



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: August 2, 2018
To: Council
From: Julia Beaty
Subject: Scup Specifications for 2019

The Council and Board will consider 2019 specifications for scup on Wednesday, August 15, 2018. Materials listed below are provided for the Council and Board's consideration of this agenda item.

Materials behind this tab:

- 1) Staff memo on 2019 scup specifications dated July 3, 2018
- 2) Proposal from Massachusetts and Rhode Island on the incidental scup possession limit
- 3) Memo from David Pierce, Massachusetts Division of Marine Fisheries on recreational scup minimum size, dated June 12, 2018
- 4) 2018 Scup Fishery Information Document
- 5) Scup data update for 2018

Materials behind other tabs:

- 6) Summary of July 19, 2018 Monitoring Committee meeting (*behind Tab 7*)
- 7) Advisory Panel Fishery Performance Report for scup (*behind Tab 7*)
- 8) Additional written comments from advisors on summer flounder, scup, and black sea bass (*behind Tab 7*)
- 9) July 2017 Scientific and Statistical Committee meeting report (*behind Tab 16*)



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Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

DATE: July 3, 2018

TO: Chris Moore, Executive Director

FROM: Julia Beaty, Staff

SUBJECT: 2019 Scup Management Measures and Review of Scup Discards through 2017

Executive Summary

In 2017, the Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission's (Commission's) Summer Flounder, Scup, and Black Sea Bass Management Board (Board) revised the scup catch and landings limits for 2018 and set catch and landings limits for 2019. The Council's Scientific and Statistical Committee (SSC) and Monitoring Committee, as well as the Council and Board, will review the 2019 catch and landings limits in July and August 2018.

Council staff recommend no changes to the previously implemented 2019 catch and landings limits, including the 2019 acceptable biological catch (ABC) of 36.43 million pounds (16,525 mt), the commercial annual catch limit (ACL) and annual catch target (ACT) of 28.42 million pounds (12,890 mt), commercial quota of 23.98 million pounds (10,879 mt), recreational ACL and ACT of 8.01 million pounds (3,636 mt), and recreational harvest limit (RHL) of 7.37 million pounds (3,342 mt). The process used to derive these values is described in later sections of this document. In addition, staff recommend no changes to the commercial scup management measures at this time.

According to the 2018 data update from the Northeast Fisheries Science Center (NEFSC) and recreational harvest estimates from the Marine Recreational Information Program (MRIP), the 2017 commercial ACL was exceeded by 17% and the recreational ACL was exceeded by 1%. The ABC was exceeded by about 13%. Neither the commercial quota nor the RHL were exceeded in 2017. According to NEFSC estimates, commercial discards in 2017 were 10.47 million pounds (4,727 mt), the highest since 1981 and a 71% increase from 2016 (NEFSC 2018). This increase in discards was likely mainly due to the large 2015 year class, which is the largest year class since at least 1984. In 2017, these scup were very abundant, but mostly too small to be landed in the commercial fishery due to the commercial minimum fish size of 9 inches total length (Dr. Mark Terceiro, NEFSC, personal communication). An analysis of commercial scup discards through 2017 is included in an appendix to this document. Recreational discards increased by 14% between 2016 and 2017 (from 780,436 pounds/354 mt to 897,281 pounds/407 mt; NEFSC 2018).

Current regulations require pound for pound paybacks of commercial ACL overages. The National Marine Fisheries Service (NMFS) will publish any changes to the 2019 commercial ACL due to the 2017 ACL overage through a notice in the Federal Register. The Council approved a modification to the commercial summer flounder, scup, and black sea bass accountability measures (AMs) in February 2018. This change, which has not yet been implemented, would eliminate the requirement for pound for

pound paybacks of ACL overages when the stock is above the target biomass, as scup is currently.¹ If NMFS approves and implements this change, then the 2017 ACL overage may not require a modification to the 2019 commercial ACL.

Recreational ACL overages do not require pound for pound paybacks when the stock is above the target biomass; therefore, no recreational ACL adjustment is needed in 2019 as a result of the 2017 recreational ACL overage.

Based on the 2017 stock assessment update, the scup stock was not overfished and overfishing was not occurring in 2016. Spawning stock biomass (SSB) was estimated to be about 397 million pounds (179,898 mt) in 2016, about 2.1 times the SSB_{MSY} proxy reference point (i.e. SSB_{40%}) of 192 million pounds (87,302 mt). Fishing mortality on fully selected age 3 scup was 0.139 in 2016, about 63% of the F_{MSY} proxy reference point (F_{40%}) of 0.220. At 252 million fish, the 2015 year class was estimated to be the largest in the time series (i.e. 1984-2016) and about 2.1 times the average recruitment (i.e. 65 million age 0 scup). The 2016 year class was estimated to be about 46% below average (NEFSC 2017).

According to the 2018 data update from the NEFSC (NEFSC 2018), the NEFSC bottom trawl survey biomass indices for scup in fall 2015 and spring 2016 were record highs for the time series (i.e. 1963 - present for the fall survey and 1968 through the present for the spring survey). Both seasonal indices decreased after 2016. Several state fisheries-independent surveys show similar trends.

Table 1: Scup catch and landings limits for 2019.

Measure	mil lb	mt	Basis
Overfishing Limit (OFL)	41.03	18,612	2017 stock assessment update projections
ABC	36.43	16,525	Assessment projections & risk policy
ABC discards	5.08	2,304	14% of ABC, based on the avg. % of catch that was discarded, 2014-2016
Projected commercial discards	4.43	2,011	87.3% of ABC discards (avg. % of dead discards from commercial fishery, 2014-2016)
Projected recreational discards	0.65	293	12.7% of the ABC discards (avg. % of dead discards from rec. fishery, 2014-2016)
Commercial ACL	28.42	12,890	78% of ABC (per FMP)
Commercial ACT	28.42	12,890	Set equal to commercial ACL
Commercial quota	23.98	10,879	Commercial ACT minus projected commercial discards
Recreational ACL	8.01	3,636	22% of ABC (per FMP)
Recreational ACT	8.01	3,636	Set equal to recreational ACL
RHL	7.37	3,342	Recreational ACT minus projected recreational discards

Introduction

The Magnuson-Stevens Act (MSA) requires that the Council’s SSC provide scientific advice for fishery management decisions, including recommendations on ABCs, prevention of overfishing, and achieving

¹ The proposed change would not modify the existing pound for pound payback requirements for quota overages. The proposed change only addresses overages due to higher than projected discards (i.e. non-landings overages). More information is available here: <http://www.mafmc.org/actions/sfsbsb-commercial-am-framework>.

maximum sustainable yield (MSY). The SSC must recommend ABCs that address scientific uncertainty. The Council's catch limit recommendations cannot exceed the ABCs recommended by the SSC.

The Monitoring Committee develops recommendations for management measures to achieve the ABCs recommended by the SSC. Specifically, the Monitoring Committee recommends ACTs that are equal to or less than the ACLs to address management uncertainty, and recommends management measures designed to achieve the ACTs.

Summer flounder, scup, and black sea bass are cooperatively managed by the Council and the Commission under a joint Fishery Management Plan (FMP). The Council and the Commission's Summer Flounder, Scup, and Black Sea Bass Management Board meet jointly each year to consider SSC and Monitoring Committee recommendations before deciding on proposed scup catch limits and other management measures. The Council and Board may set specifications for scup for up to three years at a time. The Council and Board submit their recommendations to NMFS, which is responsible for implementation and enforcement of federal fisheries regulations.

This memorandum includes information to assist the SSC and Monitoring Committee in reviewing and possibly revising the previously implemented 2019 scup catch and landings limits, as well as commercial management measures for 2019. Additional information on fishery performance and past management measures can be found in the 2018 Scup Fishery Information Document (MAFMC 2018A) and the 2017 Summer Flounder, Scup, and Black Sea Bass Fishery Performance Report developed by the Council and Commission Advisory Panels (MAFMC 2018B).

Recent Catch and Landings

According to the 2018 data update from the NEFSC (NEFSC 2018), commercial fishermen landed 15.45 million pounds (7,007 mt) of scup, about 84% of the 2017 commercial quota (18.38 million pounds, 8,337 mt), and discarded 10.42 million pounds of scup (4,727 mt). Commercial catch exceeded the ACL of 22.15 million pounds (12,890 mt) by about 17%.

According to MRIP data, 5.43 million pounds (2,462 mt) of scup were harvested by recreational fishermen from Maine through North Carolina in 2017, about 99% of the RHL of 5.50 million pounds (2,495 mt). According to the 2018 NEFSC data update (NEFSC 2018), about 0.90 million pounds (407 mt) of scup were discarded by recreational fishermen in 2017. According to these estimates, recreational catch in 2017 was 6.33 million pounds (2,849 mt), about 1% above the 2017 ACL of 6.25 million pounds (2,835 mt).

According to these estimates, the 2017 ABC was exceeded by 13%. These commercial and recreational overages mark a departure from trends in the fisheries during 2011-2016, as shown in Figure 1. The increase in discards between 2016 and 2017 was likely mainly due to the large 2015 year class, which is the largest year class since at least 1984. In 2017, these scup were very abundant, but mostly too small to be landed in the commercial fishery due to the commercial minimum fish size of 9 inches total length (Dr. Mark Terceiro, NEFSC, personal communication). An analysis of commercial scup discards through 2017 is included in an appendix to this document.

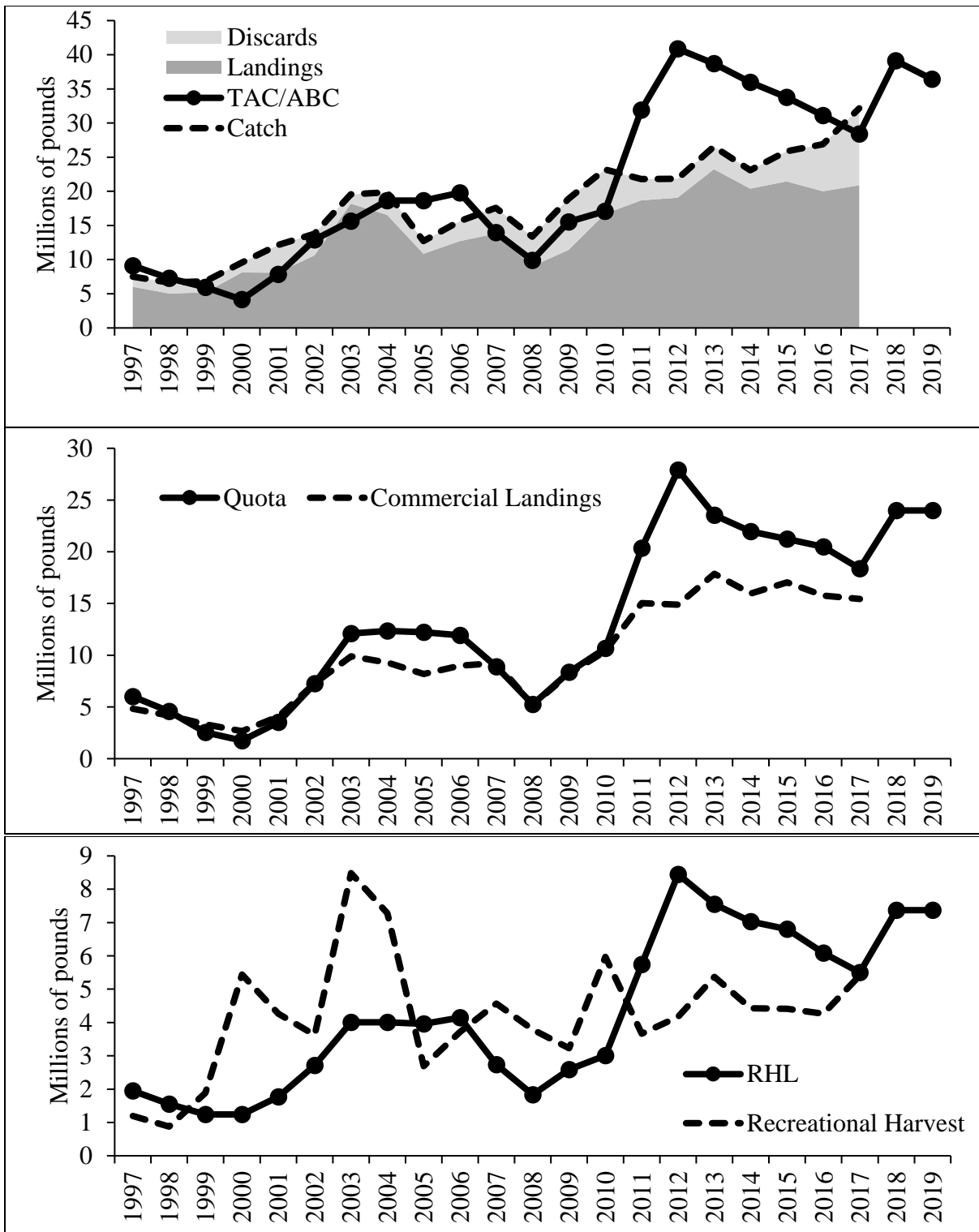


Figure 1: *Top:* total commercial and recreational catch, landings, and discards compared to ABCs. *Middle:* commercial landings compared to commercial quotas. *Bottom:* recreational harvest compared to RHLs.

The commercial scup quota is allocated among three quota periods: Winter I (January 1 – April 30, allocated 45.11% of the annual quota), Summer (May 1 – September, allocated 38.95% of the annual quota), and Winter II (October 1 – December 31, allocated 15.94% of the annual quota).² About 42% of the 2018 Winter I commercial scup quota was landed. As of June 23, 2018, 28% of the Summer commercial scup quota had been landed (Table 2).

Table 2: Commercial scup landings during the 2018 Winter I and Summer quota periods (through the week ending June 23, 2018), according to NMFS weekly landings reports. The Winter I quota is a coast-wide quota. The Summer period quota is allocated among states under the Commission’s FMP.

State	Winter I Landings (pounds) January 1 – April 28, 2018*	Summer Landings (pounds) May 1 – June 23, 2018*
Maine	0	0
New Hampshire	0	0
Massachusetts	536,100	301,591
Rhode Island	745,050	1,264,569
Connecticut	226,219	98,932
New York	1,133,110	821,485
New Jersey	1,443,524	80,653
Delaware	0	0
Maryland	34,932	0
Virginia	353,656	3,327
North Carolina	39,989	311
Other	0	0
Total landings	4,512,580	2,570,868
Quota	10,820,000	9,294,233

*Note: The Winter I period lasts from January 1 through April 30. The Summer period lasts from May 1 through September 30. Landings in this table are from the NMFS quota monitoring site (<https://www.greateratlantic.fisheries.noaa.gov/aps/monitoring/scup.html>), which reports landings by week, rather than by quota period; thus, the Winter I landings shown above do not account for 100% of the 2018 Winter I landings.

2019 OFL and ABC Projections

In 2015, the Council and Board set scup specifications for 2016-2018 based on the recommendations of the SSC and Monitoring Committee. The SSC derived their ABC recommendations from the Council’s risk policy and OFL projections provided with the 2015 benchmark stock assessment (NEFSC 2015). These projections assumed that 75% of the 2015 ABC would be caught and that F in 2016 and 2017 would be 0.22 (F_{MSY}). The SSC assigned a 60% coefficient of variation (CV) to the OFL. The SSC used a 40% probability of overfishing (p^*) to derive the 2016-2018 ABCs, based on the Council’s risk policy for a species with a typical life history.

² Prior to 2018, October was included in the summer quota period. The allocation percentages were the same as shown above.

The SSC revised their 2018 OFL and ABC recommendations and adopted a 2019 OFL and ABC in July 2018 after reviewing a stock assessment update provided by the NEFSC (NEFSC 2017). These ABC recommendations were based on biomass projections provided with the assessment update.

The projections assumed, based on patterns in the 2016 fishery, that 87% of the 2017 ABC would be caught and F in 2018 and 2019 would be 0.22 (i.e. the F_{MSY} proxy). The projections also used an OFL CV of 60% and a 40% probability of overfishing, based on the SSC’s previous OFL CV recommendation and application of the Council’s risk policy. This resulted in a 2019 OFL of 41.03 million pounds (18,612 mt) and a 2019 ABC of 36.43 million pounds (16,525 mt; Table 3).

Table 3: OFL, ABC, F, and SSB based on projections from the 2017 stock assessment update (NEFSC 2017) using an OFL CV of 60% and the Council’s risk policy ($p^*=40\%$) and assuming that 87% of the ABC will be caught in 2017 and F would be at F_{MSY} proxy of 0.22 in subsequent years.

Year	OFL		ABC Catch		ABC Landings		ABC Discards		F	SSB	
	mil lb	mt	mil lb	mt	mil lb	mt	mil lb	mt		mil lb	mt
2017	24.70	11,206	24.70	11,206	19.76	8,962	4.95	2,244	0.112	404.10	183,296
2018	45.05	20,433	39.14	17,755	33.24	15,076	5.91	2,679	0.220	396.18	179,704
2019	41.03	18,612	36.43	16,525	31.35	14,221	5.08	2,304	0.220	361.84	164,129

The SSC considered the following to be the most significant sources of uncertainty in the 2015 benchmark assessment (MAFMC 2015A):

- While older age Scup (age 3+) are represented in the catch used in the assessment model, most indices used in the model do not include ages 3+. As a result, the dynamics of the older ages of scup are driven principally by catches and inferences regarding year class strength.
- Uncertainty exists with respect to the estimate of natural mortality used in the assessment.
- Uncertainty exists as to whether the MSY proxies ($SSB_{40\%}$, $F_{40\%}$) selected and their precisions are appropriate for this stock.
- The SSC assumed that OFL has a lognormal distribution with a 60% CV, based on a meta-analysis of survey and statistical catch at age model accuracies.
- Survey indices are particularly sensitive to scup availability, which results in high inter-annual variability. Efforts were made to address this question in the Stock Assessment Workshop and Stock Assessment Review Committee (SAW/SARC) that should be continued; and
- The projection on which the ABC was determined is based on an assumption that the quotas would be landed in 2016, 2017, and 2018.

Stock Status and Biological Reference Points

Biological reference points estimated by the 2015 benchmark scup stock assessment include (NEFSC 2015):

- A biomass reference point of $SSB_{MSY\ proxy} = SSB_{40\%} = 192.47$ million pounds (87,302 mt)
- A minimum biomass threshold of $\frac{1}{2} SSB_{MSY\ proxy} = \frac{1}{2} SSB_{40\%} = 96.23$ million pounds (43,651 mt)
- A fishing mortality reference point of $F_{MSY\ proxy} = F_{40\%} = 0.220$.

Based on the 2017 stock assessment update, the scup stock was not overfished and overfishing was not occurring in 2016 relative to the biological reference points from the 2015 benchmark stock assessment. SSB was estimated to be about 397 million pounds (179,898 mt) in 2016, about 2.1 times the SSB_{MSY} proxy reference point (i.e. SSB_{40%}) of 192 million pounds (87,302 mt). Fishing mortality on fully selected age 3 scup was 0.139 in 2016, about 63% of the F_{MSY} proxy reference point (i.e. F_{40%}) of 0.220. At 252 million fish, the 2015 year class was estimated to be the largest since at least 1984 and about 2.1 times the average recruitment (i.e. number of age 0 scup) over 1984-2016. The 2016 year class was estimated to be about 46% below the 1984-2016 average at 65 million fish (NEFSC 2015, NEFSC 2017).

According to the 2018 data update from the NEFSC (NEFSC 2018), the NEFSC bottom trawl survey biomass indices for scup in fall 2015 and spring 2016 were record highs for the time series (i.e. 1963 - present for the fall survey and 1968 through the present for the spring survey). Both seasonal indices decreased after 2016. Several state fisheries-independent surveys show similar trends.

Other Management Measures

Commercial and Recreational Annual Catch Limits (ACLs)

As specified in the FMP, 78% of the ABC is allocated to the commercial fishery as a commercial ACL and 22% is allocated to the recreational fishery as a recreational ACL (Figure 2). ACLs include both landings and discards. The 2019 commercial ACL is 28.42 million pounds (12,890 mt) and the 2019 recreational ACL is 8.01 million pounds (3,636 mt; Table 1).

Annual Catch Targets (ACTs)

The Monitoring Committee recommends ACTs for the Council and Board's consideration. ACTs may be either equal to the ACLs or reduced from the ACLs to account for management uncertainty. Management uncertainty can include uncertainty in the ability of managers to control catch and uncertainty in quantifying the true catch (i.e. estimation errors). This can occur due to a lack of sufficient information about catch (e.g. due to late reporting, under-reporting, and/or misreporting of landings or discards) or due to a lack of management precision (i.e. the ability to constrain catch to desired levels).

At their July 2017 meeting, the Monitoring Committee reviewed the SSC's recommendations for 2018 and 2019 ABCs and noted that the revised 2018 ABC represented a 45% increase over the previously implemented 2018 ABC. The Monitoring Committee recommended taking a less substantial increase of 22.5% at the ACT level for 2018 and setting the 2019 ACTs equal to the 2018 ACTs. The Monitoring Committee noted potential management uncertainty associated with changes to the scup commercial quota period dates in 2018. The shift of October from the Summer to the Winter II period may impact total commercial landings and the distribution of landings by state. In addition, revisions to the MRIP time series of recreational catch data, planned to be released in July 2018, could also introduce a source of management uncertainty. The Monitoring Committee expressed concern that drastic catch limit increases have the potential to be followed by large cutbacks, especially given the uncertainty in how the MRIP revisions will impact the stock assessment. More moderate changes, as opposed to large swings in quota, provide for more stability in the fisheries.

Ultimately, the Council and Board did not accept the Monitoring Committee's recommendation, and instead recommended setting the 2019 ACL equal to the ACT. They also recommended setting the 2018

ACT equal to the 2019 ACT, which resulted in a slightly lower 2018 ACT than if the ACT had been set equal to the 2018 ACL. This resulted in stable ACTs, commercial quotas, and RHLs between 2018 and 2019 (Figure 1).

