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Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman
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MEMORANDUM

Date: July 26, 2023

To: Council and Board

From: Hannah Hart, Staff

Subject: 2023 Commercial Scup Discards Report and Gear Restricted Area Analysis

On Tuesday, August 8, the Council and Board will discuss the commercial scup discard report and Gear Restricted Area (GRA) analysis and consider recommended next steps for continuing to minimize scup discards to the extent practicable. Materials listed below are provided for the Council and Board's consideration of this agenda item.

1) 2023 Draft Commercial Scup Discards Report and Gear Restricted Area (GRA) Analysis

To be posted separately once available:

1) Summer Flounder, Scup, and Black Sea Bass Monitoring Committee meeting summary from July 27, 2023

2023 Draft Commercial Scup Discards Report and Gear Restricted Area (GRA) Analysis

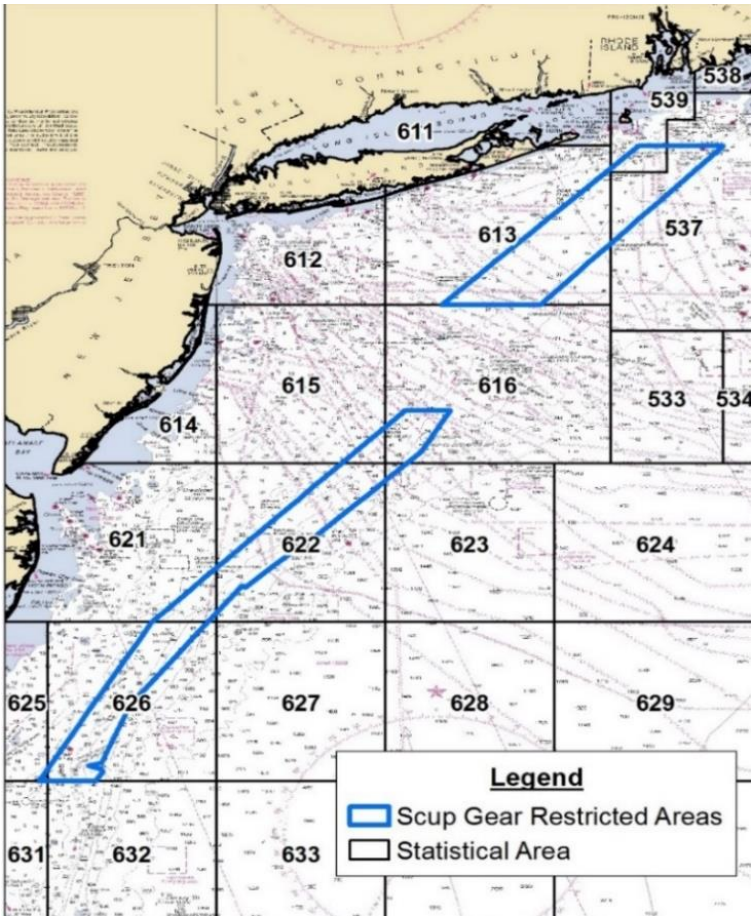


Figure 1: Scup GRAs (Northern and Southern) and NMFS statistical areas

Purpose

This document addresses the Council's *2023 Proposed Actions and Deliverables* item "*Evaluate commercial scup discards and gear restricted areas*." Specifically, it **A)** describes scup discard estimation, the history of the GRAs, and scup stock status, **B)** describes commercial scup trawl discards (per the methodologies used in the 2023 management track stock assessment) **C)** conducts a temporal and spatial analysis based on raw data from the NMFS Trawl Surveys and Northeast Fisheries Observer Program, and **D)** summarizes key findings with potential next steps for continuing to minimize scup discards to the extent practicable per National Standard 9 requirements.

A) Scup Discard Estimation, GRA History, and Scup Stock Status

Discard Estimation

Scup trawl discards were estimated in the assessment with strata (i.e., groups) of calendar quarter, statistical area, and three mesh categories: large (5" or greater), small (smaller than 5" but larger than 2.125"), and squid (2.125" or less) for the years prior to 2020, There was relatively low small-mesh coverage prior to 2004 and therefore sub-annual estimates before then are uncertain.[1] Starting in 2020, commercial trawl discard rates are estimated in the assessment with gear, statistical area, and year strata in the Catch Accounting and Monitoring System (CAMS). Strata discard rates are calculated for the year and then those annual rates are applied to landings from individual trips from matching strata. CAMS uses less than 4" for small mesh trawl gear and 4" or greater for large mesh. It is not anticipated that overall trends in discard estimates are affected by the 2020 switch in discard estimation methods, but the methodology change complicates finer scale analyses. For example, in the figures below discard estimates by gear use different mesh bins before and after 2020.

History

As part of scup rebuilding and after much discussion between the Council and NMFS throughout the development of Amendment 12 to the Summer Flounder, Scup, and Black Sea Bass FMP, NMFS implemented Northern and Southern Gear Restricted Areas (GRA) through the 2000 Scup Specifications.[2] The Northern GRA went into effect November 2000 and the Southern GRA in January 2001. Since the GRAs were initially implemented they have been reviewed (most recently 2019) and modified (most recently 2016/2017) several times. Currently, the Southern GRA is in effect from January 1 - March 15 and the Northern GRA is in effect from November 1 - December 31. The most recent change in the boundary of the Southern scup GRA became effective January 1, 2017 (Figure 1). All figures in this document illustrate the current GRAs. Vessels fishing in the GRAs during the affected times of year may not fish for, possess, or land longfin squid, black sea bass, or silver hake (whiting) unless they use diamond mesh of at least ***5 inches***.

In addition to the GRAs, there are incidental scup possession limits for trawl vessels using mesh smaller than 5 inches throughout the year. Some of the most recent change to these regulations included an increase to the incidental scup possession limit for trawl vessels using mesh smaller than 5 inches during November-April from 500 pounds to 1,000 pounds (effective January 1, 2016). This change was intended to reduce scup discards associated with the large increase in scup biomass. Additionally, effective January 1, 2019, the incidental scup possession limit from April 15-June 15 was further increased to 2,000 pounds to allow the spring small mesh inshore fisheries for longfin squid to retain, rather than discard, more of the scup they catch incidentally.

[1] Due to the high proportion of zero bycatch tows, earlier scup discard estimate coefficients of variation (C.V.s) may not reflect the underlying uncertainty (especially with lower coverage before 2004); the assessment has assigned higher C.V.s to more realistically reflect uncertainty (personal communication with Mark Tercerio). As with all estimates, actual discards were likely higher in some years and lower in some years.

[2] Fishers of the Northeastern United States; Summer Flounder, Scup, and Black Sea Bass Fisheries; 2000 Specifications, 5 Fed. Reg. 4547 (Jan. 28, 2000).

Stock Status

A 2023 management track assessment for scup was recently completed and successfully peer reviewed. This assessment retained the model structure of the 2015 benchmark stock assessment,[3] and incorporated fishery catch and fishery-independent survey data through 2022.

The updated fishing mortality (F) reference point is F_{MSY} proxy = $F_{40\%}$ = 0.190. The updated spawning stock biomass (SSB) target reference point is SSB_{MSY} proxy = $SSB_{40\%}$ = 173.27 million pounds (78,593 mt) and the overfished threshold (which is half of the target) = 86.64 million pounds (39,297 mt).

According to the 2023 assessment, the scup stock from Cape Hatteras, North Carolina extending north to the US-Canada border was not overfished and overfishing was not occurring in 2022.[4] Retrospective adjustments were statistically justified and increased the SSB estimate and decreased the F estimate. The retrospective trends were directionally similar in the previous (2021) management track assessment but had not been strong enough to warrant adjustments. From the 2023 management track assessment, adjusted SSB was estimated to be about 425 million pounds (193,087 mt, Figure 2 left vertical axis) in 2022, almost 2.5 times the SSB_{MSY} proxy reference point of 173.27 million pounds (78,593 mt, Figure 2). SSB shows a declining trend since 2018 and recruitment has been below the long-term average since 2017.

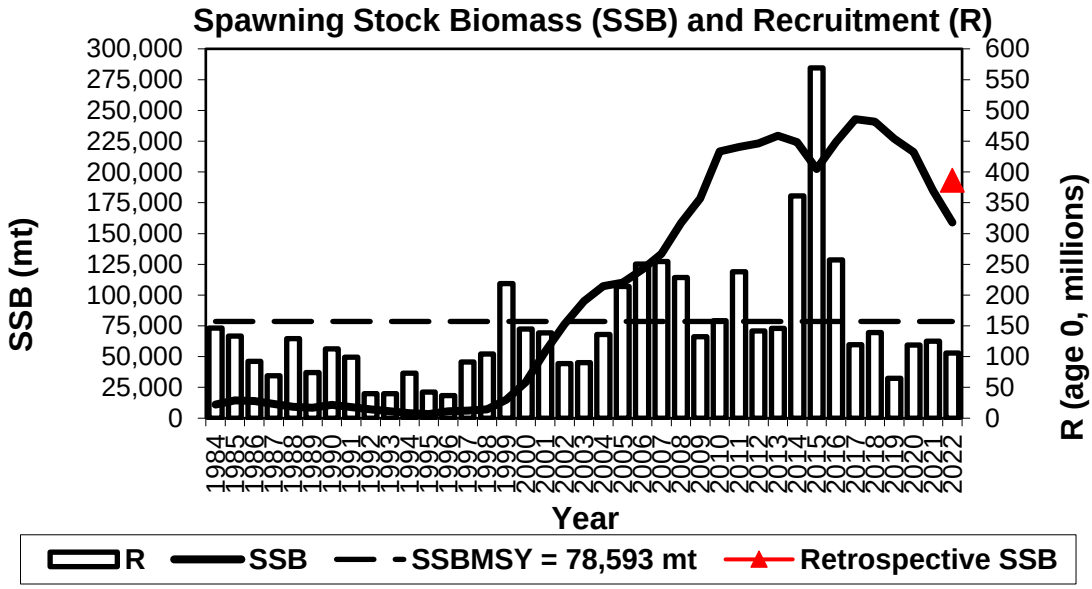


Figure 2: Scup spawning stock biomass and recruitment, 1984-2019. The horizontal dashed line represents the biomass target from the 2023 management track stock assessment. Adjusted SSB in 2022 for comparison against the SSBMSY proxy reference point is 193,087 mt.

[3] 60th Northeast Stock Assessment Workshop (2015) assessment report and peer review summaries are available at: https://repository.library.noaa.gov/view/noaa/4975

[4] Available at: https://apps-nefsc.fisheries.noaa.gov/saw/sasi.php

B) Discard Evaluation using Aggregated Management Track Assessment Discard Data

Commercial scup discards have decreased since 2017 but are relatively high compared to other years since GRA implementation in 2000/2001 (Figure 3).

