesirable consequences of increased recreational size limits needs to be addressed.

SECTION 9 – COMMERCIAL / RECREATIONAL DISCARD RATES:



Extremely revealing chart regarding commercial discards comparing percentages on observed trawls to percentages obtained from FVTR's. ***Source is 57th SAW page 302***. ***Could not find comparable information in 66th SAW Assessment Report. If available, would be interested in reviewing years 2012 – 2017.*** The disparity between observed versus unobserved discard rates (those reported on VTR's) is substantial and if representative would have significant implications quantifying annual commercial catch levels and associated discard mortality rates. Post 2000, observe the spike and degree of difference in percentage discards between observed trawls and percentages submitted on VTR's. In all but one year (2003), observed trawl discard percentages significantly exceed non-observed. In 2001, 2006, 2007 and 2008, percentages exceeded 80% of catch with a high of ~143% in 2007. 2009 was almost 60% itself. Compare these relationships to the same relationships pre-2000 when for whatever reason the spread between observed trawls and VTR's was considerably less.

Based on the "Commercial Fishery Discard Chart", it's evident from observed trawls there's a significantly greater percentage of discards as a percentage of catch occurring than what's reported on VTR's. Timing of the disparity coincides with the period of time recreational size limit increases accelerated and the growth of the biomass from 900% growth of SSB experienced between 1989 to 2003 was coming to an end. Factor in these are percentages reported on observed trawls, one has to question if percentages on unobserved trawls are substantially higher.

Now factor in the following facts included in the 66th SAW.

Commercial Discard Estimates at age

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 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 observed mean weights at age to derive fishery discard numbers at age. Classification to age for 1989-1993 was done by semiannual periods using 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. Since 1994, only NEFSC survey age-length keys were used, since 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 account for much of the discards. 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 (mt) of live discards per 100 fish lengths measured. The sampling has been stratified by gear type (fish trawl, scallop dredge, and gillnet/other) since 1994. Overall sampling intensity has improved since 1999, from 152 mt per 100 lengths to less than 20 mt per 100 lengths since 2004 (Table A9).

The reasons for discarding in the fish trawl, scallop dredge, and gillnet/pot/handline fisheries have 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 those tows, and high-grading in 11%. In the scallop fishery in 1999, quota or trip limits was given as the discard reason in over 90% of the observed tows. During 2000-2005, 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 those tows, and high grading in 3-8%. In the scallop fishery during 2000-2005, quota or trip limits was given as the discard reason for over 99% of the observed tows. During 2006-2017, minimum size regulations were identified as the discard reason in 15-20% of the observed trawl tows, quota or trip limits in 60-70%, and high grading in 5-10%. In the scallop fishery during 2006-2017, quota or trip limits was given as the discard reason for about 40% of the observed tows, with about 50% reported as "unknown." For the entire time series, quota or trip limits was given as the reason for discarding in over 90% of the gillnet/pot/handline hauls. 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 over time, with a higher proportion of older fish being discarded since about 2002 (Table A10).

As recommended by SAW 16 (NEFSC 1993), a commercial fishery discard mortality rate of 80% was applied to develop the final estimate of discard mortality from live discard estimates. The SAW 47 and SAW 57 assessments (NEFSC 2008a, 2013) considered information from 2007 and 2009 Cornell University Cooperative Extension studies (Hasbrouck et al 2011, 2012). These studies conducted scientific trips on summer inshore and winter offshore multispecies commercial trawling vessels to determine discard mortality rates relative to tow duration, fish size, and the amount of time fish were on the deck of the vessel. The mean inshore mortality was 78.7%, while the mean offshore mortality was 80.4%; both estimates are very close to the estimated overall discard mortality of 80% used in the assessment. Another study (Yergey et al. 2012) conducted by Rutgers University using acoustic telemetry to evaluate both on-deck and latent discard mortality found total discard mortality in the trawl fishery to be 81.7%, again very close to the estimated overall discard mortality of 80% used in the assessment. The 80% discard mortality rate assumption is reflected in the estimates of commercial fishery discards at age and mean weights at age in Tables A10-A11.

Combine the elevated levels of discards as a percentage of overall catch compared to what's being reported on VTR's per the above graph with the fact there's an 80% discard mortality rate associated with commercial harvest consisting disproportionately of older age fish since 2002 and explain how commercial dead discard rates from 2010 to 2017 as illustrated on page 178 of the 66th SAW calculates out to an average annual percentage of 15%. For comparison sake, recreational calculates out at ~24%.

SECTION 10 – CONCLUSIONS / OBSERVATIONS:

Once again my interests in preparing this analysis is to focus fisheries management, the scientific community, technical staffs and whoever else is necessary on issues I believe are causing considerable harm to this fishery. If we're being asked to believe the data incorporated in the 66th SAW as representative of what's happening in the fishery, then it's inconceivable anyone can question the fishery is failing and a completely new approach managing it needs to be adopted.

- SSB has declined 37% from 2004 to 2017, ~68,000 metric tons to ~42,000
- Biomass population has shrunk from ~183 million population in 2004 to 121 million in 2017, an ~ 34% decline
- The last seven years' annual recruitment are at their lowest levels since 1988 when SSB was a paltry 9,000 metric tons. 2017 SSB is ~42,000 metric tons. These below average levels will impact the fishery over a prolonged period of time as they're harvested, putting future pressure on SSB in the absolute, continued pressure on gender composition and further suppressed recruitment levels. The fishery is in a self-fulfilling downward spiral at this stage
- Gender composition of SSB has been altered in favor of more males by anywhere from 20 to 40 percentage based on age classes

As mentioned, the fishery is in a freefall and won't recover without remedial measures implemented which address catch composition, rebuilding SSB and measures insuring protection of the spawn.

From what I understand, due to MSA or current reauthorizations of MSA, there's only two remedial options available to manage the fishery

- Reduce catch
- Shorten seasons

Both options will have little to no impact improving the fishery as both address only catch. If a 75% decline in catch levels over the last 35 years hasn't nursed the fishery back to health, why believe further more negligible cuts will. The only policy decisions which will reverse current trends have to address catch composition (size), rebuilding SSB in the absolute and the female portion in particular, protect the primary fall / winter spawn and get recruitment levels back to historical levels and growth. Anything less and the stock will continue its downward trajectory.

- Recreational size limits need to be brought back to levels commensurate with commercial size limits. If catch needs to be addressed, address it in terms of tonnage, not size limits.

- Until R shows signs of recovery, the fall winter offshore commercial fishery needs to be addressed. Not suggesting shutting it down, but the allocation of quotas need to be realigned to focus a higher percentage of the harvest occurring during non-spawn months and significantly less harvest during spawning months. To my knowledge, no one has written a paper or understands the impacts commercial netting has on the spawning dynamics of the stock, a biomass more highly concentrated and vulnerable today than ever before.
- 1989 – 2003 promoted an ~900% increase in SSB, why were regulations which promoted that level of growth changed and more important why wouldn't we work our way thoughtfully back to those same regulations.
- Discard rates on commercial harvest needs to be further explored. The data not only suggests it; it illustrates there's a significantly higher percentage occurring over reported levels on VTR's as reflected in the 57th SAW report. If more observed trawls need to occur, resources should be directed in that effort since the impact on catch, in particular the impact on catch of older age class fish, could be substantially greater than what's being incorporated into models.

I wish for this document to be included in the briefing materials for the upcoming September 9th MAMFC SSC meeting at Sonesta Harbor Court in Baltimore. A similar version was sent a few months back based on recommendations from Brandon Muffley and John Boreman to Mark Terceiro for his team's review and commentary. No feedback was ever received so I'm sending it to you in the hopes you'll insure the Commission Board Members overseeing Summer Flounder and Council Members with the authority to address these issues actually have an opportunity to review the document.

If my facts are wrong, if anyone disagrees with my findings or conclusions please provide opposing positions supported by data. In the absence, this fishery is failing and remedial measures need to be implemented immediately to address what is arguably one of the most vital fisheries to the Mid-Atlantic States. It won't improve without changes in management ideologies, it's a mathematical impossibility and fishery management's own data supports that statement.

If data in the SAW report is wrong, bad policy decisions are being made based on inaccurate data. If the data is representative to what's happening within the fishery, the fishery is in trouble, dire trouble. Significantly and historically lower recruitment statistics over the last seven years has all but guaranteed the weakened state of this fishery over the foreseeable future. Steepness in this fishery, which some conspiracy theorist insist is the case, is out the window or we wouldn't find ourselves in the situation we're in today. Keep in mind the above fact "The last seven years' annual recruitment are at their lowest levels since 1988 when SSB was a paltry 9,000 metric tons. 2017 SSB is ~42,000 metric tons." How can anyone rightly defend steepness with those facts.

Dustin and Kiley, I'd be happy to discuss the analysis with you, help out in any way you think would benefit the fishery, present my analysis at meetings if necessary or not be involved at all if that's the path you choose. What I do request is for both the Commission Board Members and Council Members to see this document so they have knowledge of it and can draw their own conclusions.

Exhibit 2

MEMO

Exhibit 2

To: Dustin Colson Leaning, Fishery Management Plan Coordinator ASMFC
Kiley Dancy Fishery Management Specialist MAFMC
Dr, Christopher Moore, Executive Director MAFMC
Dr. John Boreman, Chairman SSC, North Carolina State University
Brandon Muffley Fishery Management Specialist MAFMC

From: Thomas B. Smith

Date: September 5, 2019

Re: Status Summer Flounder Stock, Addendum to August 23, 2019 Memorandum

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The following analysis is based on data provided in the 66th SAW report. Issues addressed includes the disproportionate relationship between the biomass population and an ~75% reduction in catch levels (000's) over the last four decades, a more staggering change in the relationship between assumed egg production levels to R occurring in the mid-nineties and the illustration of the impacts the harvest of larger sexually mature fish due to regulatory changes has had on gender composition of SSB, egg production and significantly declining recruitment levels.

Table A89. 2018 SAW-66 assessment January 1 population number (000s) estimates at age; F2018_BASE_V2 model run.

	Age								
	0	1	2	3	4	5	6	7+	Total
1982	81,955	56,043	25,826	3,204	1,102	370	222	252	168,973
1983	102,427	61,401	28,486	7,718	1,098	408	149	178	201,865
1984	46,954	75,541	25,145	5,436	1,840	292	123	87	155,417
1985	78,263	34,603	29,969	4,176	1,091	420	77	52	148,650
1986	81,397	57,712	13,745	4,815	811	242	109	31	158,861
1987	53,988	59,653	21,238	1,979	862	167	58	33	137,978
1988	12,474	39,674	22,770	3,300	374	186	42	22	78,842
1989	36,963	9,098	13,316	2,417	427	58	35	11	62,325
1990	44,019	26,825	3,426	2,009	442	92	15	12	76,839
1991	47,704	31,915	10,988	791	591	146	34	9	92,177
1992	47,264	34,992	12,775	2,154	190	159	45	13	97,591
1993	43,928	33,221	10,976	1,811	434	45	44	16	90,474
1994	58,403	31,857	12,529	2,199	458	123	15	18	105,602
1995	78,348	42,085	12,141	2,528	577	137	41	10	135,867
1996	59,520	59,020	26,897	3,740	445	106	30	12	149,771
1997	52,374	44,901	38,815	9,819	880	109	31	13	146,942
1998	54,518	39,840	31,214	18,434	3,497	321	45	19	147,889
1999	44,100	41,416	27,383	14,465	6,378	1,247	132	27	135,148
2000	60,551	33,485	28,640	14,065	6,151	2,824	605	79	146,399
2001	64,979	45,942	22,959	13,869	5,376	2,444	1,263	311	157,143
2002	67,860	49,508	32,263	12,752	6,661	2,674	1,306	855	173,881
2003	50,131	51,834	35,494	18,696	6,424	3,439	1,466	1,221	168,704
2004	71,270	38,248	36,908	20,554	9,533	3,374	1,922	1,540	183,349
2005	40,634	54,397	27,325	21,199	10,250	4,882	1,841	1,947	162,474
2006	48,153	30,983	38,583	15,435	10,373	5,171	2,624	2,107	153,429
2007	52,646	36,801	22,377	23,528	8,511	5,865	3,069	2,870	155,667
2008	62,460	40,214	26,566	14,106	13,919	5,188	3,708	3,810	169,971
2009	73,747	47,752	29,853	18,451	8,993	7,920	3,029	4,616	194,362
2010	51,331	56,339	35,276	20,465	11,526	5,006	4,541	4,663	189,147
2011	31,296	39,164	41,305	23,746	12,433	6,189	2,786	5,429	162,348
2012	35,187	23,863	28,729	27,637	14,014	6,294	3,239	4,678	143,640
2013	36,719	26,860	17,651	19,665	16,878	7,311	3,370	4,560	133,014
2014	42,271	27,983	19,726	11,882	11,664	8,365	3,739	4,393	130,023
2015	29,833	32,228	20,540	13,304	7,146	5,982	4,436	4,623	118,093
2016	35,853	22,759	23,727	13,886	7,981	3,672	3,169	5,123	116,170
2017	42,415	27,346	16,770	16,119	8,398	4,096	1,941	4,742	121,825