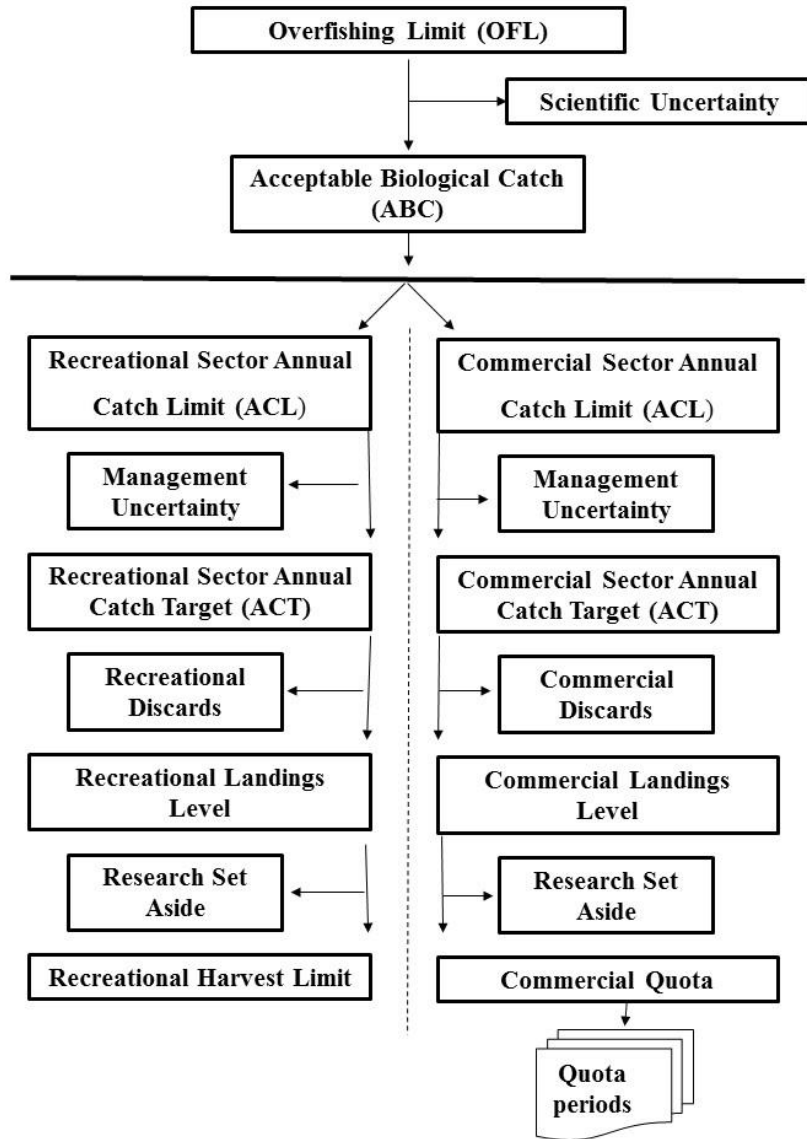


Figure 2: Scup catch and landings limit calculation methodology. The Research Set Aside program was suspended in 2014.

Commercial Quotas and Recreational Harvest Limits (RHLs)

Commercial scup quotas and RHLs are calculated by subtracting projected discards from the sector-specific ACTs. Projected discards from the stock assessment are apportioned between commercial and recreational fisheries using the average percent of dead discards attributable to each sector over the past three years. According to the 2017 assessment update (NEFSC 2017), commercial discards accounted for an average of 87.3% and recreational dead discards accounted for an average of 12.7% of all dead

discards from 2014 through 2016. These values were used to calculate the 2019 commercial quota of 23.98 million pounds (10,879 mt) and RHL of 7.37 million pounds (3,342 mt).

As previously stated, the commercial scup quota is allocated among three quota periods: Winter I (January 1 – April 30, allocated 45.11% of the annual quota), Summer (May 1 – September, allocated 38.95% of the annual quota), and Winter II (October 1 – December 31, allocated 15.94% of the annual quota). Assuming no changes to the annual 2019 quota, the 2019 Winter I quota will be about 10.81 million pounds (4,903 mt), the Summer period quota will be about 9.34 million pounds (4,237 mt), and the Winter II quota will be about 3.82 million pounds (1,733 mt).

Commercial Winter I and Winter II Quota Period Possession Limits

Commercial possession limits are designed to help constrain landings to the seasonal period quotas. The Winter I possession limit is 50,000 pounds. After 80% of the Winter I quota is landed, the possession limit drops to 1,000 pounds. The Winter II possession limit is initially set at 12,000 pounds. If the Winter I quota is not fully harvested, the Winter II possession limit increases by 1,500 pounds for every 500,000 pounds of scup not landed during the Winter I period. There are no federal possession limits during the Summer quota period; however, there are state possession limits.

Most commercial scup trips in recent years landed well below the Winter I and Winter II possession limits. These possession limits have not been modified since 2012, when the Winter I limit increased from 30,000 to 50,000 pounds and 2014 when the initial Winter II limit increased from 2,000 to 12,000 pounds. In recent years, some advisors have said that the current Winter I possession limit can cause markets to be flooded with scup, which can lead to a decrease in price. However, many advisors support status quo possession limits and the Monitoring Committee has not recommended changes in recent years. Advisors did not comment on the commercial scup possession limits at their June 2018 meeting. Staff recommend no changes to the Winter I and Winter II possession limits for 2018.

Commercial Minimum Fish Size

The minimum size for retention of scup in the commercial fishery is 9 inches total length. This measure was first implemented in 1996, when scup were first managed by the Council and Commission. The Council and Board considered modifying this measure in 2005, 2012, and in 2015. After reviewing this measure in detail 2015, the Monitoring Committee, Council, and Board all recommended no changes. The rationale for this recommendation is described in MAFMC 2015B. Advisors have expressed differing opinions on the commercial minimum fish size for scup in the past (e.g. MAFMC 2017b); however, they did not comment on this measure during their June 2018 meeting. Staff recommend that this regulation remain unchanged in 2019.

Commercial Trawl Mesh Size

Trawl vessels which possess more than 1,000 pounds of scup from November 1 through April 30 and more than 200 pounds of scup from May 1 through October 31 must use a minimum mesh size of 5.0 inches. In late 2015, the Council approved an increase in the November-April incidental limit from 500 to 1,000 pounds in recognition of the substantial increase in SSB and expansion of the age structure of the population since this measure was last modified in 2004.

In June 2018, the Council received a request from the states of Massachusetts and Rhode Island to consider an increase in the incidental scup possession limit during April 15 - June 15 (or alternatively, May 1 - June 30) to 4,000 pounds to accommodate their spring inshore squid fisheries, which use mesh smaller than 5 inches in diameter. This would allow the squid fisheries to land more of the scup which they catch incidentally, rather than discarding them.³ The Monitoring Committee will review this request and make a recommendation during their July 2018 meeting.

Summer flounder, scup, and black sea bass are all currently managed with different minimum mesh sizes (i.e. 5.5” diamond or 6” square for summer flounder, 5” diamond for scup, and 4.5” diamond for black sea bass). A study by Hasbrouck et al. (2018) confirmed that the current minimum mesh sizes for all three species are effective at releasing most fish smaller than the commercial minimum sizes (i.e. 14” total length for summer flounder, 9” total length for scup, and 11” total length for black sea bass). One goal of the Hasbrouck et al. study was to evaluate the potential for a common mesh size across all three species. The study was not able to identify a common mesh size for all three species that would be effective at minimizing discards under the current minimum fish size limits. However, the authors concluded that a common mesh size of 4.5” or 5” diamond for scup and black sea bass would be effective at releasing undersized fish.

Council staff recommend no changes to the minimum mesh sizes for 2019. The Monitoring Committee will review the results of Hasbrouck et al. (2018) during their July 2018 meeting. If the Council wishes to consider modifications to the minimum mesh sizes, the objectives should be clarified. Possible objectives could include establishing a common minimum mesh size, minimizing discards, and/or maintaining or increasing catches of legal-sized fish; however, some of these objectives may be at odds with each other. Input from the commercial fishing industry should be sought before any minimum mesh size changes are considered. As the Monitoring Committee has noted in the past, changes to these requirements can create an economic burden for fishermen if they necessitate purchase of new nets.

Commercial Pot and Trap Regulations

NMFS Vessel Trip Report data show that about 1% of the 2017 commercial scup catch was taken with pots and traps. Pots and traps used in the commercial scup fishery must have either a circular escape vent with a 3.1 inch minimum diameter or square or rectangular escape vents with each side being at least 2.25 inches in length. The Council and Commission hosted a workshop in 2005 to review several studies on vent size. Workshop participants did not recommend any changes in the vent sizes for the commercial scup fishery. The Monitoring Committee reviewed these measures in 2015 and recommend no changes (MAFMC 2015B). Staff recommend no changes to these measures for 2019.

Recreational Seasons, Possession Limits, and Minimum Size

The Council and Board will discuss 2019 recreational scup seasons, possession limits, and minimum fish sizes at their joint meeting in December 2018. Data from the first four “waves” (i.e. the two-month reporting increments for recreational data) of 2018 recreational landings are expected to be available in October 2018. The Monitoring Committee will meet in November to review these landings data and make recommendations for any necessary changes in recreational management measures. Staff have no recommendations for 2019 recreational management measures at this time.

³ The full request is available at: <http://www.mafmc.org/council-events/2018/sfsbsb-monitoring-committee-meeting>

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APPENDIX

Commercial Fishery Scup Discard Evaluation, 2001-2017

Background

- Trawl discards are estimated by calendar quarter, statistical area, and three mesh categories: large (i.e. 5" or greater), small (i.e. smaller than 5" but larger than 2.125"), and squid (i.e. 2.125" or less). Estimated discards are calculated using observer, VTR, and dealer data (NEFSC 2015).
- The scup GRAs were first effective November 2000. The Southern GRA is effective January 1 - March 15. The Northern GRA is effective November 1 - December 31.
- The most recent change in boundary of southern scup GRA became effective January 1, 2017 (Figure 1).
- Effective January 1, 2016, the incidental scup possession limit for trawl vessels using mesh smaller than 5 inches in diameter during November-April increased from 500 pounds to 1,000 pounds. This change was intended to reduce scup discards.
- The 2015 year class was estimated to be 252 million fish, about 2.1 times the average recruitment from 1984 to 2016. It appears to be the largest year class in the assessment time series since at least 1984. In 2017, these fish were mostly too small (< 8 inches/ <20 cm) to be landed in the commercial fishery (NEFSC 2018; Dr. Mark Terceiro, NEFSC, personal communication; Figure 2).

Results

- Total estimated scup discards from all mesh sizes were 4,727 mt (10.42 million pounds) in 2017, the highest since 1981 and about 71% higher than in 2016 (Figure 3, NEFSC 2018).
- On average, during 2001-2017, squid mesh discards accounted for 41% of all estimated scup discards, while small mesh accounted for 30%, and large mesh accounted for 29%. In 2017, squid mesh accounted for 50% of total estimated scup discards, small mesh accounted for 23%, and large mesh accounted for 27% (Figure 3).
- Between 2016 and 2017, scup discards with large mesh doubled (i.e. an increase of 100%). Discards with small mesh increased by 41% and discards with squid mesh increased by 73% (Figure 3).
- Estimated discards with squid and small mesh were variable, but generally decreased in the GRA statistical areas during the times when the GRAs were in effect. The northern GRA has been in effect during November and December since 2000. Estimated scup discards by squid and small mesh in the northern GRA statistical areas during the fourth quarter of the year averaged 456 mt before 2000 and 171 mt from 2000 through 2017 (Figure 4). The southern GRA has been in effect during January 1 - March 15 since 2001. Estimated scup discards by squid and small mesh in the southern GRA statistical areas during the first quarter of the year averaged 344 mt before 2001 and 242 mt from 2001 through 2017 (Figure 5).
- Between 2016 and 2017, scup discards in statistical areas which are partially included in the southern GRA increased by 148%. Within these statistical areas, squid mesh scup discards increased by 182%, small mesh discards increased by 70%, and large mesh discards increased by 206% (Figure 6 and Figure 7)

- Between 2016 and 2017, scup discards in statistical areas which are partially included in the northern GRA increased by 62%. Within these statistical areas, squid mesh scup discards increased by 53%, small mesh discards increased by 57%, and large mesh discards increased by 85% (Figure 6 and Figure 7).
- Total scup discards with all mesh sizes steadily increased from 2014 through 2017. This trend closely mirrors the trend in recruitment during 2012-2015 (Figure 8 and Figure 9).
- In general, most scup discards occurred in GRA statistical areas, though not necessarily during the times of year when the GRAs are in place or with mesh sizes regulated by the GRAs. In all years from 2001 through 2017, at least 50% (with an average of 76%) of all scup discards from all mesh sizes occurred in statistical areas which are partially included in either the GRAs. On average, since both GRAs have been in place, the northern GRA areas accounted for 49% of all scup discards and the southern GRA areas accounted for 26% of all scup discards (Figure 6).
- Over the past 5 years (i.e. 2013-2017), squid mesh discards in southern GRA statistical areas, as a percentage of all estimated squid mesh scup discards, were below average (i.e. 3% on average for 2013-2017 vs. 16% for 2001-2017). Squid mesh scup discards in the southern GRA statistical areas were 5% of total squid mesh scup discards in 2017, slightly higher than in the previous four years. Squid mesh scup discards in northern GRA statistical areas during 2013-2017 were equivalent to the 2001-2017 average of 53%. In 15 of the past 17 years, squid mesh scup discards were higher in the northern GRA statistical areas than in the southern GRA statistical areas (Figure 7).
- When examining only the southern GRA statistical areas, during 2001-2017, most squid mesh discards occurred in statistical area 616, which includes Hudson Canyon (Figure 10).
- During 2013-2017, large mesh accounted for most scup discards in the southern GRA statistical areas, averaging 65% of total scup discards per year in those areas, compared to 10% for squid mesh and 26% for small mesh (Figure 11).
- During 2013-2017, squid mesh accounted for most scup discards in the northern GRA statistical areas, averaging 49% of total scup discards per year in those areas, compared to 25% for small mesh and 26% for large mesh (Figure 12).
- Seasonal patterns in scup discards varied by year. During 2001-2017, discards from all mesh sizes in the first quarter of the year averaged 24% of total annual scup discards; however, there was considerable year-to-year variability (Figure 13). Discards in the second quarter averaged 31%. Discards in the third quarter averaged 13% and discards in the fourth quarter averaged 32%. Most squid mesh and small mesh discards occurred in quarter 2 (37% and 33%, respectively), when neither GRA is in effect. Most large mesh discards occurred in quarter 4 (44%; Figure 14).

Conclusions

- The high scup discards in 2017 were likely the result of the record high recruitment in 2015 (Figure 9).

- Between 2016 and 2017, scup discards in southern GRA statistical areas increased by a greater amount than discards in all statistical areas (i.e. 148% vs. 71%). This increase was driven by discards with large mesh (increase of 206%), small mesh (increase of 70%), and squid mesh (increase of 182%). Only squid and small mesh are regulated by the GRAs. The change in the southern GRA boundary in 2017 may have played a role in the increase in scup discards; however, recruitment likely had a greater impact on discards.
- Patterns in scup discards in squid and small mesh fisheries since 1989 suggest that implementation of the GRAs led to a reduction in scup discards in those fisheries (Figure 4 and Figure 5).
- Increased, targeted fishing effort toward scup may also have played a role, as the fleets attempt to catch the increased quotas. However, given the multispecies nature of the major mid-Atlantic trawl fisheries (e.g. summer flounder, scup, black sea bass, squid, mackerel, and butterfish), it would be difficult to tease out how multispecies effort (trips or days fished) relates directly to discards (Dr. Mark Terceiro, NEFSC, personal communication).

Figures

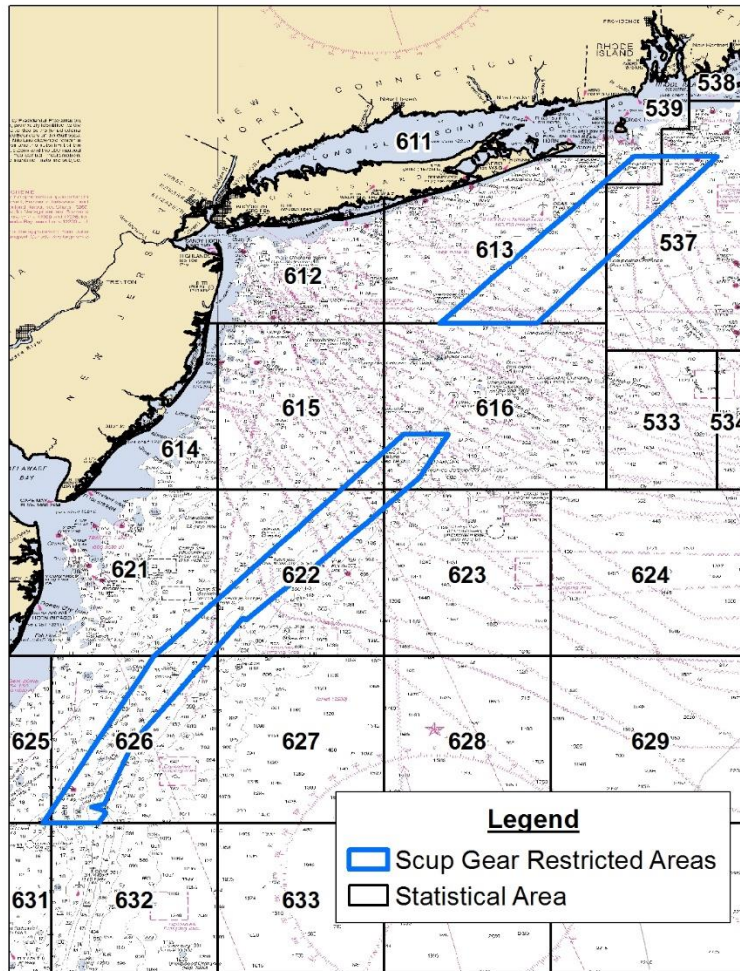


Figure 1: Scup GRAs and NMFS statistical areas.

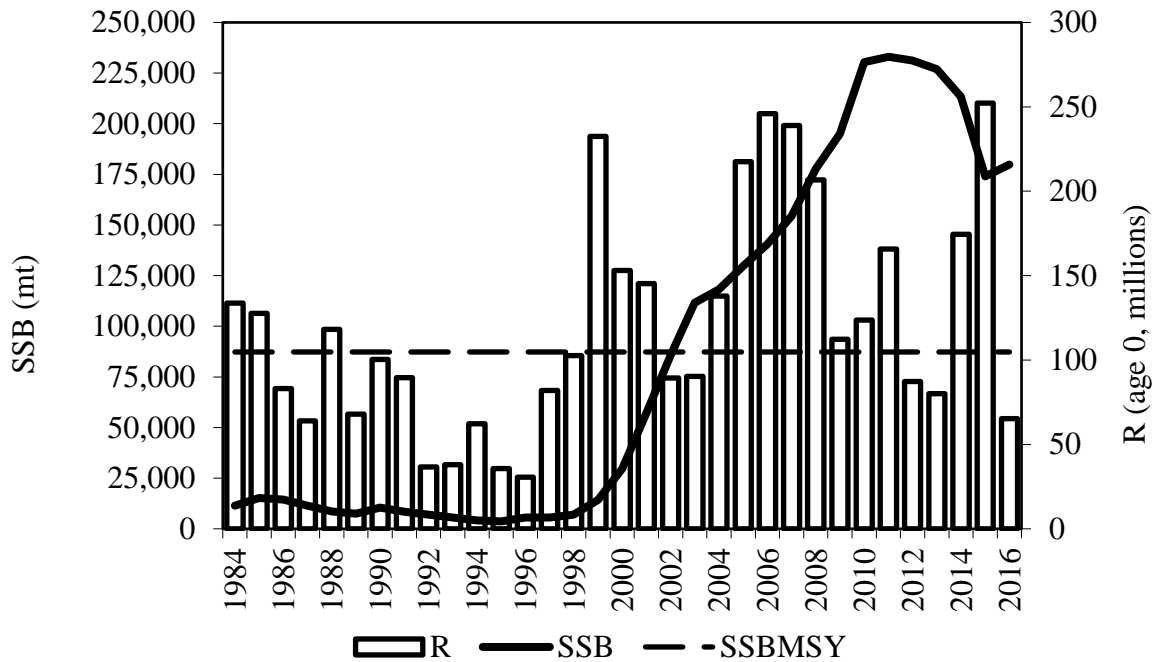


Figure 2: Spawning Stock Biomass (SSB; solid line) and Recruitment (R at age 0; vertical bars) for scup. The horizontal dashed line is the SSB_{MSY} proxy = SSB_{40%} = 87,302 mt from the 2015 benchmark stock assessment. Source: NEFSC 2017.

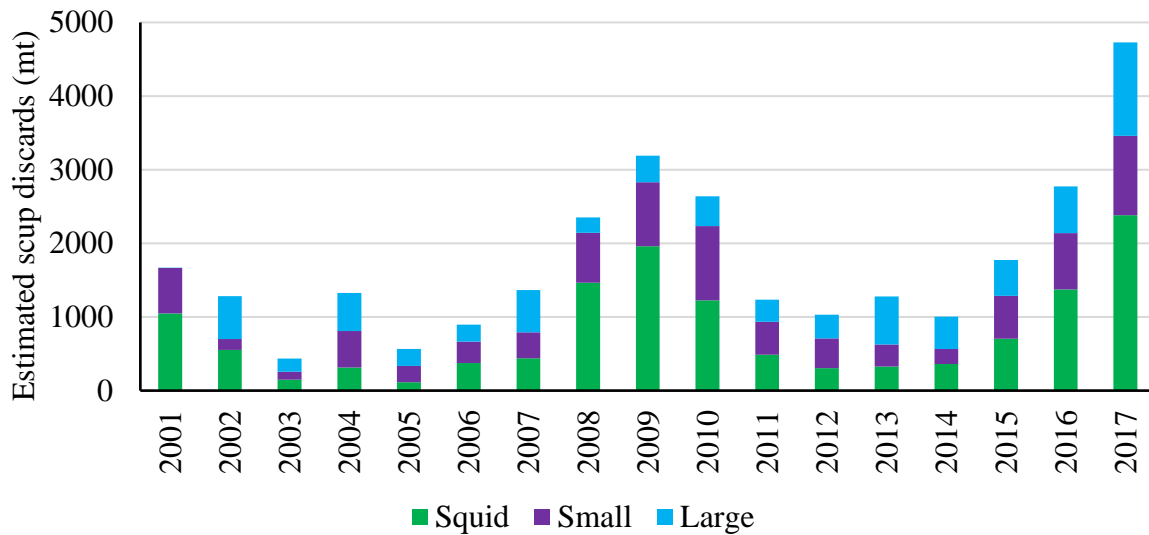


Figure 3: Estimated scup discards by year and mesh size.

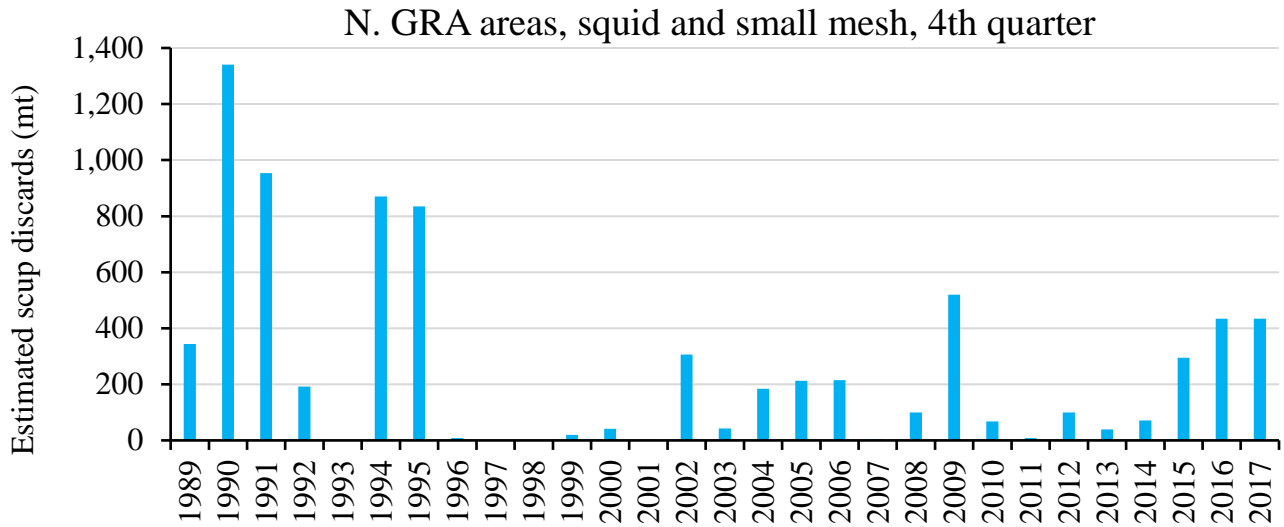


Figure 4: Estimated scup discards from squid and small mesh during the fourth quarter of the year in statistical areas which are partly included in the northern scup GRA. The northern GRA has been in effect during November and December since 2000.