Total estimated scup discards were 2,171 mt (4.8 million pounds) in 2022 and are mostly from trawl fisheries. Discard estimates from 2017 remain the record high in the time series at about 4,733 mt (10.4 million pounds). Average discards since 2001 when both GRAs were first in effect are about 1,917 mt (4.2 million pounds), just below 2022 estimated discards.

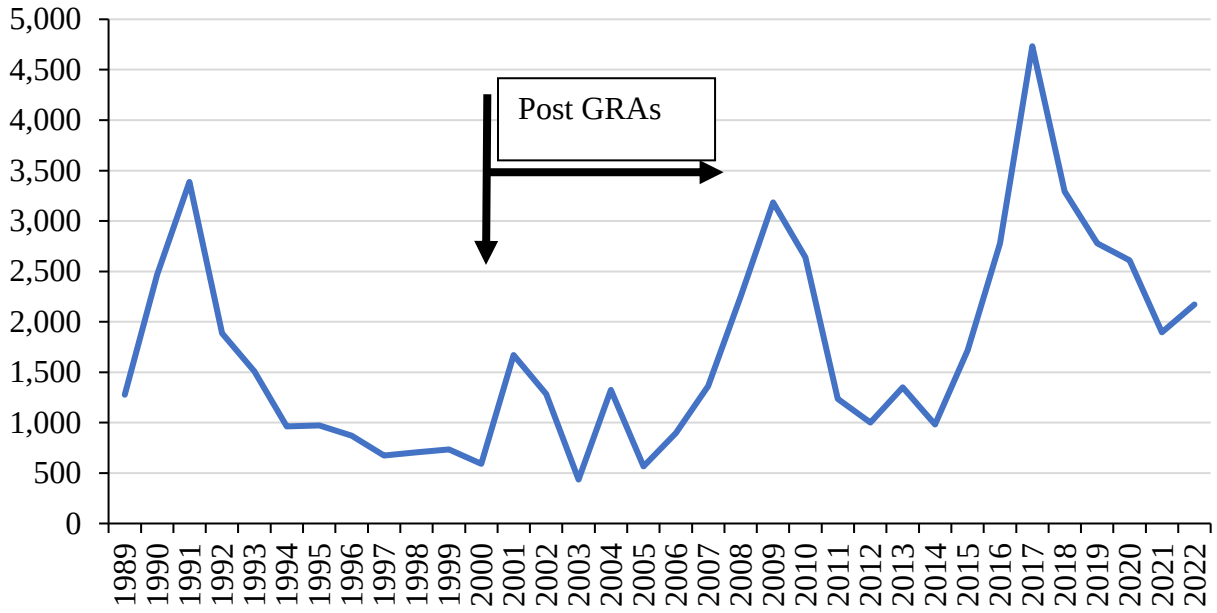


Figure 3: Estimated discards from all gear types from the 2023 management track assessment since 1989. Starting in 2020, commercial discards are estimated using CAMS.

Raw 2022 observer data indicate that about 59% of discarded scup were due to size regulation, 29% were due to no market (too small), 4% were due to vessels retaining only certain size for best price due to possession limit regulations, 3% due to no market, and 5% due to other reasons. Discard reasons were generally consistent in recent years (2020-2022).

Discards are variable by mesh size, month, quarter, and statistical area.

In 2022, CAMS-small mesh (less than 4") accounted for 55% of total estimated scup discards, CAMS-large mesh (4" or greater) accounted for 36%, and unknown mesh size accounted for 9% (Figure 4). These proportions of total scup discards by mesh size were relatively similar to 2021; however, in 2020 the proportion of total scup discards in small mesh was higher at about 71%. Given the change in mesh size categories, scup discards by mesh size from 2020-2022 cannot be directly compared to years prior to 2020; however, earlier scup discards by the different mesh size were also variable from year to year. In the more recent years, the smaller mesh sizes did account for a high proportion of total discards. On average, from 1989-2019, about 81% of total scup discards came from mesh sizes smaller than 5 inches (small and squid mesh categories combined).

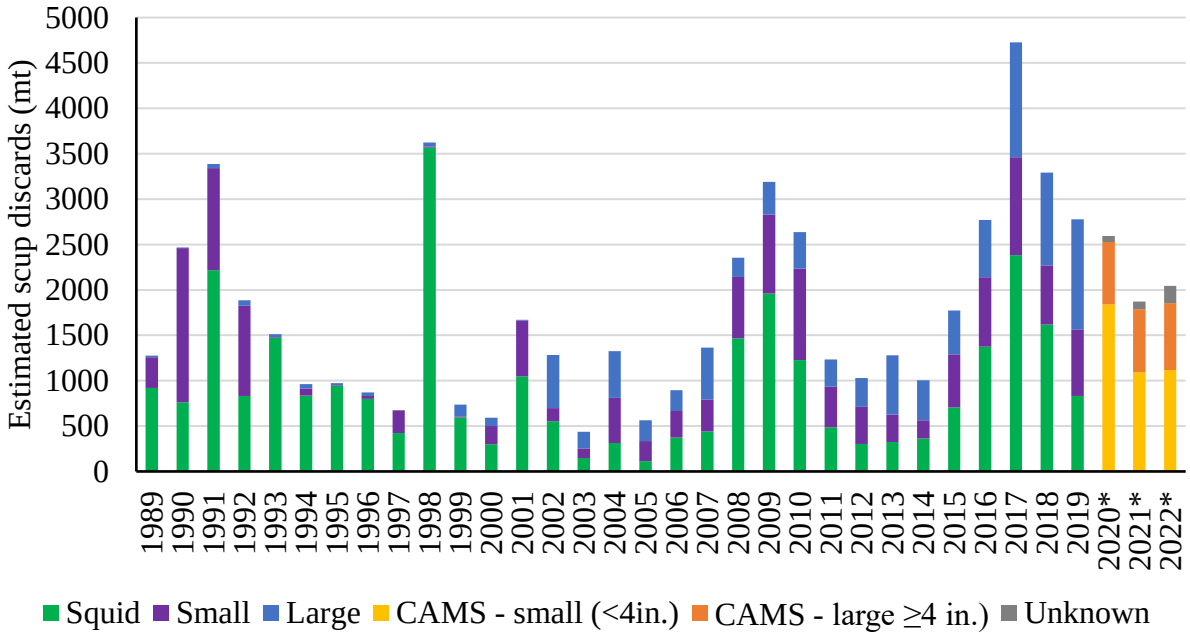


Figure 4: Estimated scup discards in trawls by year and mesh size from 1989-2022. *Note: starting in 2020 discard estimates by mesh size category changed due to the switch to CAMS. From 1989-2019 mesh categories include: large (5" or greater), small (smaller than 5" but larger than 2.125"), and squid (2.125" or less). From 2020-2022 mesh categories changed to CAM-large (4" or greater), CAMS-small (less than 4"), and Unknown.

The 2021/2022 seasonal patterns of estimated discards show that Quarters 2 and 3 (April-September) accounted for the majority of recent small mesh scup discards while less of a seasonal pattern is evident for large mesh gear (Figure 5).

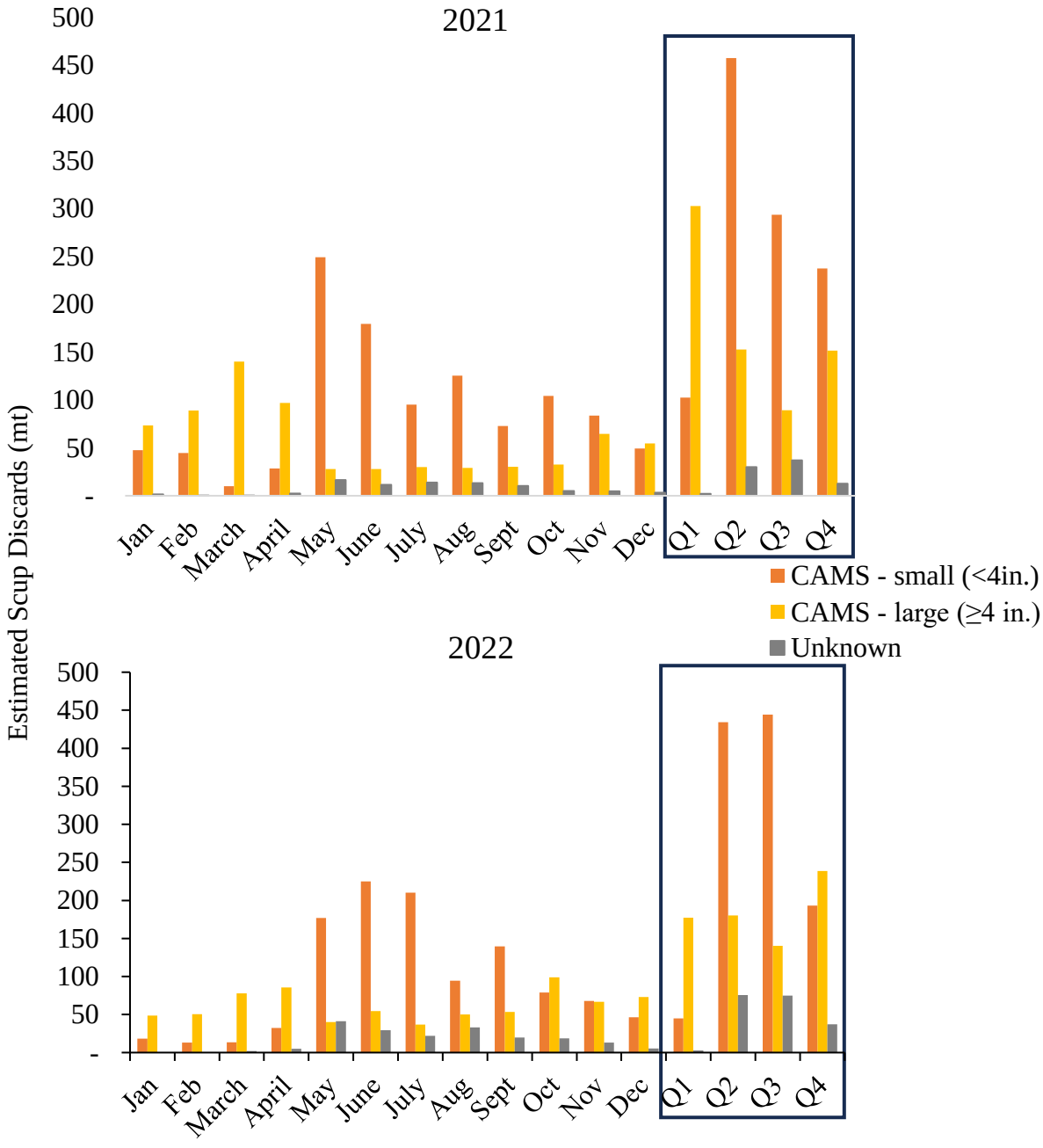


Figure 5: 2021 and 2022 estimated scup discards from trawls by month and mesh size. Estimated discards by quarter and mesh size are also shown within the black box within each graph.

