Memo

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

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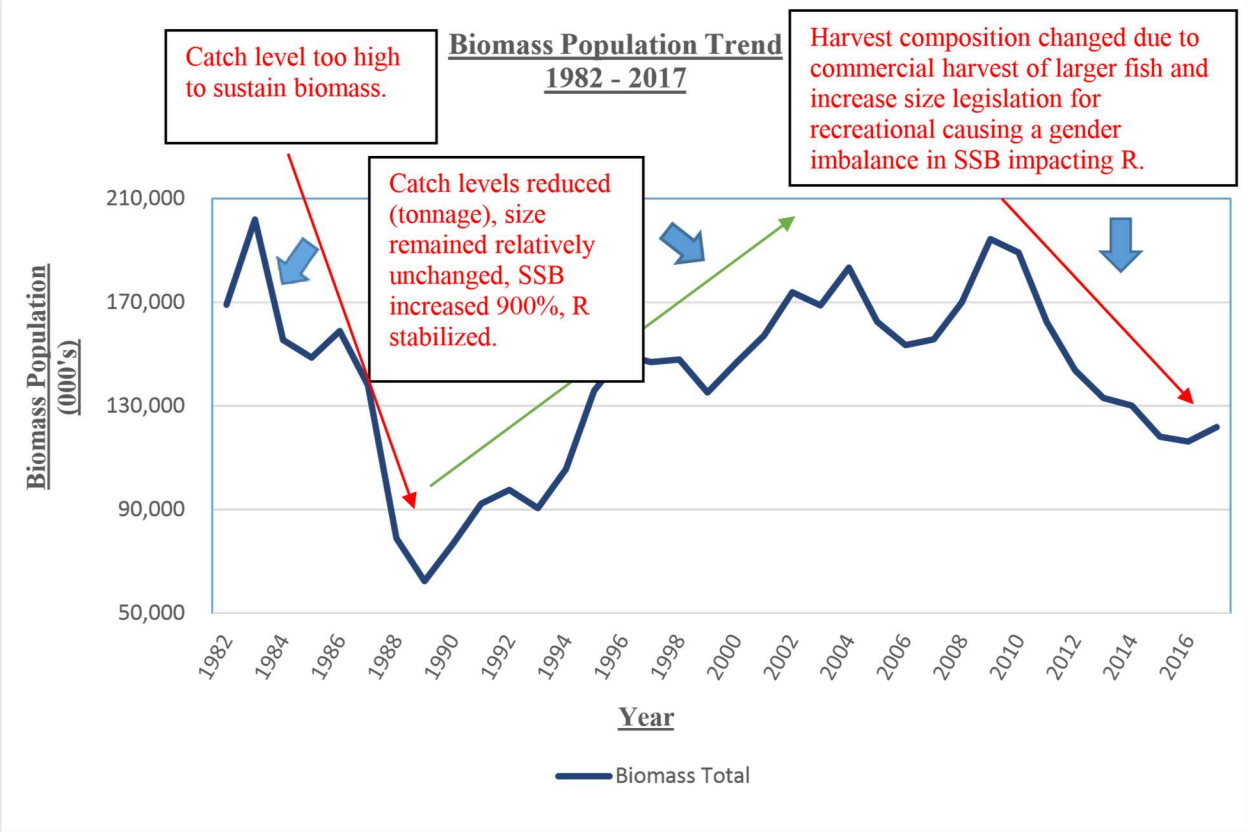
INTRODUCTION:

I've spent the better part of the last three years referencing 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 :

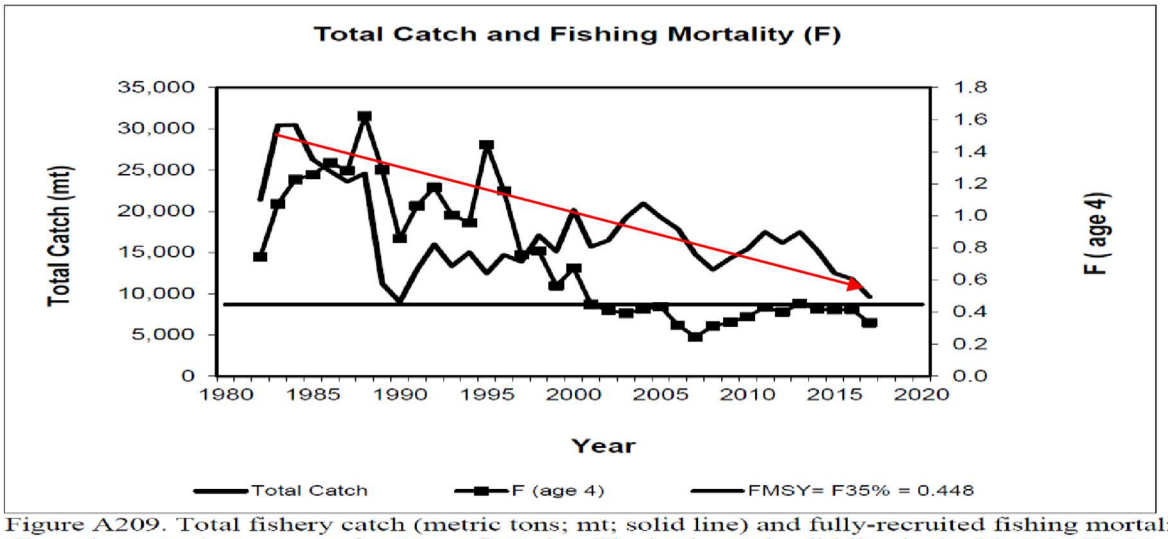
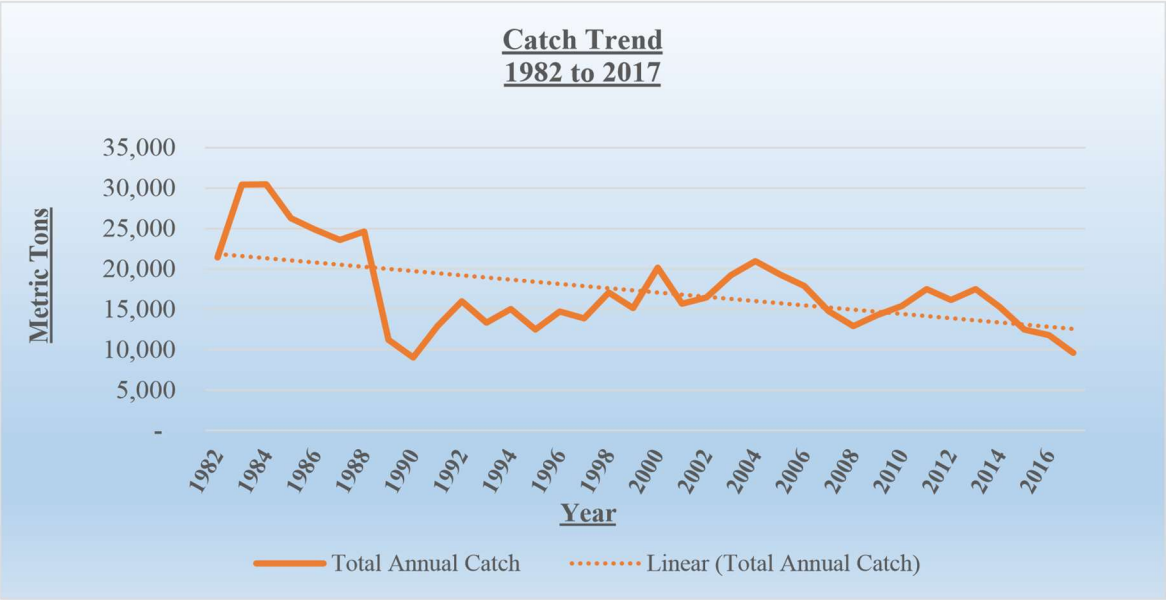


Figure A209. Total fishery catch (metric tons; mt; solid line) and fully-recruited fishing mortality (F, peak at age 4; squares) of summer flounder. The horizontal solid line is the 2018 SAW-66 recommended fishing mortality reference point proxy FMSY = F35% = 0.448.