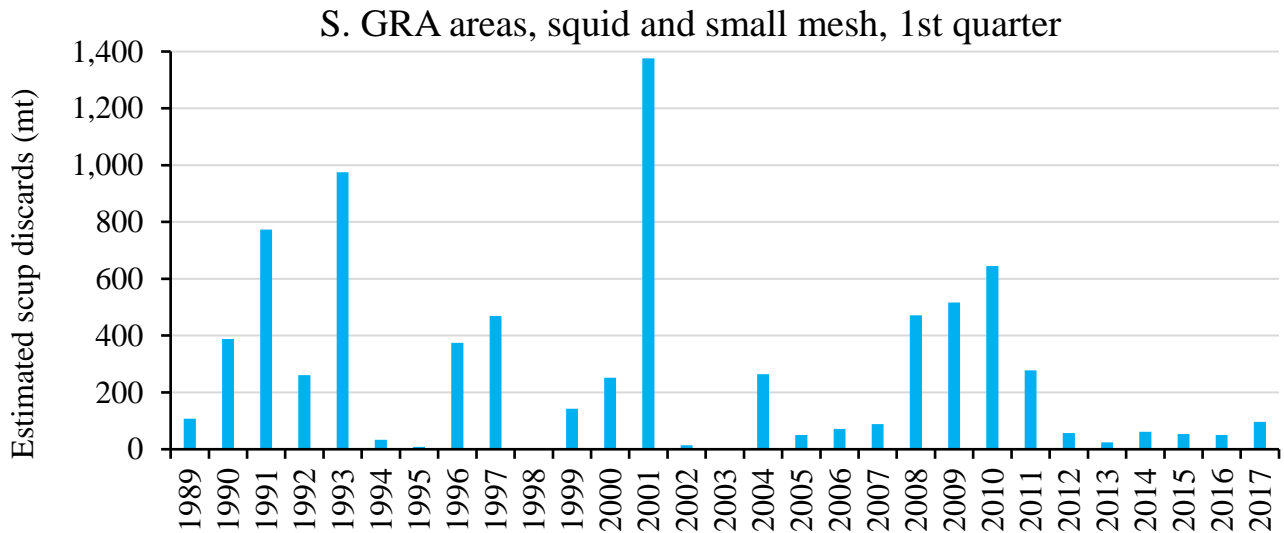


Figure 5: Estimated scup discards from squid and small mesh during the first quarter of the year in statistical areas which are partly included in the southern scup GRA. The southern GRA has been in effect during January 1 - March 15 since 2001.

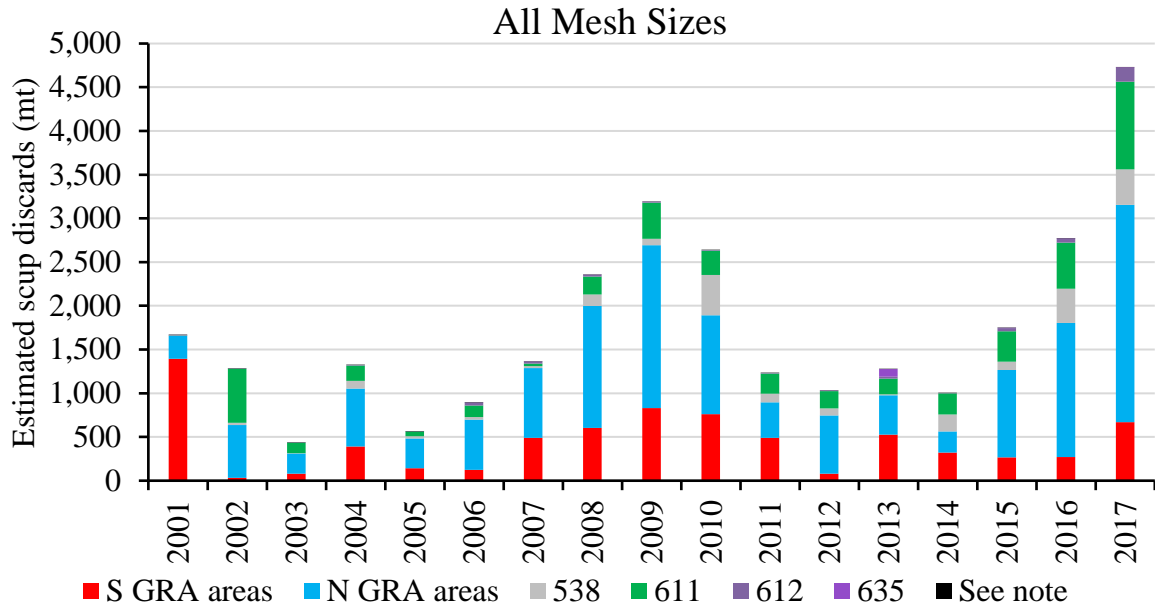


Figure 6: Estimated scup discards by year and statistical area for all mesh sizes. *Note:* statistical areas which are not part of the GRAs and which had less than 100 mt of estimated scup discards during 2001-2016 are grouped together (i.e. areas 513, 514, 515, 521, 522, 525, 526, 561, 562, 614, 627, and 636). Statistical areas with no estimated scup discards are not shown.

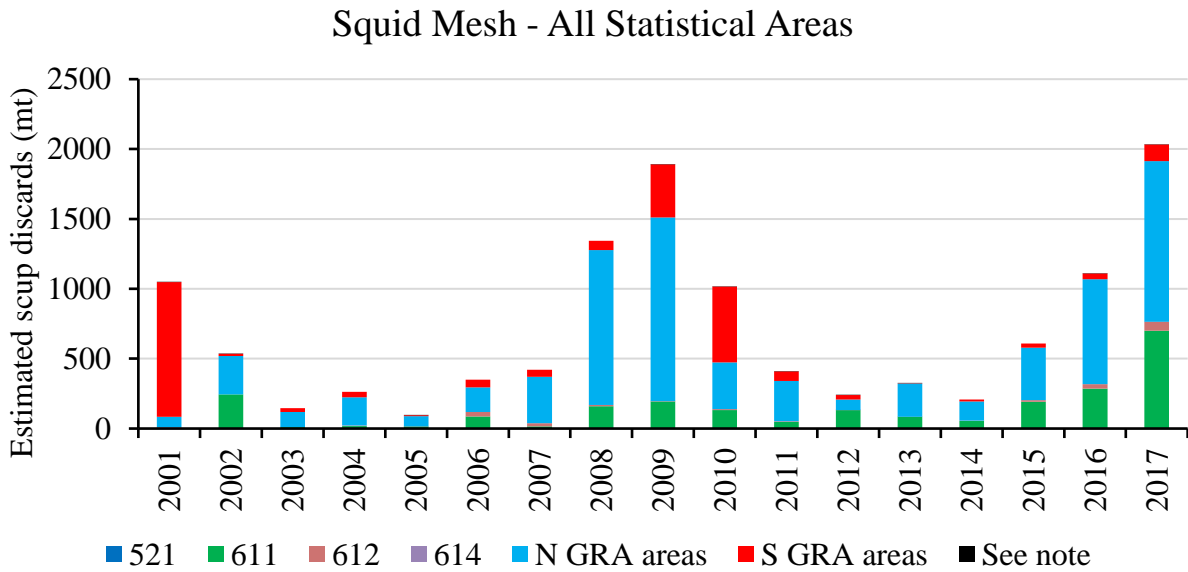


Figure 7: Estimated scup discards by year and statistical area for trawl vessels using codend mesh diameters of 2.125 inches or less (aka “squid mesh”). *Note:* all statistical areas with less than 1 mt total estimated squid mesh scup discards over 2001-2017 are grouped together (i.e. areas 513, 514, 515, 522, 525, 526, 562, 627, 632, 635, 636). Statistical areas with no estimated scup discards in squid mesh are not shown.

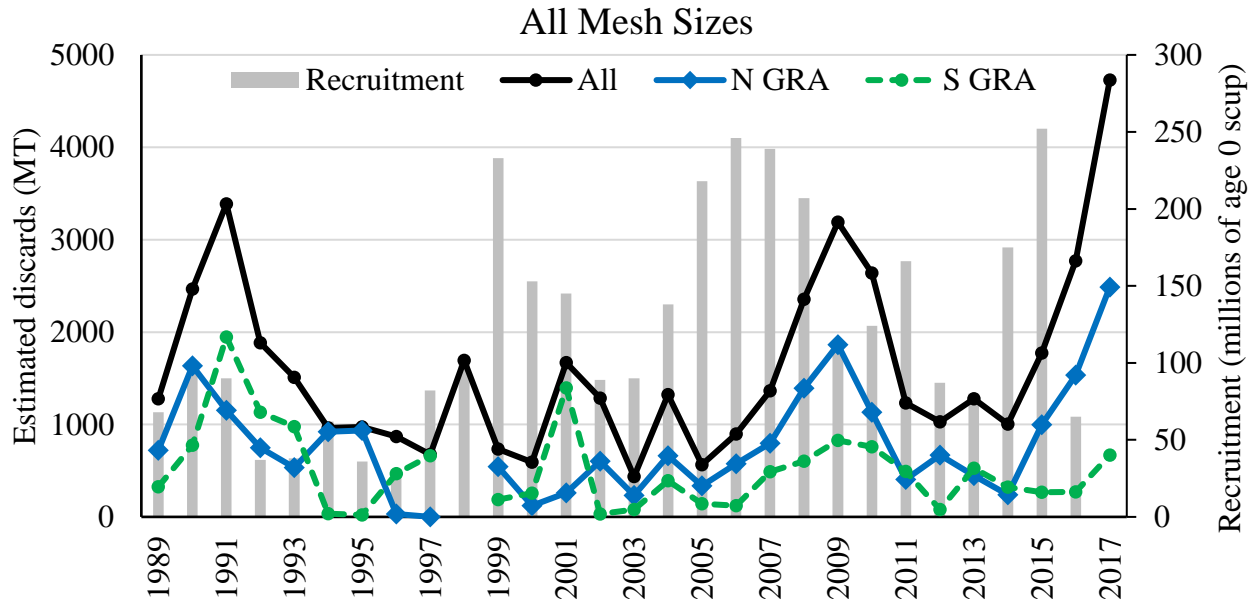


Figure 8: Estimated scup discards and recruitment. Discards are shown for all mesh sizes in all statistical areas, statistical areas partially included in the northern scup GRA, and statistical areas partly included in the southern scup GRA. Data on recruitment in 2017 are not currently available. The 1998 total discard estimate was modified to adjust for the influence of one unreasonably large tow (NEFSC 2015). Similar adjustments were not made by statistical area, therefore 1998 discard estimates by GRA areas are not shown.

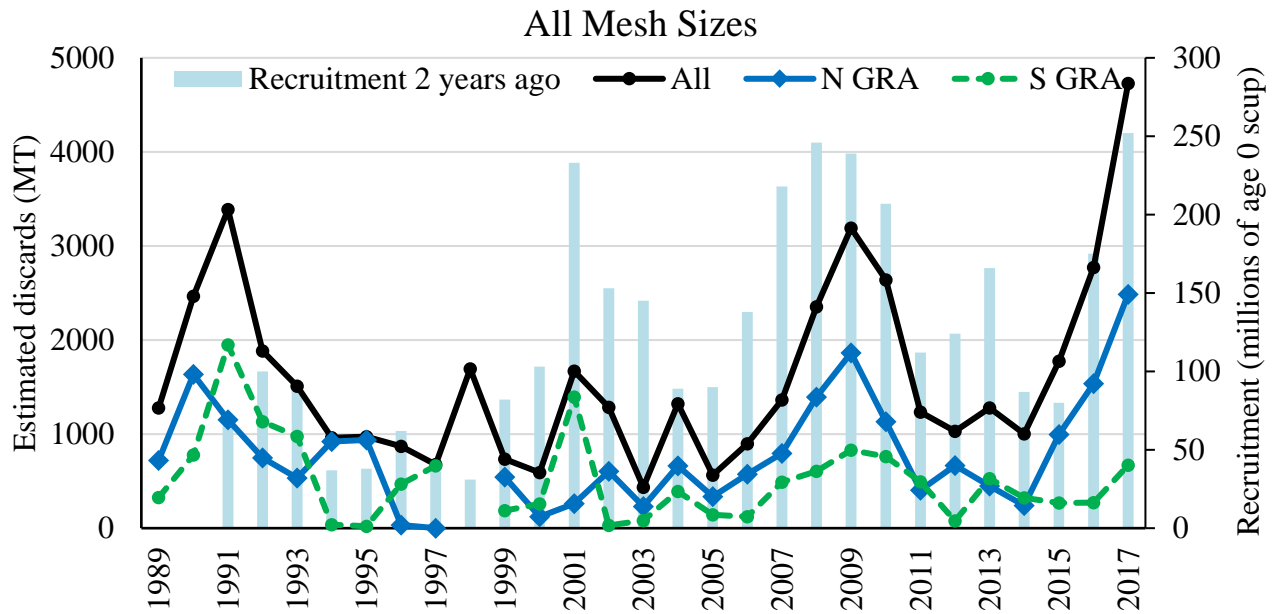


Figure 9: Estimated scup discards and recruitment from two years prior (e.g. 2015 recruitment is shown in 2017). Discards are shown for all mesh sizes in all statistical areas, statistical areas partially included in the northern scup GRA, and statistical areas included in the southern scup GRA. The 1998 total discard estimate was modified to adjust for the influence of one unreasonably large tow (NEFSC 2015). Similar adjustments were not made by statistical area, therefore 1998 discard estimates by GRA areas are not shown.

Squid Mesh - Southern GRA

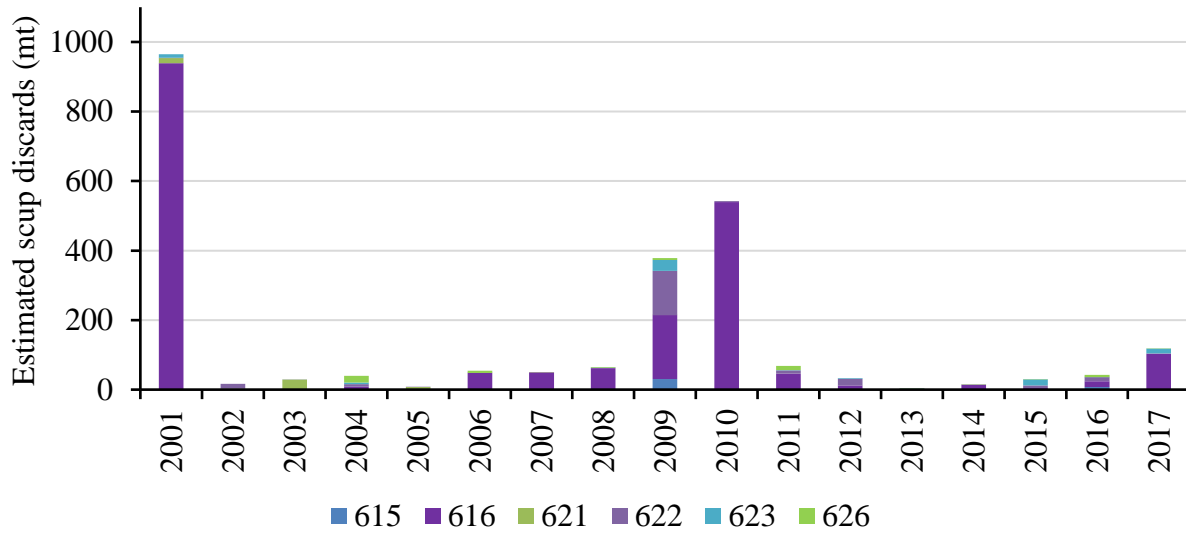


Figure 10: Estimated scup discards by year and statistical area for trawl vessels using codend mesh diameters of 2.125 inches or less (aka “squid mesh”). Only statistical areas which are partially included in the southern scup GRA are shown. Statistical areas with no estimated squid mesh scup discards are not shown (i.e. statistical areas 625, 631, and 632).

Discards from southern GRA statistical areas

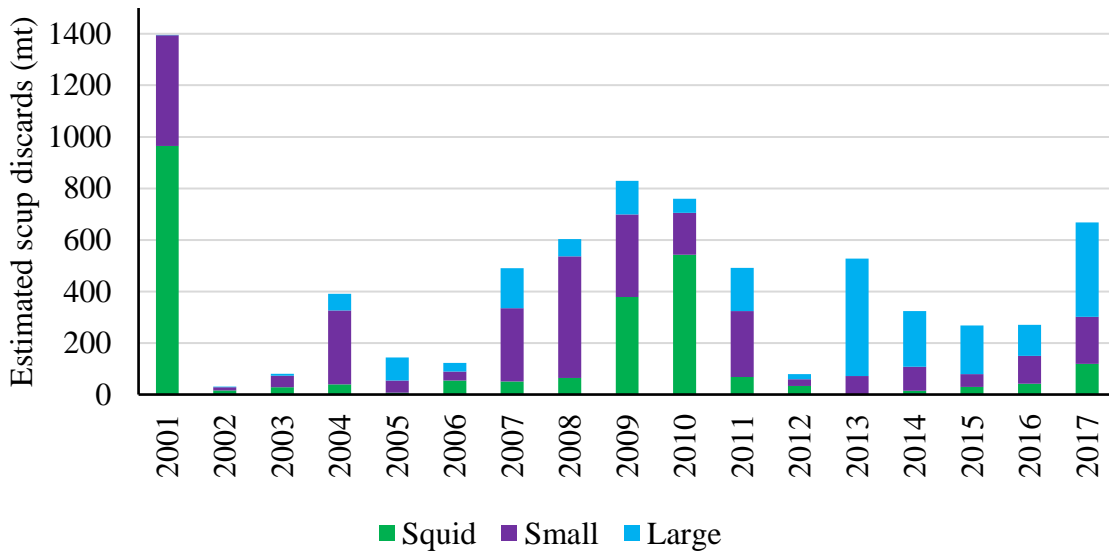


Figure 11: Estimated scup discards by year and mesh size for statistical areas which are partially included in the southern scup GRA.

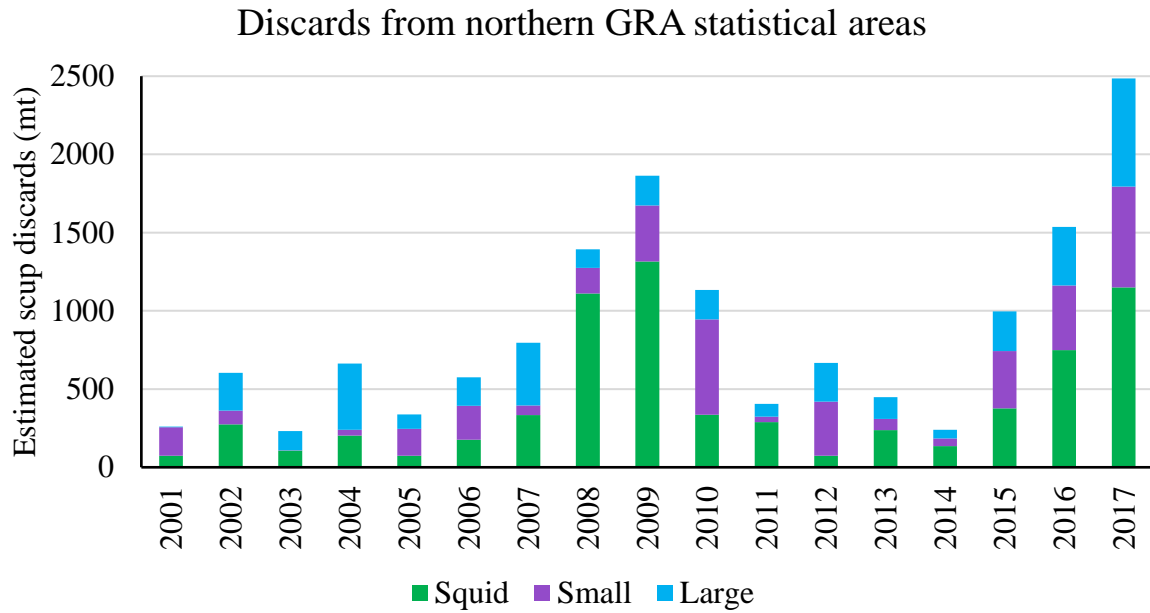


Figure 12: Estimated scup discards by year and mesh size for statistical areas which are partially included in the northern scup GRA.

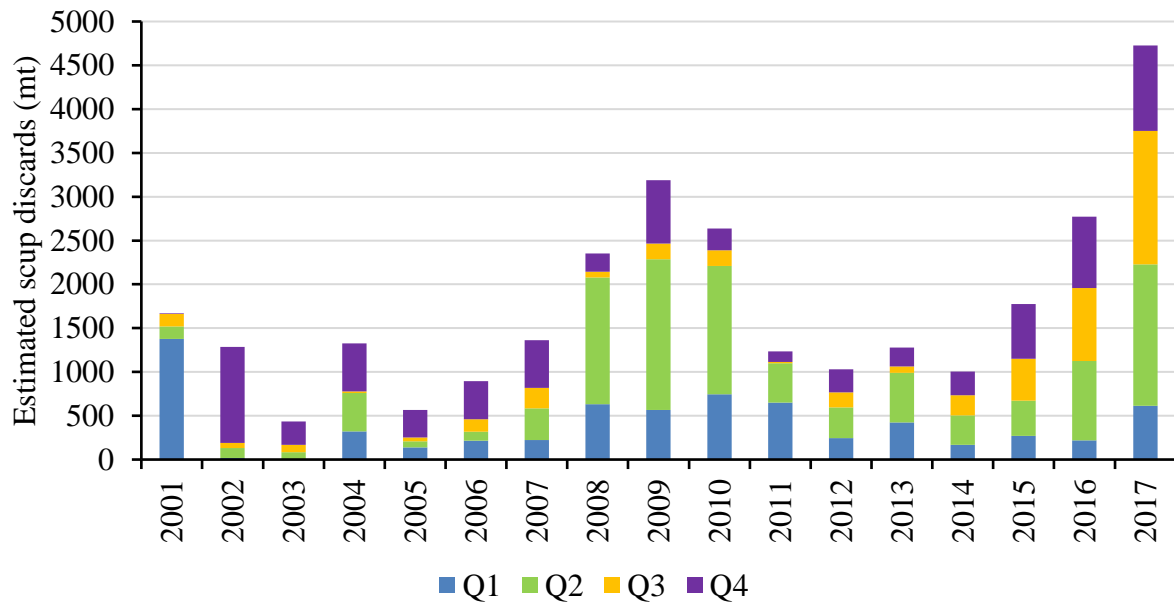


Figure 13: Estimated scup discards for all mesh categories by calendar quarter and year.