Figure 6 describes combined total discards across all mesh sizes by quarter and year and illustrates the substantial seasonal variability among years. Quarters 2 and 3 have accounted for most discards each year since 2016.

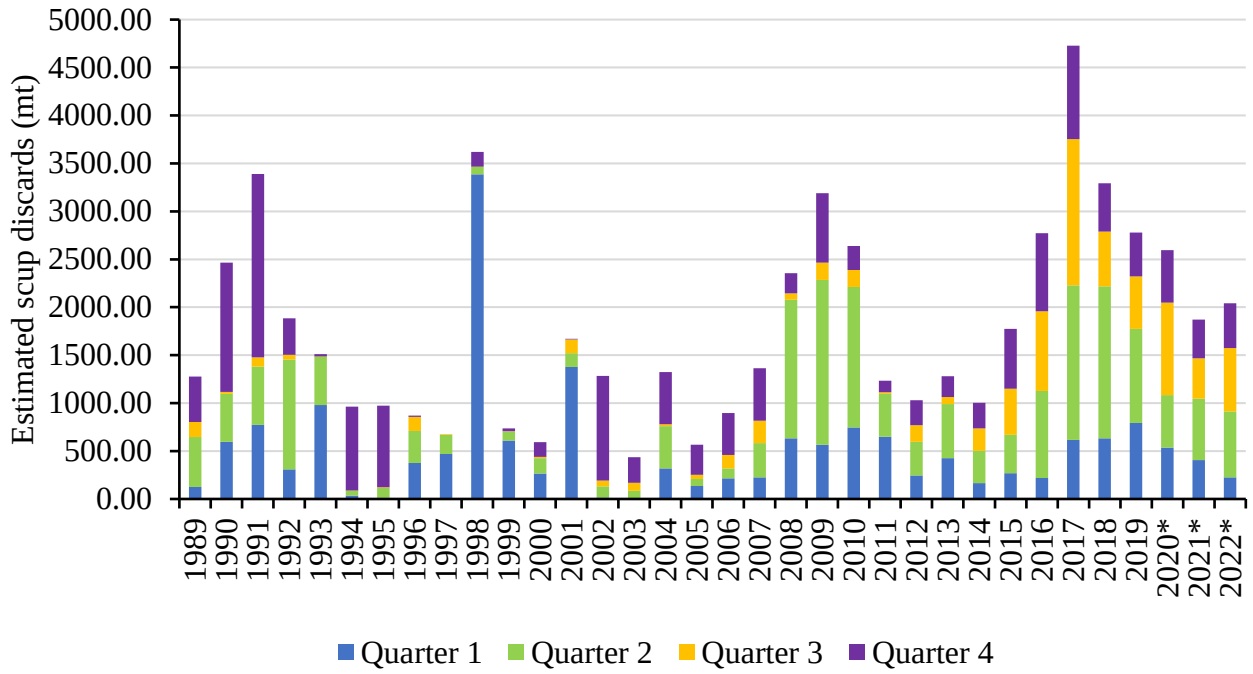


Figure 6: Estimated scup discards from trawls for all mesh categories by calendar quarter and year from 2001-2022. *Note: starting in 2020 discard estimates by mesh size category changed due to the switch to CAMS.

The proportion of commercial scup trawl discards in statistical areas which are partially included in at least one GRA has remained relatively high throughout the time series. Relatively more discards have also been observed in statistical areas 538 and 611 (which do not overlap with the GRAs) since the GRAs were implemented as shown by the grey and green bars in Figure 7.

Scup discards in statistical areas which are partially included in the Southern GRA have been much lower in recent years and are generally lower than in years prior to implementation of the GRAs (Figure 7). As shown in Figure 7, CAMS-small mesh trawl discards from 2020 through 2022 in these areas account for 10%-2% of total discards depending on the year.

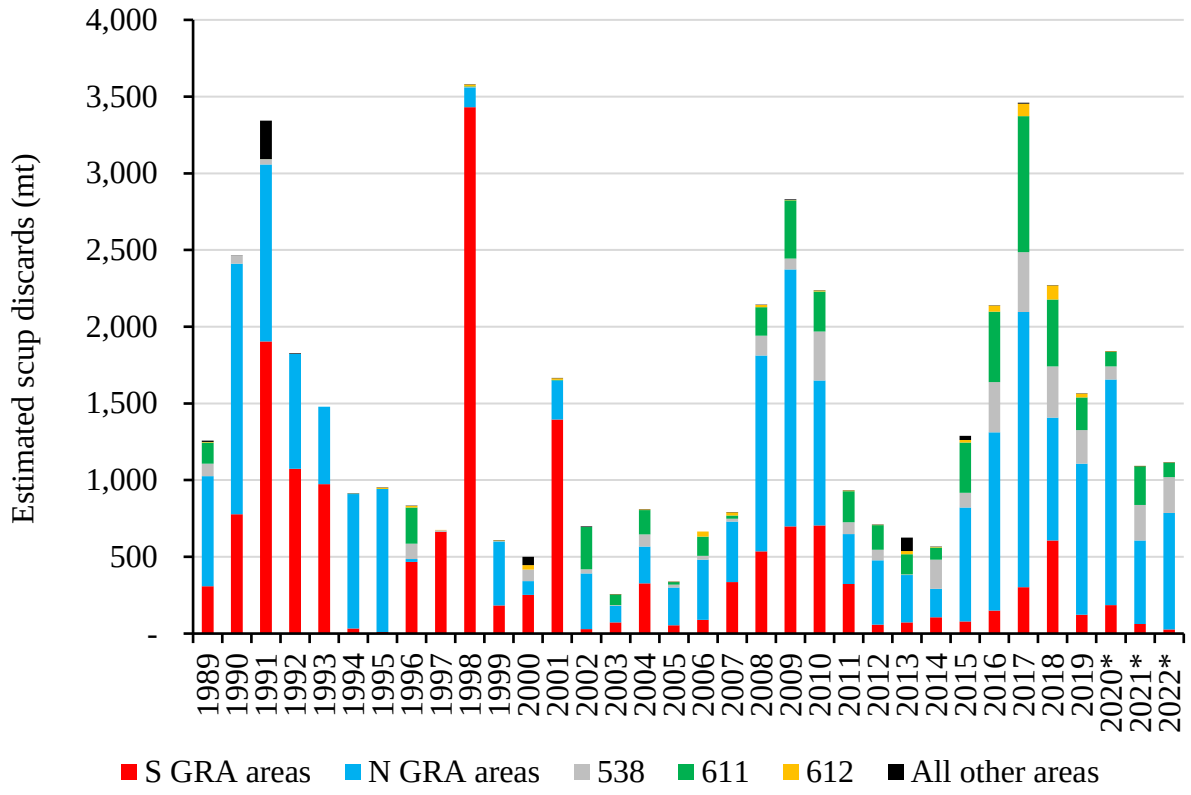


Figure 7: Estimated scup discards from trawls by year and statistical area for squid and small (less than 5") mesh sizes from 1989-2019 and CAMS-small mesh (less than 4") in 2020-2022. *Note:* all other areas are statistical areas which are not part of the GRAs and which had less than 100 mt of estimated scup discards during 2001-2022 are grouped together (i.e. areas 513, 514, 515, 521, 522, 525, 526, 533, 561, 562, 614, 624, 627, and 636). * Note: starting in 2020 discard estimates by mesh size category changed due to the switch to CAMS.

Scup discard levels have closely tracked juvenile fish numbers since 1996. The numbers of age 1-3 fish in the stock and total numbers of fish discarded from 1996-2022 are highly correlated (coefficient = 0.81 and discarded age 1-3 fish averaged at about 84% of total discards per year; Figure 8). While the percentage of all age 1-3 fish discarded yearly has been low since the GRAs, the percentage had already dropped into the current range by 1999, before the GRAs were implemented (Figure 9). The percentage of discarded weight relative to biomass has been low since the GRAs, but had also already dropped substantially by 1999 (Figure 10). Discards also appear well correlated to recent recruitment (Figure 11).

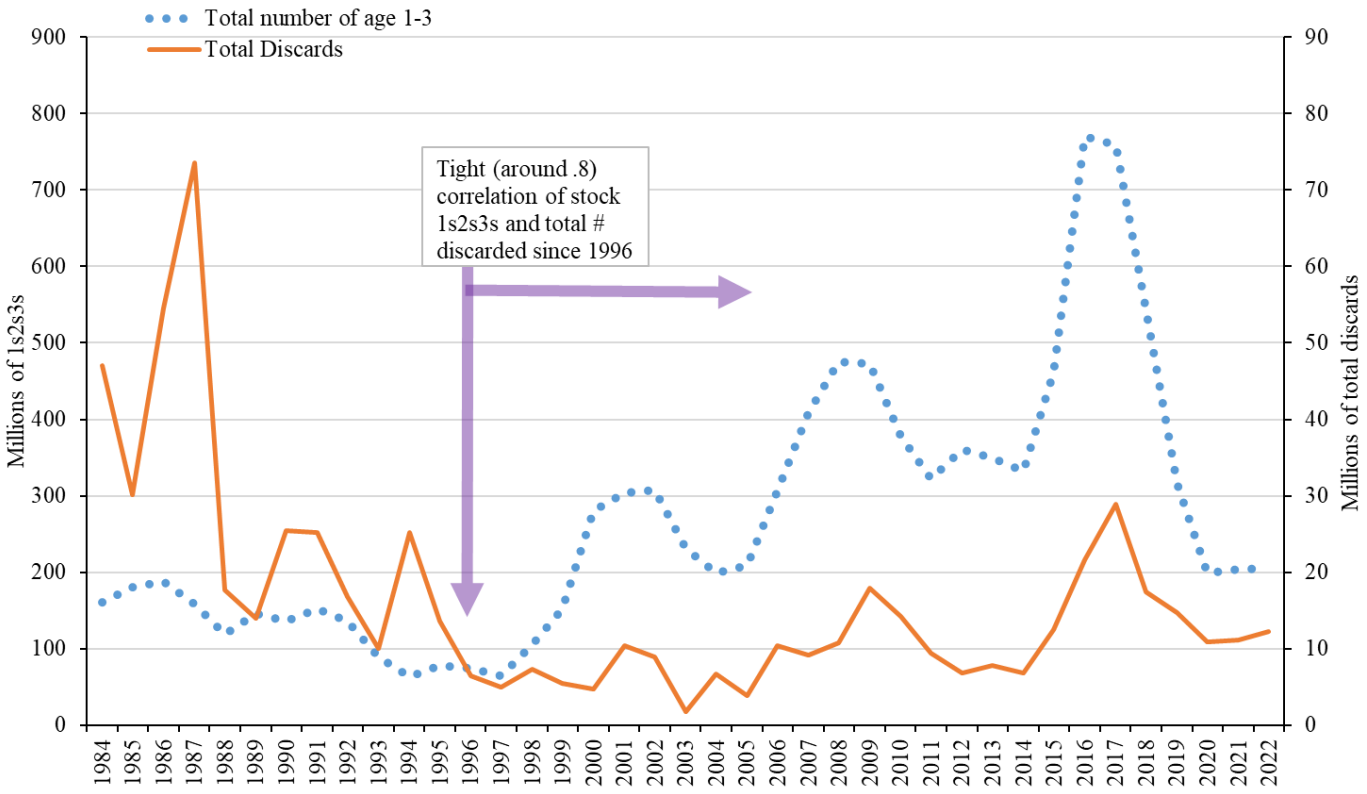


Figure 8: Total number of age 1-3 fish in the stock compared to total commercial discards from the 2023 management track assessment. *Starting in 2020 discard estimates calculated by CAMS.