Source 66th SAW Assessment Report - Page 448



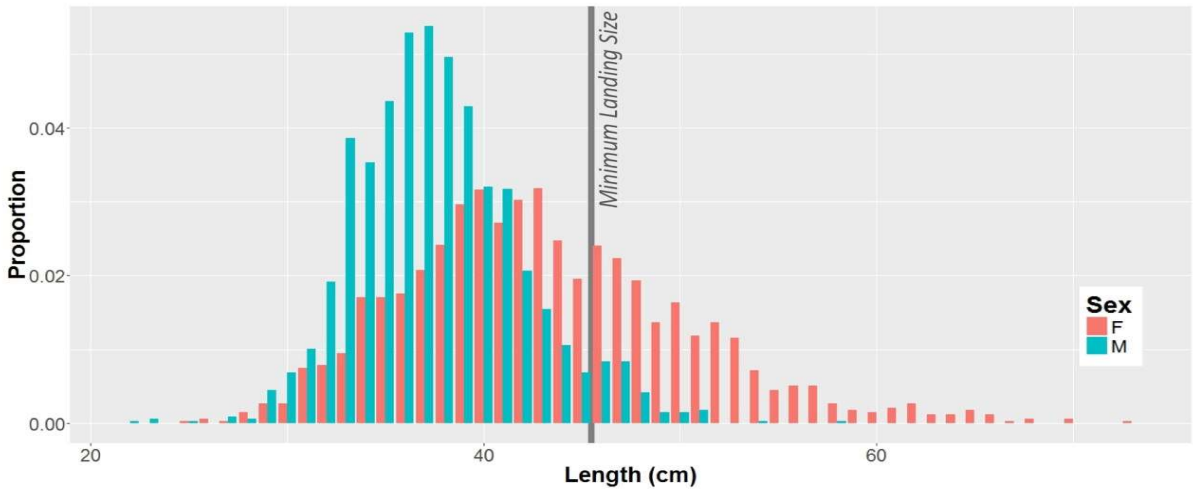
Catch per the above graph illustrates a declining trend over the last 35 years. Catch between the years 1982 to 1989 averaged ~24,000 metric tons annually while SSB averaged 21,000 metric tons a year. Too high a percentage of SSB was being harvested annually and SSB as a result declined from ~31,000 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 we're 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

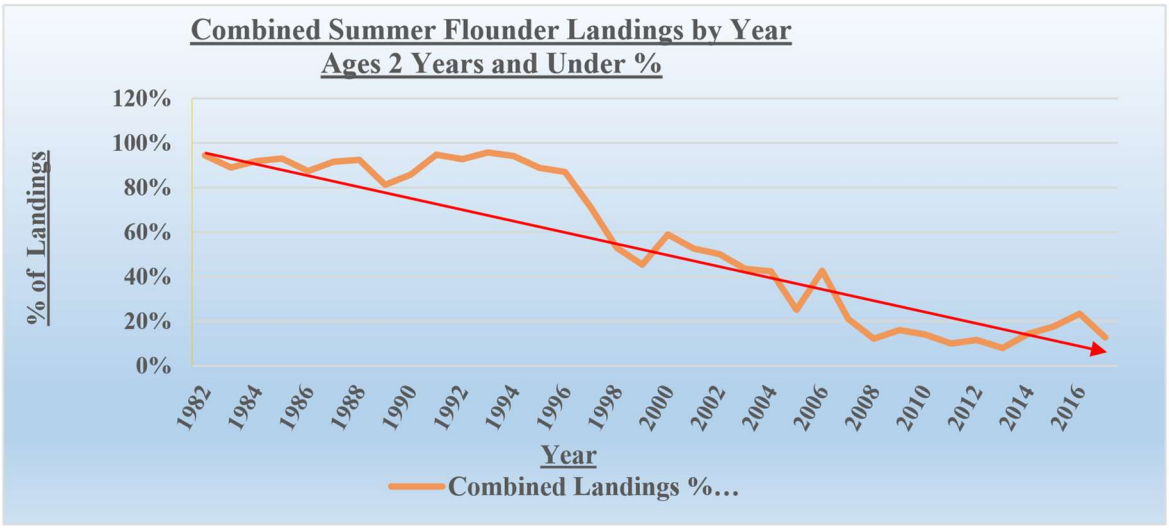
	- - - - - - - Size - - - - - - -					- - - - - - - Possession - - - - - - - -								
Year	NJ	NY	Ct	RI		NJ	NY	Ct	RI	Total		Weighted Average Size	CM's	Average Possession
2002	16.5	17	17	18		8	7	6	5	26		17.04	43.28	6.5
2003	16.5	17	17	17.5		8	7	6	5	26		16.94	43.03	6.5
2004	16.5	17.5	17	17.5		8	3	6	7	24		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

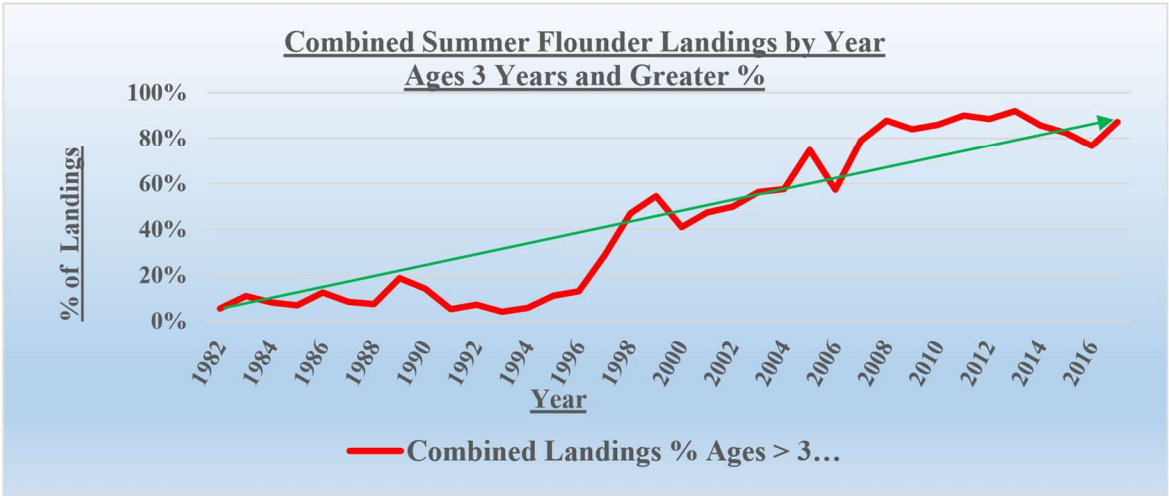
Note:
NY '04 had a season of May 15 - Sept 6. Size limit 17" through 7/30 and raised to 18" remainder of season. 17.5" used for analysis.
Ct. has ~46 designated shore sites with lower size limits, state-wide size limit used for analysis.
NJ has lower size limits in certain years for Delaware Bay and 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