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Decade	Average Annual Biomass Population (000's)	Average Annual Recruitment (000's)	Average Annual Landings (000's)	Ages 0-2 (000's)		Ages 3 and Greater (000's)		Total (000's)
				BIOMASS POPULATION				
'82 thru '89	139,115	61,803	39,650	133,581	96%	5,534	4%	139,115
'90 thru '99	117,830	53,018	17,308	110,339	94%	7,491	6%	117,830
'00 thru '09	166,538	59,243	13,135	132,256	79%	34,282	21%	166,538
'10 thru '17	132,160	38,113	9,670	95,647	69%	43,637	31%	139,284
Total				471,823		90,943		562,766

Increase / (Decrease) over base decade '82 thru '89		(87,848)	(223,412)
Increase / (Decrease) over base decade '82 thru '89		(25,595)	(265,147)
Increase / (Decrease) over base decade '82 thru '89		(189,516)	(239,838)
	Total	**(302,960)**	**(728,398)**

The decade 1982 to 1989 as previously discussed was highlighted by a significant decrease in SSB from a high of ~31,000 metric tons in 1982 to a low of ~7,000 metric tons in 1989. Cause was elevated catch levels averaging ~115% of SSB over that time-frame. SSB in 1989 dropped to its lowest level on record over the last 39-years.

Catch was reduced by more than 50% the following year and substantially over the ensuing decade while remaining in a relatively tight range until significant cuts were once again imposed in 2015. Catch in the 80's and majority of the 90's, it's important to point out, was cut by tonnage as opposed to increases in size limits. Using the decade of 1982 to 1989 as our baseline, the above graph illustrates reductions in R and catch levels over the last three decades 1990 to 2017. The last decade, 2010 to 2017, includes only eight years so the reduction in R and catch are even more substantial if a full decade was presented and trends continued in the direction they've been which is inevitable.

The biomass population as illustrated in the above chart in 1989 was ~62 million fish. Reductions in R have already been factored into these numbers as "Age 0" class fish. In 2017, the biomass population increased to ~122 million, a ~60 million fish increase from 1989. Over the last 27 years, there's been

~728 million less fish harvested than the rate of harvest between 1982 and 1989 or on average ~26 million less fish per year. The questions someone should be asking is how does three quarters of a trillion less fish harvested over the last 27-year period translate to a reduction in R over that time frame of ~300 million new recruits and why hasn't the biomass population materially increased. If we're to believe catch, recruitment, mortality (both natural and instantaneous) are already fairly factored into the biomass population table above, an approximate 300 million fish per decade reduction in landings (before consideration of lower discard rates which should amount to ~60 million less discards) along with the substantial impact on improvement to R, the biomass as of 2017 should be anywhere from 300% to 600% higher than what's being reported. Significant sacrifices have been made by both commercial and recreational groups over the last three to four decades in terms of catch quotas and size and possession restrictions, only to have the biomass remain status quo, recruitment levels plummet and SSS being impaired by changes in gender composition. That's above relationships are about as inverse as they could be and not only requires an explanation, it requires the Commission and Councils immediate attention to be corrected. Fish are inexplicably disappearing from published biomass numbers and recruitment levels are being destroyed.

The following tables offer a possible explanation.

Egg Production, Maturity and Sex Ratio Assumptions:

	AGE							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7+**
% mature '82 thru '13	30%	88%	99%	100%	100%	100%	100%	100%
% mature '14 thru '17	29%	86%	99%	100%	100%	100%	100%	100%
Est'd annual egg production / female	100,000	200,000	400,000	750,000	1,000,000	1,250,000	1,500,000	2,000,000

The above table was built based on the following information from the 66th SAW regarding maturity rates by age group. Various publications reveal summer flounder egg production ranges from ~400,000 for younger sexually mature females to over 4,000,000 for older females. The numbers I've used in the above tables are randomly assigned in an ascending order to age groups which are conservative based on published statistics including data published by NOAA and ASMFC. Above table also assumes all females are spawning which may or may not be the case.

MATURITY

In keeping with the approach from the previous benchmark assessments (NEFSC 2008a, 2013), a sexes combined, three-year moving window ogive was compiled from the NEFSC 1982-2016 fall survey data for use in assessment models. The three-year moving window approach provides well-estimated proportions mature at age that transition smoothly over the course of the time series, while still reflecting any shorter term trends. The sexes combined, three-year moving window estimates are presented in Table A86 and Figure A83. The 1982-2016 mean maturities at age (unweighted, simple arithmetic average of annual values at age) are 29% at age 0, 86% at age 1, 99% at age 2, and 100% at ages 3 and older.; these averages are 1% lower at age 0, 2% lower at age 1, and the same at ages 2 and older, compared to the 2013 SAW 57 values used in the 2013 and subsequent assessments. The most recent 5 year (2012-2016) mean values are 26% at age 0, 75% at age 1, 97% at age 2, and 100% at ages 3 and older.; these averages are the same at age 0, 2% lower at age 1, and the same at ages 2 and older, compared to the 2013 SAW 57 (2008-2012) values used in the 2013 and subsequent assessments.

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Sex Ratio Table
Female Proportion by Age Group and Period

Period	Age 0	1	2	3	4	5	6	7+
'82 thru '17	33%							
'82 thru '99		55%	55%	90%	90%	80%	80%	90%
'00 thru '10		45%	45%	50%	50%	55%	55%	90%
'11 thru '17		30%	30%	45%	45%	55%	55%	70%

The above table was built based on the following information from the 66th SAW regarding sex ratios by age group.

SEX RATIO

Sex Ratio in NEFSC Survey Raw Sample Data

In the fall survey, the proportion of females shows no trend for age 0 and the mean proportion was 33%. For ages 1 and 2, the proportion has decreased from about 0.5-0.6 in the 1980s to 0.4-0.5 by the 2010s; the means for 2012-2016 were about 0.3. The proportions at ages 3 and 4 have strongly decreased from about 0.9 through the late 1990s to about 0.5 by the 2010s; the means for 2012-2016 were 0.4 and 0.5. For ages 5-8 and older the proportions have most recently decreased to about 0.7; the means for 2012-2016 were 0.7, 0.8, 0.7, and 0.9 (Figure A76).

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Sex Ratio in NEFSC stratified mean indices

In the fall survey, the proportion of females shows no trend for age 0 and the mean proportion was 0.3. For ages 1-3 the proportion has decreased from about 0.5-0.6 in the 1980s to 0.4-0.5 by 2012-2016. The proportions at ages 4 to 7 have strongly decreased from about 0.8 through the late 1990s to about 0.3-0.8 by 2012-2016; proportions at age 8 are highly variable (Figure A80).

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Note the shaded area in the "Sex Ratio Table" which illustrates significantly reduced female composition of all age groups creating a change to the composition of SSB the result of and causing the following:

- Significant increases to recreational size limits as a means of reducing catch quotas.
- Reduced commercial quotas leading to the harvest of larger fish with higher market values intended to mitigate the impacts those reduced quotas had on ex-vessel values.
- A sizeable gender imbalance in the composition of SSB favoring males has occurred over the last two decades. You can review it in the above table (shaded area age classes 1 thru 7+) and relative drop off in R over the last three decades reflected above. Remember the current decade we're in represents eight years. If extrapolated to a full decade, recruitment would be down by ~240 million new recruits, catch levels down by ~300 million fish relative to the period 1982 to

1989. 300 million less fish harvested and recruitment levels down by a quarter of a **BILLION** new recruits for the period of one decade.

- Discounting "Age 0" class fish which has a low 29% maturity rate, the above table illustrates a substantial decrease in the female composition of every age class comprising ~95% of SSB. Statistic is arrived at by dividing the population of ages 1 thru 7+ (~75 million fish for 2017) into the total population less age class 0 or ~80 million fish. Female composition of every age class has been weakened anywhere from 22% to 50%.
- A significant change took place in this fishery around 1996 before the onset of recreational size limit increases resulting in the following:
  - Material reduction in ratio of egg production to R.
  - Spike in the average weight (age class) of fish being landed which has continued and almost doubled over the last two decades.
  - An almost complete reversal in catch composition from age classes 2 and younger to 3 and older.
  - The above two bullets are the primary reason for the erosion in gender composition of SSB resulting in the materially weakened reproductive strength of SSB impacting bullet one
  - It's worth reviewing what changes took place in the mid-nineties regarding the offshore fall / winter fishery because either the assumptions in the models being used to quantify recruitment completely changed or a cataclysmic change took place involving the relationship or ratio of new recruits to estimated egg production pulling from various tables in the 66th SAW as reflected on page 7.