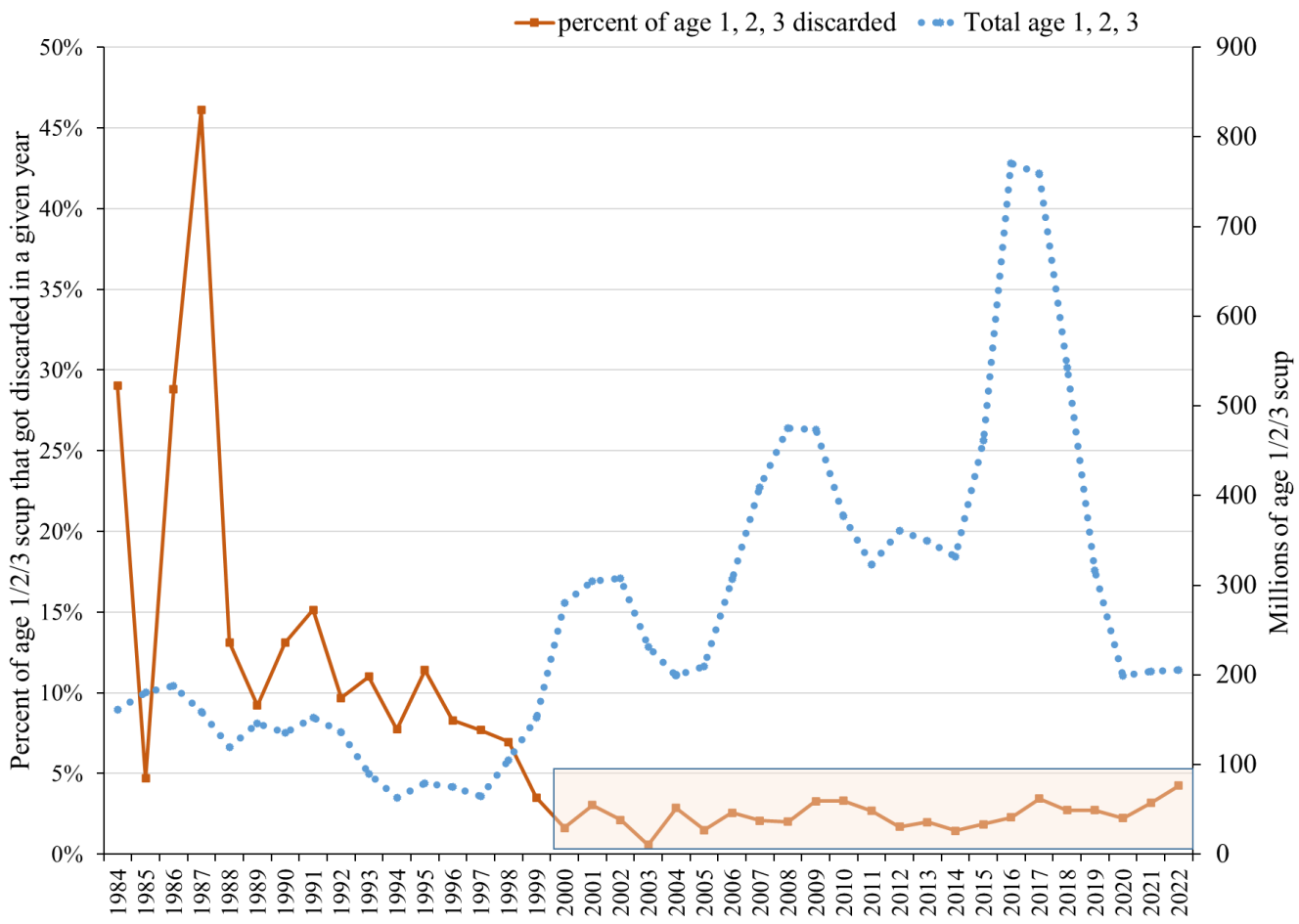


Figure 9: Percentage of age 1-3 fish discarded compared to the total number of age 1-3 fish in the stock from the 2023 management track assessment. *Starting in 2020 discard estimates calculated through CAMS.

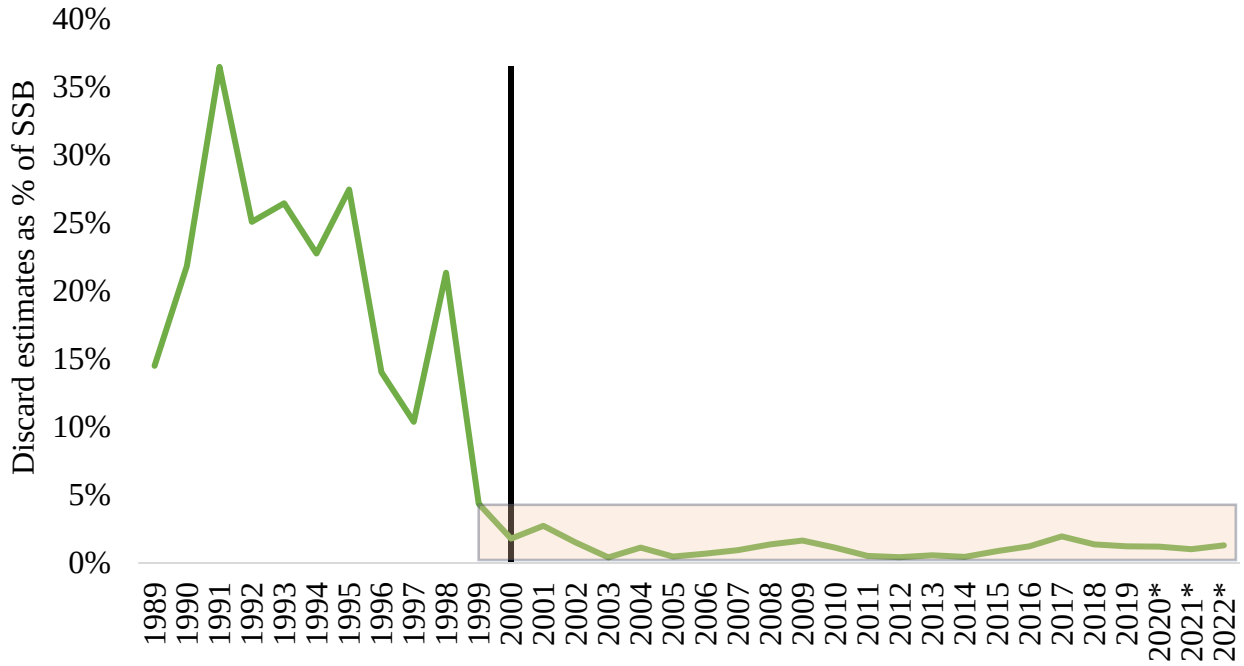


Figure 10: Annual discard estimates as a proportion of spawning stock biomass from 1989-2022 from the 2023 management track assessment (NEFSC 2019). The black solid line represents the implementation of the GRAs in November 2000. *Starting in 2020 discard estimates calculated through CAMS.

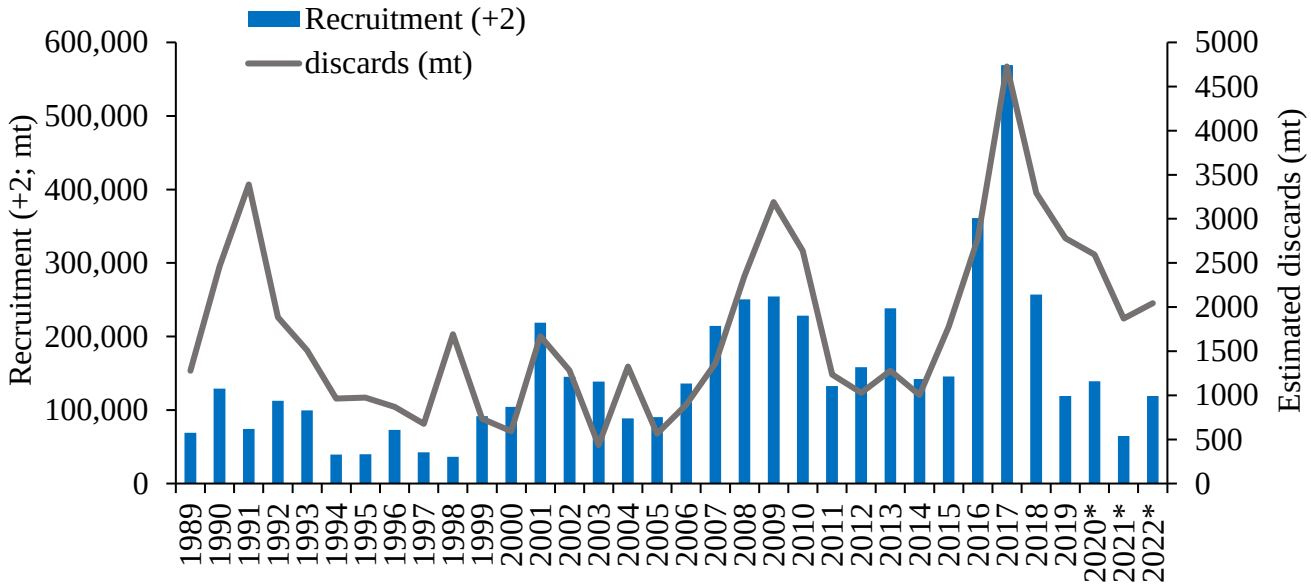


Figure 11: Estimated annual scup discards and recruitment from two years prior (e.g. 2015 recruitment is shown in 2017). Discards are shown for all mesh sizes combined in all statistical areas from 1989-2022. * Note: starting in 2020 discard estimates by mesh size category changed due to the switch to CAMS.

C. Initial Spatial and Temporal Analysis with Raw Trawl Survey and Observer Data[5]

Southern GRA

The majority of scup caught during the winter and spring NEFSC bottom trawl surveys (January – March) 1980-1999 occurred in, around, and to the south of the current Southern GRA boundary (Figure 12). Substantial winter longfin squid landings also occurred around the Southern GRA 1997-1999 (Figure 13), and despite limited observer coverage, small mesh (<5") scup discarding was also observed in the Southern GRA area (especially in the northern portion) during the GRA closure time period preceding implementation (1990-1999; Figure 14).