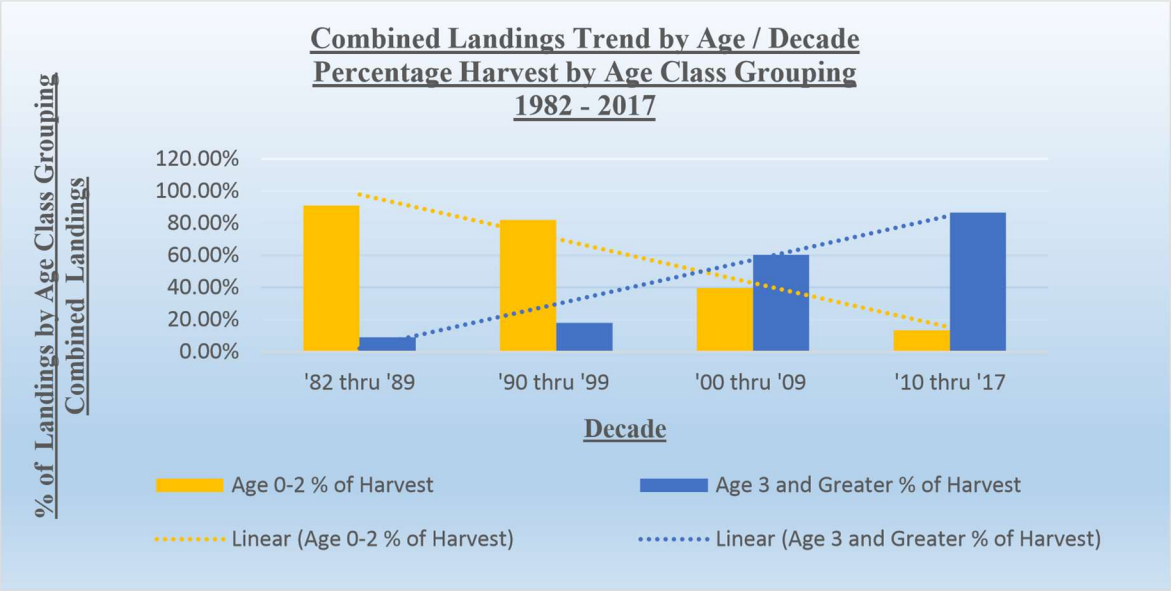


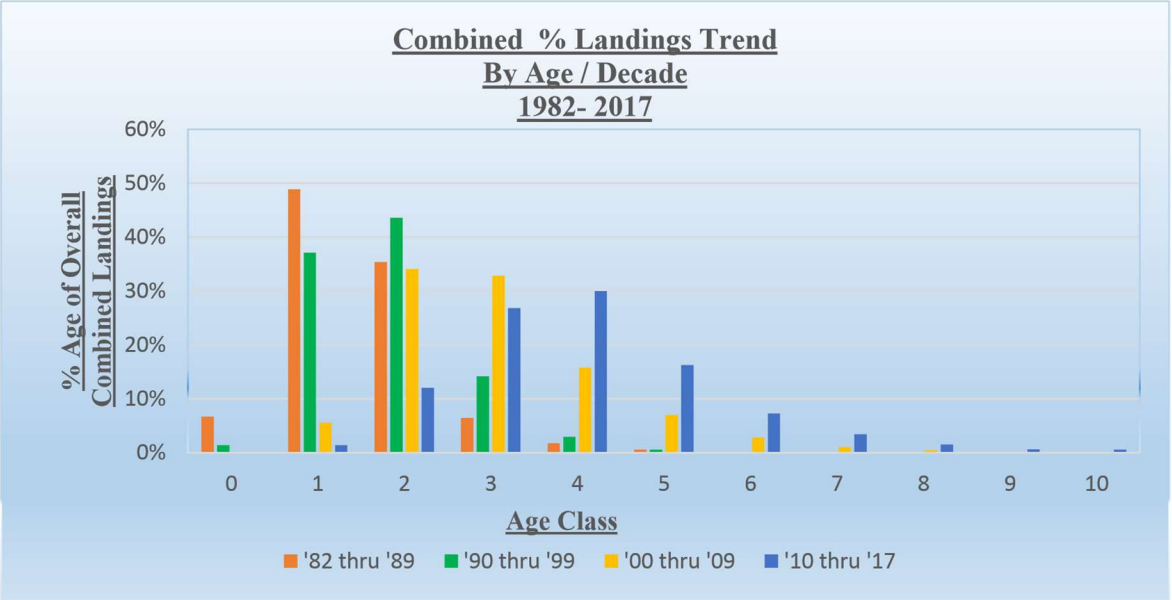
Source for above graph is **Rutgers *Sex and Length Study*** and the minimum landing size bar is 18 inches or 45.72 centimeters. Observe the disproportionate change in gender mix based on increased sizes which begins at approximately 42 centimeters or 16.50 inches. In the above "State Size and Possession 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.

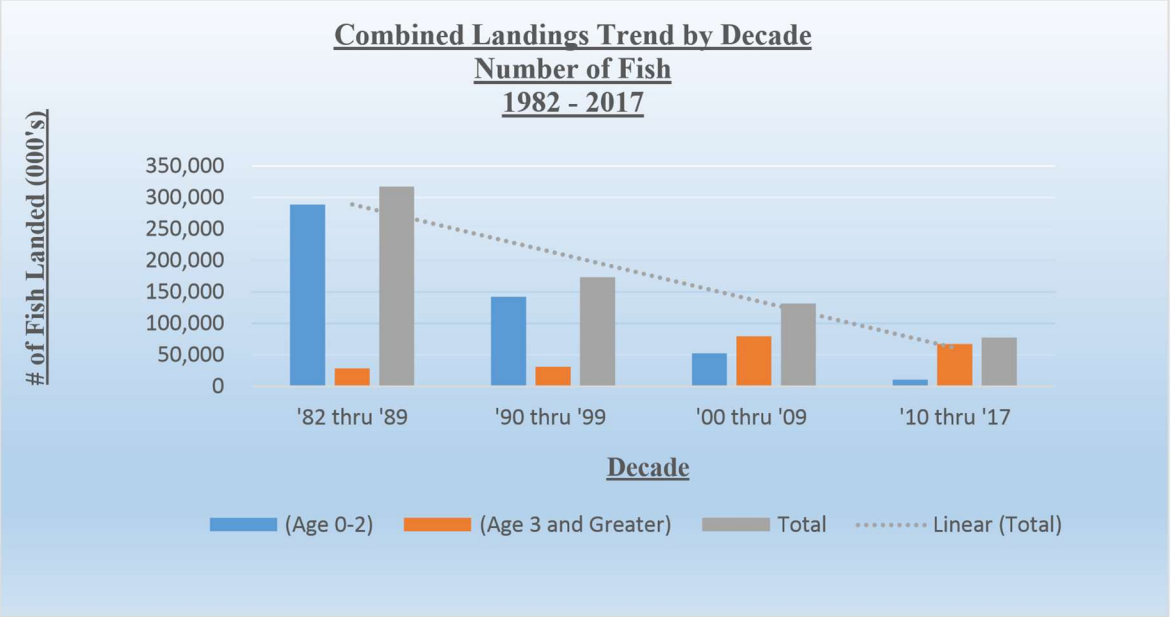
SECTION 2 - LANDINGS COMPOSITION CHANGE:

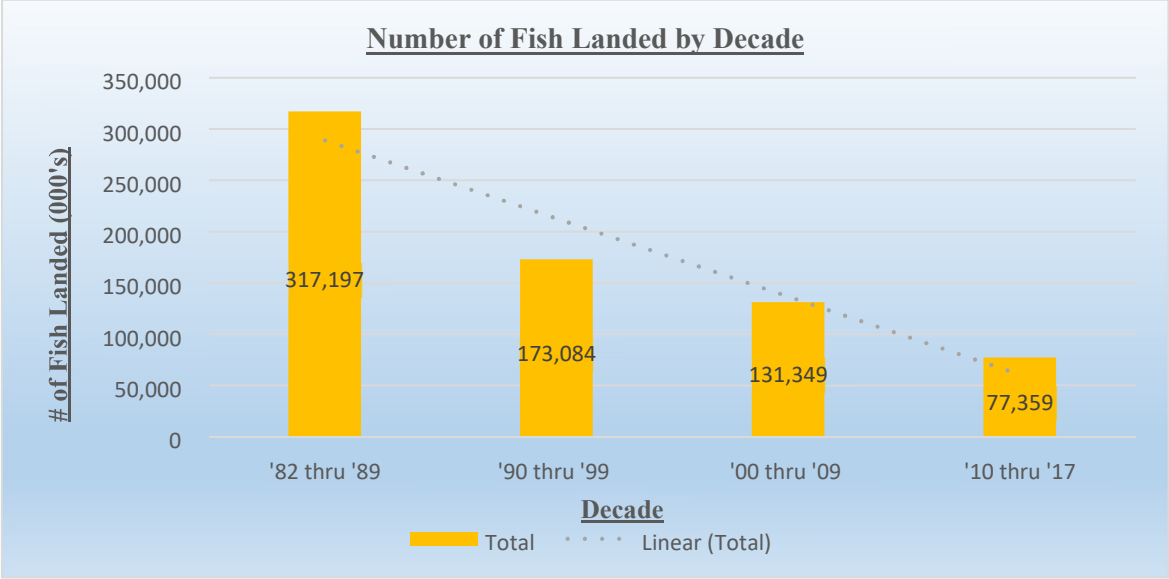




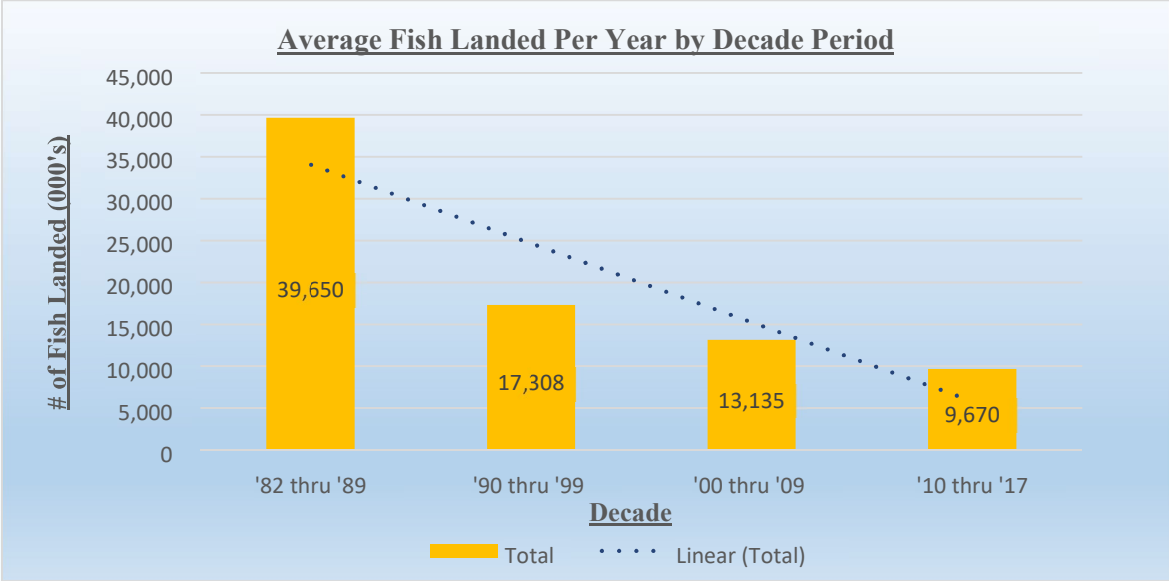

Combined Landings Trend by Age / Decade
Percentage Harvest by Age Class Grouping
1982 - 2017
% of Landings by Age Class Grouping
Combined Landings
120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
'82 thru '89
'90 thru '99
'00 thru '09
'10 thru '17
Decade
Age 0-2 % of Harvest
Age 3 and Greater % of Harvest
Linear (Age 0-2 % of Harvest)
Linear (Age 3 and Greater % of Harvest)


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)

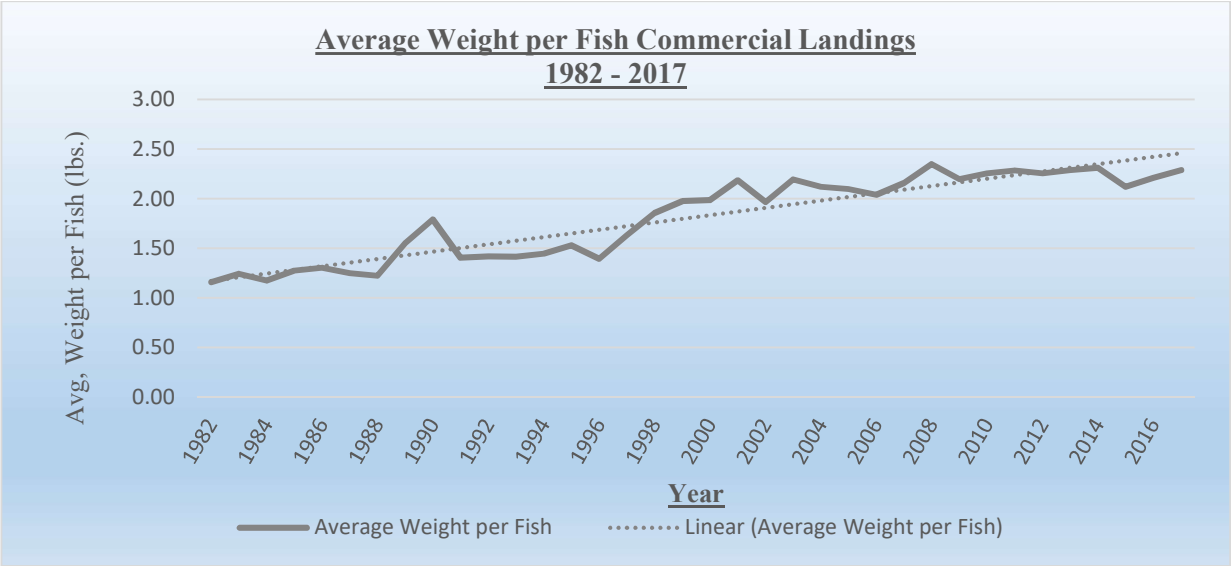


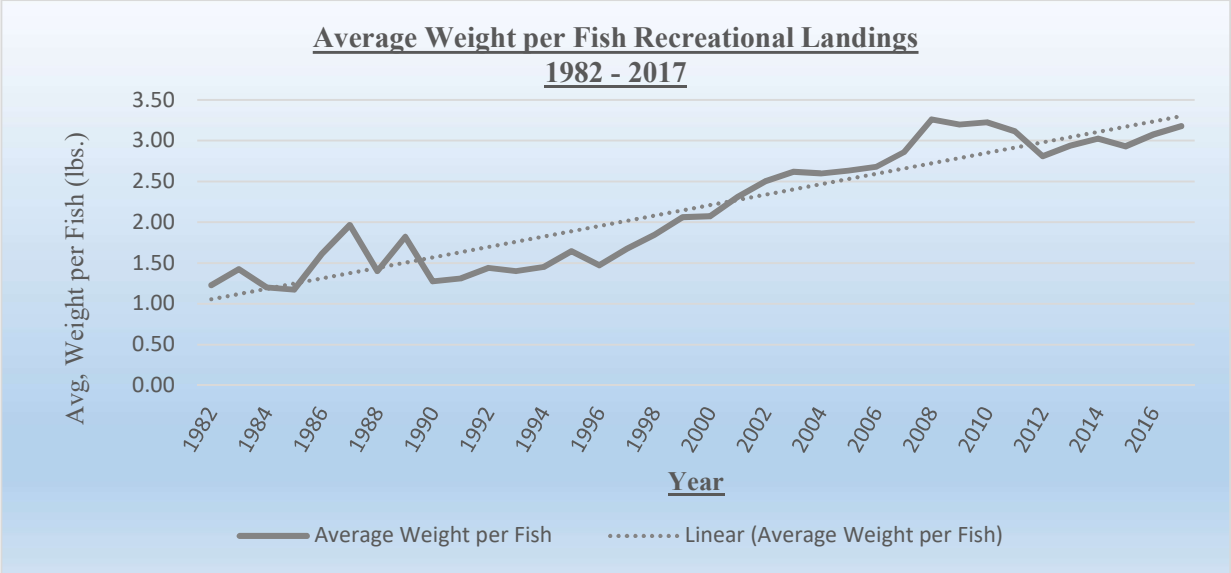
Keep in mind the data in the above landings graph for ’82 thru ’89 and ’10 thru ’17 represents 8 years in each of those decades compared to ten years in the 90’s and first decade of 2000 based on the availability of data in the 66th SAW. That makes the decrease in landings between the 80’s and today 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 it’s decline.