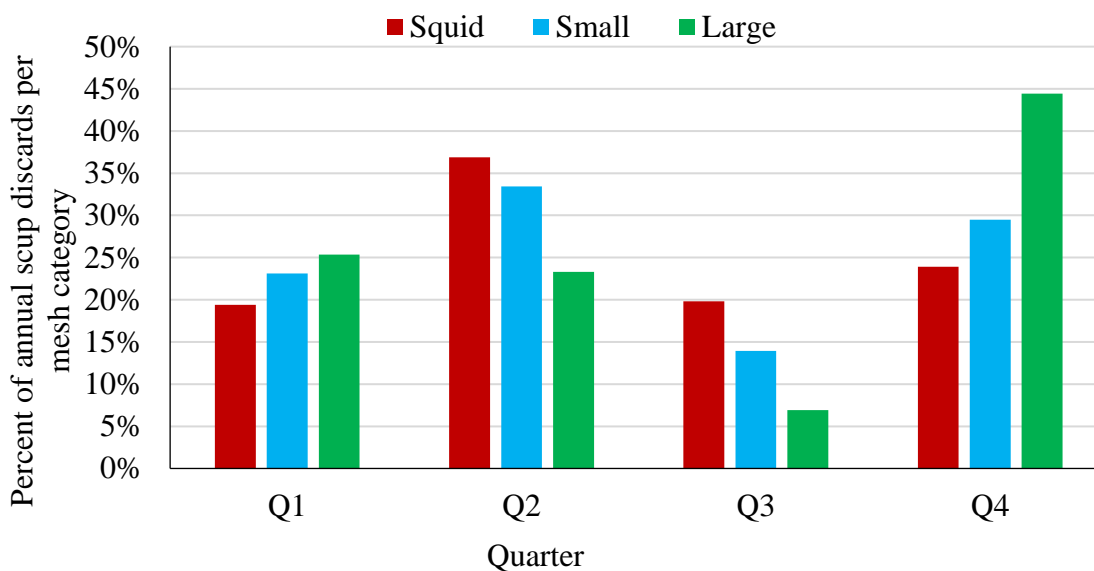


Figure 14: Average percent of annual scup discards per quarter for each of three mesh categories (squid, small, and large), 2001-2017.



Appendix References

NEFSC (Northeast Fisheries Science Center). 2015. SARC 60 Scup Working Paper - TOR 1: Estimates of Commercial Fishery Scup Discards: 1989-2013.

NEFSC (Northeast Fisheries Science Center). 2017. Scup Assessment Update for 2017. Available at: <http://www.mafmc.org/ssc-meetings/2017/july-19-20>.

NEFSC (Northeast Fisheries Science Center). 2018. Scup Data Update for 2018. Available at: <http://www.mafmc.org/ssc-meetings/2018/july-17-18>

TO: Julia Beaty, Scup Fishery Management Specialist, MAFMC

FROM: David Pierce, Director, MA Division of Marine Fisheries 
Jason McNamee, Chief, RI Division of Marine Fisheries 

DATE: June 12, 2018

SUBJECT: Annual Scup Specifications – Minimum Mesh Size & Incidental Possession Limit

Overview

Massachusetts and Rhode Island would like the Summer Flounder, Scup, and Black Sea Bass Monitoring Committee to consider potential changes to the scup bottom trawl minimum mesh size and/or triggers during the specification setting process for 2019 in recognition of the small mesh squid fisheries that seasonally occur in our states' waters. These rules were important conservation measures for scup when the stock was in poor condition, but as currently set may now lead to potentially high levels of scup discarding during this period with little conservation value. Discards in the squid fishery, particularly in and around Nantucket Sound, have been the subject of much negative attention for the Council as of late.

Background

The federal/interstate plan currently mandates a bottom trawl minimum mesh size of 5" diamond when possessing more than 1,000 lb of scup during October 1–April 30 and 200 lb during May 1–September 30 (Table 1). These mesh size triggers serve to discourage a directed fishery on scup with small mesh that would cause regulatory discards due to the minimum size (9").

MA and RI have gradually been increasing our directed scup trip limit for trawl gear over multiple years as the scup annual quota has increased due to rebuilding. Currently, both states have a 10,000-lb weekly possession limit for scup caught by trawl. These higher weekly limits reflect the states' interest to accommodate the occasional large tow of scup, and thereby reduce regulatory discards.

The small mesh squid fisheries in MA and RI occur seasonally. MA allows trawl gear with a 1 7/8" minimum mesh to target squid from April 23–June 9 (or longer by Director's declaration; generally a week if at all) in the state waters south of Cape Cod; otherwise the minimum trawl mesh is 6.5" throughout the cod-end and 6" throughout the remainder of the net. RI's small mesh squid fishery is not regulated to the extent seen in MA, but has similar characteristics (mesh size and seasonality) and is impacted negatively through regulatory discards by the scup mesh trigger as is the case in MA.

Larger, adult scup generally arrive in Southern New England waters during the operation of the small mesh squid fishery and are susceptible to bycatch. Smaller scup follow, usually as the squid fishery nears its conclusion in state waters either due to regulation or squid availability.

Because of the scup minimum mesh incidental limit, one of two things is happening in the directed small mesh squid fishery off MA and RI. Vessels are fishing with small mesh to get their squid limit—potentially discarding large amounts of legal-sized scup—and then switching to at least 5" mesh to target scup. In this case, if the mesh trigger were higher, fishermen would be allowed to be more efficient by not discarding the scup during squid fishing, thereby not having to do additional tows to add value to the trip. In a worst-case scenario, fishermen are potentially unaware of or unconcerned with the scup mesh trigger rule and keep the scup intercepted while fishing for squid. Even in this case, there is value in allowing the scup to be landed rather than causing a regulatory violation for a species that is not overfished, overfishing is not occurring, and annual federal quotas are not being reached.

Request

An analysis of RI harvester and dealer data suggests that a 4,000-lb scup bycatch limit for the small mesh squid fishery would largely eliminate scup discards in the fishery. (The RI data are likely representative of MA as well given the two fisheries' similarities, e.g., common participants, identical trip limits). To reduce scup discards and improve efficiency in the small mesh squid fishery, MA and RI are interested to have this incidental limit apply during April 15–June 15 (or May–June if it is problematic to straddle the Winter I/Summer Periods). Interestingly, the first incidental limit set was for 4,000 lb in 1996, when the stock was at drastically lower levels in need of rebuilding (i.e., $SSB_{1996} = 5,535$ mt vs. $SSB_{2016} = 179,898$ mt, per the 2017 stock assessment update). An alternative option would be to seasonally eliminate the minimum mesh size requirement.

We note that there has been hesitance in the past to increase the Summer Period incidental possession limit to avoid conflict with (i.e., be higher than) the directed fishery possession limits in state waters. Due to the broad range of the states' trip limits during the Summer Period (itself a product of divergent state shares and effort levels), there is not a one-size-fits-all incidental possession limit for May–September. As previously stated, MA and RI now have Summer Period trawl trip limits for scup of 10,000 lb weekly, a level approaching that of the Winter II Period (12,000 lb or higher) when a 1,000-lb incidental possession limit applies. At a bare minimum, MA and RI should be afforded the same incidental limit as the Winter II fishery, although a 4,000-lb season limit would do much more to eliminate unnecessary discarding in our states' squid fisheries. An incidental limit higher than a state's directed trip limit need not be considered a conflict; in essence it just eliminates the minimum mesh requirement for that state's directed fishery. Given the rebuilt stock status and numerous other state and federal conservation measures, a year-round 4,000-lb incidental possession limit may not be an unreasonable approach.

Table 1. Scup Minimum Mesh Size and Landings Trigger History

Years		1996	1997-1998	1999-2001	2002-2004	2005-2015	2016-present
Minimum Mesh Size (generalized)		4"	4.5"	4.5"	4.5"	5"	5"
Incidental Limit (lbs)	Winter	4,000	4,000	200	500	500	1,000
	Summer		1,000	100	100	200	200



David E. Pierce, Ph.D.
Director

Commonwealth of Massachusetts

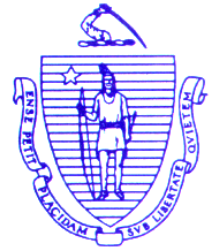
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MEMORANDUM

TO: Julia Beaty, Scup Fishery Management Specialist, MAFMC

FROM: David Pierce, Director 

DATE: June 12, 2018

SUBJECT: Annual Scup Specifications – Recreational Minimum Size

MA DMF would like the Summer Flounder, Scup, and Black Sea Bass Monitoring Committee to consider potential changes to the scup recreational minimum size during the specification setting process for 2019 in recognition of recreational stakeholder interest to retain smaller scup to be used for live bait.

The recreational scup minimum size in federal waters and most state waters of MA–NJ is 9”, and 8” in state waters of DE–NC. Recreational limits range from 30 to 50 fish.

In Massachusetts (and elsewhere), scup are a popular bait fish, especially for striped bass and bluefish fishing. For-hire and private vessels will often fish for scup under the recreational limits, and retain some in a live well to then use as live bait for other targets. Several recreational fishing community members have expressed a desire to be able to use scup as small as 6” for live bait purposes. At the current 9” minimum size, the hook-up ratio is reduced compared to what it could be with a smaller bait fish. Striped bass and bluefish will often bite only part of a large (9”) bait fish, missing the hook, thereby causing more bait to be wasted than if a smaller scup were used.

One our south coast in particular scup is one of three main bait sources to be used for striped bass and bluefish fishing, with eels and menhaden being the other two. Eels are depleted, posing challenges to their acquisition whether by purchase (extremely expensive) or personal harvest (low, inconsistent catch). Menhaden distribution isn’t predictable and they haven’t yet returned to many of our inshore areas, meaning they must be purchased or travel is required to harvest them. The most popular method of fishing with menhaden around the Islands is as chum, which requires substantially more bait as well. Scup are readily available and easily caught in the same places and times as striped bass and bluefish fishing occurs. Using them for live bait means any unused fish can be returned alive to the water, with little waste.

Proponents of a smaller recreational minimum size for scup (with the intent of it being for bait) argue it would be unlikely to increase landings of smaller scup (for food) because fish below the 9” minimum size provide little meat. Regardless, this abundant species should be able to accommodate limited take of smaller fish without jeopardy they believe. An allowance of 5 fish per angler has been suggested. Because it would be a compliance and enforcement challenge to assign a different size to scup being used for bait versus scup being landed for consumption, we suggest the Monitoring Committee consider a 5-fish “bait tolerance” with regards to the minimum size, possibly with a threshold size limit of 6”. The tolerance could apply to possession alone (requiring its use as bait) or landing as well.

We look forward to the Monitoring Committee’s review of this concept, and hope the Advisory Panel can be consulted as well.



Scup Fishery Information Document

June 2018

This document provides a brief overview of the biology, stock condition, management system, and fishery performance for scup with an emphasis on 2017, the most recent complete fishing year.

1. Biology

Scup (*Stenotomus chrysops*) are a schooling, demersal (i.e., bottom-dwelling) species. They are found in a variety of habitats in the Mid-Atlantic. Scup essential fish habitat includes demersal waters, areas with sandy or muddy bottoms, mussel beds, and sea grass beds from the Gulf of Maine through Cape Hatteras, North Carolina. Scup undertake extensive seasonal migrations between coastal and offshore waters. They are found in estuaries and coastal waters during the spring and summer. In the fall and winter, they move offshore and to the south, to outer continental shelf waters south off New Jersey. Scup spawn once annually over weedy or sandy areas, mostly off southern New England. Spawning takes place from May through August and usually peaks in June and July.¹

About 50% of scup are sexually mature at two years of age and about 17 cm (about 7 inches) total length. Nearly all scup older than three years of age are sexually mature. Scup reach a maximum age of at least 14 years. They may live as long as 20 years; however, few scup older than 7 years are caught in the Mid-Atlantic.^{2,3}

Adult scup are benthic feeders. They consume a variety of prey, including small crustaceans (including zooplankton), polychaetes, mollusks, small squid, vegetable detritus, insect larvae, hydroids, sand dollars, and small fish. The Northeast Fisheries Science Center's (NEFSC's) food habits database lists several predators of scup, including several shark species, skates, silver hake, bluefish, summer flounder, black sea bass, weakfish, lizardfish, king mackerel, and monkfish.¹

2. Status of the Stock

The scup stock was designated as overfished in 2005, requiring development of a rebuilding plan. The stock was declared rebuilt ahead of schedule in 2009 after a benchmark stock assessment determined that the stock was no longer overfished and overfishing was not occurring.²

The most recent benchmark stock assessment took place in 2015. An update to that assessment using commercial and recreational fishery data and fishery-independent survey data through 2016 indicated that the stock was not overfished and overfishing was not occurring. Spawning stock biomass (SSB) was estimated to be 396.6 million pounds in 2016, about 2.1 times the target SSB level (Figures 1 and 2).^{3,4}

According to data through 2017, the NEFSC bottom trawl survey biomass indices for scup in fall 2015 and spring 2016 were record highs for the time series (i.e. 1963 - present for the fall survey and 1968 through the present for the spring survey). Both seasonal indices decreased after 2016. Several state fisheries-independent surveys show similar trends.⁵

Fishing mortality was estimated to be 0.139 in 2016, 37% below the fishing mortality reference point (Figure 1). The 2015 year class (i.e. those scup spawned in 2015) was estimated to be 252 million fish, about 2.1 times the average recruitment from 1984 to 2016. The 2016 year class is estimated to be 65 million fish, about 47% below the average (Figure 2).⁴

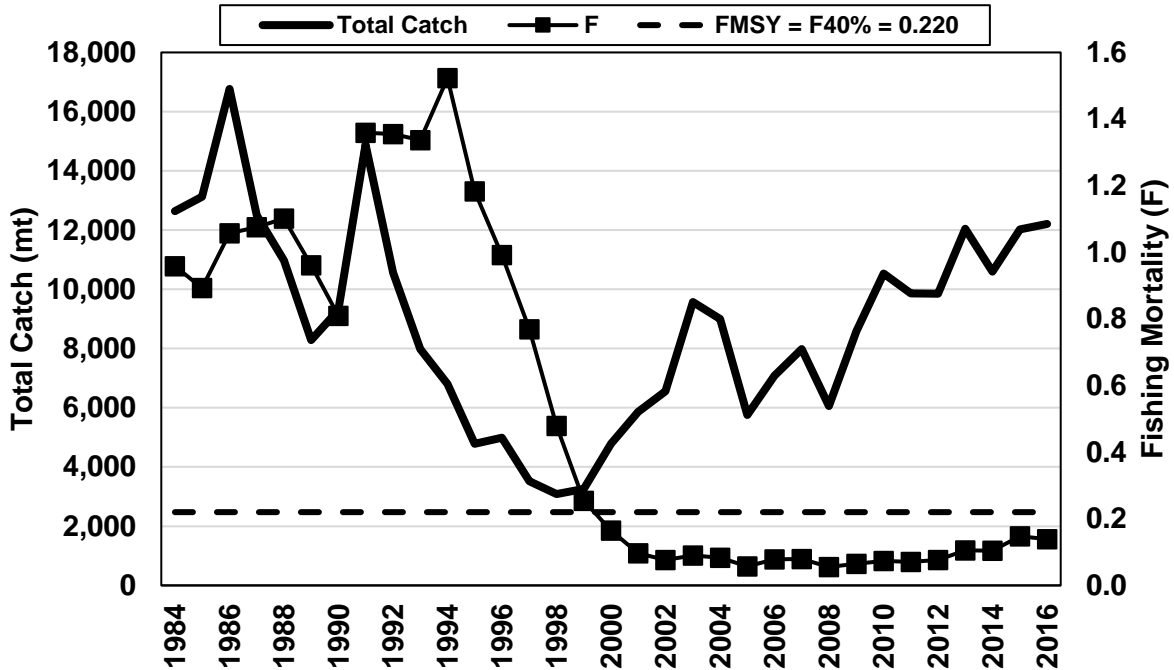


Figure 1: Total fishery catch and fishing mortality rate (F) for fully-selected age 3 scup, 1984-2016. The horizontal dashed line is the fishing mortality reference point from the 2015 benchmark stock assessment. Overfishing is occurring when the fishing mortality rate exceeds this threshold.⁴

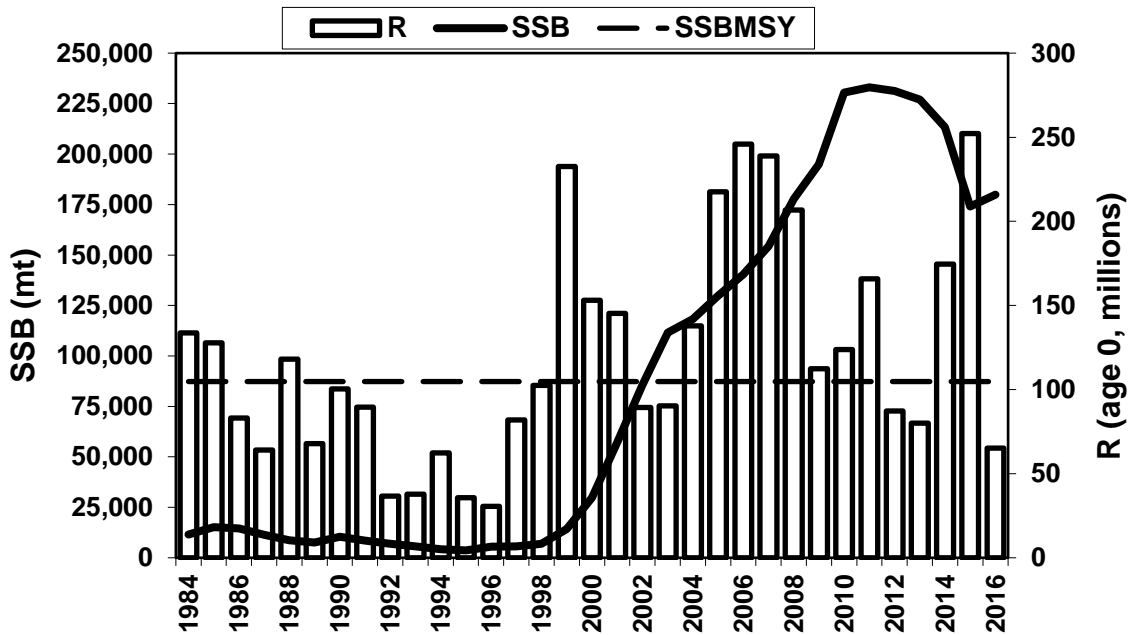


Figure 2: Scup spawning stock biomass and Recruitment, 1984-2016.⁴

3. Management System and Overall Fishery Performance

The Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (Commission) cooperatively develop fishery regulations for scup off the east coast of the United States. The National Marine Fisheries Service (NMFS) 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 waters (0-3 miles offshore) and federal waters (3-200 miles offshore, also known as the Exclusive Economic Zone or EEZ). The management unit for scup includes U.S. waters from Cape Hatteras, North Carolina to the U.S./Canadian border.

The federal Fishery Management Plan (FMP) for scup has been in place since 1996, when scup were incorporated into the Summer Flounder FMP through Amendment 8. Amendment 8 established gear restrictions, reporting requirements, commercial quotas, a moratorium on new commercial scup permits, recreational possession limits, and minimum size restrictions for scup fisheries. The Council has made several adjustments to the FMP since 1996. The FMP and subsequent amendments and framework adjustments can be found at: www.mafmc.org/sf-s-bsb/.

The Council's Scientific and Statistical Committee (SSC) recommends annual Acceptable Biological Catch (ABC) levels for scup. The annual ABC is divided into commercial and recreational Annual Catch Limits (ACLs), based on the allocation percentages prescribed in the FMP (i.e. 78% commercial, 22% recreational). Both ABCs and ACLs are catch-based limits, meaning they account for both landings and discards. Projected discards are subtracted to determine the commercial quota and recreational harvest limit (RHL), which are landings-based limits. Table 1 shows scup catch and landings limits from 2007 through 2018, as well as commercial and recreational landings through 2016.

Total scup landings (commercial and recreational) from Maine to North Carolina peaked in 1981 at over 27 million pounds and reached a low of 5.1 million pounds in 1998. In 2017, about 20.87 million pounds of scup were landed by commercial and recreational fishermen (Figure 3).^{6,7}

Table 1: Summary of scup catch limits, landings limits, and landings, 2007 through 2018. Values are in millions of pounds unless otherwise noted.

Measure	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019 ^a
ABC	--	--	11.70	17.09	51.70	40.88	38.71	35.99	33.77	31.11	28.40	39.14	36.43
TAC ^b	13.97	9.90	15.54	17.09	31.92	--	--	--	--	--	--	--	--
Commercial ACL	--	--	--	--	--	31.89	30.19	28.07	26.35	24.26	22.15	30.53	28.42
Commercial ACT ^c	--	--	--	--	--	31.89	30.19	28.07	26.35	24.26	22.15	28.42	28.42
Commercial quota ^d	8.90	5.24	8.37	10.68	20.36	27.91	23.53	21.95	21.23	20.47	18.38	23.98	23.98
Commercial landings	9.25	5.19	8.20	10.40	15.03	14.88	17.87	15.96	17.03	15.76	15.44	--	--
% of commercial quota landed	104%	99%	98%	97%	74%	53%	76%	72%	80%	77%	84%	--	--
Recreational ACL	--	--	--	--	--	8.99	8.52	7.92	7.43	6.84	6.25	8.61	8.01
Recreational ACT ^c	--	--	--	--	--	8.99	8.52	7.92	7.43	6.84	6.25	8.01	8.01
RHL ^d	2.74	1.83	2.59	3.01	5.74	8.45	7.55	7.03	6.80	6.09	5.50	7.37	7.37
Recreational landings	4.56	3.79	3.23	5.97	3.67	4.17	5.37	4.43	4.41	4.26	5.42	--	--
% of RHL harvested	166%	207%	125%	198%	64%	49%	71%	63%	65%	70%	98%	--	--

^a2019 measures will be reviewed by the Council in 2018 and may be revised.

^bPrior to implementation of the 2011 Omnibus ACLs and AMs Amendment, the Council specified a Total Allowable Catch (TAC). After implementation of this amendment, the Council specified ABCs instead of TACs. Both terms refer to the total catch limit in a given year. The difference between the TAC and the ABC in 2009 is due to NMFS specifying a revised catch limit after new scientific information became available. In 2011, the difference was due to the Council specifying a more conservative limit than that recommended by the SSC.

^cThe ACT is the annual catch target and is set equal to or less than the ACL to account for management uncertainty.

^dCommercial quotas and RHLs reflect the removal of projected discards from the sector-specific ACLs. For 2006-2014, these limits were also adjusted for Research Set Aside. This program was suspended in 2014.