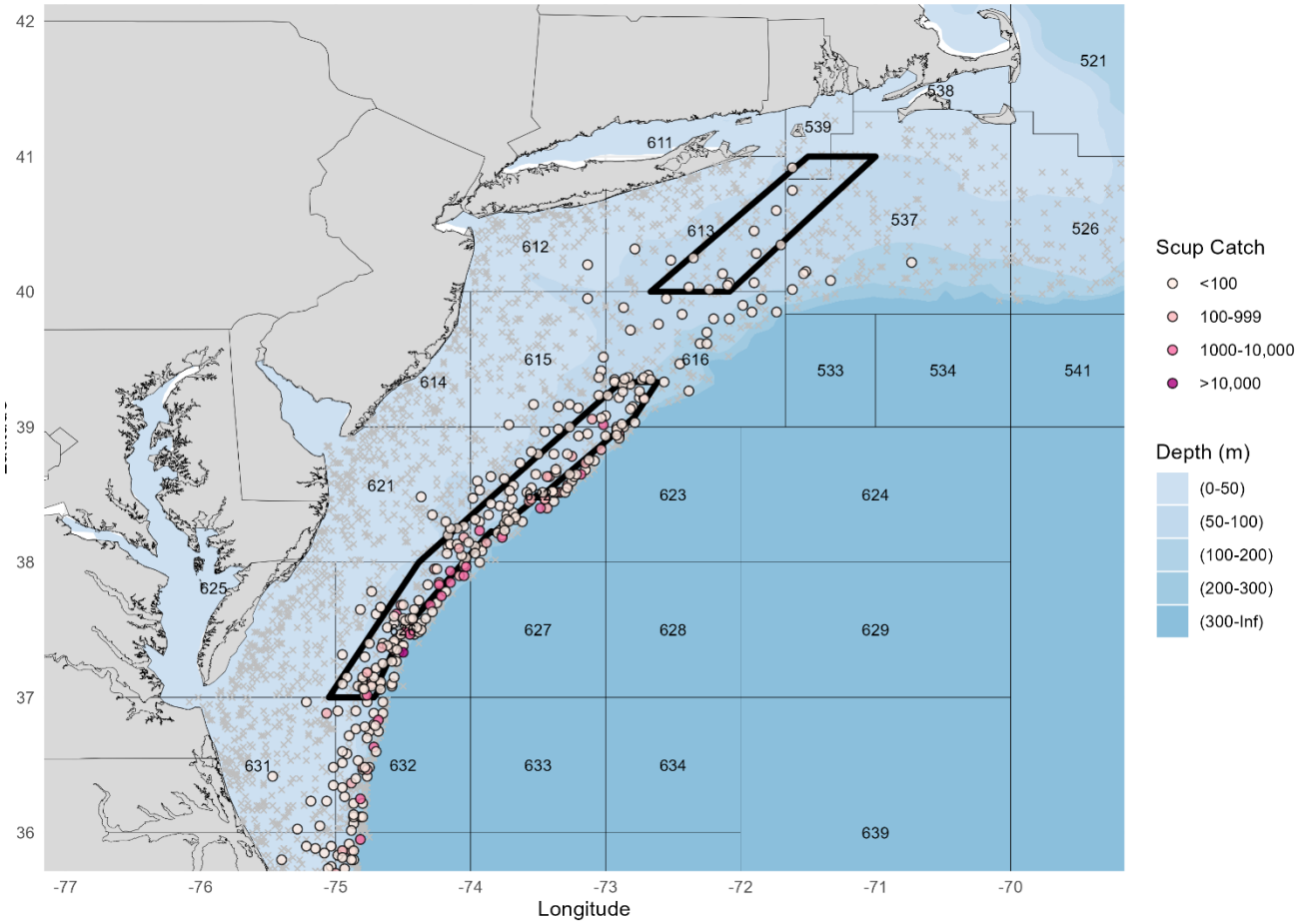


Figure 12: Total NEFSC survey scup catches during the months of January through March (similar timing as when the Southern GRA closure occurs) from 1980 through 1999. Note the Southern GRA closure was not effective until 2001. Colored circles represent quantity of scup catch in survey areas and grey x's represent areas surveyed but where no scup were caught. Black boxes shown are the Northern and Southern GRA boundaries.

[5] Different scales are used on observer data figures because the observed amounts are dependent on numbers of observed trips, which vary substantially across years.

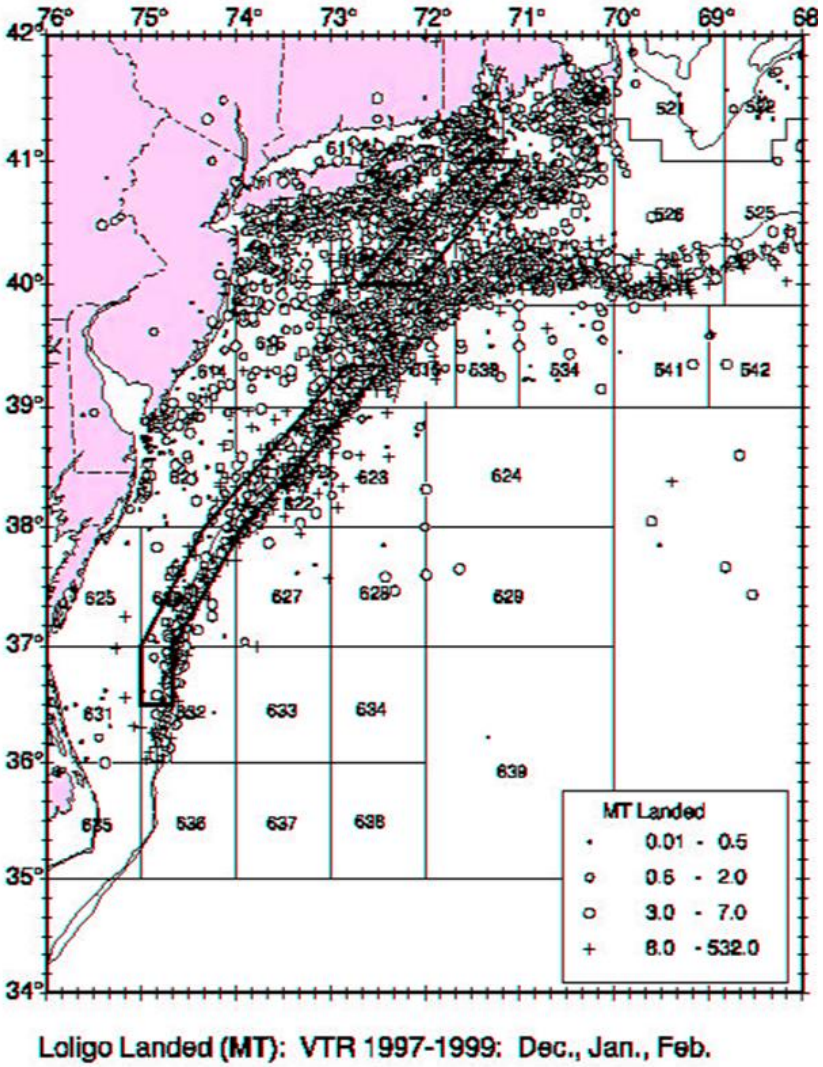


Figure 13: Total commercial longfin squid landings (mt) from 1997 through 1999 in December through February. Black boxes shown are the Northern and Southern GRA boundaries. (MAFMC 2001, Scup Specifications EA)

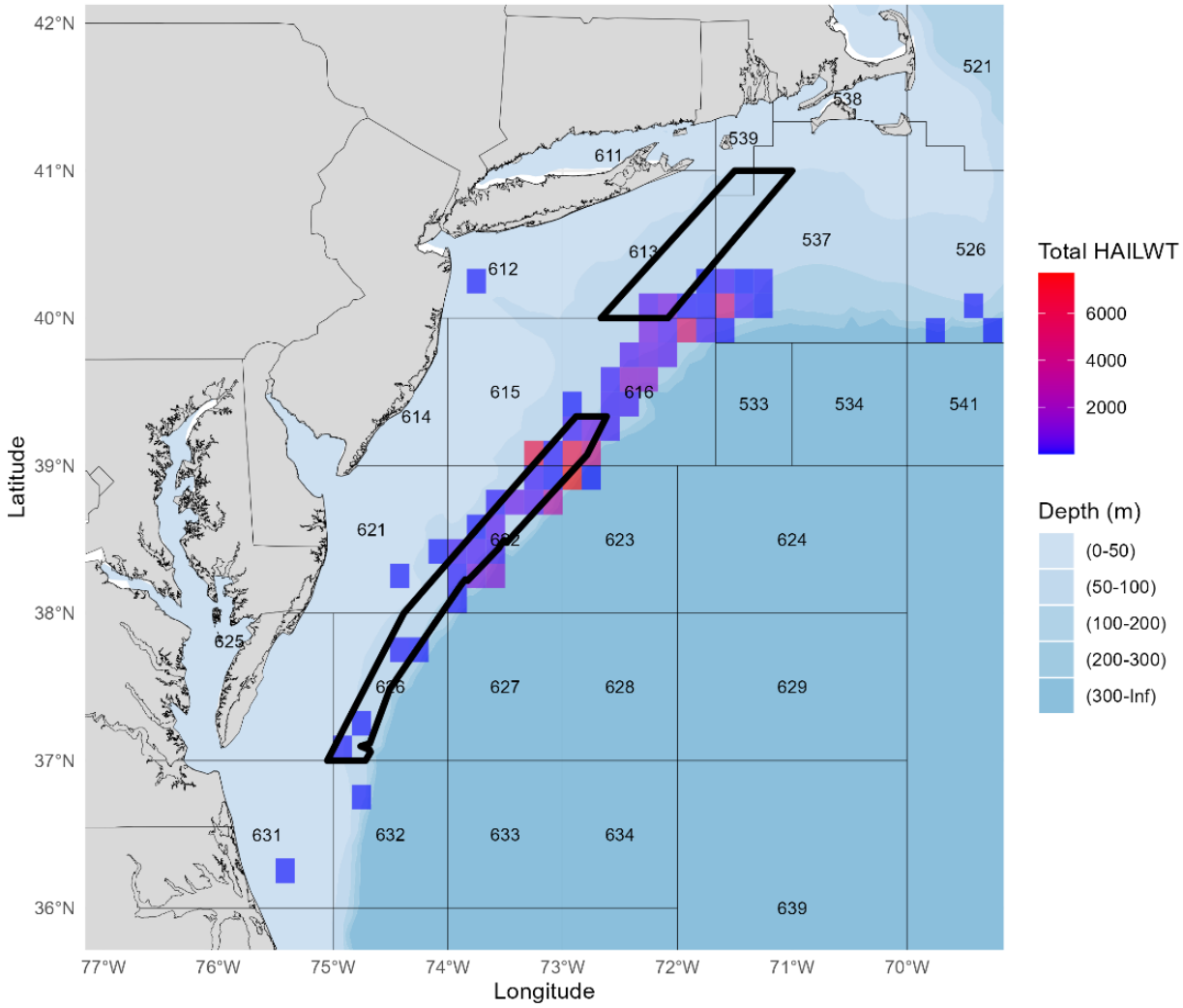


Figure 14: Commercial small mesh (less than 5") scup discards (mt) during January through March 15 from 1990 through 1999. Shaded TMS colors represent the quantity of observed commercial scup discard by ten-minute squares (TMS) and the black boxes shown are the current Northern and Southern GRA boundaries. Data Source: Unpublished NMFS Observer Program data.