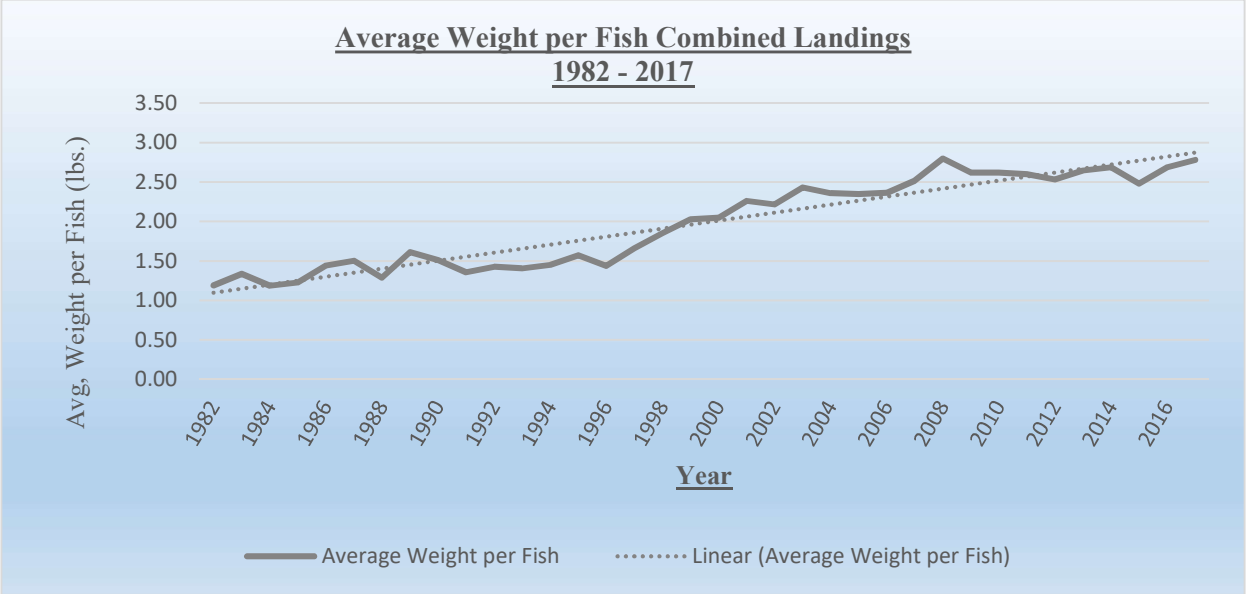


The above graph deals with the same information but to neutralize the disparity of months in each decade is presented in terms of average yearly fish landings. Trend and percentage reduction in landings over the last four decades would elicit the same conclusion as above.

SECTION 3 - AVERAGE WEIGHT OF LANDINGS TREND:

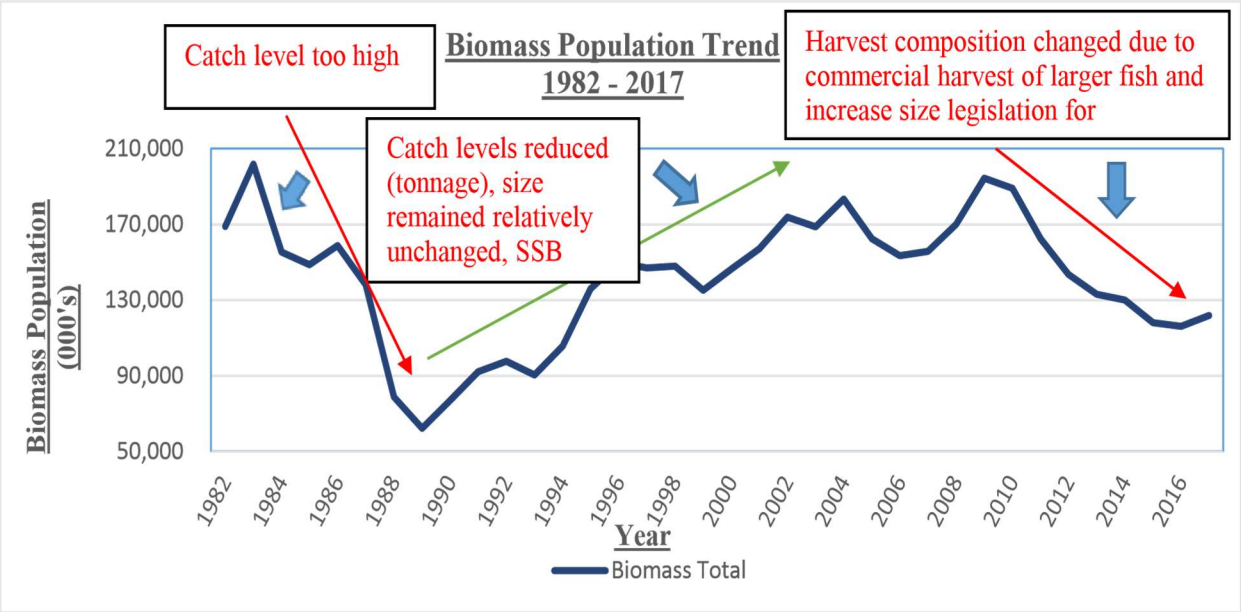






The above charts illustrate observations made in previous sections which is an on-going trend of harvesting larger sexually mature fish which can be extrapolated from the "Sex Ratio" excerpts on pages ***60 and 61 of the 66th SAW*** reflected in Section 6. A harvest consisting of a significantly higher 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

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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.

Decade	Biomass Population				
	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%

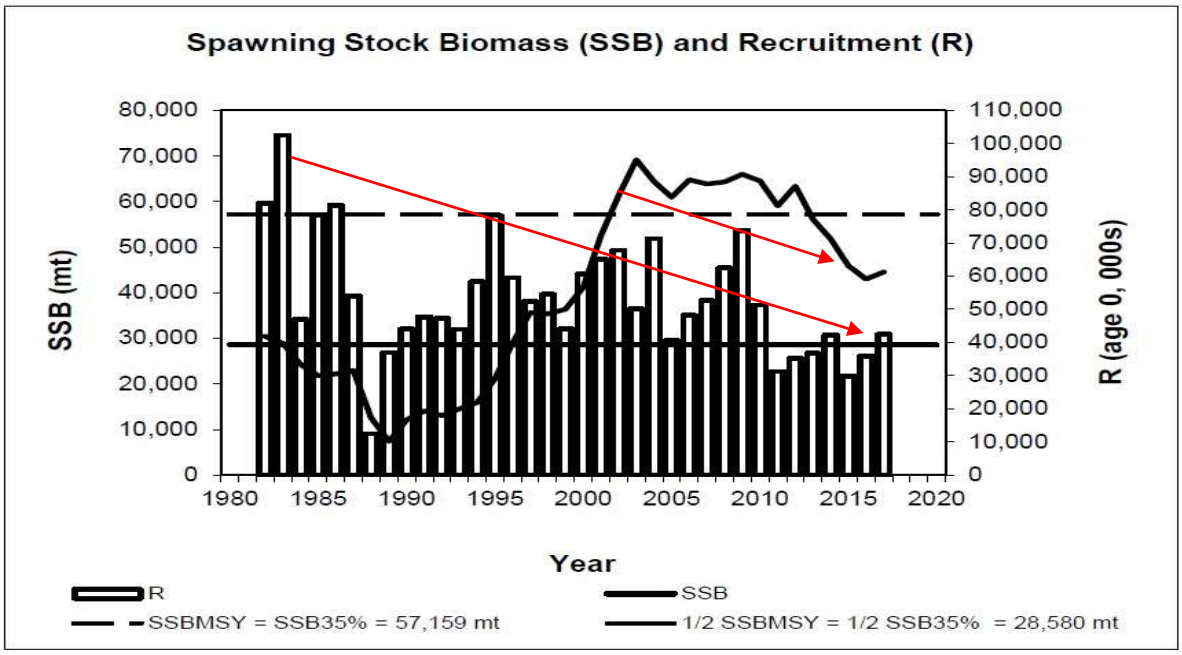
Same information as above but age classes are represented in percentages as opposed to absolute numbers of fish. Again the significant shift in biomass composition jumps off the page and when combined with the decline in female composition of older age classes it's difficult not to question the impact 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.

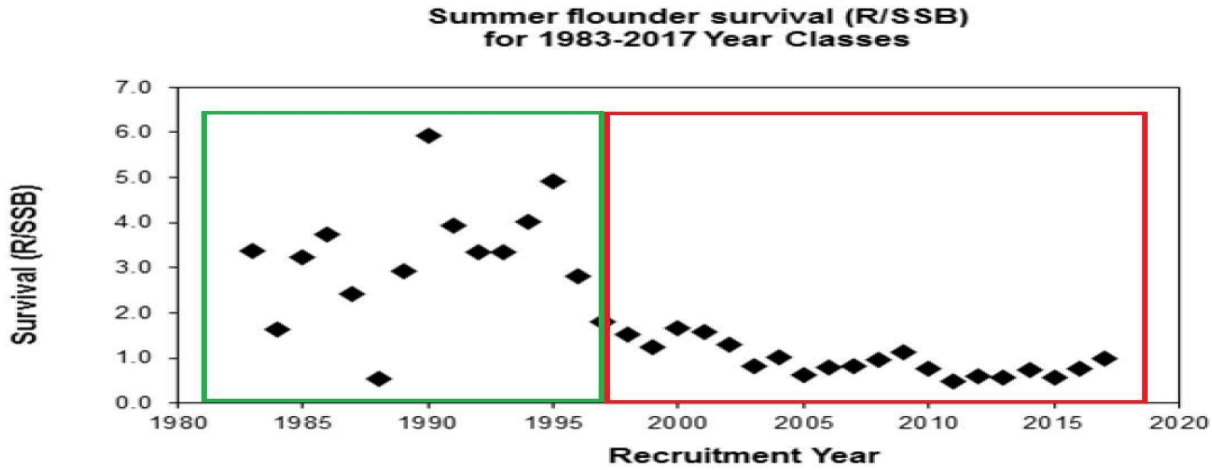
	Age								
	0	1	2	3	4	5	6	7+	Total
1982	81,955	56,043	25,826	3,204	1,102	370	222	252	168,973
1983	102,427	61,401	28,486	7,718	1,098	408	149	178	201,865
1984	46,954	75,541	25,145	5,436	1,840	292	123	87	155,417
1985	78,263	34,603	29,969	4,176	1,091	420	77	52	148,650
1986	81,397	57,712	13,745	4,815	811	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.

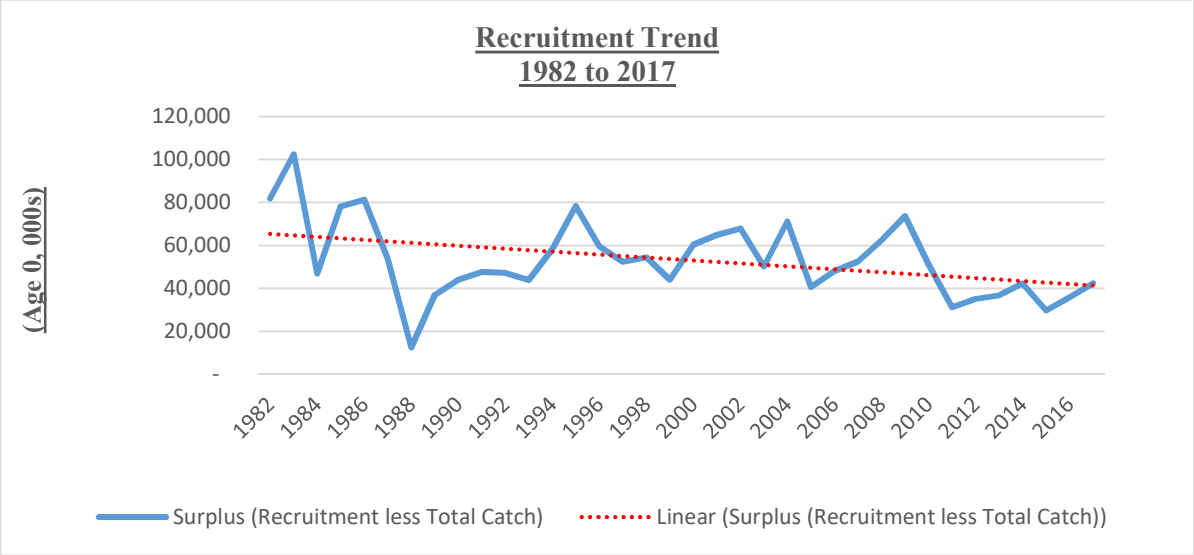
SECTION 5 – RECRUITMENT:

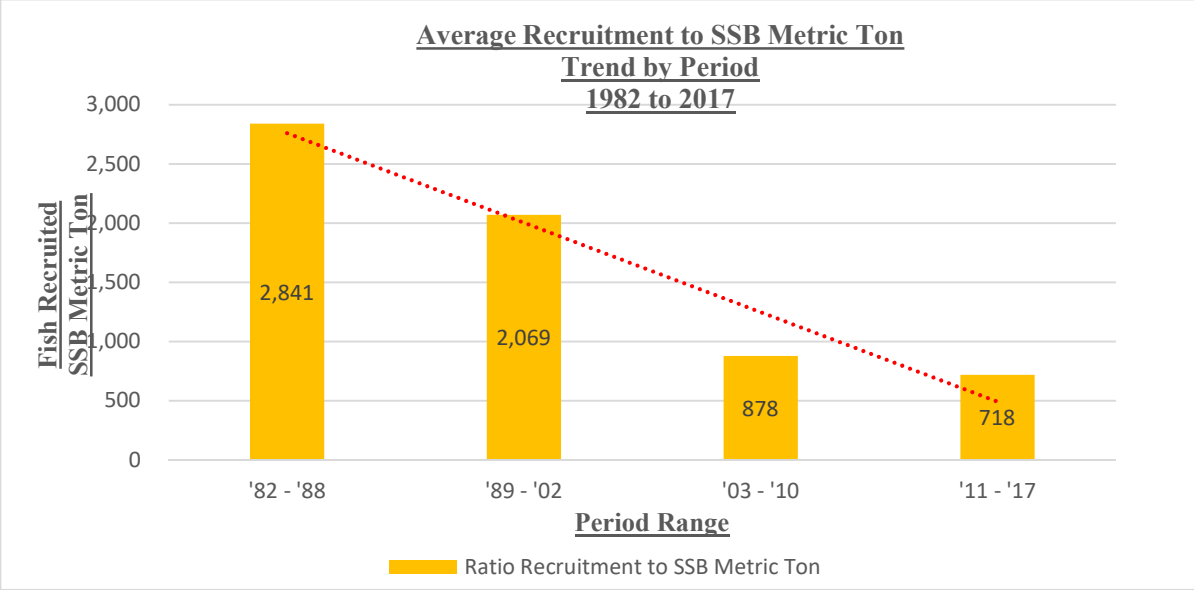


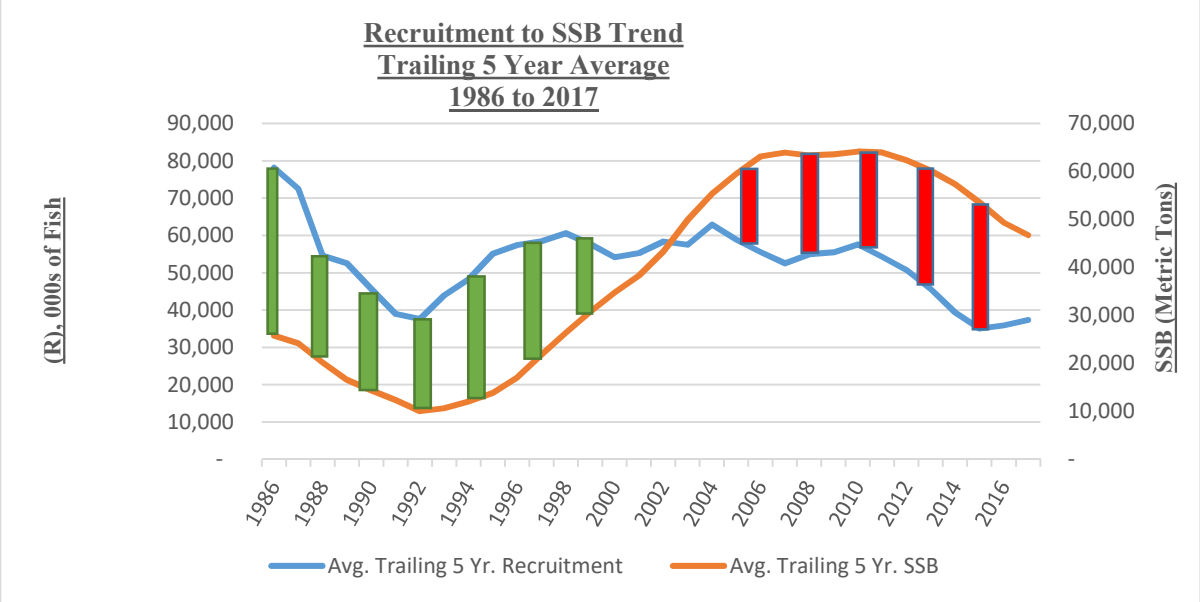
Source 66th SAW – Page 449



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

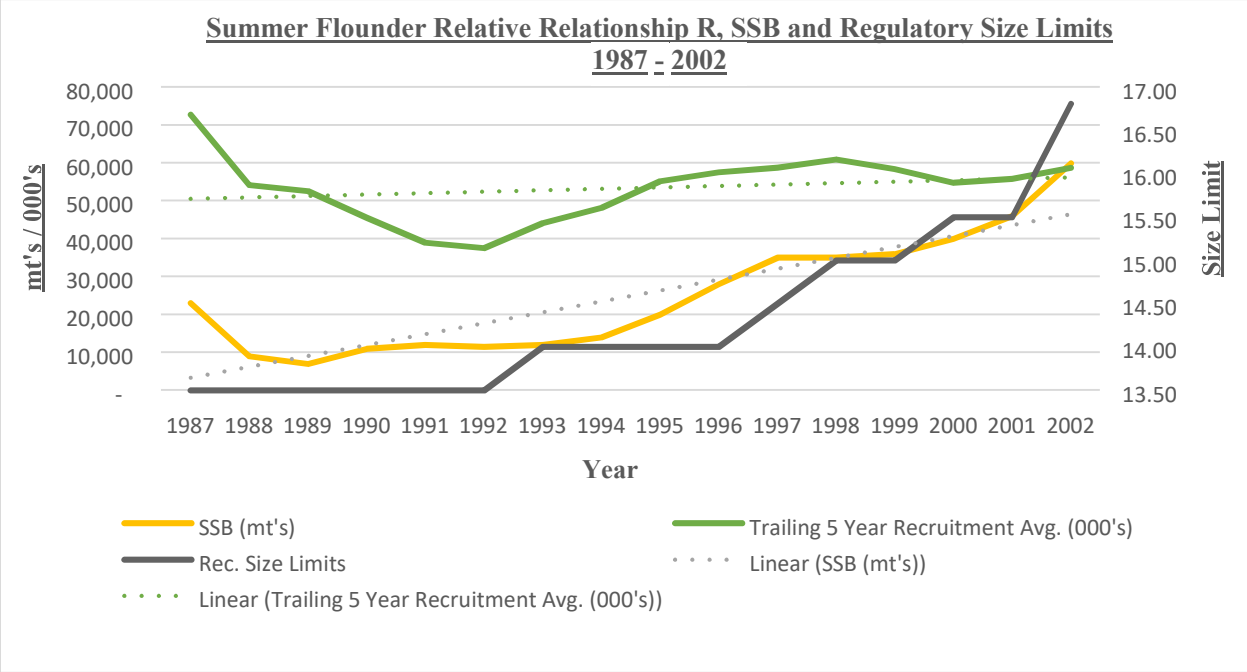
series is variable without a strong trend. Most recently the proportion of females at ages 5 and older has decreased to less than 0.6 (Figure A79).

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).

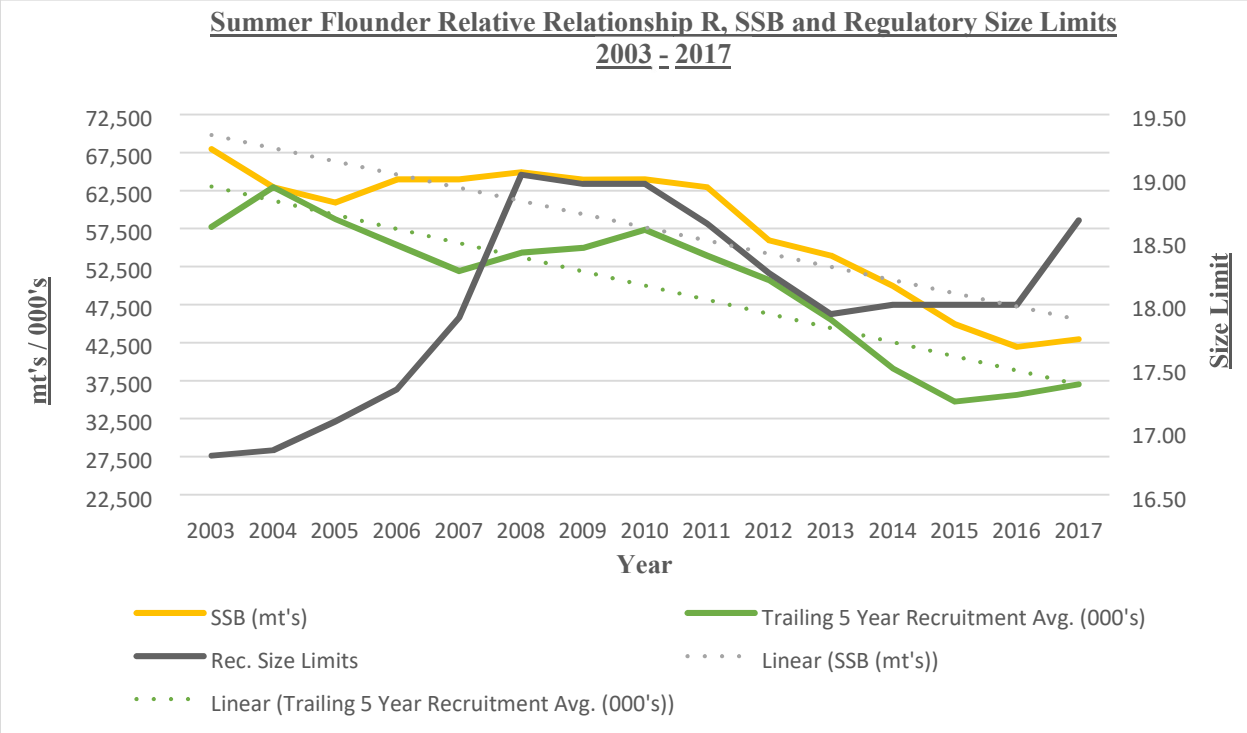
Points of Discussion / Observations:

- 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.

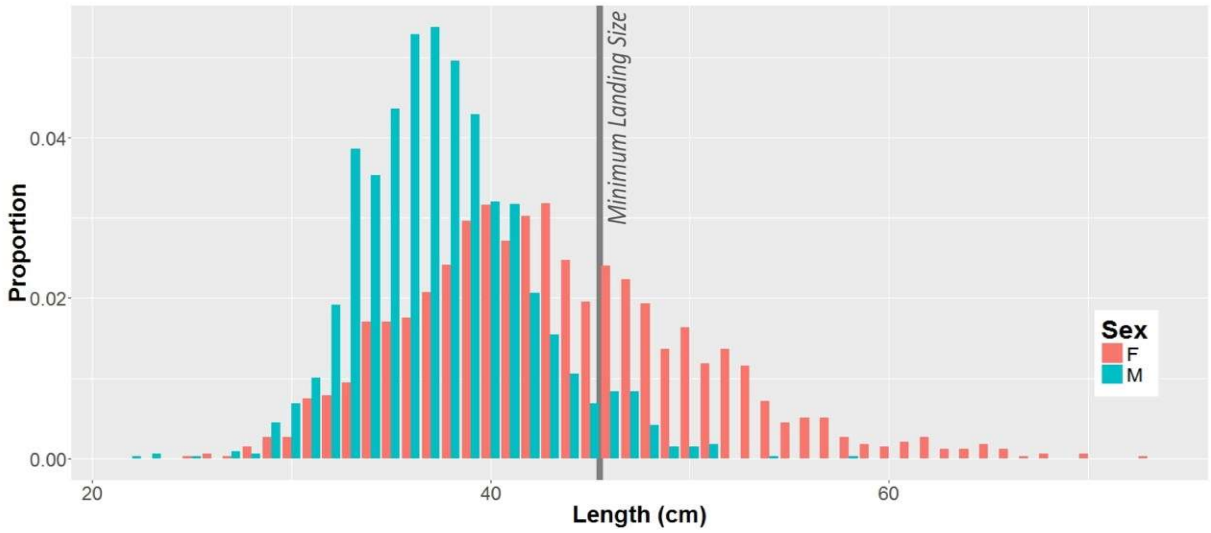
SECTION 7. - SIZE LIMIT INCREASES TO SSB / RECRUITMENT TRENDS:



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.

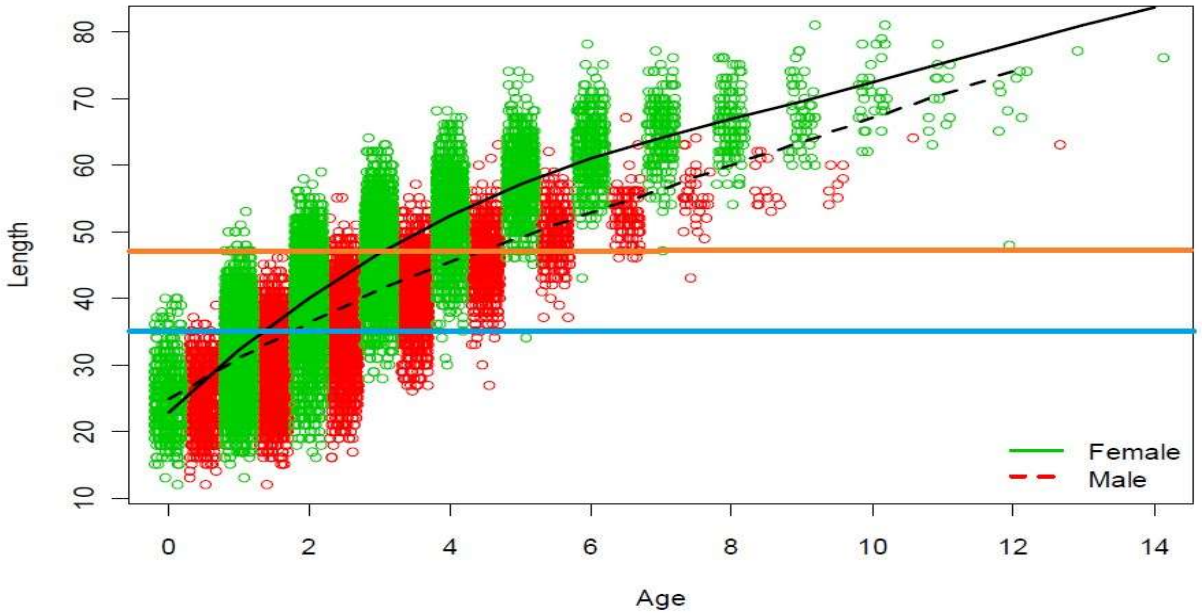


Figure A175. Model fit to sex stratification, i.e. female and male data. Female estimates: Linf = 83.6, k = 0.17, t0 = -1.9. Male estimates: Linf = 86.3, k = 0.10, t0 =-3.3

Weighted Average Recreational Size Limit 2019 – 18.73”

Commercial Size Limit – 14”

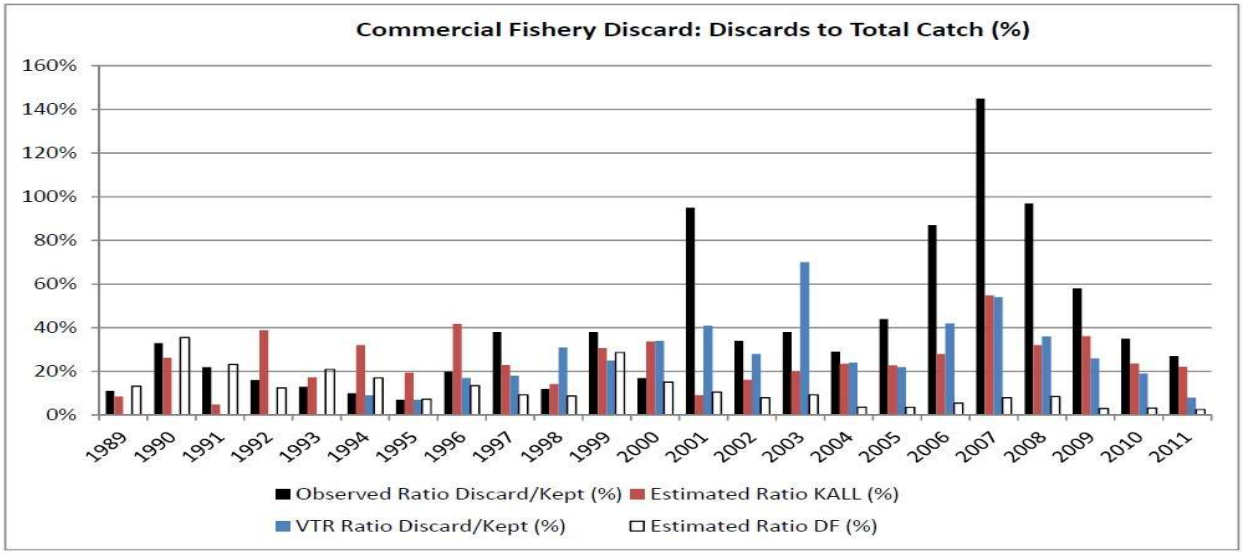
	0	1	2	3	4	5	6	7+			
% Available Commercial Harvest	15%	35%	57%	82%	95%	100%	100%	100%			
% Available Recreational Harvest	0%	4%	13%	34%	60%	87%	98%	100%			
Commercial # of fish accessible (000's)	6,362	9,571	9,559	13,218	7,978	4,096	1,941	4,742	51,105		**64.35%**
Recreational # of fish accessible (000's)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