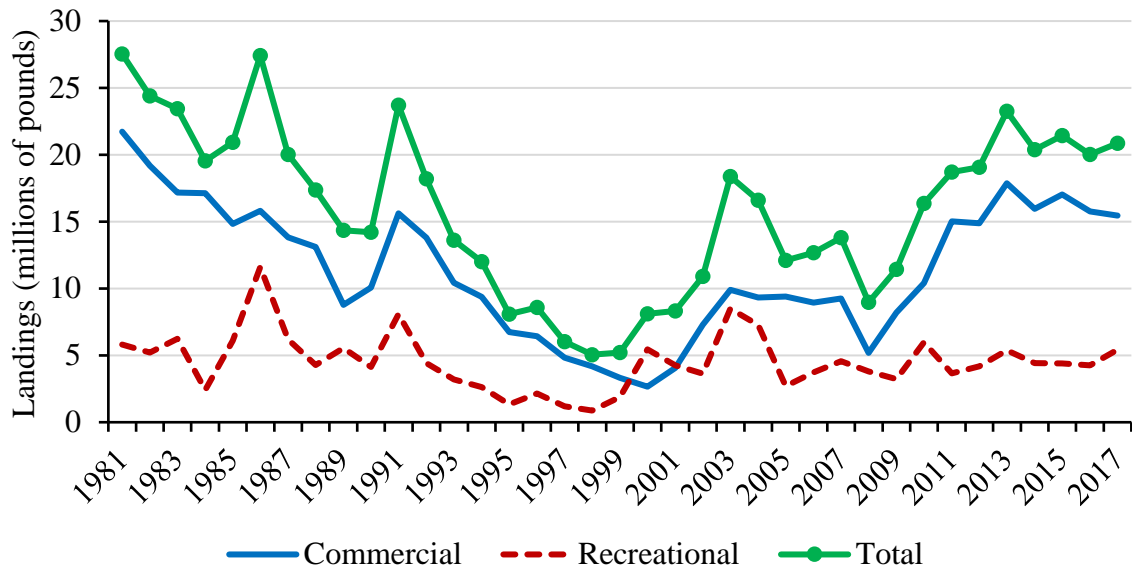


Figure 3: Commercial and recreational scup landings, Maine - North Carolina, 1981-2017.^{5,6}

4. Commercial Fishery Regulations and Performance

Commercial scup landings peaked in 1981 at 21.73 million pounds and reached a low of 2.66 million pounds in 2000 (Figure 3). In 2017, commercial fishermen landed 15.44 million pounds of scup, about 84% of the commercial quota.⁶

Commercial discards have been increasing since 2014. About 10.47 million pounds of scup were discarded in commercial fisheries in 2017. This is the highest amount of discards since 1981 and represents about a 71% increase from 2016. This resulted in the 2017 commercial ACL being exceeded by about 17% and the ABC being exceeded by about 11%, despite the quota underage. This increase in discards was likely mainly due to the large 2015 year class, which appears to be the largest year class since at least 1984. In 2017, these scup were very abundant, but mostly too small to be landed in the commercial fishery due to the commercial minimum fish size of 9 inches total length.⁵

The commercial scup fishery operates year-round, taking place mostly in federal waters during the winter and mostly in state waters during the summer. A coast-wide commercial quota is allocated between three quota periods, known as the winter I, summer, and winter II quota periods. These seasonal quota periods were established to ensure that both smaller day boats, which typically operate near shore in the summer months, and larger vessels operating offshore in the winter months can land scup before the annual quota is reached. The dates of the summer and winter II periods were modified in 2018 (Table 2).

The summer period quota is divided among states according to the allocation percentages outlined in the Commission’s FMP (Table 3). Once the quota for a given period is reached, the commercial fishery is closed for the remainder of that period. If the full winter I quota is not harvested, unused quota is added to the winter II period. Any quota overages during the winter I and II periods are subtracted from the quota allocated to those periods in the following year. Quota overages during

the summer period are subtracted from the following year's quota only in the states where the overages occurred.

A possession limit of 50,000 pounds of scup is in effect during the winter I quota period. A possession limit of 12,000 pounds is in effect during the winter II period. If the winter I quota is not reached, the winter II possession limit increases by 1,500 pounds for every 500,000 pounds of quota not caught during winter I. The winter II possession limit was 18,000 pounds in 2017 due to quota rollover from the winter I period. During the summer period, various state-specific possession limits are in effect.

The commercial scup fishery in federal waters is predominantly a bottom otter trawl fishery. In 2017, about 97% of the commercial scup landings (by weight) reported on vessel trip reports (VTRs) were caught with bottom otter trawls. Pots and sink gillnets each accounted for about 1% of landings. All other gear types each accounted for less than 1% of the 2017 commercial scup landings.⁹

Trawl vessels may not possess 1,000 pounds or more of scup during October - April, or 200 pounds or more during May - September, unless they use a minimum mesh size of 5-inch diamond mesh, applied throughout the codend for at least 75 continuous meshes forward of the terminus of the net. Pots and traps for scup are required to have degradable hinges and escape vents that are either circular with a 3.1 inch minimum diameter or square with a minimum length of 2.25 inches on the side.

VTR data suggest that NMFS statistical areas 537, 539, 611, 613, and 616 were responsible for the largest percentage of commercial scup catch in 2017. Statistical area 539, off Rhode Island, had the highest number of trips which caught scup (Table 4, Figure 4).⁹

Over the past two decades, total scup ex-vessel revenue ranged from a low of \$4.66 million in 2000 to a high of \$11.53 million in 2015. In 2017, 15.44 million pounds of scup were landed by commercial fishermen from Maine through North Carolina. Total ex-vessel value in 2017 was \$9.60 million, resulting in an average price per pound of \$0.62. All revenue and price values were adjusted to 2017 dollars to account for inflation.⁶

In general, the price of scup tends to be lower when landings are higher, and vice versa (Figure 6). This relationship is not linear and many other factors besides landings also influence price. The highest average price per pound over the past two decades was \$1.46 (\$2.27 in 2017 dollars) and occurred in 1998. The lowest mean price per pound was \$0.55 (\$0.52 in 2017 dollars) and occurred in 2013.⁶

Over 171 federally-permitted dealers from Maine through North Carolina purchased scup in 2017. More dealers in New York purchased scup than in any other state (Table 5).⁶

At least 100,000 pounds of scup were landed by commercial fishermen in 17 ports in 7 states in 2017. These ports accounted for approximately 92% of all 2017 commercial scup landings. Point Judith, Rhode Island was the leading port, both in terms of landings and number of vessels landing scup (Table 6).⁶ The ports and communities with the greatest participation in the scup fishery are described in Amendment 13 to the FMP (available at <http://www.mafmc.org/sf-s-bsb/>). Detailed

community profiles developed by the Northeast Fisheries Science Center's Social Science Branch can be found at www.mafmc.org/communities/.

A moratorium permit is required to fish commercially for scup. In 2017, 634 vessels held commercial moratorium permits for scup.¹⁰

Table 2: Dates, allocations, and possession limits for the commercial scup quota periods.

Quota Period	Dates	% of commercial quota allocated	Possession limit
Winter I	January 1 – April 30	45.11%	50,000 pounds, until 80% of winter I allocation is reached, then reduced to 1,000 pounds.
Summer	May 1 – September 30*	38.95%	State-specific
Winter II	October 1 – December 31*	15.94%	12,000 pounds. If winter I quota is not reached, the winter II possession limit increases by 1,500 pounds for every 500,000 pounds of scup not landed during winter I.

*Prior to 2018, the summer period was May 1 - October 31 and the winter II period was November 1 - December 31, with the same allocations as shown above.

Table 3: State-by-state quotas for the commercial scup fishery during the summer quota period.

State	Share of summer quota
Maine	0.1210%
Massachusetts	21.5853%
Rhode Island	56.1894%
Connecticut	3.1537%
New York	15.8232%
New Jersey	2.9164%
Maryland	0.0119%
Virginia	0.1650%
North Carolina	0.0249%
Total	99.9908%

Table 4: Statistical areas which accounted for at least 5% of the total commercial scup catch (by weight) in 2017, with associated number of trips.⁹

Statistical Area	Percent of 2017 Commercial Scup Catch	Number of Trips
537	40%	1,426
539	14%	2,506
616	12%	542
613	12%	1,126
611	9%	1,870

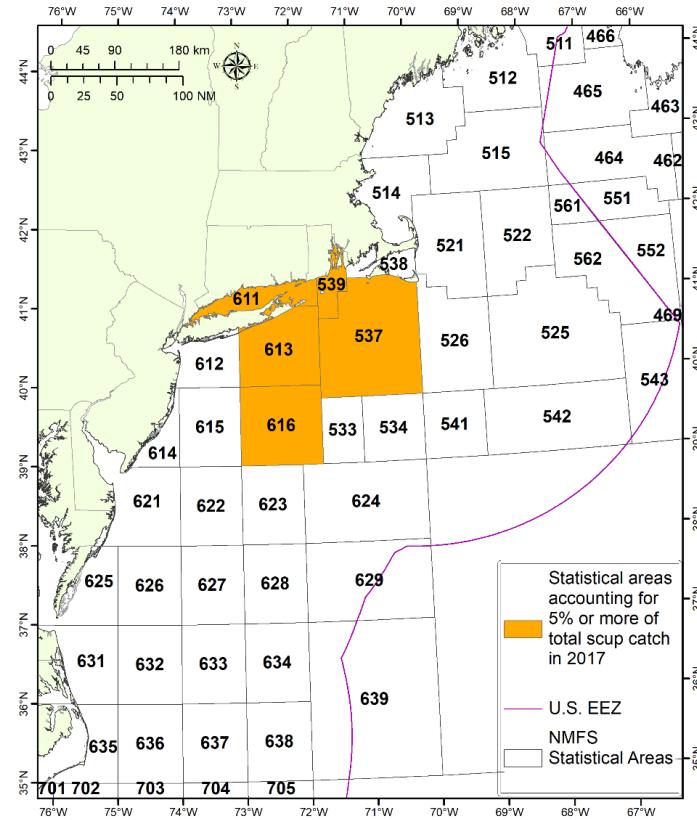


Figure 4: NMFS Statistical Areas, highlighting those which accounted for at least 5% of the commercial scup catch in 2017.⁹

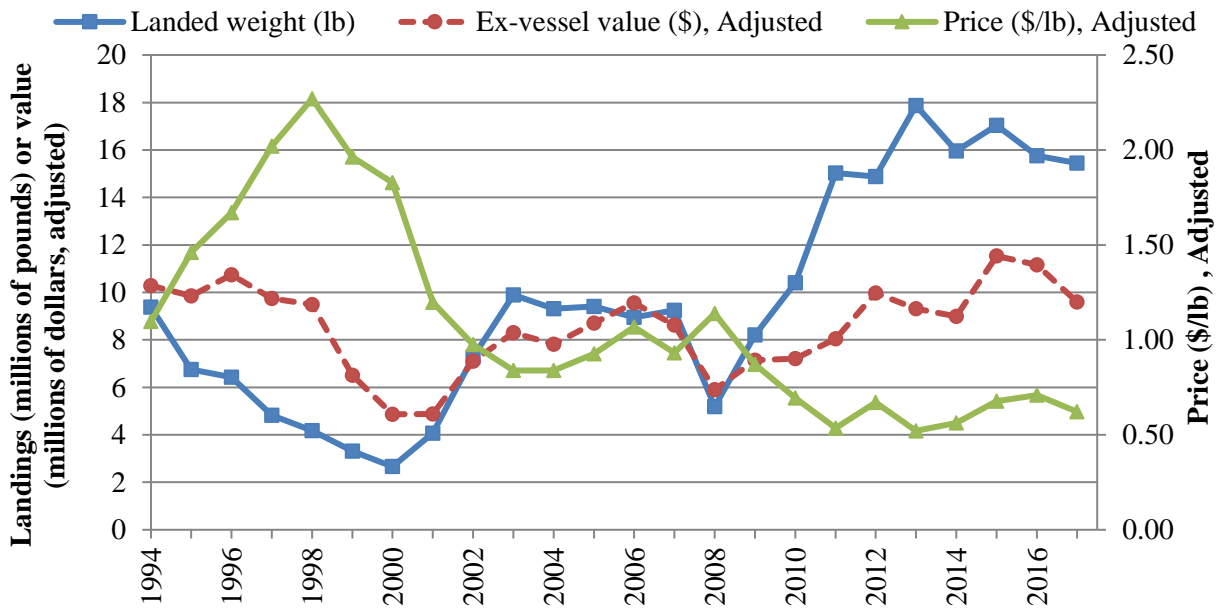


Figure 6: Landings, ex-vessel value, and price for scup from Maine through North Carolina, 1994-2017. Ex-vessel value and price are adjusted to show real 2017 dollars.⁶

Table 5: Number of dealers per state which reported purchases of scup in 2017. C = Confidential.⁶

State	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC
Number of Dealers	C	37	28	15	39	21	C	4	13	14

Table 6: Ports reporting at least 100,000 pounds of scup landings in 2017, based on NMFS dealer data. C = Confidential.⁶

Port	Scup Landings (lb)	% of total commercial scup landings	Number of vessels
POINT JUDITH, RI	5,279,877	34%	134
MONTAUK, NY	2,655,349	17%	83
NEW BEDFORD, MA	2,067,044	13%	69
PT. PLEASANT, NJ	1,414,580	9%	38
NEW LONDON, CT	438,687	3%	6
HAMPTON, VA	360,494	2%	42
LITTLE COMPTON, RI	281,527	2%	12
BELFORD, NJ	270,689	2%	19
MATTITUCK, NY	265,314	2%	4
STONINGTON, CT	213,465	1%	17
HAMPTON BAYS, NY	200,614	1%	37
NEWPORT, RI	175,828	1%	14
HYANNIS, MA	163,783	1%	13
BEAUFORT, NC	149,994	1%	31
CAPE MAY, NJ	137,123	1%	21
TIVERTON, RI	100,521	1%	4
SHINNECOCK, NY	100,005	1%	7

Scup Gear Restricted Areas

Two scup gear restricted areas (GRAs) were first implemented in 2000 with the goal of reducing scup discards in small-mesh fisheries. Trawl vessels may not fish for or possess longfin squid, black sea bass, or silver hake in the Northern GRA from November 1 – December 31 and in the Southern GRA from January 1 – March 15 unless they use mesh which is at least 5 inches in diameter (Figure 5). The GRAs are thought to have contributed to the recovery of the scup population in the mid- to late-2000s.⁸ The Council modified the boundaries of the GRAs several times since they were first implemented. The most recent modification, effective as of January 1, 2017, reduced the size of the southern GRA to restore access to certain historical winter squid fishing areas.

As previously stated, commercial scup discards have been increasing since 2014 and increased by 71% between 2016 and 2017, likely due to the large 2015 year class.⁵ The increase between 2016 and 2017 may also be due to the recent modifications to the southern scup GRA. Further analysis is needed to evaluate the impact of the GRA modification on commercial scup discards in 2017.

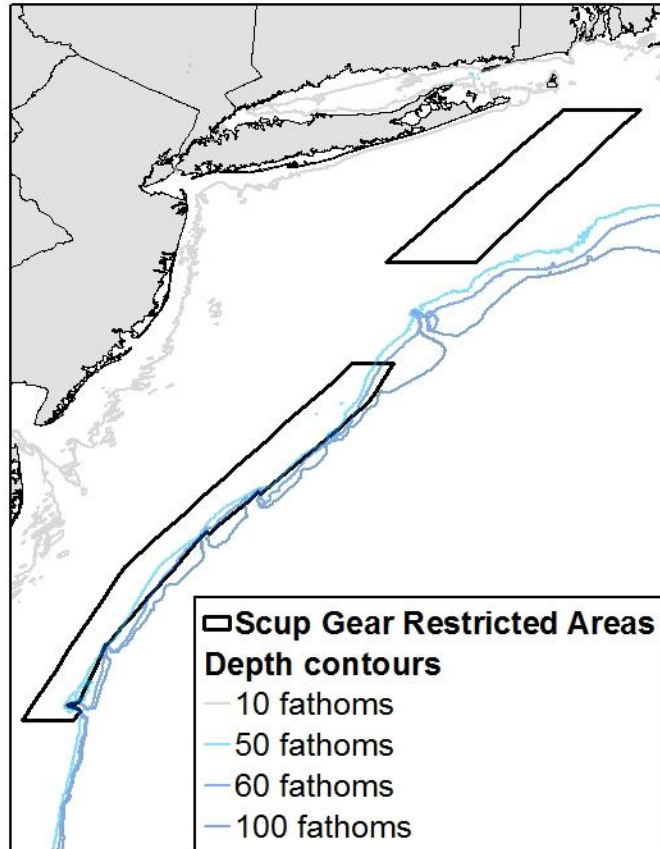


Figure 5: The Scup Gear Restricted Areas.

5. Recreational Fishery Regulations and Performance

The recreational scup fishery is managed on a coast-wide basis in federal waters. Current federal regulations include a minimum size of 9 inches total length, a year-round open season, and a possession limit of 50 scup (Table 7). These measures have been unchanged since 2015.

The Commission applies a regional management approach to recreational scup fisheries in state waters, where New York, Rhode Island, Connecticut, and Massachusetts develop regulations intended to achieve 97% of the recreational harvest limit. The minimum fish size, possession limit, and open season for recreational scup fisheries in state waters vary by state. State waters measures remained unchanged from 2015 through 2017 (Table 8). The states of Massachusetts through New York reduced their recreational minimum size limits for 2018. New Jersey extended their recreational fishing season to the full year. All other state waters measures remained unchanged from 2017 to 2018 (Table 9).

Recreational catch and landings of scup peaked in 1986, when an estimated 30.87 million scup were caught and 24.8 million scup were landed by recreational fishermen from Maine through North Carolina. Recreational catch was lowest in 1998 when an estimated 2.7 million scup were caught and 1.2 million scup were landed (Table 10). Recreational anglers from Maine through North Carolina caught an estimated 14.53 million scup and landed 5.50 million scup (about 5.42 million pounds) in 2017.⁷

Vessels carrying passengers for hire in federal waters must obtain a federal party/charter permit. In 2017, 752 vessels held scup federal party/charter permits. Many of these vessels also held party/charter permits for summer flounder and black sea bass.¹⁰

Most recreational scup catch occurs in state waters during the warmer months when the fish migrate inshore. Between 2008 and 2017, about 97% of recreational scup landings (in numbers of fish) occurred in state waters and about 3% occurred in federal waters (Table 11). New York, Massachusetts, Connecticut, Rhode Island, and New Jersey accounted for over 99.9% of recreational scup harvest in 2017 (Table 12).⁷

About 60% of recreational scup landings (in numbers of fish) in 2017 were from anglers who fished on private or rental boats. About 29% were from anglers fishing on party or charter boats, and about 12% were from anglers fishing from shore (Table 13).⁷

Table 7: Federal recreational measures for scup, 2005-2018.

Regulation	2005-2007	2008-2009	2010-2011	2012	2013	2014	2015-2018
Minimum size (total length)	10 in.	10.5 in.	10.5 in.	10.5 in.	10 in.	9 in.	9 in.
Possession limit	50	15	10	20	30	30	50
Open season	Jan 1–Feb 28 & Sept 18 – Nov 30	Jan 1–Feb 28 & Oct 1–Oct 31	Jun 6 – Sept 26	Jan 1 – Dec 31	Jan 1 – Dec 31	Jan 1 – Dec 31	Jan 1 – Dec 31

Table 8: Scup recreational fishing measures in state waters for 2015-2017.

State	Minimum Size (inches)	Possession Limit	Open Season
MA	10	30 fish	May 1-December 31
MA (party/charter)	10	45 fish	May 1-June 30
		30 fish	July 1-December 31
RI (private and shore)	10	30 fish	May 1-December 31
RI Shore Program (7 designated shore sites)	9		
RI (party/charter)	10	30 fish	May 1-August 31; November 1-December 31
		45 fish	September 1-October 31
CT (private angler)	10	30 fish	May 1-December 31
CT Shore Program (45 designed shore sites)	9		
CT (party/charter)	10	30 fish	May 1-August 31; November 1-December 31
		45 fish	September 1-October 31
NY (private and shore)	10	30 fish	May 1-December 31
NY (party/charter)	10	30 fish	May 1-August 31; November 1-December 31
		45 fish	September 1- October 31
NJ	9	50 fish	January 1-February 28; July 1-December 31
DE	8	50 fish	January 1-December 31
MD	8	50 fish	January 1-December 31
VA	8	30 fish	January 1-December 31
NC, North of Cape Hatteras	8	50 fish	January 1-December 31

Table 9: Scup recreational fishing measures in state waters for 2018.

State	Minimum Size (inches)	Possession Limit	Open Season
MA	9	30 fish; 150 fish/vessel with 5+ anglers on board	May 1-December 31
MA (party/charter)	9	45 fish	May 1-June 30
		30 fish	July 1-December 31
RI (private & shore)	9	30 fish	May 1-December 31
RI shore program (7 designated shore sites)	8		
RI (party/charter)	9	30 fish	May 1-August 31; November 1-December 31
		45 fish	September 1-October 31
CT (private & shore)	9	30 fish	May 1-December 31
CT shore program (46 designated shore sites)	8		
CT (party/charter)	9	30 fish	May 1-August 31; November 1-December 31
		45 fish	September 1-October 31
NY (private & shore)	9	30 fish	May 1-December 31
NY (party/charter)	9	30 fish	May 1-August 31; November 1-December 31
		45 fish	September 1- October 31
NJ	9	50 fish	January 1- December 31
DE	8	50 fish	January 1-December 31
MD	8	50 fish	January 1-December 31
VA	8	30 fish	January 1-December 31
NC, North of Cape Hatteras (N of 35° 15'N)	8	50 fish	January 1-December 31

Table 10: Estimated recreational catch and harvest of scup, Maine - North Carolina, 1981 - 2017.⁶

Year	Recreational catch (millions of fish)	Recreational harvest (millions of fish)	Recreational harvest (millions of pounds)	% of catch retained
1981	10.38	9.08	5.81	88%
1982	7.18	6.45	5.20	90%
1983	10.16	8.84	6.25	87%
1984	7.77	6.06	2.42	78%
1985	13.86	10.81	6.09	78%
1986	30.87	24.82	11.60	80%
1987	12.38	9.92	6.20	80%
1988	7.54	6.06	4.27	80%
1989	11.39	9.18	5.56	81%
1990	10.17	8.04	4.14	79%
1991	16.85	13.28	8.09	79%
1992	10.08	7.76	4.41	77%
1993	7.08	5.66	3.20	80%
1994	5.65	4.27	2.63	76%
1995	3.77	2.42	1.34	64%
1996	4.68	2.97	2.16	64%
1997	3.07	1.92	1.20	62%
1998	2.67	1.21	0.87	45%
1999	4.64	3.25	1.89	70%
2000	11.28	7.24	5.44	64%
2001	9.93	5.10	4.26	51%
2002	7.58	3.65	3.62	48%
2003	14.66	9.45	8.48	64%
2004	13.43	7.15	7.28	53%
2005	7.04	2.59	2.69	37%
2006	9.61	3.43	3.72	36%
2007	10.05	4.75	4.56	47%
2008	10.71	3.49	3.79	33%
2009	8.70	3.13	3.23	36%
2010	11.15	5.15	5.97	46%
2011	6.47	3.06	3.67	47%
2012	8.83	3.67	4.17	42%
2013	10.02	4.98	5.37	50%
2014	8.99	4.13	4.43	46%
2015	8.39	4.05	4.41	48%
2016	12.10	3.84	4.26	32%
2017	14.53	5.50	5.42	38%

Table 11: Estimated percent of scup (in numbers of fish) caught by recreational fishermen in state and federal waters, Maine - North Carolina, 2008 - 2017.⁶

Year	State waters	Federal waters
2008	96.7%	3.3%
2009	97.8%	2.2%
2010	95.9%	4.1%
2011	97.8%	2.2%
2012	99.6%	0.4%
2013	96.0%	4.0%
2014	95.4%	4.6%
2015	97.9%	2.1%
2016	93.3%	6.7%
2017	95.4%	4.6%
2008-2017 average	96.6%	3.4%
2015-2017 average	95.5%	4.5%

Table 12: Recreational scup harvest by state in 2016 and 2017. Percentages were calculated based on numbers of fish.⁶

State	2016	2017
Maine	0.0%	0.0%
New Hampshire	0.00%	0.02%
Massachusetts	22.58%	23.64%
Rhode Island	15.04%	9.04%
Connecticut	21.46%	18.82%
New York	32.70%	33.56%
New Jersey	7.71%	14.91%
Delaware	0.0%	0.0%
Maryland	0.0%	0.0%
Virginia	0.50%	0.00%
North Carolina	0.00%	0.01%
Total	100.0%	100.0%

Table 13: Scup harvest by recreational fishing mode, Maine - North Carolina, 1981 - 2017, based on numbers of fish. Some percentages do not sum to 100% due to rounding.⁶

Year	Shore	Party/charter	Private/rental	Total
1981	9%	12%	80%	9,083,708
1982	13%	22%	65%	6,454,108
1983	25%	34%	41%	8,836,563
1984	21%	4%	75%	6,057,310
1985	10%	3%	87%	10,810,048
1986	8%	13%	79%	24,823,042
1987	5%	6%	89%	9,915,988
1988	12%	19%	70%	6,062,309
1989	10%	11%	79%	9,176,431
1990	5%	16%	78%	8,042,990
1991	12%	17%	71%	13,279,092
1992	13%	13%	74%	7,764,179
1993	5%	31%	64%	5,663,018
1994	5%	22%	73%	4,270,240
1995	9%	35%	56%	2,419,031
1996	4%	15%	81%	2,972,207
1997	7%	24%	69%	1,916,434
1998	10%	14%	77%	1,211,136
1999	6%	25%	69%	3,250,650
2000	8%	16%	77%	7,243,949
2001	15%	15%	70%	5,098,820
2002	14%	36%	50%	3,646,840
2003	9%	14%	77%	9,452,312
2004	11%	21%	68%	7,153,535
2005	15%	6%	78%	2,589,430
2006	9%	18%	73%	3,434,137
2007	7%	11%	82%	4,747,826
2008	11%	25%	64%	3,486,942
2009	7%	36%	57%	3,134,057
2010	7%	25%	68%	5,148,269
2011	10%	15%	75%	3,056,212
2012	7%	31%	61%	3,668,490
2013	18%	33%	48%	4,984,345
2014	12%	24%	64%	4,125,316
2015	12%	17%	71%	4,048,113
2016	19%	22%	59%	3,838,524
2017	12%	29%	60%	5,500,291
2015-2017 average	14%	22%	63%	4,462,309

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- ⁹ Unpublished NMFS Vessel Trip Report data.
- ¹⁰ Unpublished NMFS permit data.