In recent years, there have been substantial amounts of scup discarded during the first longfin squid trimester of the year (January – April) despite the Southern GRA closure. The majority of these discards occur largely outside of the Southern GRA boundary (Figure 15). Scup catch from recent spring NEFSC survey data indicates a large amount of scup is still caught within the Southern GRA boundary (Figure 16).

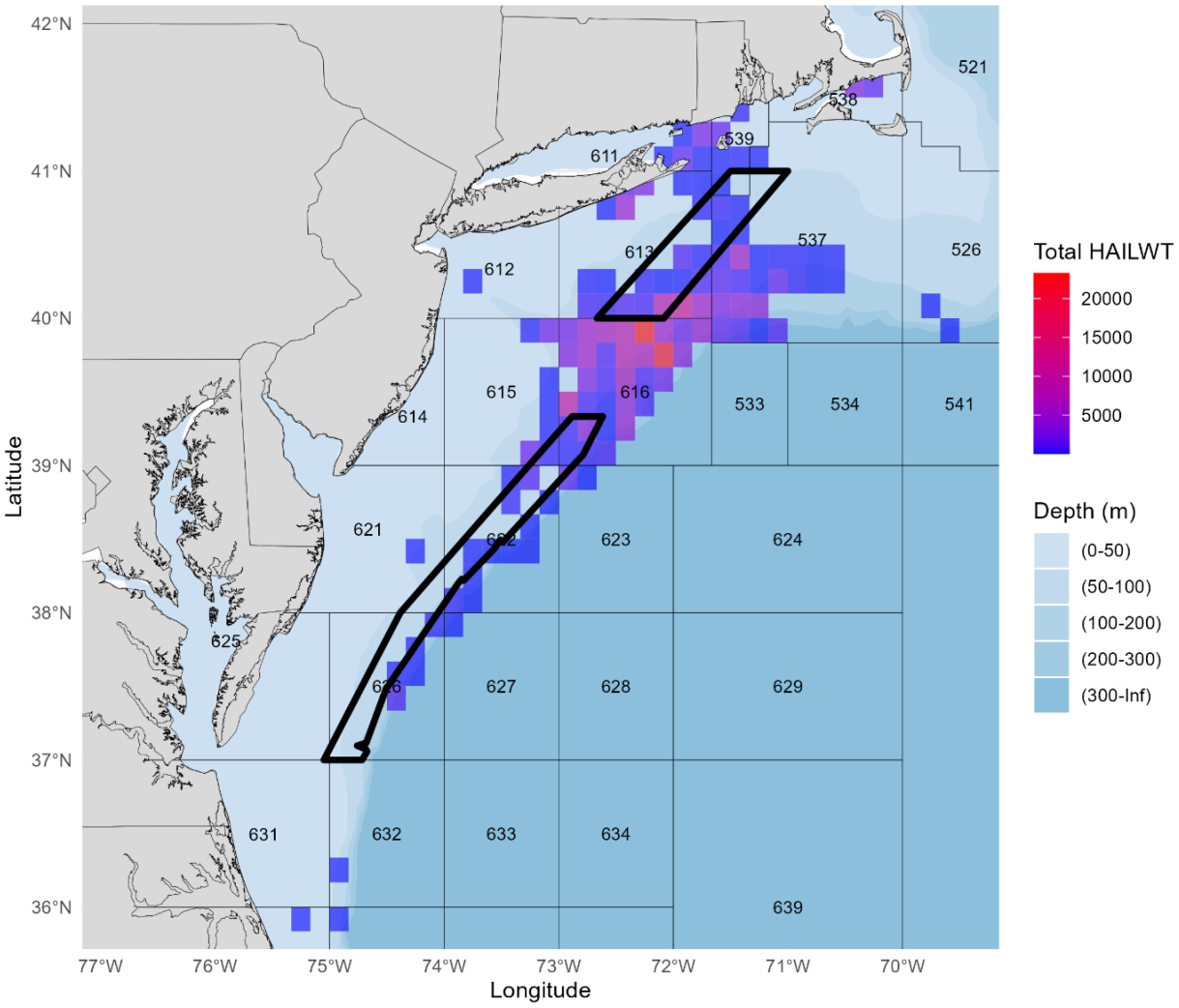


Figure 15: Recent commercial small mesh (less than 5") scup discards (mt) during the first trimester of each year (January through April) from 2017-2022. Shaded TMS colors represent the quantity of observed commercial scup discards by TMS and the black boxes shown are the Northern and Southern GRA boundaries. Data Source: Unpublished NMFS Observer Program data.

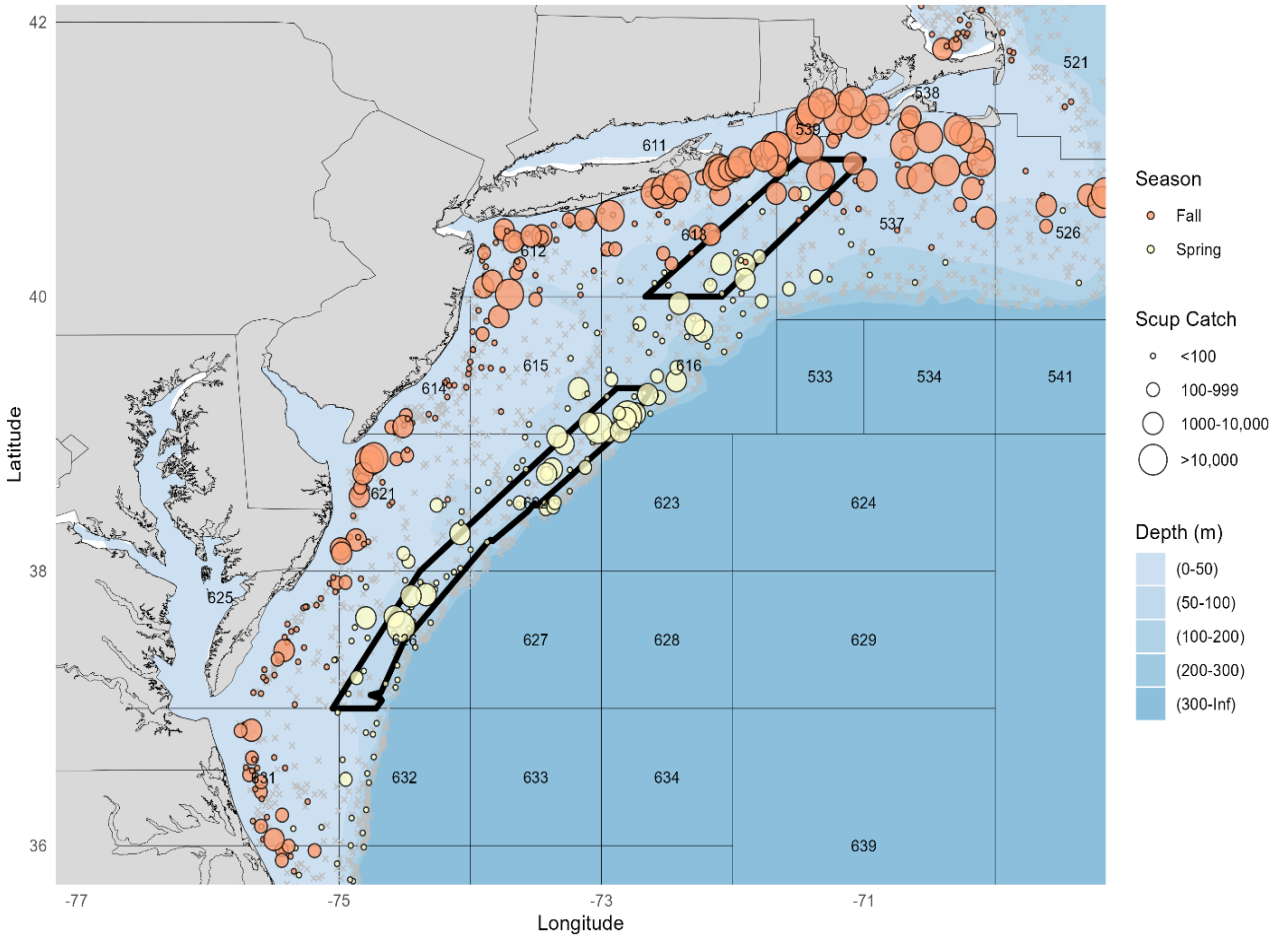


Figure 16: Total NEFSC survey scup catch numbers during the NEFSC trawl surveys 2017-2022. Colors represent the different surveys and the size of the circle represents the quantity of scup caught. Black boxes shown are the Northern and Southern GRA boundaries.

Northern GRA

The Northern GRA is generally aligned with the small mesh discard observations that occurred before GRA implementation (Figure 17) as well as with commercial longfin squid effort (Figure 13). Unlike the Southern GRA, the NEFSC trawl survey data do not overlap temporally or spatially with the Northern GRA given the timing of when the survey is conducted.