Projected Egg Production by Age / Year

	AGE								
	0	1	2	3	4	5	6	7+	Projected Egg Production
Year	(000's)	(000's)	(000's)	(000's)	(000's)	(000's)	(000's)	(000's)	(000's)
1982	811,354,500	5,424,962,400	5,624,902,800	2,162,700,000	991,800,000	370,000,000	266,400,000	453,600,000	16,105,719,700
1983	1,014,027,300	5,943,616,800	6,204,250,800	5,209,650,000	988,200,000	408,000,000	178,800,000	320,400,000	20,266,944,900
1984	464,844,600	7,312,368,800	5,476,581,000	3,669,300,000	1,656,000,000	292,000,000	147,600,000	156,600,000	19,175,294,400
1985	774,803,700	3,349,570,400	6,527,248,200	2,818,800,000	981,900,000	420,000,000	92,400,000	93,600,000	15,058,322,300
1986	805,830,300	5,586,521,600	2,993,661,000	3,250,125,000	729,900,000	242,000,000	130,800,000	55,800,000	13,794,637,900
1987	534,481,200	5,774,700,800	4,625,636,400	1,335,825,000	775,800,000	167,000,000	69,600,000	59,400,000	13,342,443,400
1988	123,492,600	3,840,443,200	4,959,306,000	2,227,500,000	336,600,000	186,000,000	50,400,000	39,600,000	11,763,341,800
1989	365,933,700	880,686,400	2,900,224,800	1,631,475,000	384,300,000	58,000,000	42,000,000	19,800,000	6,282,419,900
1990	435,788,100	2,596,660,000	746,182,800	1,356,075,000	397,800,000	92,000,000	18,000,000	21,600,000	5,664,105,900
1991	472,269,600	3,089,372,000	2,393,186,400	533,925,000	531,900,000	146,000,000	40,800,000	16,200,000	7,223,653,000
1992	467,913,600	3,387,225,600	2,782,395,000	1,453,950,000	171,000,000	159,000,000	54,000,000	23,400,000	8,498,884,200
1993	434,887,200	3,215,792,800	2,390,572,800	1,222,425,000	390,600,000	45,000,000	52,800,000	28,800,000	7,780,877,800
1994	578,189,700	3,083,757,600	2,728,816,200	1,484,325,000	412,200,000	123,000,000	18,000,000	32,400,000	8,460,688,500
1995	775,645,200	4,073,828,000	2,644,309,800	1,706,400,000	519,300,000	137,000,000	49,200,000	18,000,000	9,923,683,000
1996	589,248,000	5,713,136,000	5,858,166,600	2,524,500,000	400,500,000	106,000,000	36,000,000	21,600,000	15,249,150,600
1997	518,502,600	4,346,416,800	8,453,907,000	6,627,825,000	792,000,000	109,000,000	37,200,000	23,400,000	20,908,251,400
1998	539,728,200	3,856,512,000	6,798,409,200	12,442,950,000	3,147,300,000	321,000,000	54,000,000	34,200,000	27,194,099,400
1999	436,590,000	4,009,068,800	5,964,017,400	9,763,875,000	5,740,200,000	1,247,000,000	158,400,000	48,600,000	27,367,751,200
2000	599,454,900	2,652,012,000	5,103,648,000	5,274,375,000	3,075,500,000	1,941,500,000	499,125,000	142,200,000	19,287,814,900
2001	643,292,100	3,638,606,400	4,091,293,800	5,200,875,000	2,688,000,000	1,680,250,000	1,041,975,000	559,800,000	19,544,092,300
2002	671,814,000	3,921,033,600	5,749,266,600	4,782,000,000	3,330,500,000	1,838,375,000	1,077,450,000	1,539,000,000	22,909,439,200
2003	496,296,900	4,105,252,800	6,325,030,800	7,011,000,000	3,212,000,000	2,364,312,500	1,209,450,000	2,197,800,000	26,921,143,000
2004	705,573,000	3,029,241,600	6,577,005,600	7,707,750,000	4,766,500,000	2,319,625,000	1,585,650,000	2,772,000,000	29,463,345,200
2005	402,276,600	4,308,242,400	4,869,315,000	7,949,625,000	5,125,000,000	3,356,375,000	1,518,825,000	3,504,600,000	31,034,259,000
2006	476,714,700	2,453,853,600	6,875,490,600	5,788,125,000	5,186,500,000	3,555,062,500	2,164,800,000	3,792,600,000	30,293,146,400
2007	521,195,400	2,914,639,200	3,987,581,400	8,823,000,000	4,255,500,000	4,032,187,500	2,531,925,000	5,166,000,000	32,232,028,500
2008	618,354,000	3,184,948,800	4,734,061,200	5,289,750,000	6,959,500,000	3,566,750,000	3,059,100,000	6,858,000,000	34,270,464,000
2009	730,095,300	3,781,958,400	5,319,804,600	6,919,125,000	4,496,500,000	5,445,000,000	2,498,925,000	8,308,800,000	37,500,208,300
2010	508,176,900	4,462,048,800	6,286,183,200	7,674,375,000	5,763,000,000	3,441,625,000	3,746,325,000	8,393,400,000	40,275,133,900
2011	309,830,400	2,067,859,200	4,907,034,000	8,014,275,000	5,594,850,000	4,254,937,500	2,298,450,000	7,600,600,000	35,047,836,100
2012	348,351,300	1,259,966,400	3,413,005,200	9,327,487,500	6,306,300,000	4,327,125,000	2,672,175,000	6,549,200,000	34,203,610,400
2013	363,518,100	1,418,208,000	2,096,938,800	6,636,937,500	7,595,100,000	5,026,312,500	2,780,250,000	6,384,000,000	32,301,264,900
2014	418,482,900	1,477,660,800	2,343,448,800	4,010,175,000	5,248,800,000	5,750,937,500	3,084,675,000	6,150,200,000	28,484,380,000
2015	295,346,700	1,701,638,400	2,440,152,000	4,490,100,000	3,215,700,000	4,114,687,500	3,659,700,000	6,472,200,000	26,389,524,600
2016	354,944,700	1,201,675,200	2,818,767,600	4,686,525,000	3,591,450,000	2,524,500,000	2,614,425,000	7,172,200,000	24,964,487,500
2017	419,908,500	1,443,868,800	1,992,276,000	5,440,162,500	3,779,100,000	2,816,000,000	1,601,325,000	6,638,800,000	24,131,440,800

Ratio Estimated Egg Production to R 1982 to 2017

Year	Projected Egg Production (000's)	Recruitment (000's)	R to Projected Egg Production Ratio	89 - '95 Average Ratio .00066%	Increased R at .00066% Ratio
1982	16,105,719,700	81,955	**0.00051%**	n/a	n/a
1983	20,266,944,900	102,427	**0.00051%**	n/a	n/a
1984	19,175,294,400	46,954	**0.00024%**	n/a	n/a
1985	15,058,322,300	78,263	**0.00052%**	n/a	n/a
1986	13,794,637,900	81,397	**0.00059%**	n/a	n/a
1987	13,342,443,400	53,988	**0.00040%**	n/a	n/a
1988	11,763,341,800	12,474	**0.00011%**	n/a	n/a
1989	6,282,419,900	36,963	**0.00059%**	n/a	n/a
1990	5,664,105,900	44,019	**0.00078%**	n/a	n/a
1991	7,223,653,000	47,704	**0.00066%**	n/a	n/a
1992	8,498,884,200	47,264	**0.00056%**	n/a	n/a
1993	7,780,877,800	43,928	**0.00056%**	n/a	n/a
1994	8,460,688,500	58,403	**0.00069%**	n/a	n/a
1995	9,923,683,000	78,348	**0.00079%**	n/a	n/a
1996	15,249,150,600	59,520	**0.00039%**	100,783	41,263
1997	20,908,251,400	52,374	**0.00025%**	138,185	85,811
1998	27,194,099,400	54,518	**0.00020%**	179,729	125,211
1999	27,367,751,200	44,100	**0.00016%**	180,876	136,776
2000	19,287,814,900	60,551	**0.00031%**	127,475	66,924
2001	19,544,092,300	64,979	**0.00033%**	129,169	64,190
2002	22,909,439,200	67,860	**0.00030%**	151,411	83,551
2003	26,921,143,000	50,131	**0.00019%**	177,925	127,794
2004	29,463,345,200	71,270	**0.00024%**	194,726	123,456
2005	31,034,259,000	40,634	**0.00013%**	205,109	164,475
2006	30,293,146,400	48,153	**0.00016%**	200,211	152,058
2007	32,232,028,500	52,646	**0.00016%**	213,025	160,379
2008	34,270,464,000	62,460	**0.00018%**	226,497	164,037
2009	37,500,208,300	73,747	**0.00020%**	247,843	174,096
2010	40,275,133,900	51,331	**0.00013%**	266,183	214,852
2011	35,047,836,100	31,296	**0.00009%**	231,635	200,339
2012	34,203,610,400	35,187	**0.00010%**	226,055	190,868
2013	32,301,264,900	36,719	**0.00011%**	213,483	176,764
2014	28,484,380,000	42,271	**0.00015%**	188,256	145,985
2015	26,389,524,600	29,833	**0.00011%**	174,411	144,578
2016	24,964,487,500	35,853	**0.00014%**	164,993	129,140
2017	24,131,440,800	42,415	**0.00018%**	159,487	117,072

The above table reflects the trend in the ratio of published recruitment statistics relative to estimated egg production from 1982 to 2017. Trend is alarming to put it mildly in terms of the drop off in egg production over the last decade and reduced ratio of new recruits relative to egg production between the years 1996 and 2017 (red shaded area). Projected egg production is in **TRILLIONS** and arrived at by taking biomass population by age group times percentage sexually mature fish times assumed percentage of females times an assumed number of eggs produced per female which as mentioned I believe to be ultra conservative. Recruitment numbers are in **MILLIONS**.

Main points of discussion:

- Recruitment numbers used in the biomass population equates to less than 1/1000th of a percent of estimated egg production. It was my understanding summer flounder have a high survival rate so this level of R compared to egg production is surprising and if correct should be cause for concern to fisheries management. It illustrates more than ever the necessity to protect the spawn.
- If survival percentages have in fact decreased this significantly and abruptly since 1995, we need to understand why since the decline of R is the primary reason the fishery is failing. Recreational fishing activity doesn't occur during the spawn or in the demographics of the spawn so any disruption being encountered is due to either commercial harvest or environmental issues contributing to the decline which I believe to be negligible based on the immediacy of the drop in the ratio between 1995 and 1996.
- Average R to egg production (.00066%) for the years 1989 to 1995 is being used as a baseline comparison to future years after catch levels were significantly reduced after 1988. That period ratio averaged .00066% new recruits to estimated eggs produced. From 1996 to 2017, there's not a singular year which approximates that ratio, the highest being 1996 at 00039%, lowest being 2011 at .00009% and 2013 and 2015 at .00011% with the last 10-years averaging .00014%, a 79% reduction to baseline.
- The last column reflects incremental R annually if the ratio remained the same as years 1989 to 1995 or .00066%. The increase in recruitment and biomass levels over the prior 10-years 2008 to 2017 would have been ~1.7 **BILLION** fish or approximately 13 times the 2017 reported biomass population of 122 million fish. Consider the benefits this would have had on the fishery, commercial and recreational catch quotas, SSB, future recruitment levels, season lengths and the health of the fishery overall. It's a staggering statistic.
- At the same time, take note of the trend in estimated egg production over the years. 1989 to 2004, the period SSB and the biomass experienced their most significant growth, egg production increased almost every year. Over the past decade overall has decreased in excess of 40% due to gender composition changes within SSB commensurate with increased harvest levels of older age fish causing the continued and substantial erosion of R.
- Reference the data and observations provided in my earlier memorandum dated August 23, 2019 and consider the impacts each of the following are having:
    - What impact is the harvest of larger fish both commercially and recreationally having on dead discard rates of younger age populations.
    - Harvest of a significant portion of the commercial quota during the fall / winter spawn from a biomass more highly concentrated today than ever before in recorded history.
    - Commercial dead discard rates are in models at 80% of total discards. Statistics on page 178 of the 66th SAW have commercial discard rates as a percentage of total commercial catch over the last eight years at 15.3% while those same rates on observed commercial trips per the 57th SAW reflect significantly higher numbers. Five years between 2001 and 2009 averaged ~100% of total catch, 2007 being the highest at ~143%. Considerably greater discard percentages than reported on VTR's and discard assumptions built into fishery models. Put the two together and it paints a lethal picture.
    - Fish being towed during the fall / winter fisheries in waters ranging from 120 to 600 feet have zero chance of survival considering the weight and duration of the tow, depths fished and a lengthy sortation process. It's not only conceivable it's probably there's a 100% dead discard rates associated with the commercial fishery this time of year.

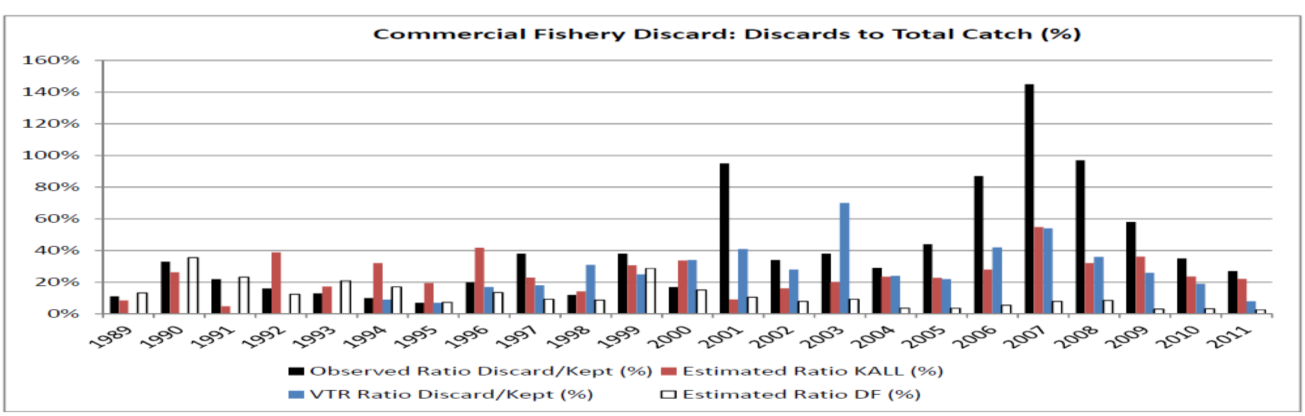
The above data collectively and below graphs reveal we're harvesting a significantly higher percentage of older age fish, a significantly higher percentage consisting of sexually mature females. Since a significant percentage of the commercial harvest takes place during the fall / winter months, primary spawn period of summer flounder, it's prudent to address that issue until more is known about the impacts on the efficacy of the spawn and discard rates of younger age classes while older age classes are being harvested. Bear in mind, as mentioned in this latest SAW report, the biomass is at its most concentrated level ever so factor that into the impacts commercial harvest might be having on the spawn during their offshore migration and throughout the winter. Found the following excerpt from the original FMP dated October 1987 on page 36 and if it holds true today it could be a significant factor leading to the demise in recruitment statistics and the reason why three-quarters of a trillion less fish harvested over the last 27 years has had little to no impact on increasing the overall size of the biomass.