Scup Data Update for 2018

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

Fishery and Survey Data

Reported 2017 landings in the commercial fishery were 7,007 mt = 15.448 million lbs, about 84% of the commercial quota (8,337 mt = 18.380 million lbs). Estimated 2017 landings in the recreational fishery were 2,462 mt = 5.428 million lbs, about 99% of the recreational harvest limit (2,495 mt = 5.501 million lbs). Total commercial and recreational landings in 2017 were 9,469 mt = 20.876 million lbs. Commercial fishery discards have been increasing since 2014, increased by 71% from 2016 to 2017, and were estimated at 4,727 mt (10.421 million lbs) in 2017, the highest since 1981. Most of the commercially discarded scup in 2017 were 16-18 cm age 2 fish from the large 2015 year class. Recreational discards were estimated at 407 mt = 0.897 million lbs in 2017. Total estimated commercial and recreational discards in 2017 were 5,134 mt = 11.313 million lbs. The total catch in 2017 was 14,603 mt = 32.194 million lbs, the highest since 1991, and about 13% above the 2017 ABC = 12,881 mt = 28.398 million lbs (Table 1, Figure 1).

The NEFSC fall 2015 and spring 2016 survey biomass indices were record highs for the time series, although both seasonal indices then decreased (Figures 2-4). The NEFSC 2017 fall survey did not sample the scup assessment strata, and so no 2017 fall index is available. The MADMF spring and fall 2017, RIDFW spring and fall 2016, URIGSO 2015-2017, CTDEP spring 2016-2017, NYDEC 2016-2017, and NEAMAP spring 2016 indices were also at or near record highs. NJDFW indices decreased during 2013-2017 (Figures 5-12). Some of the indices of recruitment (RIDFW, NYDEC, NEFSC; age 0 fish) indicate the recruitment of a large year class in 2015 (Figure 13). Measures of mean size, size-structure, and exploitation ratio (total fishery catch/survey biomass index) from the NEFSC trawl surveys are presented in Figures 14-19.

Table 1. Total catch (metric tons) of scup from Maine through North Carolina. Landings include revised Massachusetts landings for 1986-1997. Commercial discards for 1981-1988 calculated as the geometric mean ratio of discards to landings numbers at age for 1989-1993. Commercial discard estimate for 1998 is the mean of 1997 and 1999 estimates. Recreational catch from MRIP (2004-2017 and MRFSS (1981-2003; adjusted by MRFSS to MRIP 2004-2011 ratio).

Year	Commercial Landings	Commercial Discards	Recreational Landings	Recreational Discards	Total Catch
1981	9,856	4,495	3,116	59	17,526
1982	8,704	3,970	2,791	53	15,518
1983	7,794	3,555	3,353	63	14,765
1984	7,769	3,543	1,296	33	12,641
1985	6,727	3,068	3,268	60	13,123
1986	7,176	3,273	6,223	97	16,769
1987	6,276	2,862	3,323	42	12,504
1988	5,943	2,710	2,289	35	10,977
1989	3,984	1,277	2,980	43	8,285
1990	4,571	2,466	2,220	42	9,299
1991	7,081	3,388	4,336	87	14,892
1992	6,259	1,885	2,366	52	10,562
1993	4,726	1,510	1,714	31	7,981
1994	4,392	962	1,409	41	6,804
1995	3,073	974	720	14	4,781
1996	2,945	870	1,156	22	4,993
1997	2,188	675	642	9	3,514
1998	1,896	705	469	16	3,086
1999	1,505	735	1,012	7	3,259
2000	1,207	592	2,919	61	4,779
2001	1,729	1,671	2,285	184	5,869
2002	3,173	1,284	1,944	152	6,553
2003	4,405	436	4,549	176	9,566
2004	4,209	1,324	3,278	182	8,993
2005	3,711	565	1,215	270	5,761
2006	4,081	896	1,681	426	7,084
2007	4,193	1,363	2,085	346	7,987
2008	2,370	1,693	1,713	287	6,062
2009	3,721	3,189	1,462	211	8,583
2010	4,866	2,638	2,715	318	10,537
2011	6,819	1,234	1,632	173	9,858
2012	6,751	1,029	1,842	231	9,853
2013	8,105	1,279	2,464	224	12,072
2014	7,239	1,004	2,124	229	10,596
2015	7,725	1,774	2,295	226	12,020
2016	7,147	2,772	1,932	354	12,205
2017	7,007	4,727	2,462	407	14,603

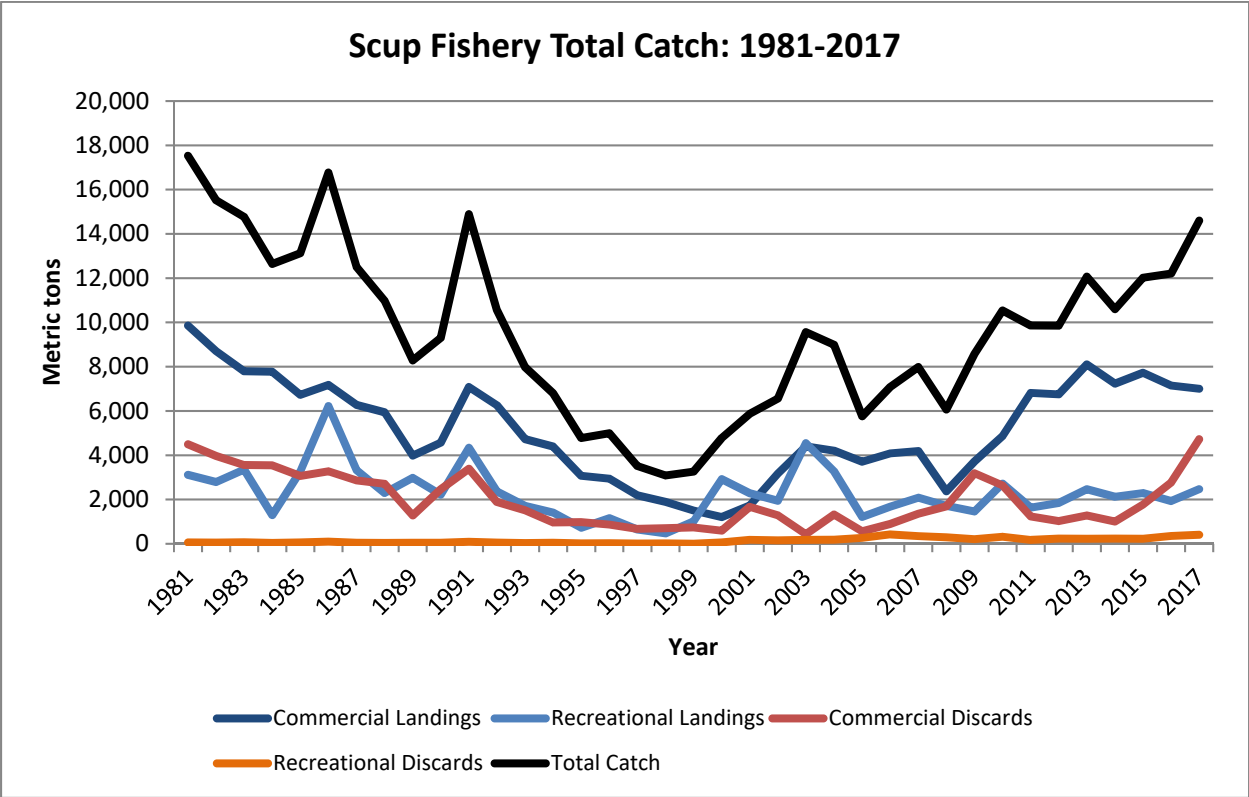


Figure 1. Scup fishery total catch.

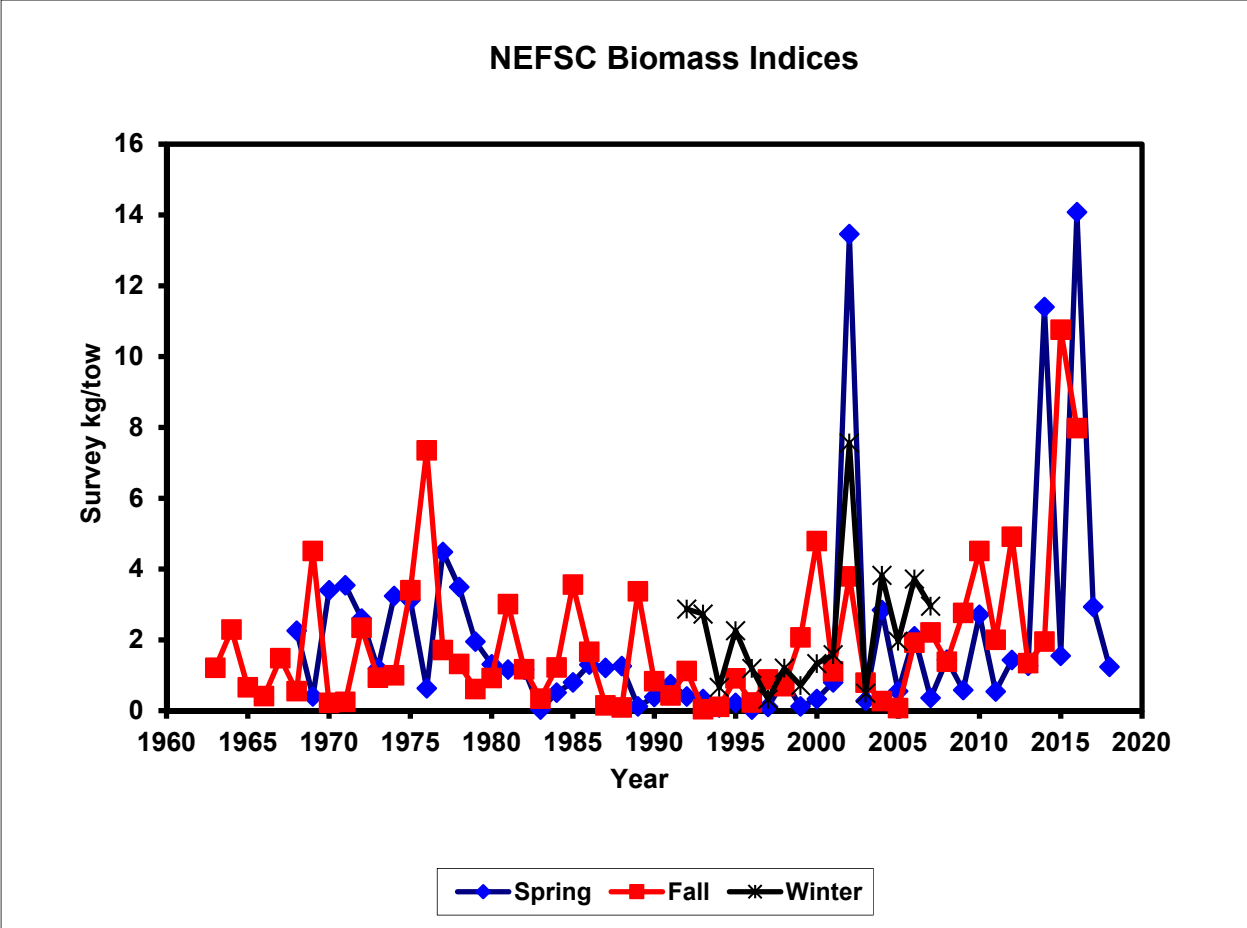


Figure 2. NEFSC trawl survey biomass indices for scup.

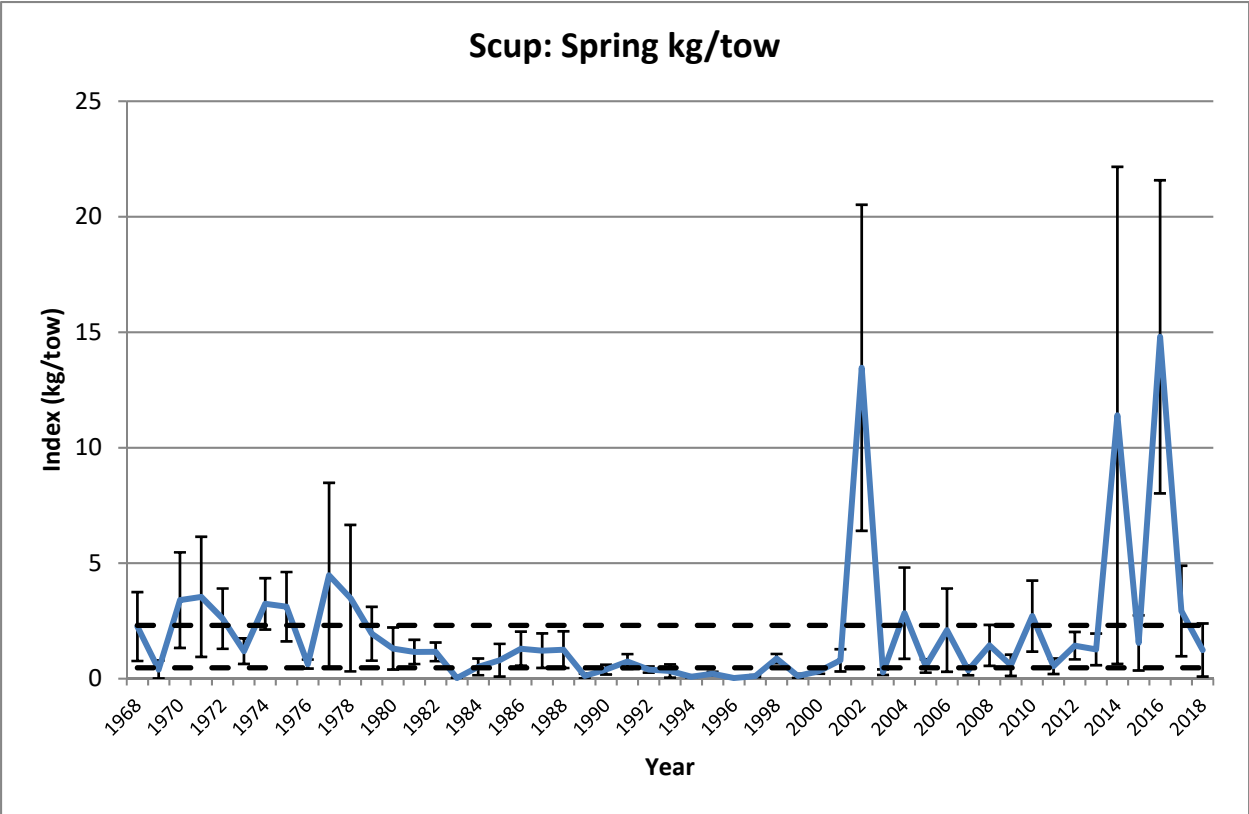


Figure 3. NEFSC spring trawl survey biomass indices for scup. Whiskers around each annual index represent +/- one standard deviation. Dashed lines represent 65% confidence intervals around the 2004-2011 mean, a period when the stock was estimated to be at or above SSBMSY and not experiencing overfishing.

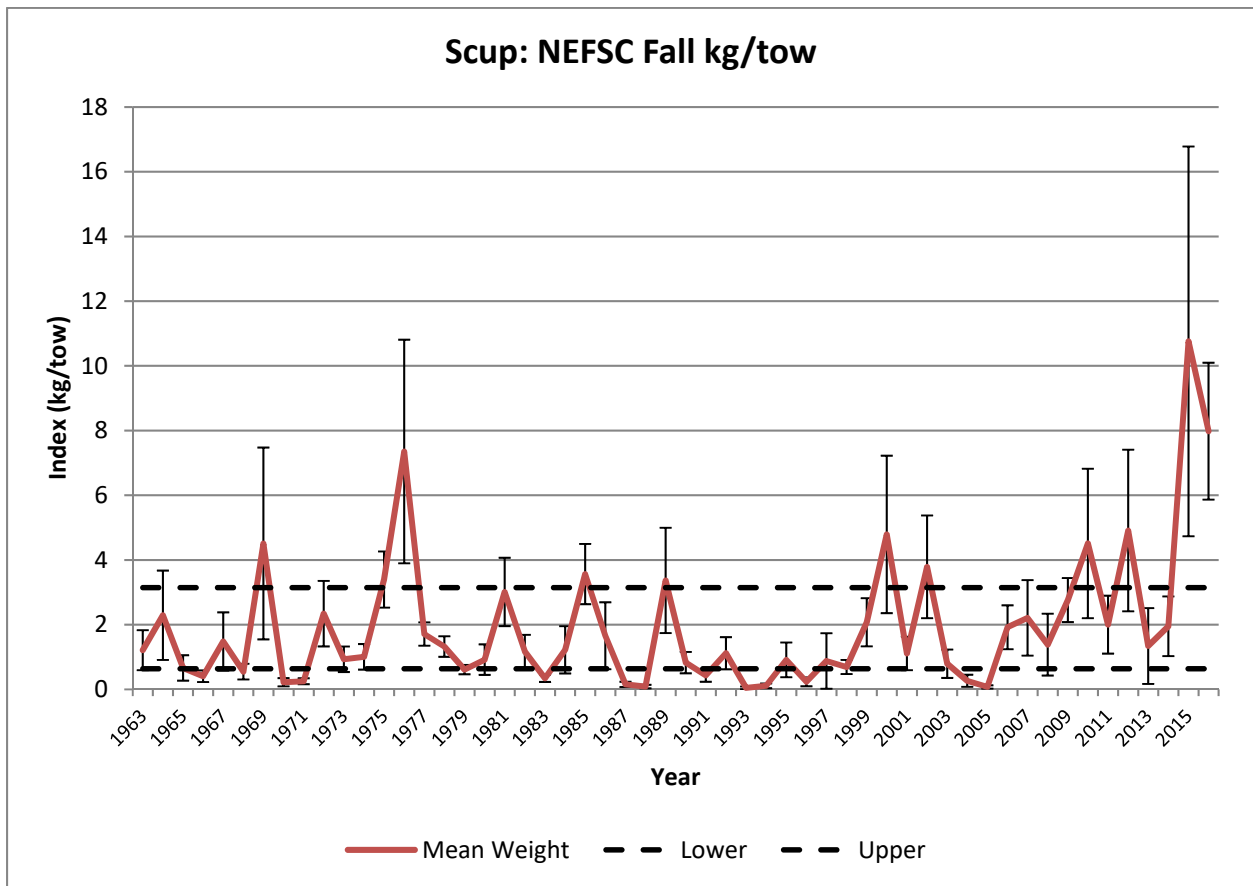


Figure 4. NEFSC fall trawl survey biomass indices for scup. Whiskers around each annual index represent +/- one standard deviation. Dashed lines represent 65% confidence intervals around the 2004-2011 mean, a period when the stock was estimated to be at or above SSBMSY and not experiencing overfishing.

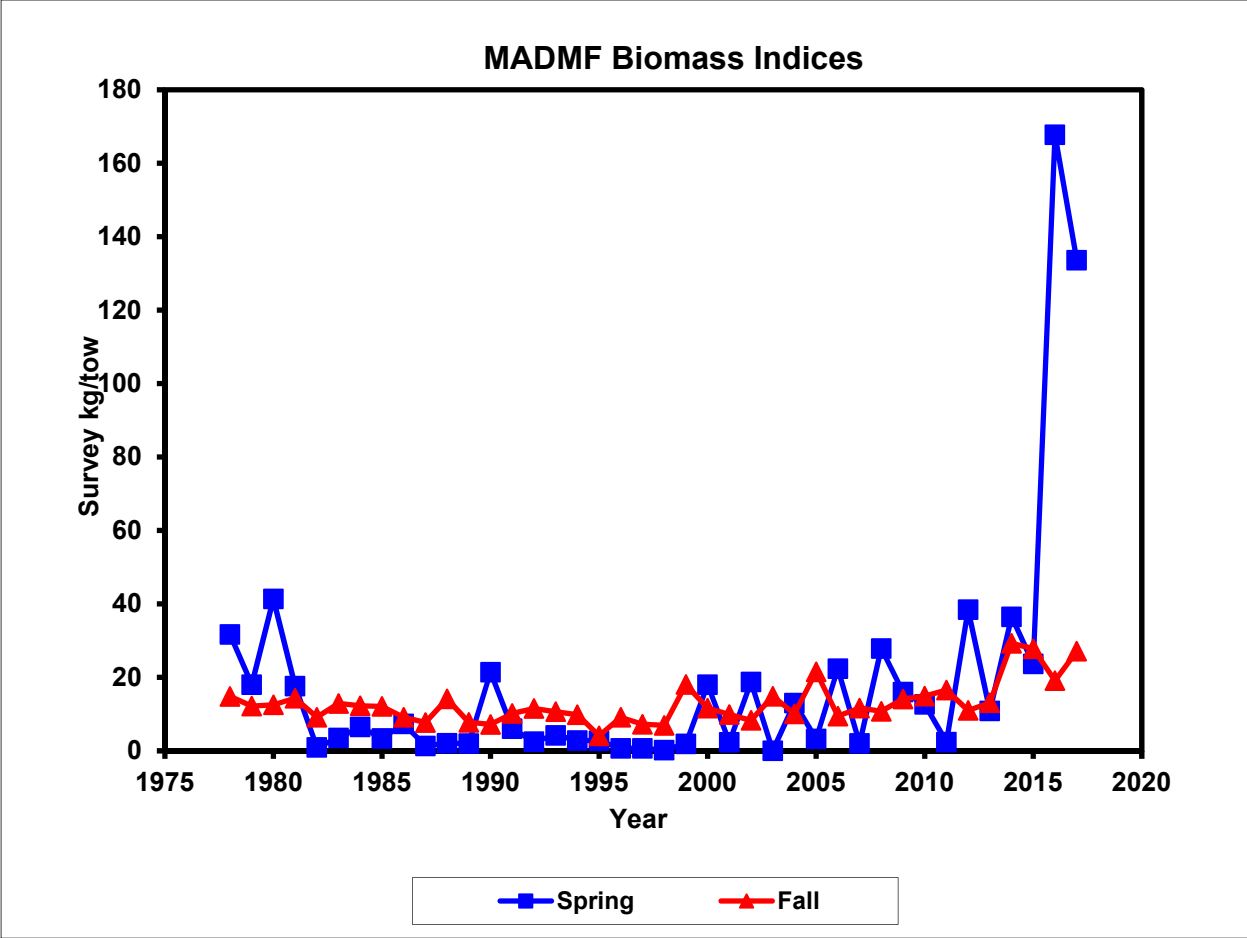


Figure 5. MADMF trawl survey indices for scup.