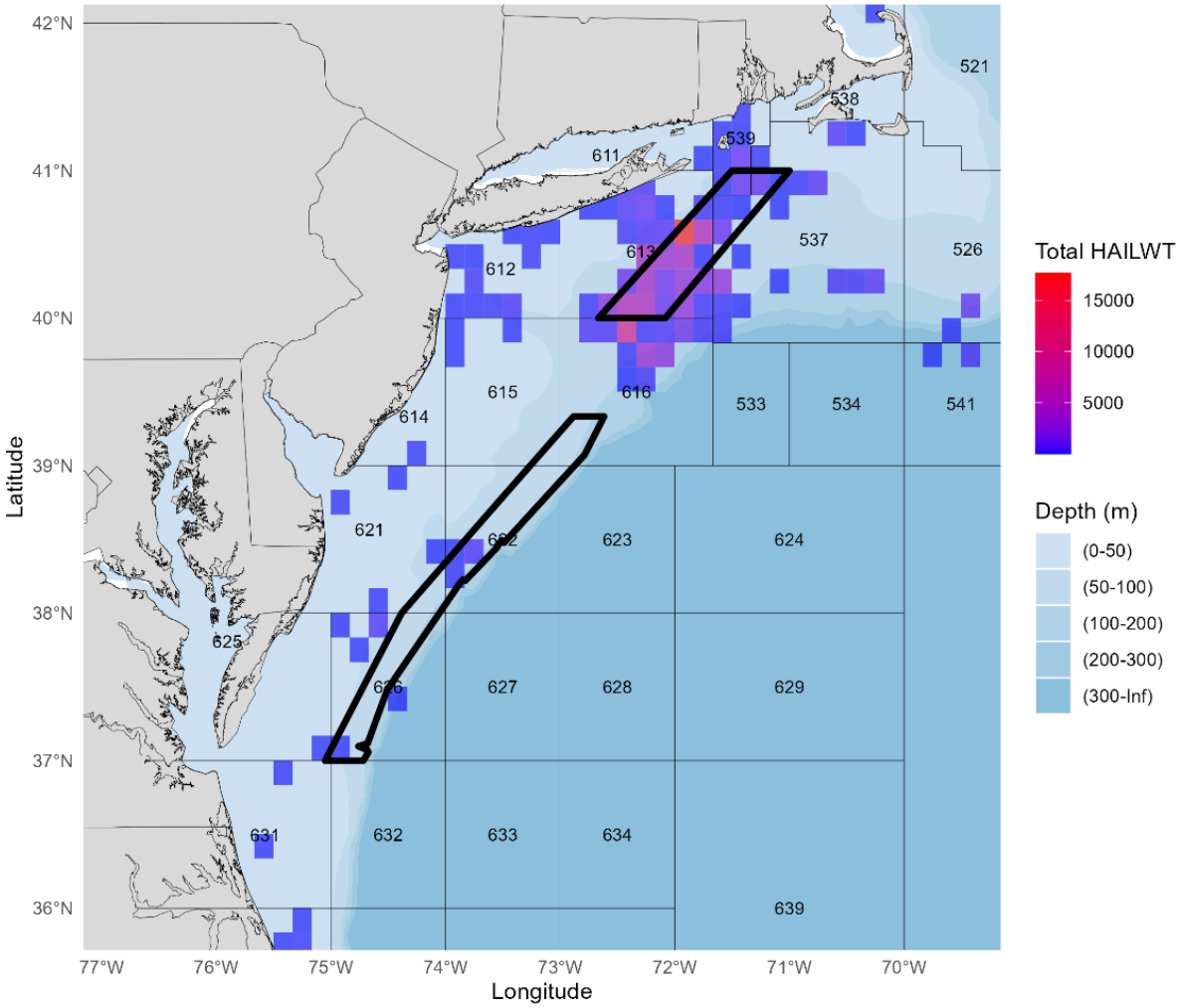


Figure 17: Commercial small mesh (less than 5") scup discards (mt) during November through December (similar timing as when the Northern GRA closure occurs) from 1990 through 1999. Shaded TMS colors represent the quantity of observed commercial scup discards by TMS and the black boxes shown are the Northern and Southern GRA boundaries. Data Source: Unpublished NMFS Observer Program data.

In recent years, there have been substantial northern scup discards during the second longfin squid trimester (May – August) when no GRAs are active (Figure 18 left panel) as well as in the third squid trimester (September – December) despite the Northern GRA closure (**Figure 18** right panel).

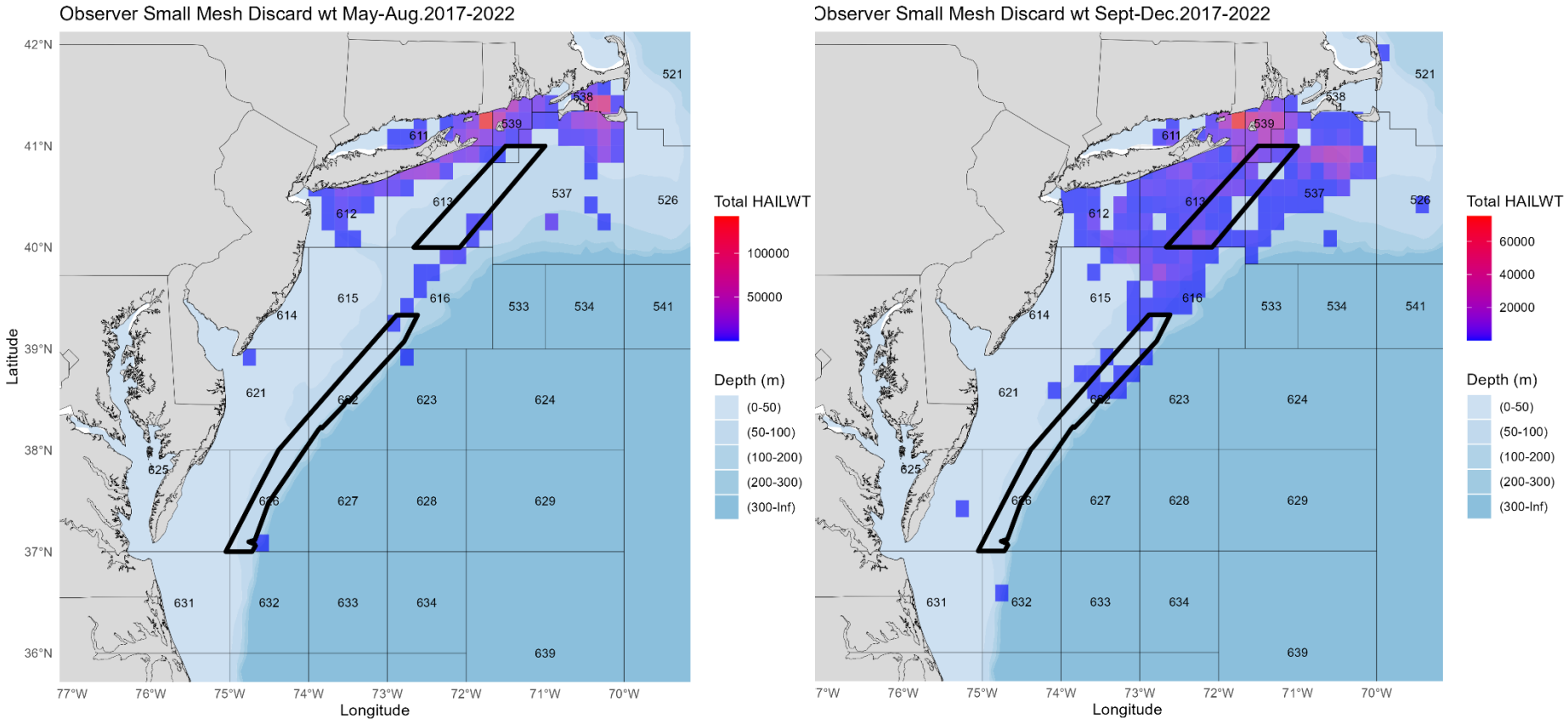


Figure 18: Recent commercial small mesh (less than 5") scup discards (mt) during the second and third trimester of each year (May – August and September – December) from 2017-2022. Shaded TMS colors represent the quantity of observed commercial scup discard by TMS and the black boxes shown are the Northern and Southern GRA boundaries. Data Source: Unpublished NMFS Observer Program data.

D) Key Findings and Recommendations

The analysis indicates that commercial scup discards have decreased since the recent peak in 2017 and represent a very small percentage of annual scup biomass since implementation of the GRAs (Figure 10). However, absolute discard amounts remain relatively high compared to other periods following the implementation of the GRAs, and represent 10%-40% of total annual catch from 2013-2022. The majority of commercial discards are from smaller mesh gear, but spatial and temporal patterns vary year to year.

There is a strong correlation between scup discards and juvenile fish stock numbers, emphasizing the importance of reducing discards to sustain the stock's health. The analysis suggests that the GRAs have had a positive impact in reducing discards of juvenile scup in the GRAs, but there are now substantial discards around the GRAs in both time and space.

It appears the GRAs have contributed to the rebuilding of the scup stock since the early 2000s; however, given the spatial patterns of recent scup discards, it seems that alternative measures (e.g., modified closures and/or areas) or modification of the GRAs might do a better job at minimizing scup discards. However, continued use of the GRAs should consider changes that should have a high probability of further reducing where discards ***will be*** rather than reacting to where discards ***have been***. Variability in both scup distributions and fleet effort should both be accounted for in any alternative development. Impact analyses should also consider how fishing effort might react to any potential GRA changes.

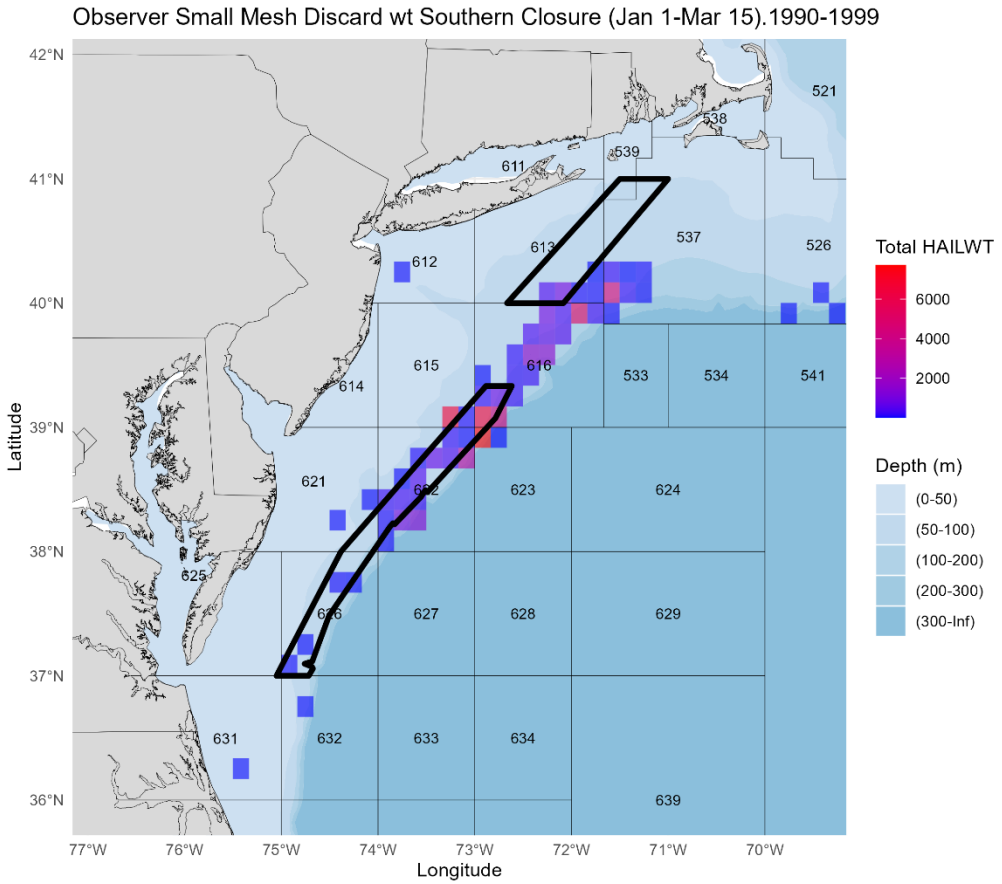
Staff recommend the Council's Scientific and Statistical Committee review this report and provide feedback and recommendations on research to examine the predictability of scup bycatch using environmental data or other ways to reduce scup bycatch.