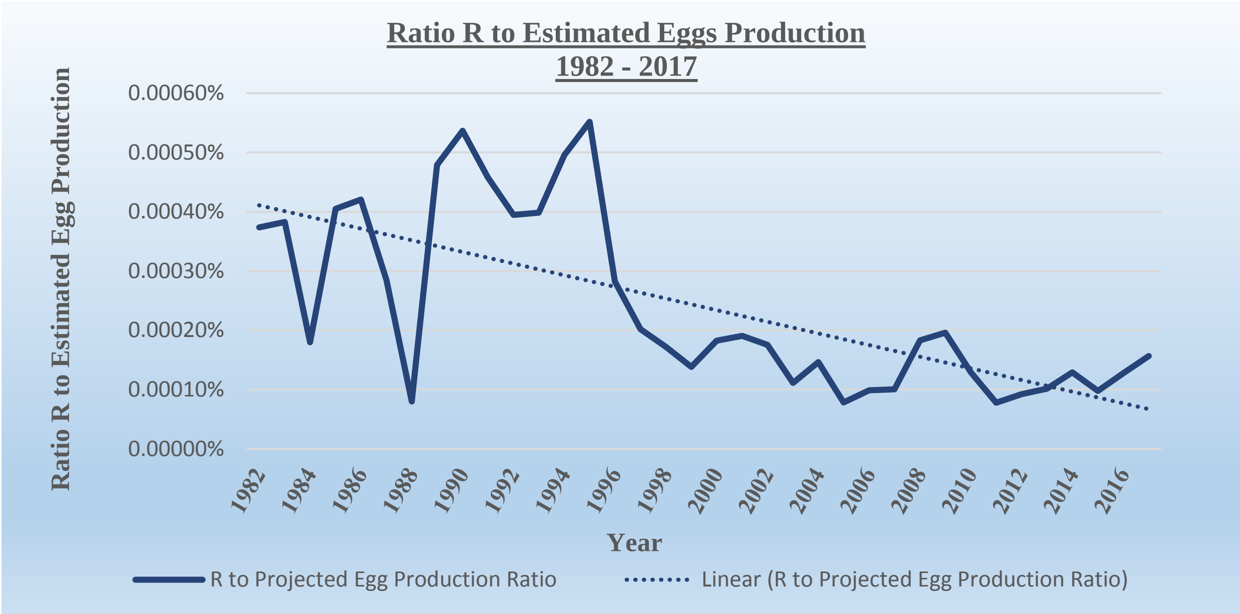
> Summer flounder support extensive commercial fisheries along the Atlantic Coast, principally from Massachusetts through North Carolina. Most commercial landings come from otter trawl vessels (Figure 16) while the second most important commercial gear is pound nets (section 7.1.1.1). Most of the fishing activity takes place in the EEZ during the winter (section 7.1.1.2). Summer flounder are part of an overall mixed bottom trawl fishery which generally also includes: winter flounder, yellowtail flounder, *Loligo*, scup, butterfish, and other species (section 7.1.1.8). According to 1985 weighout data, the average tow time for all otter trawl vessels that landed summer flounder was 1.9 hours.
>
> Generally, the sorting of otter trawl caught fish brought on deck is begun immediately after redeployment of the net. Often the species and market categories to be retained are placed on ice as rapidly as possible. Once the valuable catch is stored, the undersized and bycatch is generally shoveled overboard. Several hours may lapse before the discards are returned to the sea.

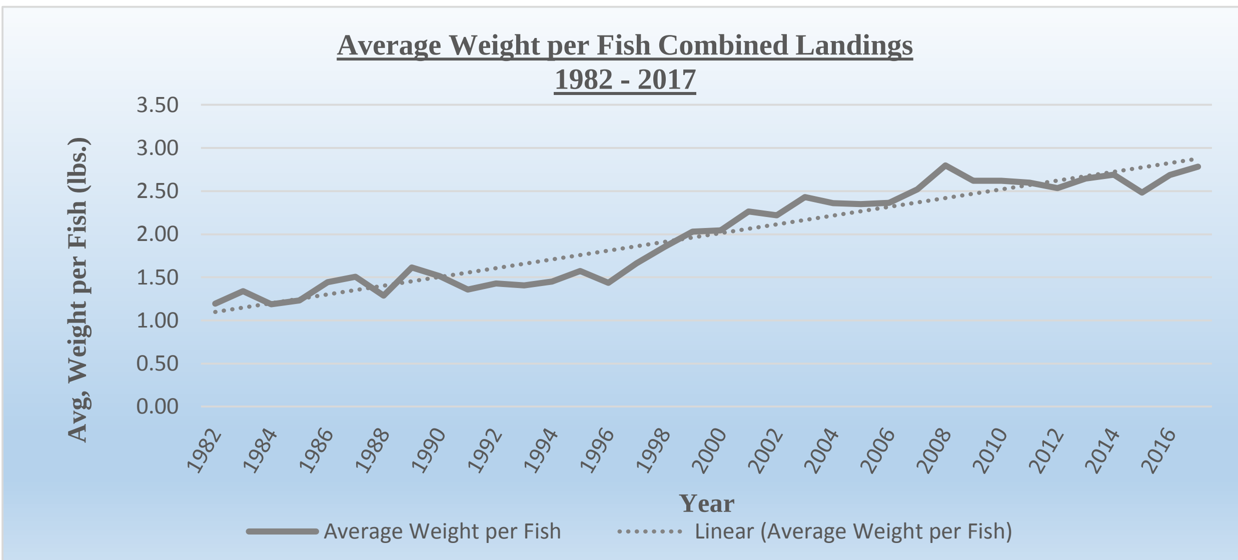
Key Points:

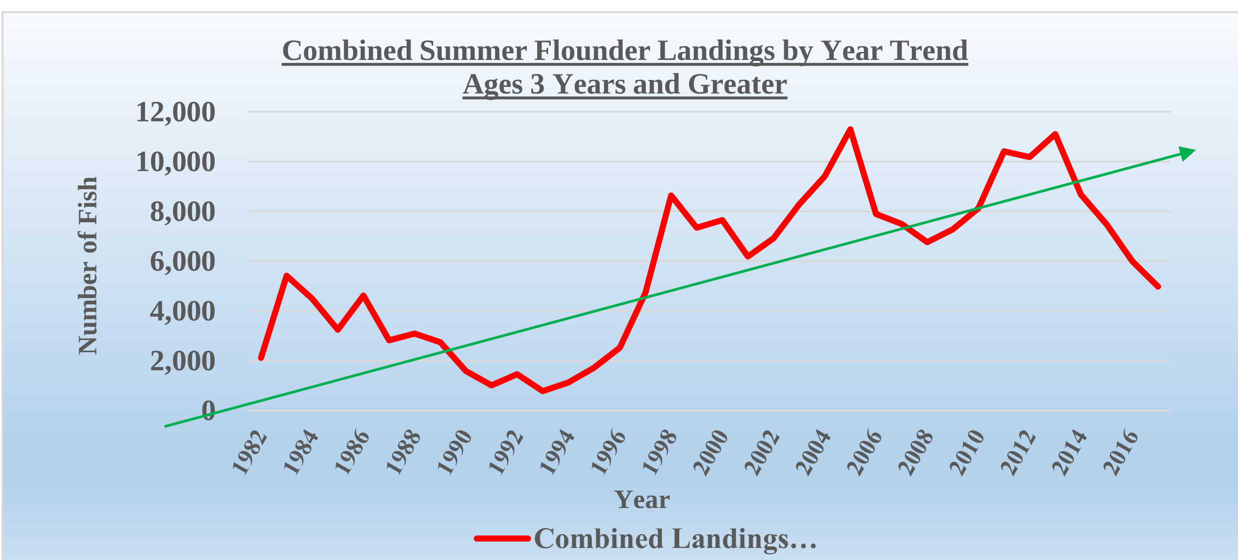
- Most of the commercial landings take place in the EEZ during the winter (summer flounder primary spawn)
- Average tow time was 1.9 hours.
- Generally sorting "of catch" begins immediately after redeployment of the net (how long does it take to empty the net and redeploy).
- Once the valuable catch is stored, the undersized and bycatch is generally shoveled overboard, several hours may lapse before the discards are returned to sea.

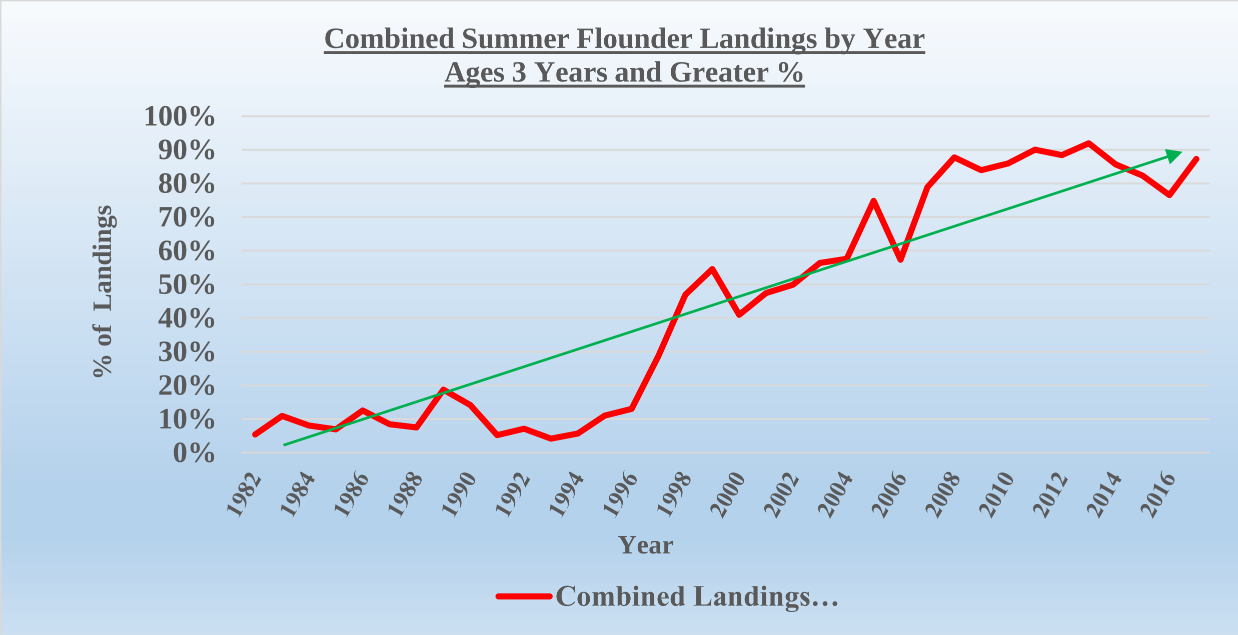
Any fish towed in a net for ~2 hours, brought up from depths ranging between 120 to 600 ft., retained on deck for several hours through the sortation process until "valued catch" is iced and stored will be dead when shoveled overboard. Dead discard rates as a percentage of catch have to be enormous in this process as evidenced in the below graph from the 57th SAW and dead discard as a percentage of total discards is arguably 100% as opposed to 80% used in models. No summer flounder or other species will survive any one of the above conditions individually much less all of them collectively.




Ratio R to Estimated Eggs Production
1982 - 2017
Ratio R to Estimated Egg Production
0.00060%
0.00050%
0.00040%
0.00030%
0.00020%
0.00010%
0.00000%
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
R to Projected Egg Production Ratio
Linear (R to Projected Egg Production Ratio)


Average Weight per Fish Combined Landings
1982 - 2017
Avg, Weight per Fish (lbs.)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Average Weight per Fish
Linear (Average Weight per Fish)


Combined Summer Flounder Landings by Year Trend
Ages 3 Years and Greater
Number of Fish
12,000
10,000
8,000
6,000
4,000
2,000
0
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Combined Landings…



These trends and what's causing them will continue until measures are taken by the Commission and Council to reverse them. The path the fishery is currently on which is one of continued decline will continue without management intervention. Another few years of the existing regulations could conceivably cause irreparable harm to the fishery if it hasn't already. Every additional year of poor recruitment will cause multiple years of reduced harvest, increased gender imbalance in SSB and continued pressure on future recruitment classes. These issues need to be addressed before 2020 regulations are established and there a tremendous amount of people and businesses depending on your help to determine the best approach to put this information in front of the Commission and Council before the October joint meeting. Again if you disagree with my interpretations and findings, I'd appreciate you sharing those disagreements or concerns. If the absence of any, an entirely new philosophy needs to be introduced managing this stock well beyond catch reductions in the form of increased size limits and shortened season which as stated previously will have zero impact on the problems facing or the trajectory of the fishery. If three quarters of a BILLION less fish harvested over the last 27-years hasn't corrected the fishery or improved recruitment, why would we believe future catch cuts will address the problems hurting the fishery.

I look forward to hearing back from both of you with any questions, comments, observations or concerns as well as an appropriate path forward for the Commission and Council to receive the analysis provided. I appreciate your efforts in advance.

John you sent me an email which stated the following "In my capacity as Chair of the SSC, I limit public comments at the meeting to addressing only potential sources of scientific uncertainty associated with the data and methods used to derive the ABC." With that understanding, there's five questions I believe should be asked at the upcoming September 9th meeting at Royal Sonesta Harbor Court. They are as follows:

- Why did the ratio of recruits to egg production drop off so suddenly and precipitously between the years 1995 and 1996 and continue a sustained downward spiral through 2017? The impact on recruitment is substantial.
- Age classes 7+ populations in the biomass for the decades 80' and 90's averaged 45,000 fish, 15,000 in the 90's. Overall percentage of catch was negligible and insignificant yet the biomass

actually declined from 252,000 in 1982 to 27,000 in 1999. In the first two decades of 2000, the biomass population numbers increased from 27,000 in 1999 to 4,742,000 in 2017 when larger fish were being harvested, recreational landings consist entirely of larger sexually mature fish due to regulations, average commercial landings weights have doubled, recruitment levels and SSB continue to spiral downward, annual catch levels of age classes 7+ have increased ~2200% for the current decade compared to the 80's and 90's, commercial discard rates are quoted as being 80% with a higher proportion of older fish being discarded since 2002 discussed in Section 9 of my previous draft, yet these age classes are being reported as experiencing explosive growth never before experienced. The results are the polar opposite of what one would expect, what explanation and evidence is there supporting that trend and explosion in these age classes.

- Over the last 27-years based on the information reflected on pages 1 and 2 above, why would landings be down by three-quarters of a trillion fish for the years 1990 through 2017 compared to the average harvest for the baseline period 1982 through 1989 causing a corresponding reduction in recruitment of ~303 million fish over the same period. Changes in gender composition of SSB is part of the explanation but again the data is directionally opposite of what one would expect. What plausible explanation could explain that kind of inverse relationship and trend?
- Considering the above bullet, how is it possible over the same 27-year period, the biomass population increased by only 60 million fish when the relationship between recruitment and landings statistics would suggest a much greater increase in the biomass.
- Why are commercial discard rates as a percentage of catch in the SAW report being reported at ~15% when rates on observed trawls are showing percentages consistently higher?

John / Brandon, I'd ask that this addendum please be included in the "Supplemental Materials" public commentary section for the upcoming SSC meeting next week. Chris, Dustin and Kiley, I'm sending you this as an addendum to my initial draft sent 8/25/19. Curious if you've had a chance to review the analysis and have comments. My opinion is clearly stated in both documents and I believe it's critical this information as mentioned be elevated to the Commission Board and Council Members responsible for the management of the summer flounder fishery well in advance of the October 8th through 10th joint meeting in Durham NC.

The fishery is in a downward spiral it can't reverse without management intervention and changes in policy decisions. The data couldn't be more clear in that respect. Recruitment is the key to every fishery and in the case of summer flounder it's being destroyed. Until measures are taken to improve the reproductive strength of SSB and protect the spawn, the fishery will continue its decline.

I'd appreciate your thoughts as well as the plan to put this information in front of the Commission and Council. This can't be a footnote a day before the meeting in briefing materials, Members need to see the data as far in advance as possible and be prepared to discuss it at next week's SSC meeting and more importantly at the Joint Commission / Council meeting in October. I'll do anything to facilitate that happening but I need your help and support determining the best approach for that to happen.

None of what I've taken the time to do is about culpability, how we got here doesn't matter only in the sense of learning from mistakes we might have made along the way. It's about correcting and growing this extremely important fishery for the benefits of all the constituents' dependent on it. I think we all share the same sentiment and can hopefully work together to make that a reality.

Summer Flounder Fishery Information Document

August 2019

This document provides a brief overview of the biology, stock condition, management system, and fishery performance for summer flounder (*Paralichthys dentatus*) with an emphasis on 2018. Data sources include unpublished National Marine Fisheries Service (NMFS) survey, dealer, vessel trip report (VTR), permit, and Marine Recreational Information Program (MRIP) databases and should be considered preliminary. For more resources on summer flounder management, including previous Fishery Information Documents, please visit http://www.mafmc.org/sf-s-bsb.

Key Facts:

- The 2018 benchmark stock assessment found that in 2017, summer flounder was not overfished and overfishing was not occurring (in contrast to the last assessment which found overfishing was occurring).
- Incorporation of a revised time series of recreational data from MRIP contributed to an increase in estimated stock biomass compared to the previous assessment.
- Commercial and recreational landings in 2018 were among the lowest in the time series.
- Commercial price per pound has been increasing since 2011 and remained well above average in 2018 at $4.11 per pound.
- MRIP revisions resulted in a higher proportion of estimated recreational harvest from the private and shore modes and a decrease in estimated harvest from the for-hire fishery.

Basic Biology

Summer flounder spawn during the fall and winter over the open ocean areas of the continental shelf. From October to May, larvae and postlarvae migrate inshore, entering coastal and estuarine nursery areas. Juveniles are distributed inshore and in many estuaries throughout the range of the species during spring, summer, and fall. Adult summer flounder exhibit strong seasonal inshore-offshore movements, normally inhabiting shallow coastal and estuarine waters during the warmer months of the year and remaining offshore during the colder months.

Summer flounder habitat includes pelagic waters, demersal waters, saltmarsh creeks, seagrass beds, mudflats, and open bay areas from the Gulf of Maine through North Carolina. Summer flounder are opportunistic feeders; their prey includes a variety of fish and crustaceans. While the natural predators of adult summer flounder are not fully documented, larger predators (e.g., large sharks, rays, and monkfish) probably include summer flounder in their diets.[1]

Spawning occurs during autumn and early winter, and the larvae are transported toward coastal areas by prevailing water currents. Development of post larvae and juveniles occurs primarily within bays and estuarine areas. Most fish are sexually mature by age 2. The largest fish are females, which can attain lengths over 90 cm (36 in) and weights up to 11.8 kg (26 lb). The Northeast Fisheries Science Center (NEFSC) commercial fishery sampling in 2018 observed the oldest summer flounder collected to date, a 57 cm fish (likely a male) estimated to be age 20. Also sampled were two age 17 fish, at 52 cm (likely a male) and at 72 cm (likely a female). Two large (likely female) fish at 80 and 82 cm were both estimated to be age 9, from the 2009 year class (the 6th largest of the 36 year modeled time series). These samples indicate that increased survival of summer flounder over the last two decades has allowed fish of both sexes to grow to the oldest ages estimated to date.[2]

Status of the Stock

The most recent benchmark summer flounder stock assessment was completed and reviewed during the 66th Stock Assessment Workshop and Stock Assessment Review Committee (SAW/SARC 66) in November 2018.[3] This assessment uses a statistical catch at age model (the age-structured assessment program, or "ASAP" model). Stock assessment and peer review reports are available online at the Northeast Fisheries Science Center (NEFSC) website: http://www.nefsc.noaa.gov/saw/reports.html.

The assessment incorporated the revised time series of recreational catch from MRIP, which is 30% higher on average compared to the previous summer flounder estimates for 1981-2017. The MRIP estimate revisions account for changes in both the angler intercept survey and recreational effort survey methodologies. While fishing mortality rates were not strongly affected by incorporating these revisions, increased recreational catch resulted in increased estimates of stock size compared to past assessments.

The biological reference points for summer flounder as revised through the recent benchmark assessment are described in Table 1.

Table 1: Summary of biological reference points and terminal year SSB and F estimates from the 2018 benchmark stock assessment.

	SAW/SARC 66 (2018) Biological Reference Points and stock status results (data through 2017)
SSB_{MSY} (biomass target)	126.01 mil lb (57,159 mt)
½ SSB_{MSY} (minimum stock size, or overfished, threshold)	63.01 mil lb (28,580 mt)
Terminal year SSB (2017)	98.22 mil lb (44,552 mt) 78% of SSB_{MSY} **(not overfished)**
$F_{MSY\ PROXY} = F_{35\%}$ (overfishing threshold)	0.448
Terminal year F (2017)	0.334 25% below F_{MSY} (**not overfishing**)

Assessment results indicate that the summer flounder stock was not overfished and overfishing was not occurring in 2017 relative to the biological reference points. Fishing mortality on the fully selected age 4 fish ranged between 0.744 and 1.622 during 1982-1996 and then decreased to 0.245 in 2007. Since 2007 the fishing mortality rate has increased, and in 2017 was estimated at 0.334, below the SAW 66 F_{MSY} proxy = $F_{35\%}$ = 0.448 (Figure 1). The 90% confidence interval for F in 2017 was 0.276 to 0.380.

SSB decreased from 67.13 million lb (30,451) mt in 1982 to 16.33 million lb (7,408) mt in 1989, and then increased to 152.46 million lb (69,153) mt in 2003. SSB has decreased since 2003 and was estimated to be 98.22 million lb (44,552 mt) in 2017, about 78% of SSB_{MSY} = 126.01 million lb (57,159 mt), and 56% above the ½ SSB_{MSY} proxy = ½ $SSB_{35\%}$ = 63.01 million lb (28,580 mt; Figure 2). The 90% confidence interval for SSB in 2017 was 39,195 to 50,935 mt.

Recruitment of juvenile summer flounder to the fishery has been below average since about 2011 (Figure 2), although the driving factors behind this trend have not been identified. Bottom trawl survey data also indicate a recent trend of decreasing length and weight at age, which implies slower growth and delayed maturity. These factors affected the change in biological reference points used to determine stock status.

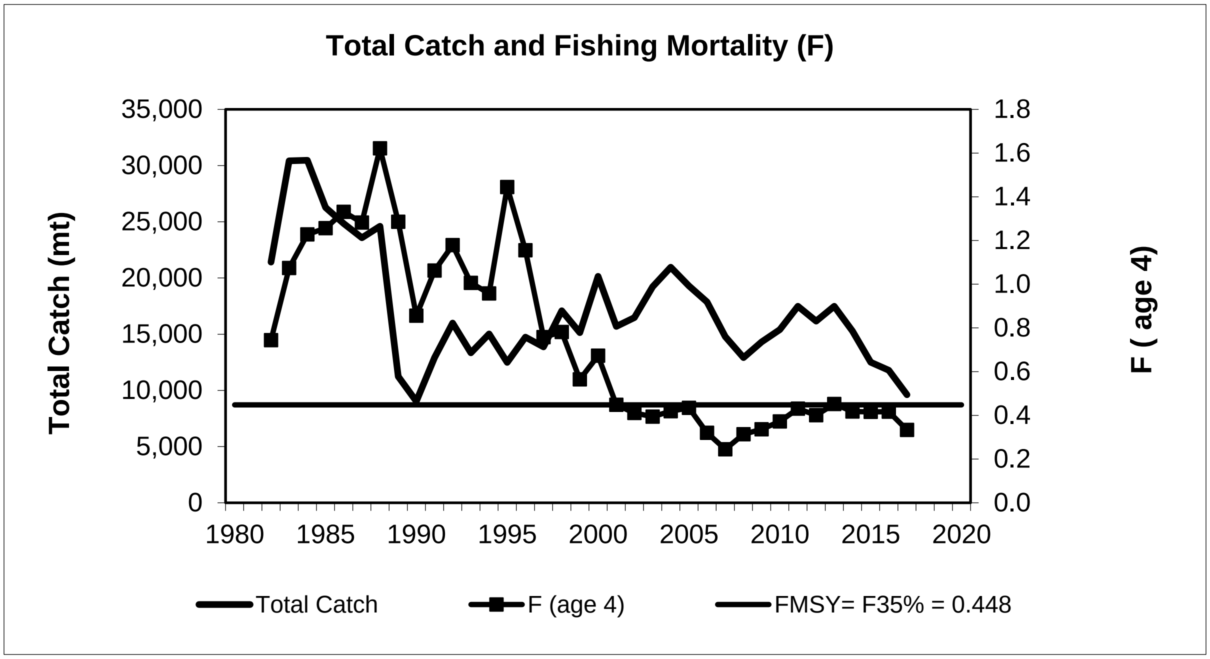


Figure 1: Total fishery catch (mt; solid line) and fully-recruited fishing mortality (F, peak at age 4; squares) of summer flounder. The horizontal solid line is the 2018 SAW66 recommended fishing mortality reference point proxy FMSY = F35% = 0.448.[3]

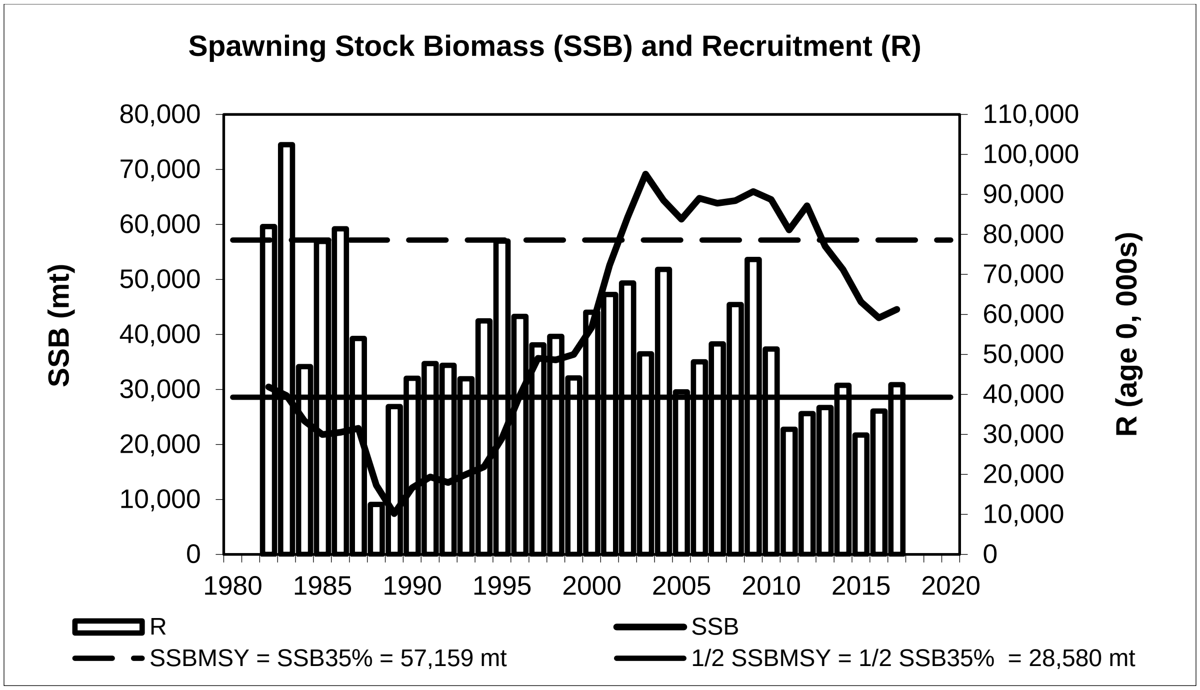


Figure 2: Summer flounder spawning stock biomass (SSB; solid line) and recruitment at age 0 (R; vertical bars) 1980-2017. The horizontal dashed line is the 2018 SAW66 recommended target biomass reference point proxy, $SSB_{MSY} = SSB_{35\%} = 57,159$ mt. The horizontal solid line is the 2018 SAW66 recommended threshold biomass reference point proxy ½ SSB_{MSY} = ½ $SSB_{35\%}$ = 28,580 mt.[3]

Management System and Fishery Performance

Management

The Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (Commission or ASMFC) work cooperatively to develop fishery regulations for summer flounder off the east coast of the United States. The Council and Commission work in conjunction with NMFS, which serves as the federal implementation and enforcement entity. This cooperative management endeavor was developed because a significant portion of the catch is taken from both state (0-3 miles offshore) and federal waters (3-200 miles offshore, also known as the Exclusive Economic Zone, or EEZ).

The joint Fishery Management Plan (FMP) for summer flounder became effective in 1988, and established the management unit for summer flounder as U.S. waters in the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border. The FMP also established measures to ensure effective management of summer flounder fisheries, which currently include catch and landings limits, commercial quotas, recreational harvest limits, minimum fish sizes, gear regulations, permit requirements, and other provisions as prescribed by the FMP.

There are large commercial and recreational fisheries for summer flounder. These fisheries are managed primarily using output controls (catch and landings limits), with 60 percent of the landings being allocated to the commercial fishery as a commercial quota and 40 percent allocated to the recreational fishery as a recreational harvest limit. Management also uses minimum fish sizes, gear regulations, permit requirements, and other provisions as prescribed by the FMP. The

Summer Flounder FMP, including subsequent Amendments and Frameworks, are available on the Council website at: http://www.mafmc.org/fisheries/fmp/sf-s-bsb.

The Council's Scientific and Statistical Committee (SSC) recommends annual Acceptable Biological Catch (ABC) levels for summer flounder, which are then approved by the Council and Commission and submitted to NMFS for final approval and implementation. The ABC is divided into commercial and recreational Annual Catch Limits (ACLs), based on the landings allocation prescribed in the FMP and the recent distribution of discards between the commercial and recreational fisheries. The Council first implemented recreational and commercial ACLs, with a system of overage accountability, in 2012. Both the ABC and the ACLs are catch limits (i.e., include both projected landings and discards), while the commercial quota and the recreational harvest limit are landing limits. Table 2 shows summer flounder catch and landings limits from 2008 through 2019, as well as commercial and recreational landings through 2018.

Total (commercial and recreational combined) summer flounder landings, taking into account the revised recreational data from MRIP, generally declined throughout the early 1980s, dropping to a time series low of 13.74 million lb in 2018 (Figure 3).[4,5]

Table 2: Summary of catch limits, landings limits, and landings for commercial and recreational summer flounder fisheries from 2008 through 2019 (revised). Values are in millions of pounds unless otherwise noted.

Management measures	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019[a]
ABC	--	21.50	25.5	33.95	25.58	22.34	21.94	22.57	16.26	11.30	13.23	25.03
Commercial ACL	--	--	--	--	14.00	12.11	12.87	13.34	9.43	6.57	7.70	13.53
Commercial quota[b,c]	9.32	10.74	12.79	17.38	12.73	11.44	10.51	11.07	8.12	5.66	6.63	10.98
Commercial landings	9.21	10.94	13.04	16.56	13.03	12.49	11.07	10.68	7.81	5.83	6.14	--
% of commercial quota landed	99%	102%	102%	95%	102%	109%	105%	96%	96%	103%	93%	--
Recreational ACL	--	--	--	--	11.58	10.23	9.07	9.44	6.84	4.72	5.53	11.51
Recreational harvest limit [b]	6.21	7.16	8.59	11.58	8.49	7.63	7.01	7.38	5.42	3.77	4.42	7.69
Harvest - OLD MRIP	8.15	6.03	5.11	5.96	6.49	7.36	7.39	4.72	6.18	3.19	3.35	--
% Over/Under RHL (Old MRIP)[d]	131%	84%	59%	51%	76%	96%	105%	64%	114%	85%	76%	--
Harvest - NEW MRIP	12.34	11.66	11.34	13.48	16.13	19.41	16.24	11.83	13.24	10.06	7.60	--

[a] As revised via interim final rule on May 17, 2019 (84 FR 22393), based on the 2018 benchmark stock assessment.
[b] For 2008-2014, commercial quotas and RHLs are adjusted for Research Set Aside (RSA). Quotas and harvest limits for 2015-2019 do not reflect an adjustment for RSA due to the suspension of the program in 2014.
[c] Commercial quotas also reflect deductions from prior year landings overages and discard-based Accountability Measures.
[d] The revised MRIP data cannot be compared to past RHLs given that these limits were set based on an assessment that used previous MRIP data.

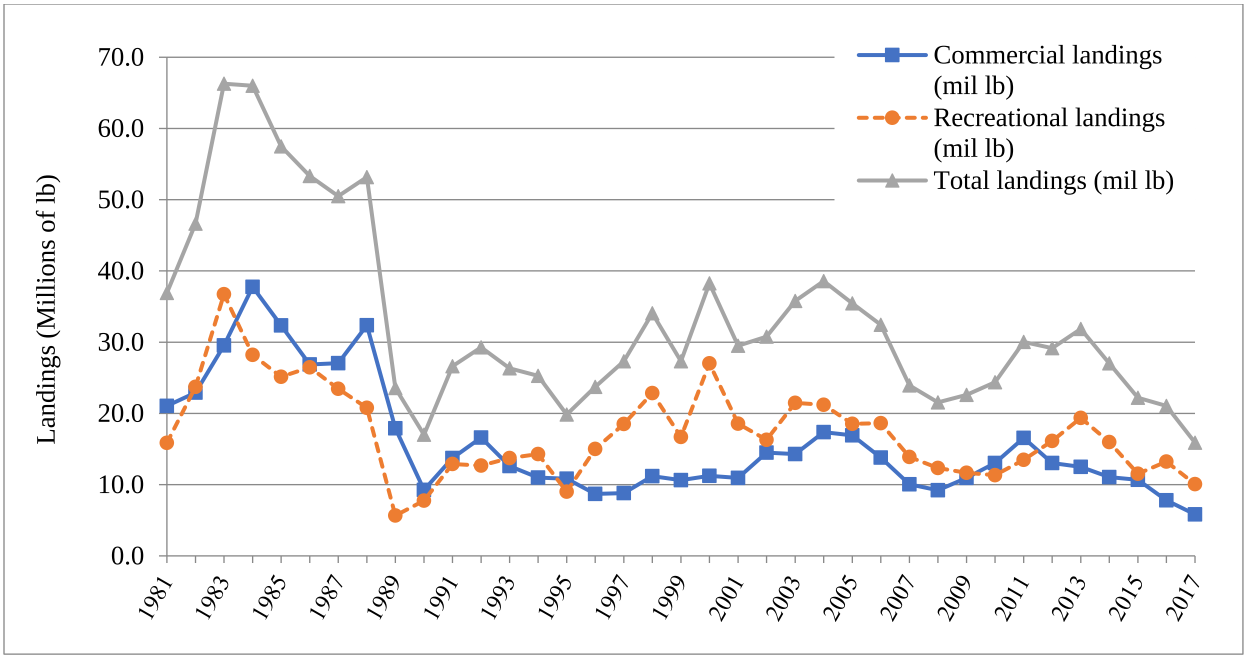


Figure 3: Commercial and recreational summer flounder landings in millions of pounds, Maine-North Carolina, 1980-2018. Recreational landings are based on revised MRIP data.[4,5]

Commercial Fishery

Commercial landings of summer flounder peaked in 1984 at 37.77 million pounds, and reached a low of 5.83 million pounds in 2017. In 2018, commercial fishermen from Maine through North Carolina landed 6.14 million pounds of summer flounder, about 93% of the commercial quota (6.63 million pounds after deductions for prior year landings and discard overages; Table 2). Total ex-vessel value in 2018 was $25.27 million, resulting in an average price per pound of $4.11 (Figure 4).

A moratorium permit is required to fish commercially for summer flounder in federal waters. In 2018, 741 vessels held such permits.[6]

The commercial quota is divided among the states based on the allocation percentages given in Table 3 and each state sets measures to achieve their state-specific commercial quotas. The Council and ASFMC recently approved modifications to the commercial allocations through a Summer Flounder Commercial Issues Amendment (see: http://www.mafmc.org/actions/summer-flounder-amendment). A summary of the commercial allocation changes is available at: http://www.mafmc.org/s/SF-Allocation-Revisions-Fact-Sheet-March-2019.pdf. These changes are pending implementation by the National Marine Fisheries Service, and if approved, are expected to take effect on January 1, 2021.

Table 3: State-by-state percent share of commercial summer flounder allocation.

State	Allocation (%)
ME	0.04756
NH	0.00046
MA	6.82046
RI	15.68298
CT	2.25708
NY	7.64699
NJ	16.72499
DE	0.01779
MD	2.03910
VA	21.31676
NC	27.44584
Total	100

For 1994 through 2018, NMFS dealer data indicate that summer flounder total ex-vessel revenue from Maine to North Carolina ranged from a low of $9.47 million in 1996 to a high of $30.02 million in 2015 (values adjusted to 2018 dollars to account for inflation). The mean price per pound for summer flounder ranged from a low of $0.99 in 2002 (in 2018 dollars) to a high of $4.13 in 2017. In 2018, 6.14 million pounds of summer flounder were landed generating $25.27 million in total ex-vessel revenue (an average of $4.11 per pound; Figure 4).[4]

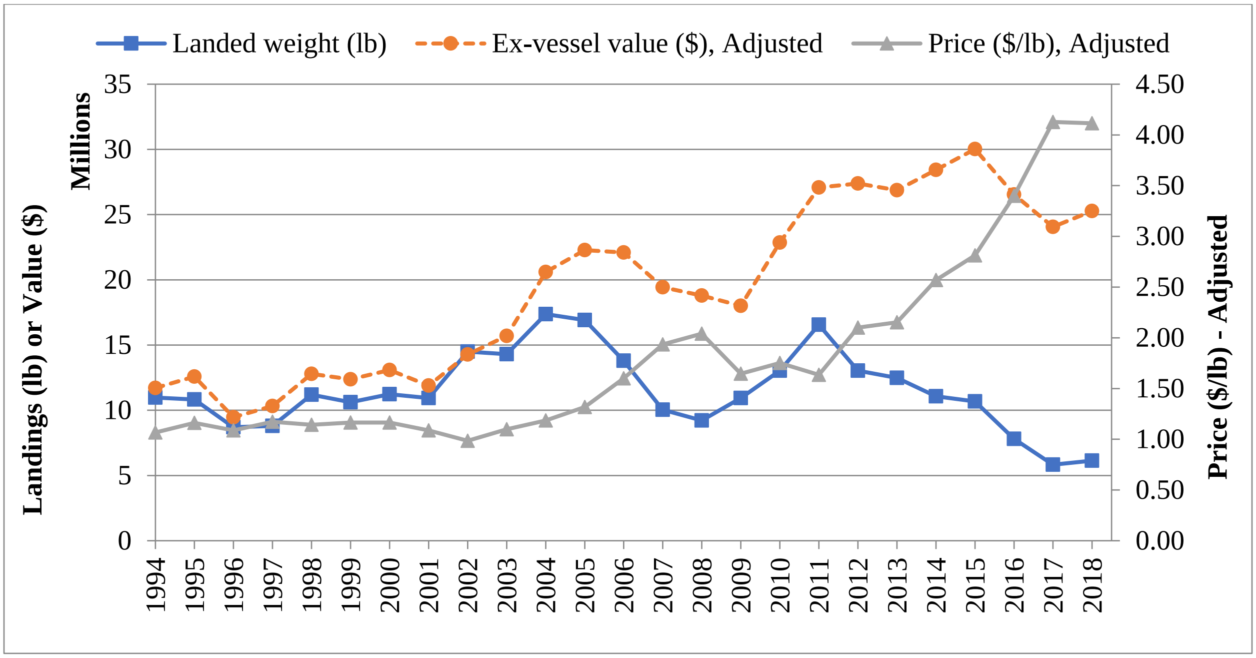


Figure 4: Landings, ex-vessel value, and price per pound for summer flounder, Maine through North Carolina, 1994-2018. Ex-vessel value and price are adjusted to real 2018 dollars using the Gross Domestic Product Price Deflator (GDPDEF).[4]

VTR data for 2018 indicate that the bulk of the summer flounder landings were taken by bottom otter trawls (96 percent). All other gear types each accounted for less than 1 percent of landings.[7] Current regulations require a 14-inch total length minimum fish size in the commercial fishery. Trawl nets are required to have 5.5-inch diamond or 6-inch square minimum mesh in the entire net for vessels possessing more than the threshold amount of summer flounder (i.e., 200 lb from November 1-April 30 and 100 lb from May 1-October 31).

VTR data were also used to identify all NMFS statistical areas that accounted for more than 5 percent of the summer flounder commercial catch in 2018 (Table 4; Figure 5). Statistical areas 616 and 537 were responsible for the highest percentage of the catch (34% and 17% respectively; Table 4). While statistical area 539 accounted for only 6% of 2018 summer flounder catch, this area had the highest number of trips that caught summer flounder (2,473 trips).[7] Note that discards on VTRs are self-reported.

At least 100,000 pounds of summer flounder were landed by commercial fishermen in 14 ports in 7 states in 2018. These ports accounted for 81% of all 2018 commercial summer flounder landings. Beaufort, NC and Point Judith, RI were the leading ports in 2018 in pounds of summer flounder landed, while Point Judith, RI was the leading port in number of vessels landing summer flounder (Table 5).[4]

Over 200 federally permitted dealers from Maine through North Carolina bought summer flounder in 2018. More dealers bought summer flounder in New York than in any other state (

Table 6). All dealers combined bought approximately $25.27 million worth of summer flounder in 2018.[4]

Table 4: Statistical areas that accounted for at least 5 percent of the total summer flounder catch in 2018, with associated number of trips.[7]

Statistical Area	Percent of 2018 Commercial Summer Flounder Catch	Number of Trips
616	34%	1,062
537	17%	1,199
613	13%	1,553
612	6%	1,281
539	6%	2,473
622	6%	263

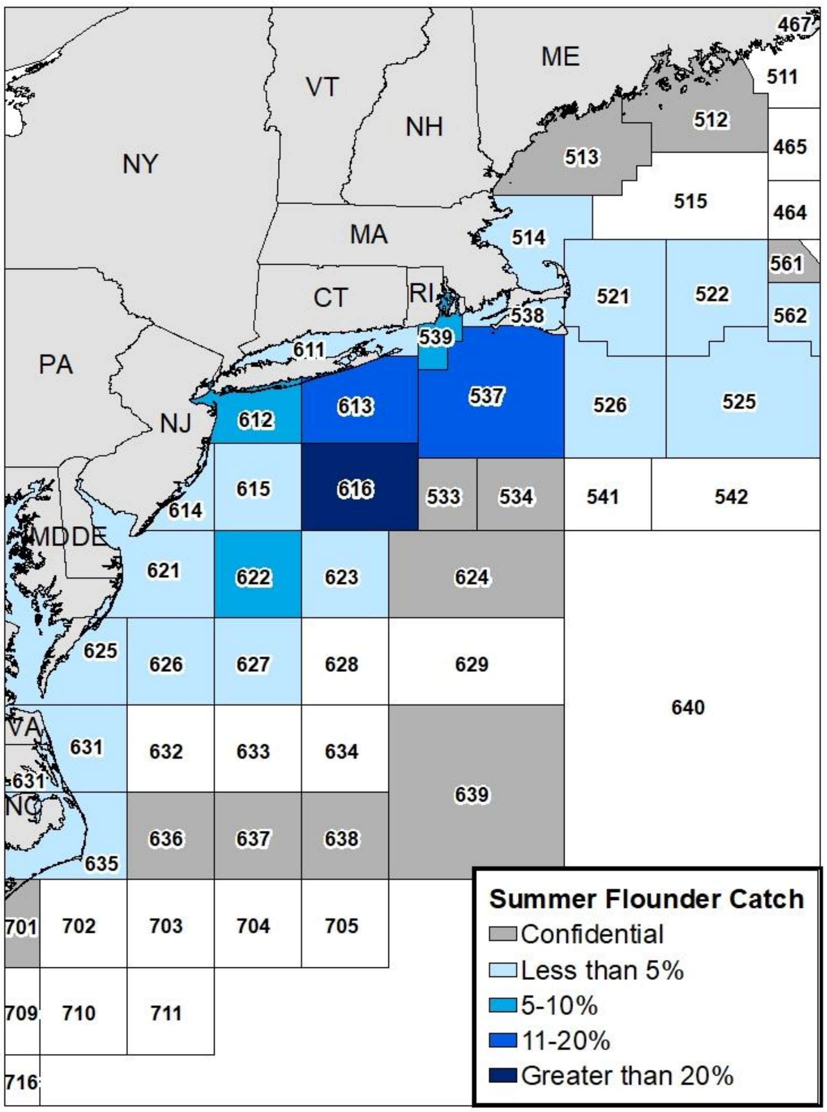


Figure 5: NMFS statistical areas showing percent of total commercial summer flounder catch in 2018, according to VTR data.[7]

Table 5: Ports reporting at least 100,000 pounds of commercial summer flounder landings in 2018, based on dealer data.[4]

Port	Commercial summer flounder landings (lb)	% of total 2018 commercial summer flounder landings	Number of vessels landings summer flounder
BEAUFORT, NC	1,028,999	17%	70
POINT JUDITH, RI	894,791	15%	129
PT. PLEASANT, NJ	558,815	9%	51
HAMPTON, VA	524,723	9%	55
NEWPORT NEWS, VA	498,680	8%	45
MONTAUK, NY	263,770	4%	68
CHINCOTEAGUE, VA	190,783	3%	25
BELFORD, NJ	180,625	3%	20
WANCHESE, NC	172,657	3%	15
CAPE MAY, NJ	161,144	3%	44
NEW BEDFORD, MA	142,044	2%	58
ENGELHARD, NC	139,805	2%	11
ORIENTAL, NC	104,421	2%	7
STONINGTON, CT	100,526	2%	19

Table 6: Number of dealers per state which reported purchases of summer flounder in 2018. C = Confidential.[4]

State	MA	RI	CT	NY	NJ	DE	MD	VA	NC
Number Of Dealers	30	27	15	49	29	C	6	16	28

Recreational Fishery

There is a significant recreational fishery for summer flounder, primarily in state waters when the fish migrate inshore during the warm summer months. The Council and ASMFC determine annually whether to manage the recreational fishery under coastwide measures or conservation equivalency. Under conservation equivalency, state- or region- specific measures are developed through the ASMFC's management process and submitted to NMFS. The combined state or regional measures must achieve the same level of conservation as would a set of coastwide measures developed to adhere to the overall recreational harvest limit. If NMFS considers the combination of the state- or region- specific measures to be "equivalent" to the coastwide measures, they may then waive the coastwide regulation in federal waters. Anglers fishing in federal waters are then subject to the measures of the state in which they land summer flounder.

The recreational fishery has been managed using conservation equivalency each year since 2001. From 2001 through 2013, measures were developed under state-by-state conservation equivalency. Since 2014, a regional approach has been used, under which the states within each region must have identical size limits, possession limits, and season length. The 2018 and 2019 regional conservation equivalency measures are given in Table 7.

In July 2018, MRIP released revisions to their time series of recreational catch and landings estimates based on adjustments for a revised angler intercept methodology and a new effort estimation methodology (i.e., a transition from a telephone-based effort survey to a mail-based effort survey). The revised estimates of catch and landings are several times higher than the previous estimates for shore and private boat modes, substantially raising the overall summer flounder catch and harvest estimates. On average, the new landings estimates for summer flounder (in pounds) are 1.8 times higher over the time series 1981-2017, and 2.3 times higher over the past 10 years (2008-2017). In 2017, new estimates of landings in pounds were 3.16 times higher than the previous estimates.

Revised MRIP estimates indicate that recreational catch for summer flounder peaked in 2010 with 58.89 million fish caught. Recreational harvest peaked in 1983, with 25.78 million fish landed, totaling 36.74 million pounds. Recreational catch reached a low in 1989 with 5.06 million fish caught, while landings reached a low in 2018 with 2.41 million fish landed (3.35 million pounds; Figure 6).[5]

Table 7: Summer flounder recreational fishing measures in 2018 and 2019, by state, under regional conservation equivalency. 2018 and 2019 regions include: 1) Massachusetts, 2) Rhode Island, 3) Connecticut and New York, 4) New Jersey, 5) Delaware, Maryland, The Potomac River Fisheries Commission, and Virginia, and 6) North Carolina.

	2018			2019		
State	**Minimum Size (inches)**	**Possession Limit**	**Open Season**	**Minimum Size (inches)**	**Possession Limit**	**Open Season**
Massachusetts	17	5 fish	May 23-October 9	17	5 fish	May 23-October 9
Rhode Island (Private, For-Hire, and all other shore-based fishing sites)	19	6 fish	May 1-December 31	19	6 fish	May 3-December 31
RI 7 designated shore sites	N/A	N/A		19	4 fish*	
				17	2 fish*	
Connecticut	19	4 fish	May 4-September 30	19	4 fish	May 4- September 30
CT Shore Program (45 designed shore sites)	17			17		
New York	19			19		
New Jersey	18	3 fish	May 25-September 22	18	3 fish	May 24- September 21
NJ Shore program site (ISBSP)	16	2 fish		16	2 fish	
New Jersey/Delaware Bay COLREGS	17	3 fish		17	3 fish	
Delaware	16.5	4 fish	January 1-December 31	16.5	4 fish	January 1- December 31
Maryland						
PRFC						
Virginia						
North Carolina	15	4 fish	January 1-December 31	15	4 fish	January 1- December 31

*Combined possession limit of 6 fish, no more than 2 fish at 17-inch minimum size limit.

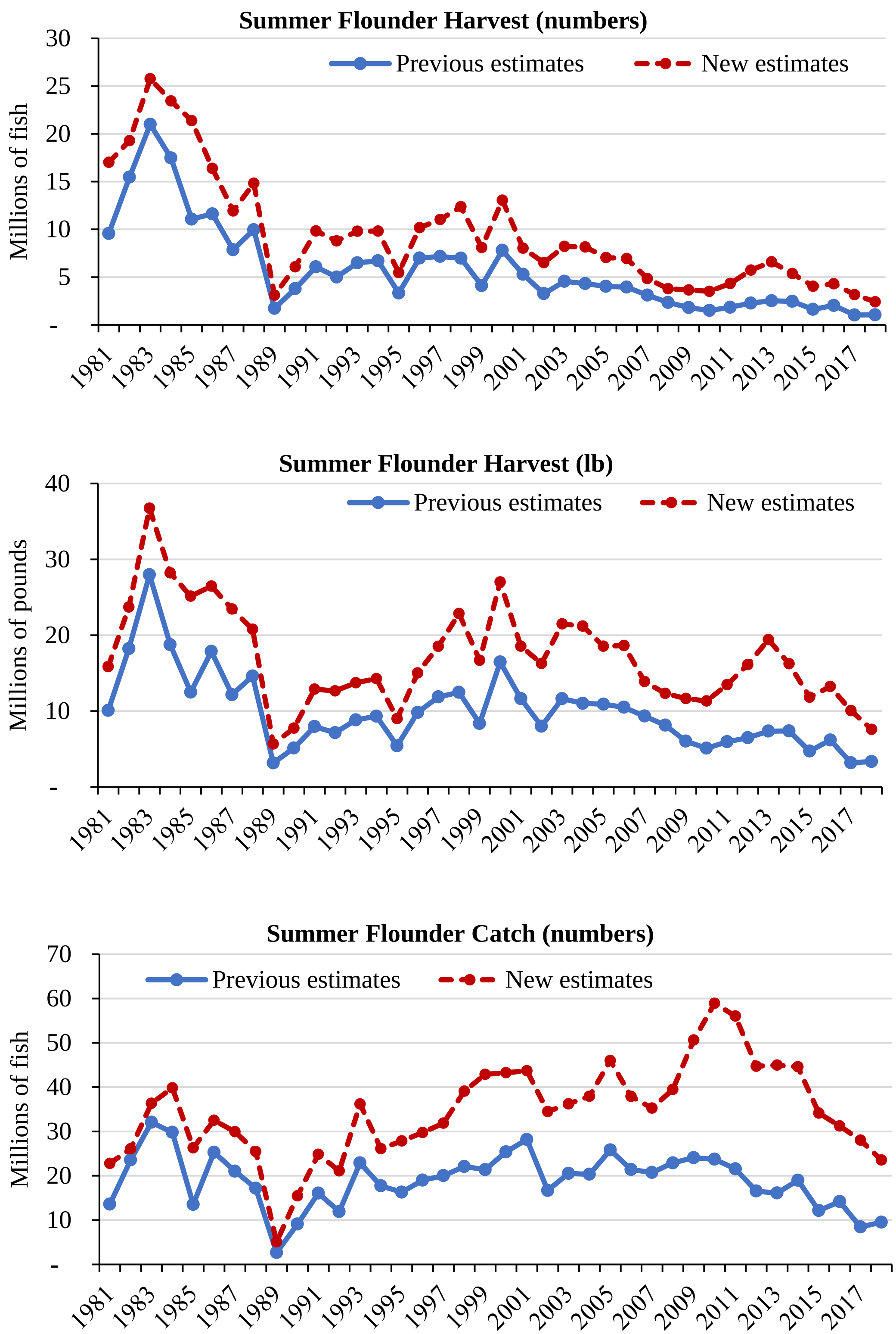


Figure 6: Pre- and post-revision MRIP estimates of recreational summer flounder harvest in numbers of fish and pounds and catch in numbers of fish, ME - NC, 1981 - 2017. 2018 "old" MRIP values are "back-calibrated," as MRIP stopped producing estimates using the old methodology after 2017.[5]

For-hire vessels carrying passengers in federal waters must obtain a federal party/charter permit. In 2018, 812 vessels held summer flounder federal party/charter permits.[6] Many of these vessels also hold recreational permits for scup and black sea bass.

On average, an estimated 84 percent of the landings (in numbers of fish) occurred in state waters over the past ten years, and about 82 percent of landings came from state waters in 2018 (Table 8). The majority of summer flounder were landed in New York and New Jersey in 2018 (Table 9).[5]

By fishing mode, about 84% of recreational summer flounder harvest in 2018 was from anglers who fished on private or rental boats. About 6% was from party or charter boats, and about 10% was from anglers fishing from shore. The revised MRIP time series increased the proportion of harvest estimated to occur from private and shore modes while making no changes to the estimates for party/charter modes, modifying the percentages attributable to each mode (

Table 10).[5]

Table 8: Estimated percentage of summer flounder recreational landings (in numbers of fish) from state vs. federal waters, Maine through North Carolina, 2009-2018 (revised MRIP data).[5]

Year	State <= 3 mi	EEZ > 3 mi
2009	90%	10%
2010	93%	7%
2011	94%	6%
2012	86%	14%
2013	77%	23%
2014	78%	22%
2015	82%	18%
2016	79%	21%
2017	79%	21%
2018	82%	18%
Avg. 2009 - 2018	**84%**	**16%**
Avg. 2016 - 2018	**80%**	**20%**

Table 9: State contribution (as a percentage) to total recreational landings of summer flounder (in numbers of fish), from Maine through North Carolina, 2016-2018 (revised MRIP data).[5]

State	2016	2017	2018	2016-2018 average
Maine	0%	0%	0%	0%
New Hampshire	0%	0%	0%	0%
Massachusetts	2%	2%	3%	2%
Rhode Island	3%	5%	7%	5%
Connecticut	8%	4%	7%	6%
New York	42%	37%	25%	35%
New Jersey	34%	38%	43%	38%
Delaware	4%	3%	4%	4%
Maryland	1%	2%	2%	2%
Virginia	5%	6%	6%	6%
North Carolina	2%	3%	2%	2%
Total	100%	100%	100%	100%

Table 10: The percent of summer flounder landings (in number of fish) by recreational fishing mode, Maine through North Carolina, 1981-2018 (revised MRIP data).[5]

Year	Shore	Party/Charter	Private/Rental	Total number of fish landed (millions)
1981	45%	7%	49%	17.02
1982	14%	12%	74%	19.29
1983	19%	12%	68%	25.78
1984	13%	12%	75%	23.45
1985	12%	5%	84%	21.39
1986	25%	6%	69%	16.38
1987	12%	7%	81%	11.93
1988	19%	11%	70%	14.82
1989	20%	7%	73%	3.10
1990	16%	13%	71%	6.07
1991	24%	10%	66%	9.83
1992	13%	6%	81%	8.79
1993	12%	9%	79%	9.80
1994	15%	9%	76%	9.82
1995	14%	4%	82%	5.47
1996	6%	7%	86%	10.18
1997	7%	7%	86%	11.04
1998	8%	3%	89%	12.37
1999	10%	5%	85%	8.10
2000	16%	5%	80%	13.05
2001	8%	3%	89%	8.03
2002	10%	4%	86%	6.51
2003	7%	6%	87%	8.21
2004	9%	9%	82%	8.16
2005	6%	6%	88%	7.04
2006	8%	3%	89%	6.95
2007	5%	9%	85%	4.85
2008	6%	4%	89%	3.78
2009	7%	4%	89%	3.65
2010	10%	4%	86%	3.51
2011	4%	3%	93%	4.33
2012	9%	3%	88%	5.74
2013	11%	4%	85%	6.59
2014	7%	7%	86%	5.28
2015	7%	5%	88%	3.95
2016	8%	4%	89%	4.30
2017	13%	4%	84%	3.17
2018	11%	5%	84%	2.41
% of Total, 1981-2018	14%	7%	78%	--
% of Total, 2014-2018	9%	6%	85%	--

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[6] Unpublished NMFS permit data as of December 31, 2018.

[7] Unpublished NMFS Vessel Trip Report (VTR) data as of March 27, 2019.