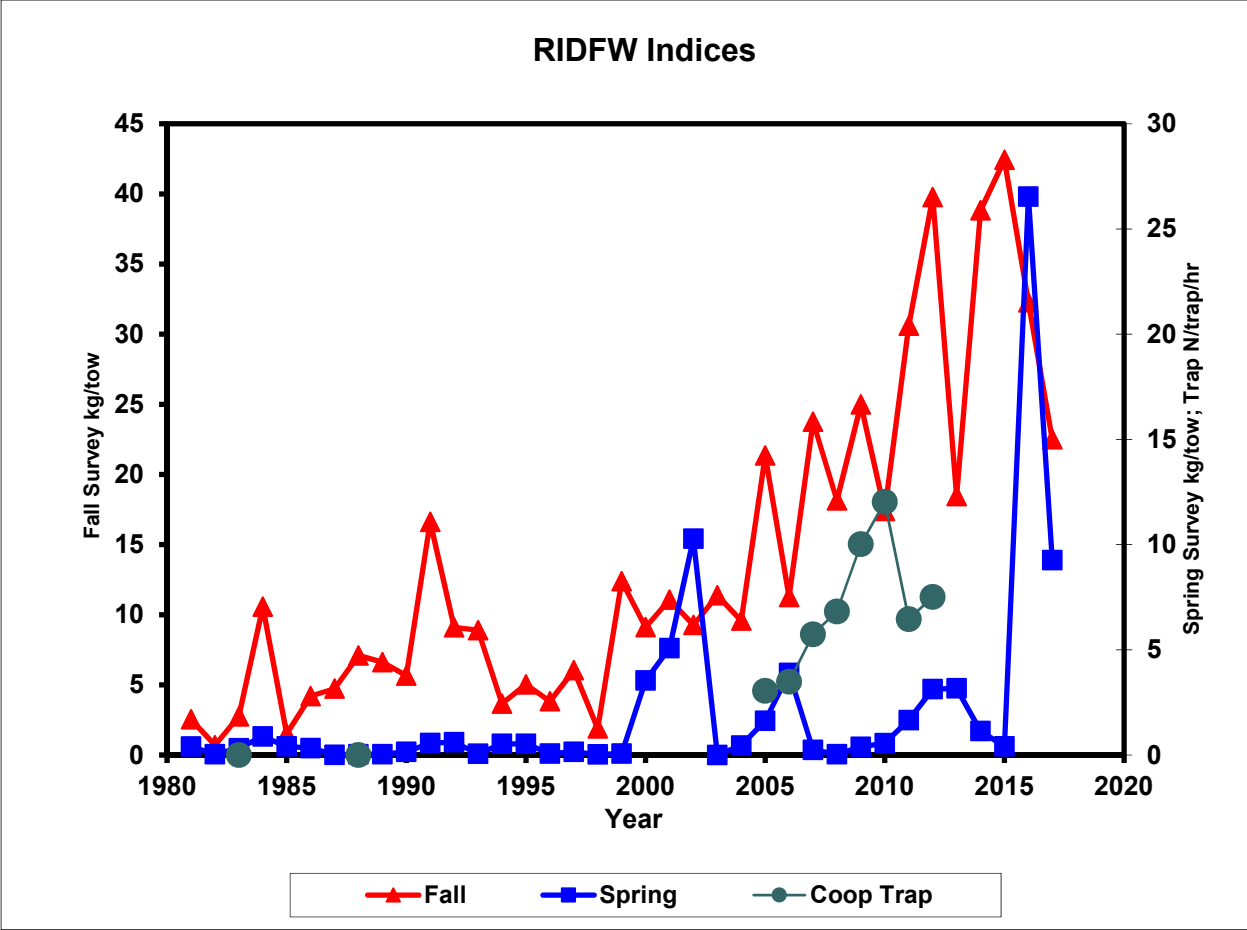


Figure 6. RIDFW trawl and trap survey indices for scup. The Cooperative trap survey ended in 2012.

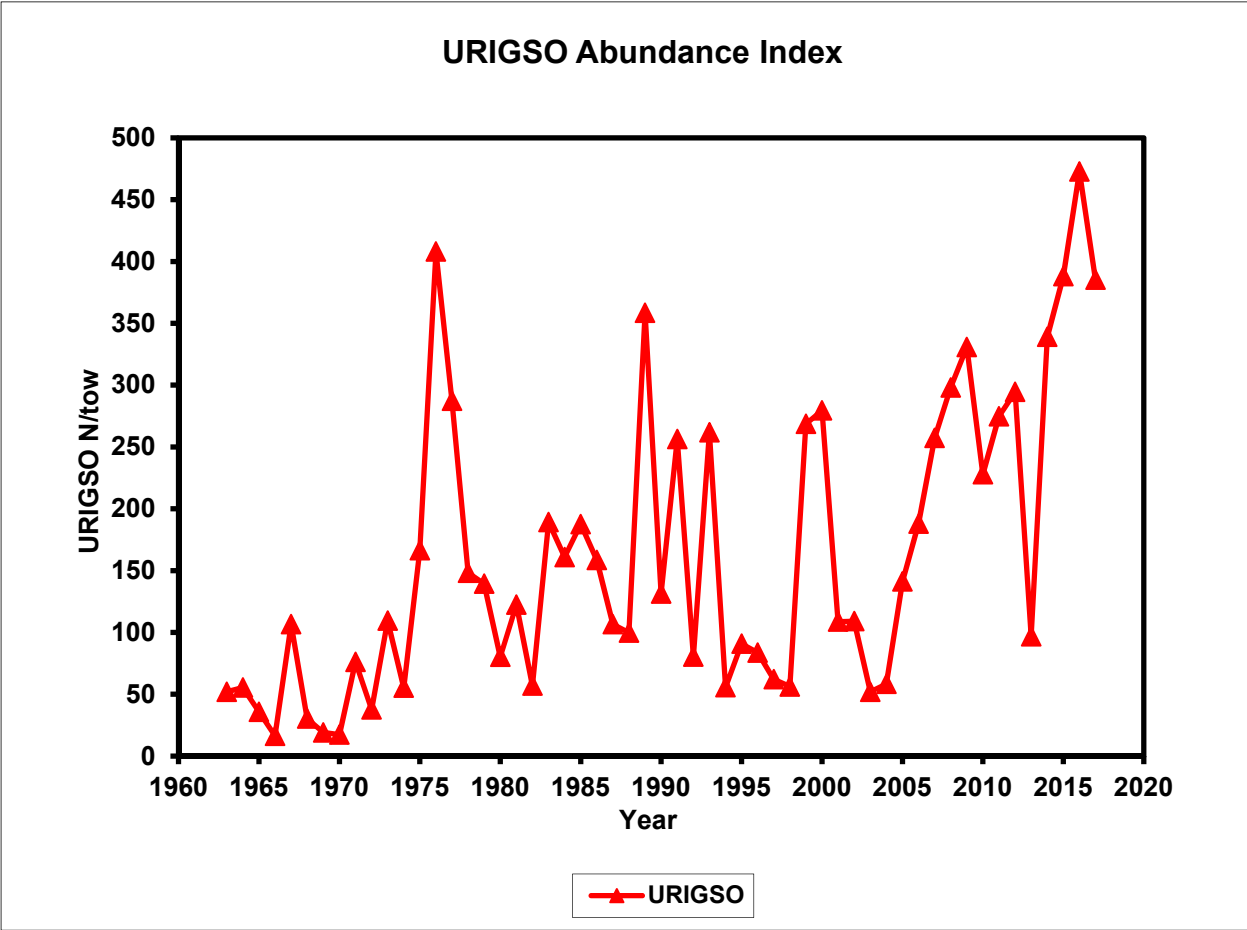


Figure 7. URIGSO trawl survey indices for scup.

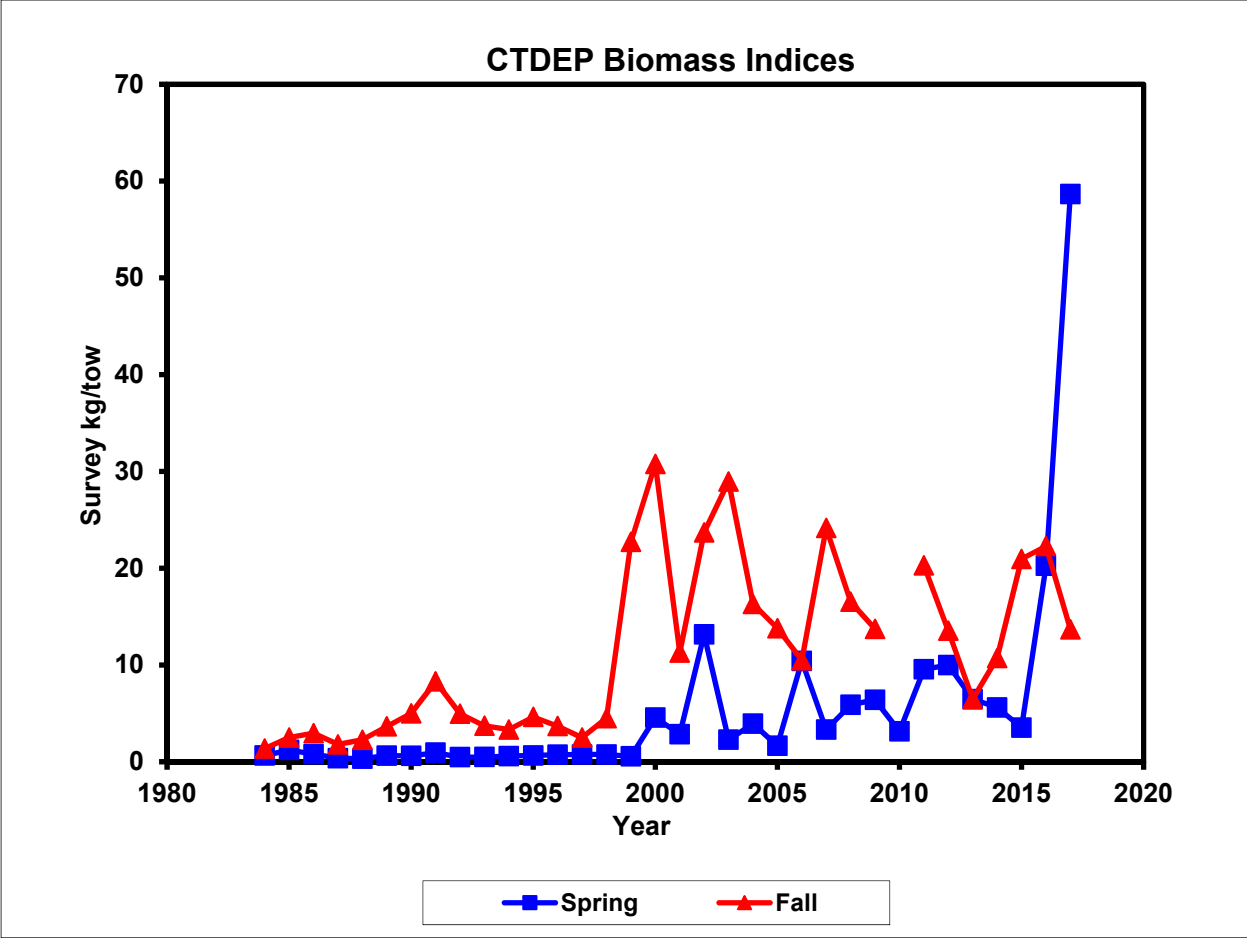


Figure 8. CTDEP trawl survey indices for scup.

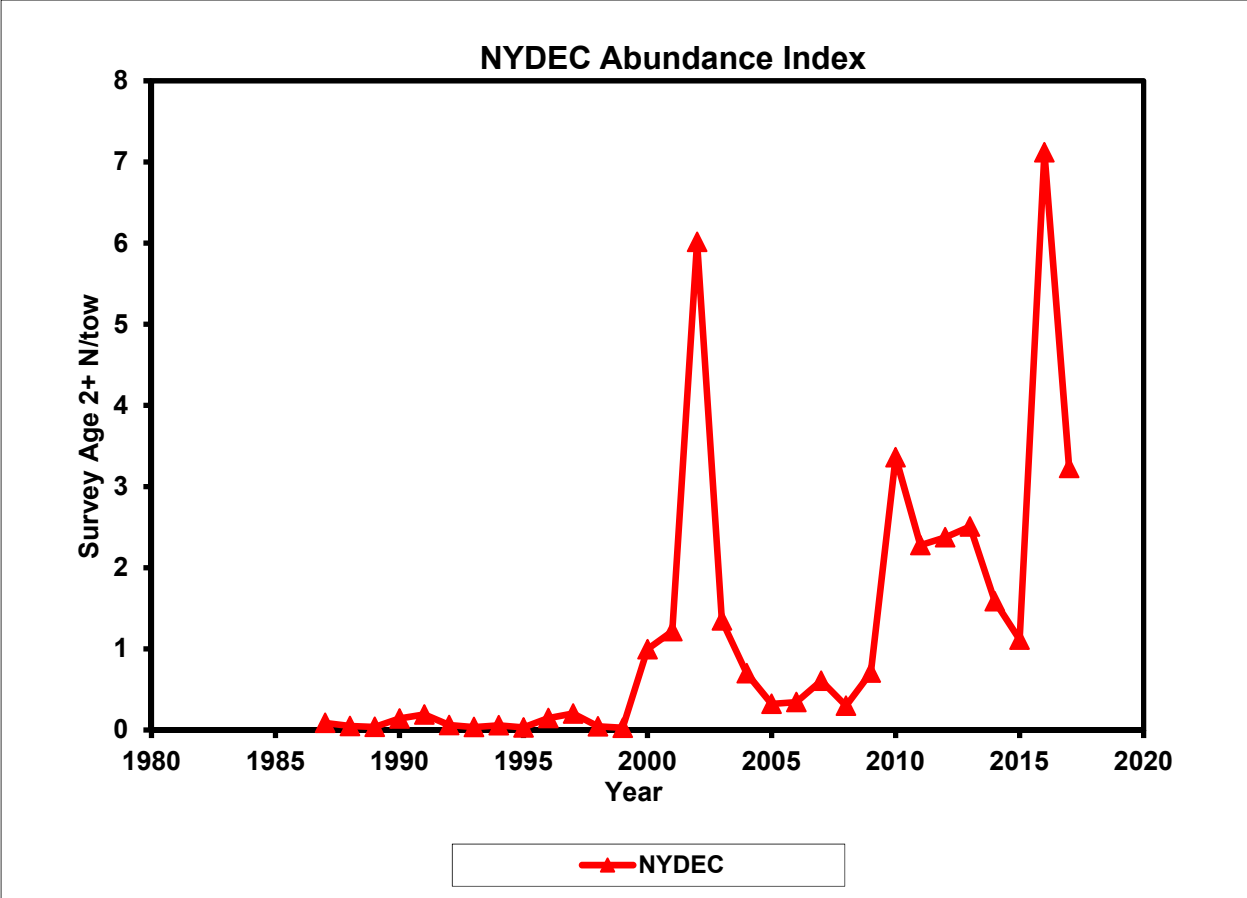


Figure 9. NYDEC trawl survey indices for scup.

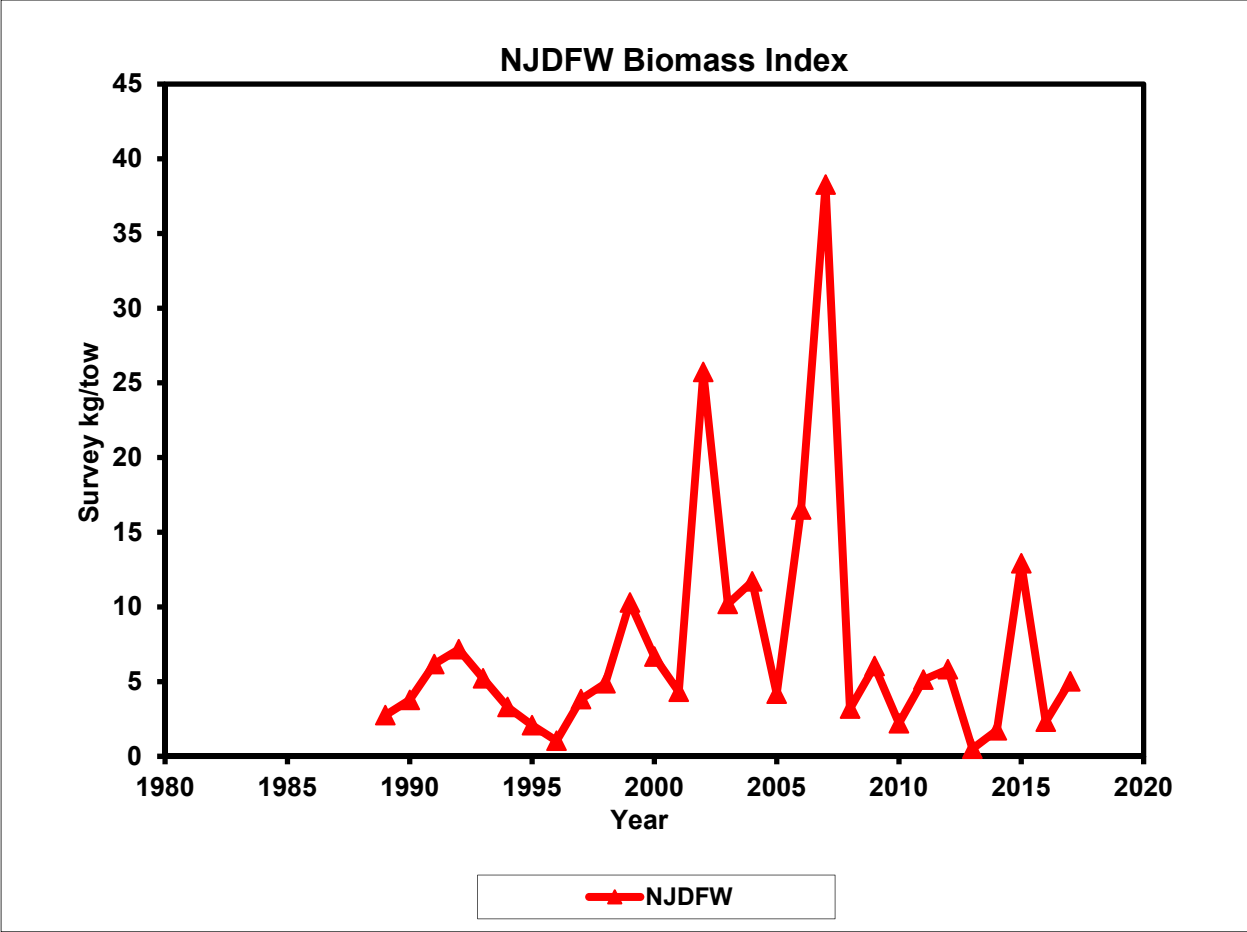


Figure 10. NJDMF trawl survey indices for scup.

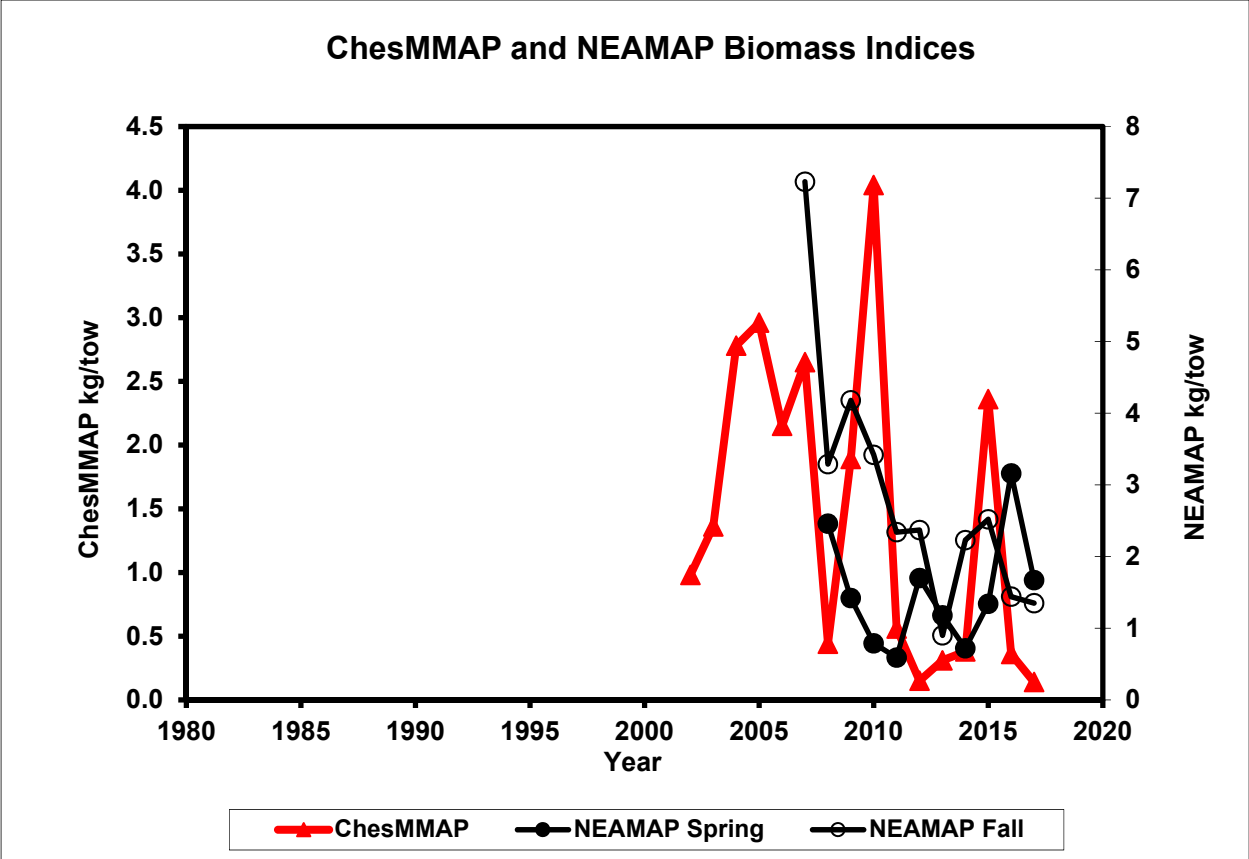


Figure 11. VIMS (ChesMMAP and NEAMAP) trawl survey indices for scup.

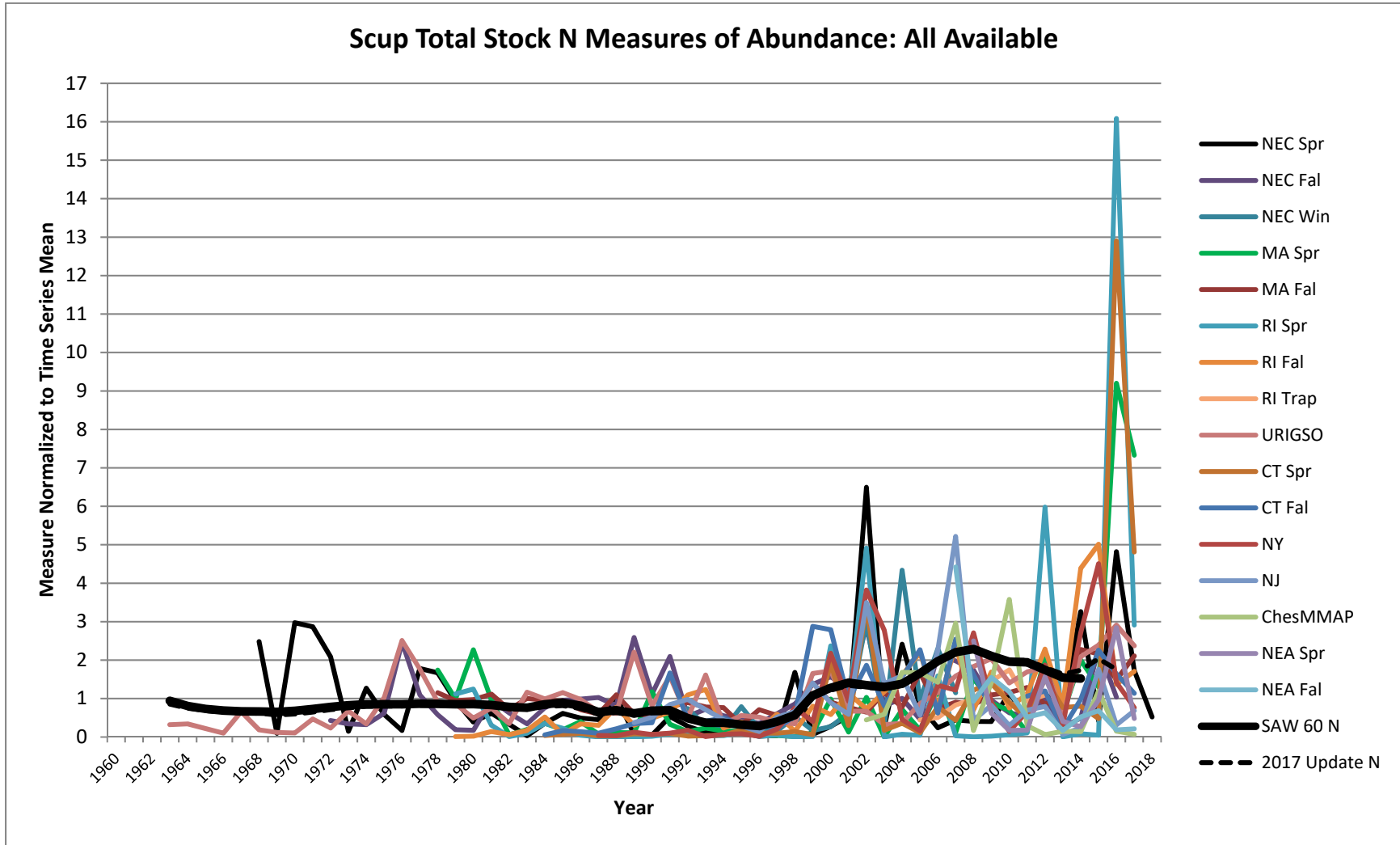


Figure 12. Measures of scup aggregate numeric abundance. Indices normalized to time series means.

Scup Age 0 Measures of Abundance

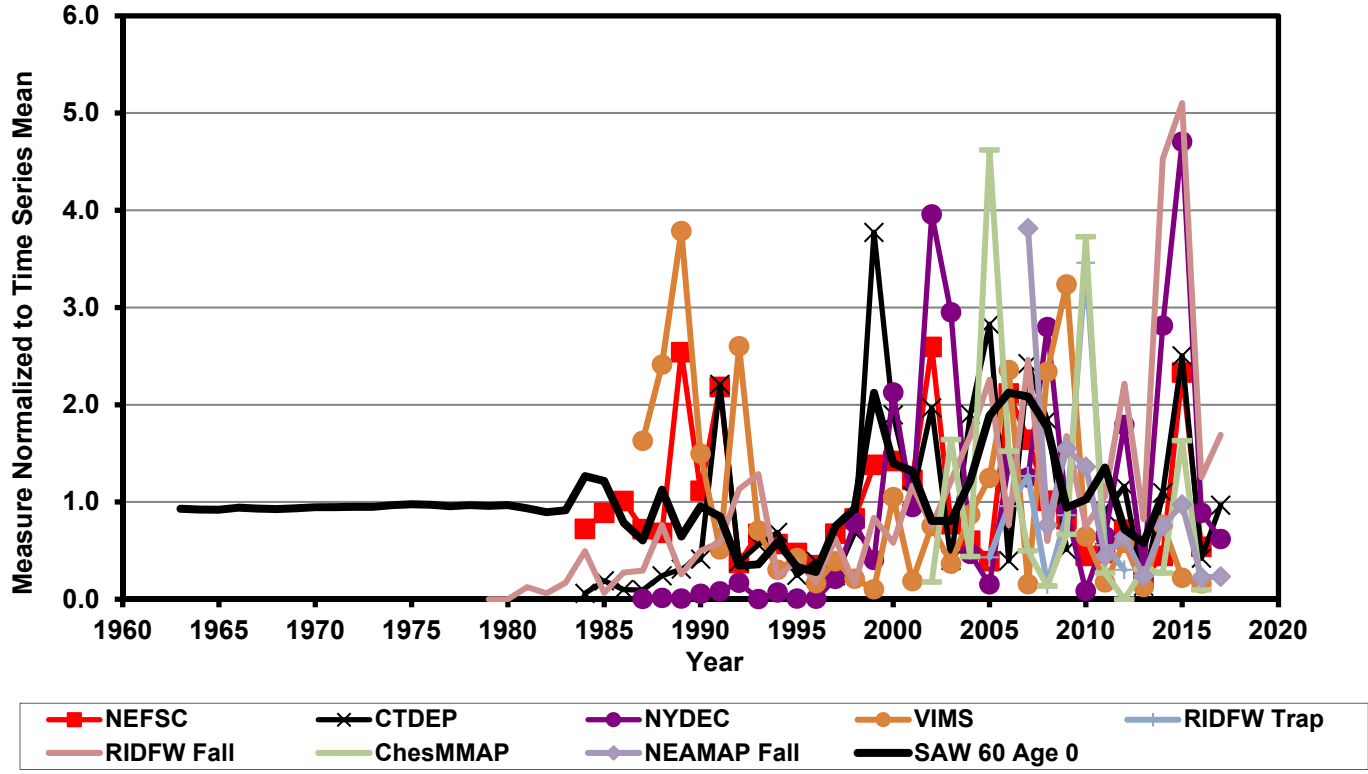


Figure 13. Measures of scup age 0 abundance. Indices normalized to time series means.

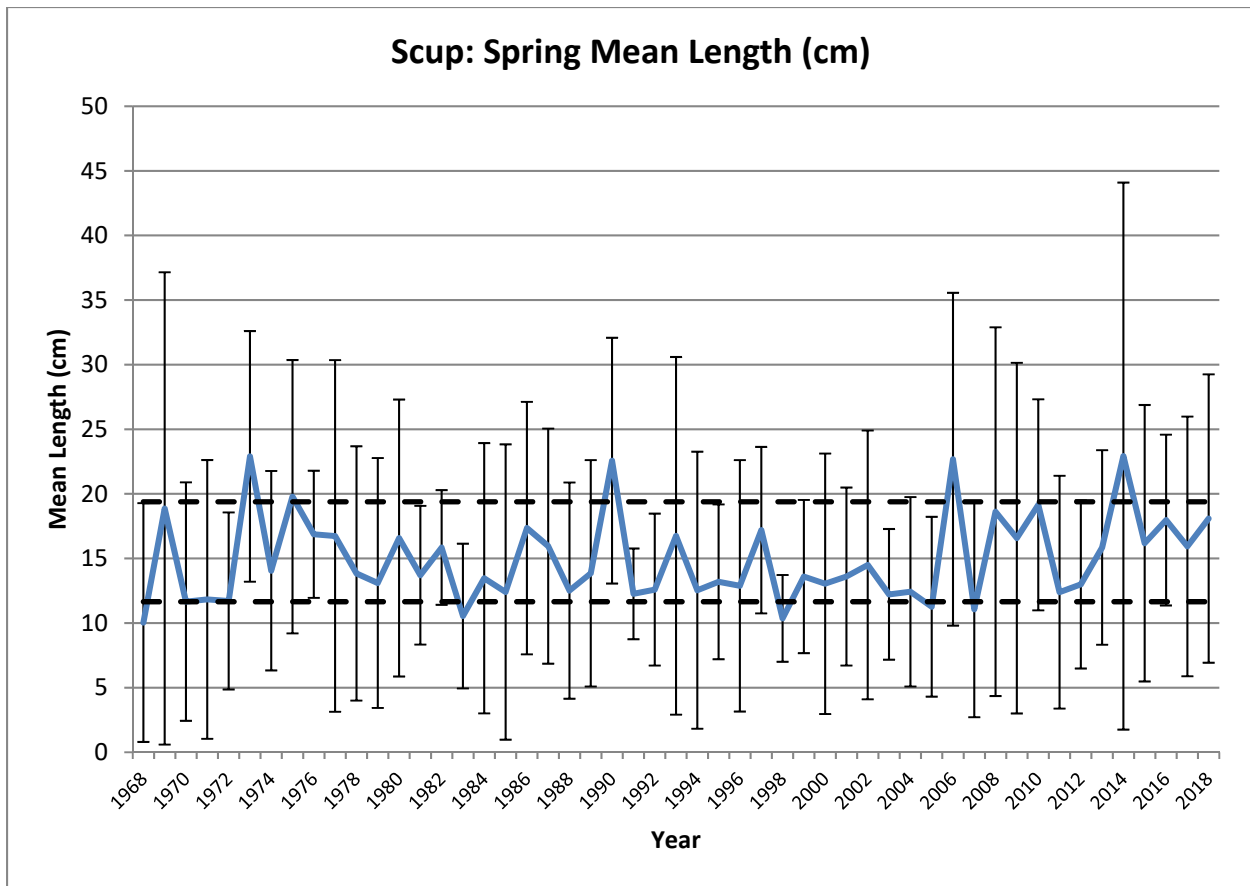


Figure 14. Trend in mean length of the NEFSC Spring survey catch. Whiskers around each annual index represent +/- one standard deviation. Dashed lines represent 65% confidence intervals around the 2004-2011 mean, a period when the stock was estimated to be at or above SSBMSY and not experiencing overfishing.

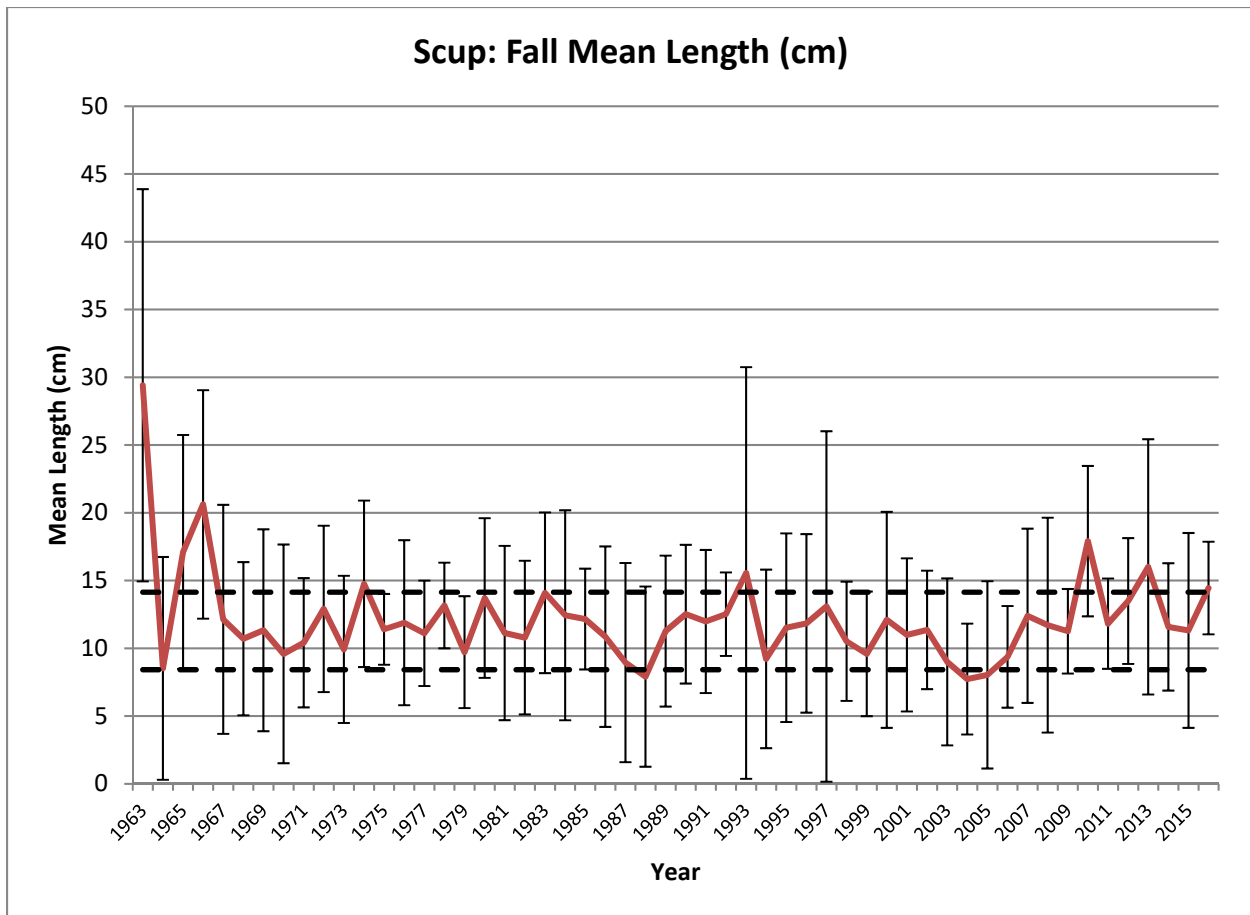


Figure 15. Trend in mean length of the NEFSC Fall survey catch. Whiskers around each annual index represent +/- one standard deviation. Dashed lines represent 65% confidence intervals around the 2004-2011 mean, a period when the stock was estimated to be at or above SSBMSY and not experiencing overfishing.

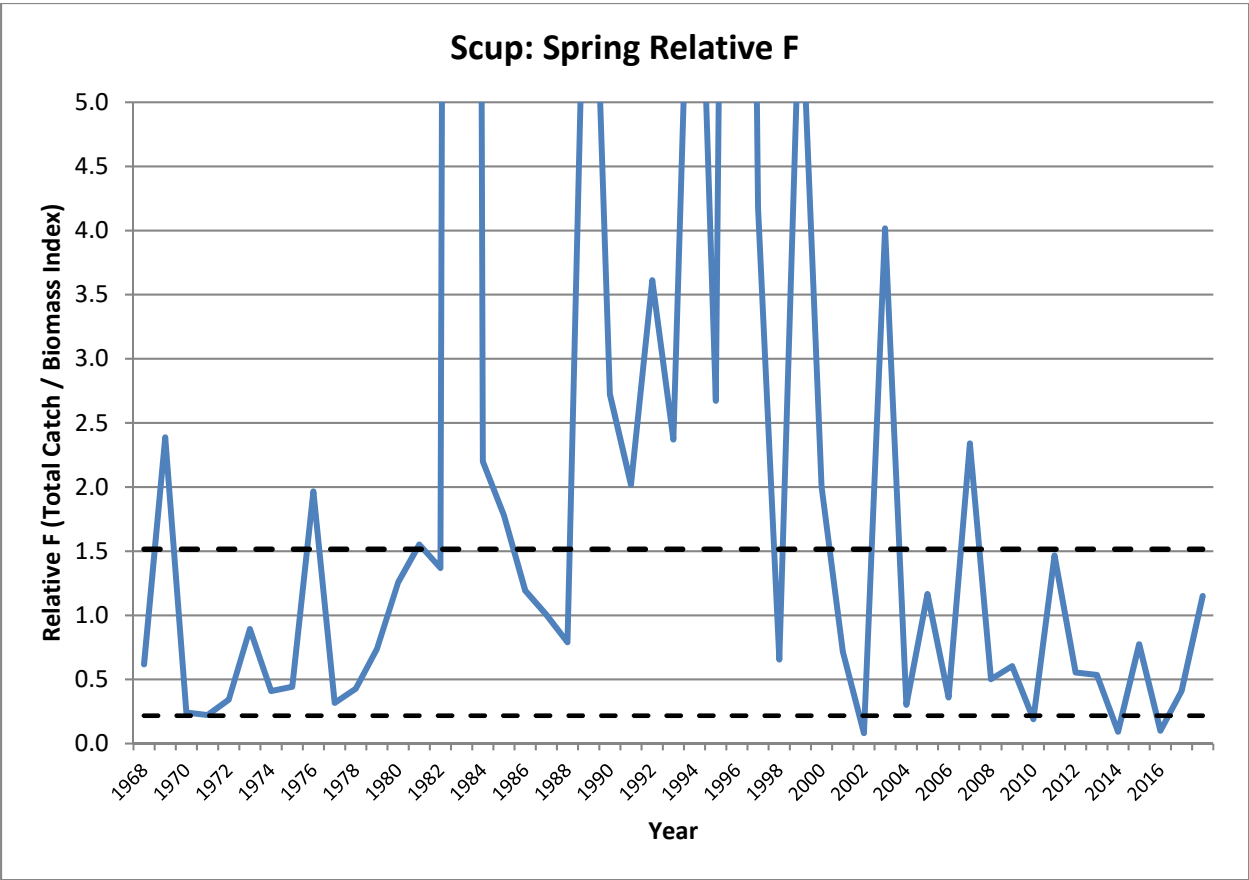


Figure 18. Trend in exploitation ratio based on total fishery catch and the NEFSC Spring survey biomass index Whiskers around each annual index represent +/- one standard deviation. Dashed lines represent 65% confidence intervals around the 2004-2011 mean, a period when the stock was estimated to be at or above SSBMSY and not experiencing overfishing.

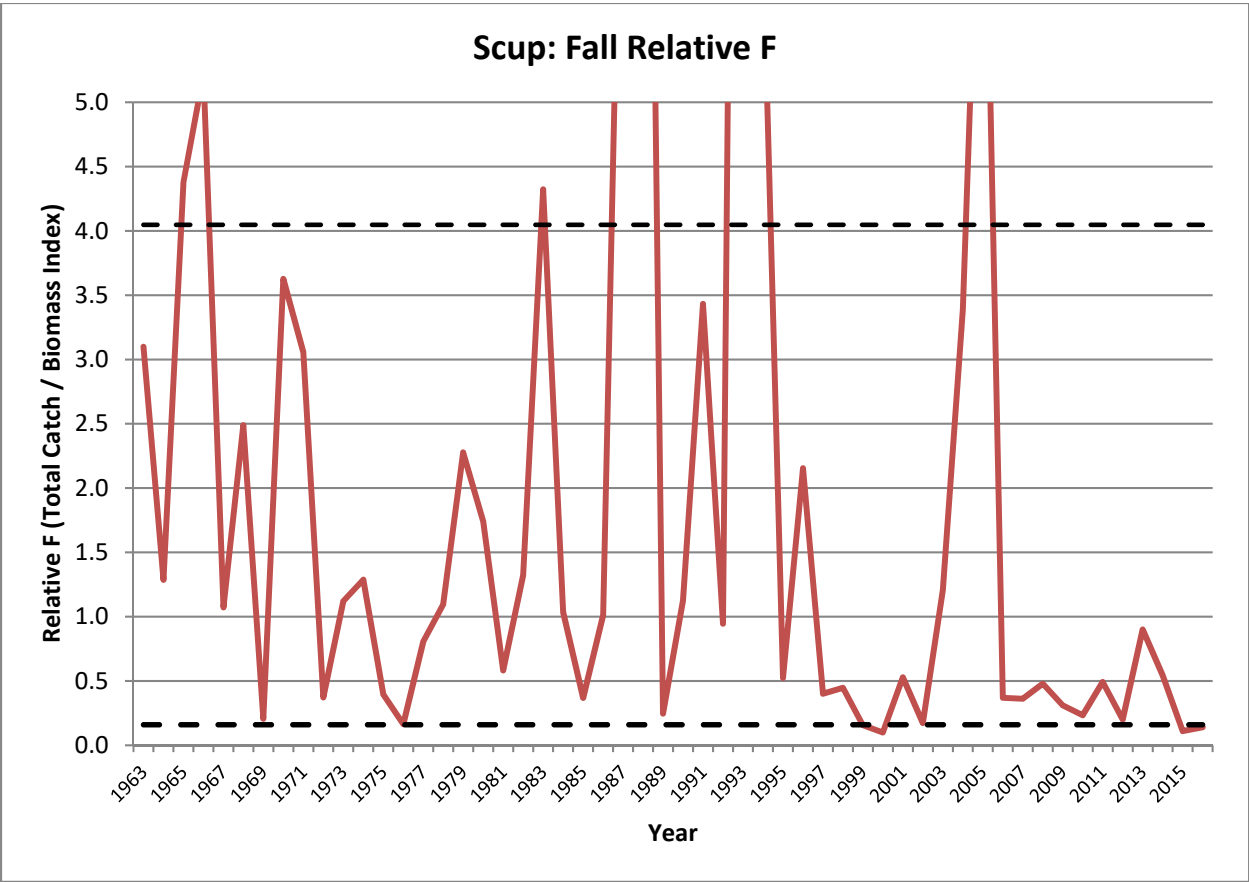


Figure 19. Trend in exploitation ratio based on total fishery catch and the NEFSC Fall survey biomass index. Whiskers around each annual index represent +/- one standard deviation. Dashed lines represent 65% confidence intervals around the 2004-2011 mean, a period when the stock was estimated to be at or above SSBMSY and not experiencing overfishing.