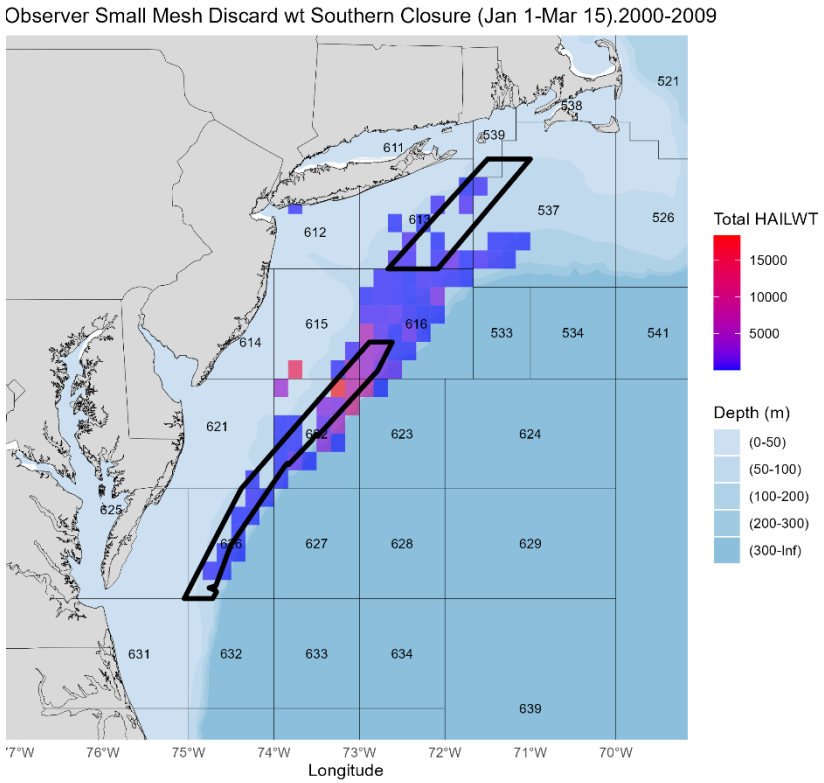
For the 2024 Implementation Plan, staff recommend identifying, as a high priority, research to examine if scup bycatch/discards can be predicted using environmental data. Recent research has demonstrated promise for such work in river herring and shad bycatch. (Roberts et. al., 2023).[6] Such information could help ensure that any GRA modifications do not simply re-direct effort and create alternative scup bycatch hotspots.

For the 2024 Implementation Plan, staff also recommend the Council include a Framework Action to consider GRA modifications or other measures to further reduce scup discards (working in tandem with the identified high priority research).

[6] Roberts, K.E., Stepanuk, J.E.F., Kim, H., Thorn, L.H., Chong-Montenegro, C., Nye, J.A. (2023). Developing a subseasonal ecological forecast to reduce fisheries bycatch in the Northeast U.S. Progress in Oceanography: 213:103021.

APPENDIX 1





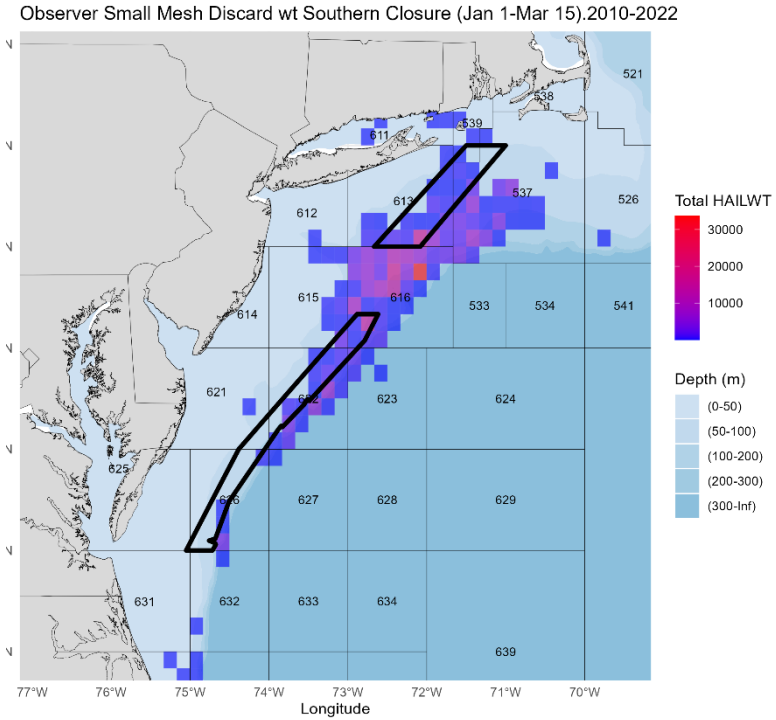


Figure 19: Commercial small mesh (less than 5") scup discards (mt) during the Southern GRA closure: prior to the implementation of the GRAs (left); shortly after implementation (top right); and in more recent years (bottom right). Data Source: Unpublished NMFS Observer Program data.

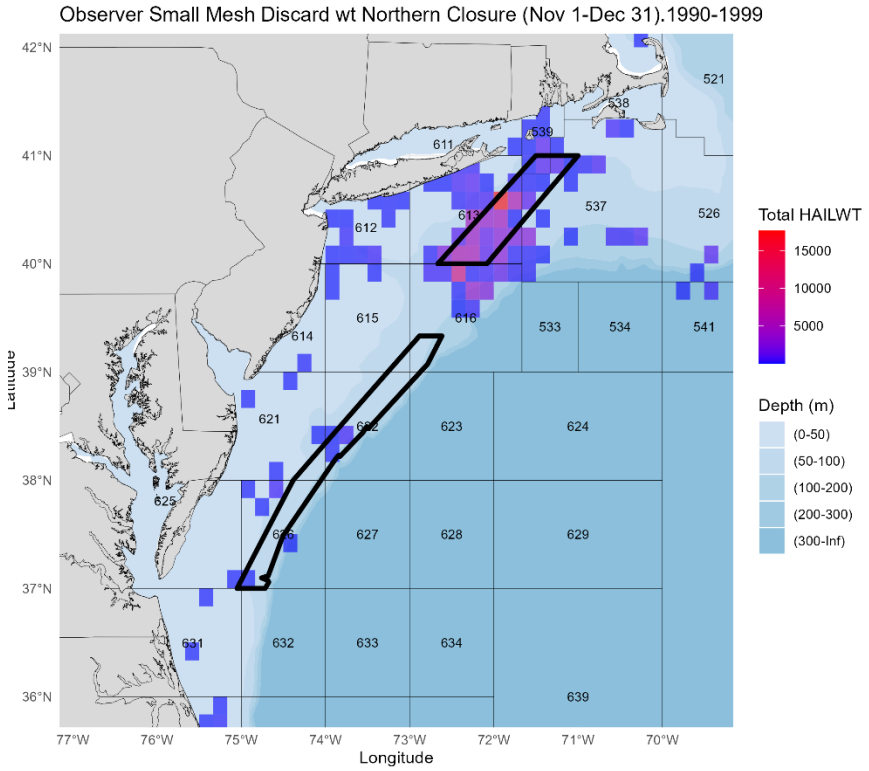


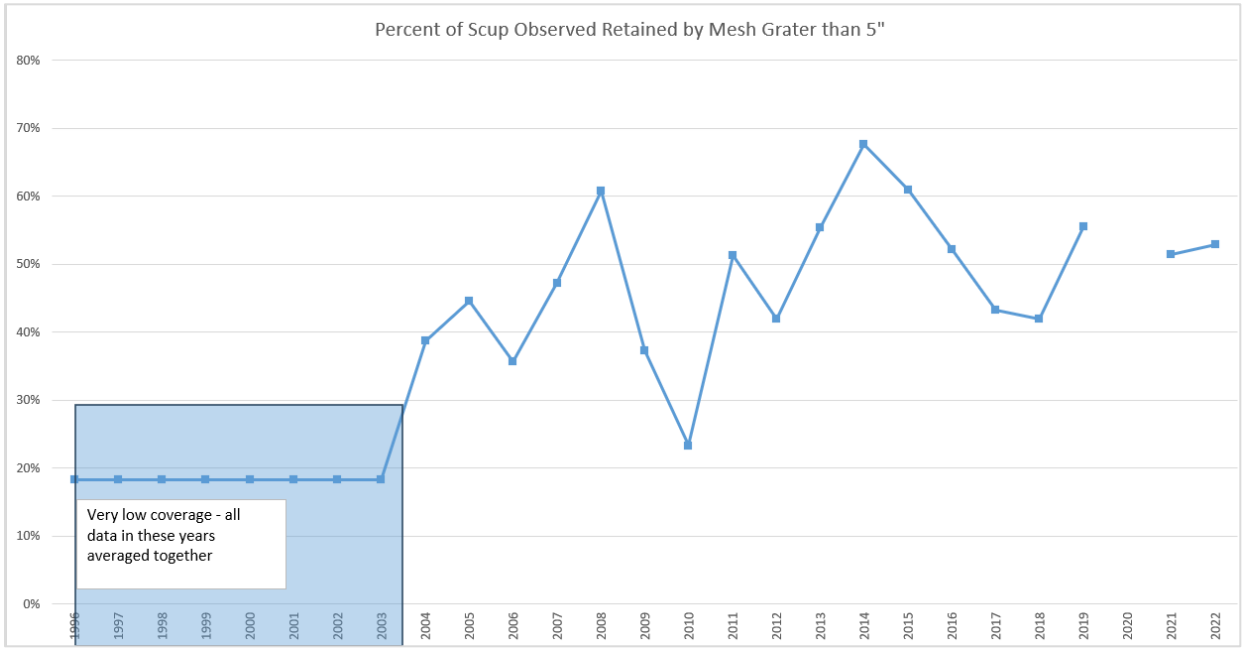
Figure 20: Commercial small mesh (less than 5") scup discards (mt) during November through December (when the Northern GRA closure occurs): prior to the implementation of the GRAs (left); shortly after implementation (top right); and in more recent years (bottom right). Data Source: Unpublished NMFS Observer Program data.

APPENDIX 2 – Mesh for Retained Scup

Source: Unpublished NMFS VTR and Observer Data

(VTR/Observer percentage scale differences are likely due to observer day deployment allocation targets among various fleets – they should not be directly compared)

Staff examined the proportion of retained scup by mesh greater than 5" in trawl observer data:



Staff examined the proportion of retained scup by mesh greater than 5" in Vessel Trip Report data: