Mid-Atlantic Fishery Management Council
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Richard B. Robins, Jr., Chairman | Lee G. Anderson, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: November 24, 2015

To: Chris Moore

From: Julia Beaty

Subject: Scup Gear Restricted Areas (GRAs)

Contents

This document contains a summary of a recent analysis of the scup GRAs, as well as alternatives for consideration under a framework to modify the GRAs.

Two additional documents are included with this tab:

- A white paper on commercial fishery scup discards in the GRAs
- Figures showing observed scup catch and discards in spring 2014-2015 and fall 2015.

Background

In 2000 the Council implemented two Gear Restricted Areas (GRAs) for scup. The scup GRAs were designed to reduce scup discards in small mesh fisheries. The Council modified the boundaries of the GRAs in late 2000, in 2001, and in 2005. The current boundaries are shown in Figure 1. Under the current regulations, trawl vessels in the southern GRA from January 1 through March 15 that fish for or possess non-exempt species (i.e. longfin squid, black sea bass, and silver hake/whiting) must fish with nets that have a minimum mesh size of 5.0-inch diamond mesh, applied throughout the codend for at least 75 continuous meshes forward of the terminus of the net.[1] The same applies for trawl vessels in the northern GRA from November 1 through December 31.

The Council discussed a framework action to modify the scup GRAs at their February and April 2014 meetings. In June 2014 the Council postponed further development of the framework until after completion of the Deep Sea Corals Amendment. The Council was in the process of developing new coral protection areas, some of which overlapped with the scup GRAs. The Council took final action on the coral amendment in June 2015, voting to prohibit the use of all bottom-tending gear in fifteen “discrete coral zones” and one “broad coral zone” (Figure 2).

[1] For trawl nets with codends (including an extension) of fewer than 75 meshes, the entire trawl net must have a minimum mesh size of 5.0 inches (12.7 cm) throughout the net.

This document summarizes Advisory Panel (AP) comments on the scup GRAs, recent analysis of the effectiveness of the GRAs, and a range of management alternatives for Council consideration.

Advisory Panel Input

The Council's Summer Flounder, Scup, and Black Sea Bass Advisory Panel (AP) and its Mackerel, Squid, and Butterfish AP participated in a webinar in March 2014 to provide input on the scup GRA framework. Membership of the APs has since changed. The APs have not since met to discuss the GRAs. AP members have, however, commented on the GRAs at other meetings over the past year.

Hank Lackner, an AP member and commercial scup and squid fisherman, provided a recommendation for modifications to the eastern boundary of the southern GRA (Figure 2). Lackner's modification is intended to restore access to certain canyon areas for longfin squid fishing. Multiple advisors support Lackner's recommendation.[2]

Over the past few years, multiple advisors recommended that the GRAs be eliminated because they are no longer needed now that the scup stock has been rebuilt to over 200% of the target biomass. In addition, they argued, the GRAs pose significant challenges for the operation of other fisheries. A few advisors commented that there are ways to reduce scup discards without GRAs, such as increasing the incidental possession limits (which would allow fishermen targeting other species to land more scup).[3]

Aside from those advisors who recommended that both GRAs be eliminated, no advisors have proposed recommendations for modifications to the northern GRA.

No advisors provided comments on the timing of the scup GRAs.

Council staff recommend that the APs be given the opportunity to provide additional feedback on the GRAs through a webinar or in-person meeting if the Council moves forward with development of this framework in 2016.

Analysis

Mark Terceiro and Alicia Miller, of the Northeast Fisheries Science Center (NEFSC) performed an analysis of the scup GRAs, using observer data on discards through 2013. Their report is included with this memo. Their analysis shows that most of the observed scup discards in the commercial fishery occurred in small mesh tows (i.e. smaller than the minimum mesh size for the scup commercial fishery) in the NMFS statistical areas that now include the GRAs. Since implementation of the GRAs in 2001, scup discards in those areas have declined. Their analysis suggests that "the GRAs have likely reduced the discard mortality of small scup and are responsible for the improved post-recruitment survival of these small scup".

Mark Terceiro updated the scup discard estimates in 2015 (with data through 2014) for the 2015 scup benchmark stock assessment. Council staff used the updated estimates from trips with

[2] The Council voted in April 2014 to include Lackner's proposal in the suite of alternatives for consideration under the GRA framework.

[3] The Council voted in April 2014 to consider an increase in the incidental possession limit for scup as part of the GRA framework. The incidental possession limits can also be modified through the annual specifications process.

small mesh tows (i.e. smaller than the minimum mesh size for scup) to produce Figures 3-6. These updated data suggest similar conclusions as found in Terceiro and Miller's analysis, namely that statistical areas 611 and 538 have accounted for relatively high discards outside of the GRAs from 1989 through 2014. Very few scup discards have been observed in statistical area 632 (currently included in the southern GRA). The largest remaining sources of scup discards are small mesh trips during times of the year when the GRAs are not in effect (e.g. areas 538, 539, 611, and 613 in quarters two and three; Figures 4 and 5). Relatively high discards also occurred in statistical area 616 in quarter 1 (Figure 3). This is an area and time of year when the southern GRA is in effect. These relatively high discards likely mostly occurred in trips in statistical area 616 but outside of the southern GRA (Mark Terceiro, personal communication).

The discard estimates for scup used in the 2015 benchmark stock assessment are estimated by calendar quarter, by statistical area, and by three mesh categories ("large" for codends or liners greater than or equal to 4.5 or 5 inches, "small" for 2.125 – 4.5 or 5 inches, and "squid" for less than or equal to 2.125 inches). Mark Terceiro re-calculated these discard estimates by month (rather than quarter) to examine the timing of scup discards for the purposes of evaluating the effectiveness of the timing of the GRAs. He cautioned that using month as the time stratum degrades the precision of overall discard estimates and should only be used for generalizations about the timing of discards. The monthly discard estimates suggest that most scup discards in recent years (2010-2014) occurred on small mesh trips in statistical areas 537-539 and 611 during May and June, and in squid mesh (<2.125 inches) and large mesh (>4.5 or 5 inches) trips in area 616 during January through March.

Alternatives

Council staff propose the following alternatives for further development and analysis. These alternatives are identical to those considered by the Council in April 2014, with the addition of alternatives to modify the timing of the GRAs.

1. No action/*status quo*
2. Modify the area of the northern GRA
    a. Expand the northern GRA to include more of statistical area 613
    b. Other options?
3. Modify the area of the southern GRA
    a. Modify the southern GRA so the eastern boundary aligns with that proposed by Hank Lackner (Figure 1).
    b. Remove statistical area 632 from the southern GRA
    c. Expand the southern GRA to include more of statistical area 616
    d. Other options?
4. Modify the timing of the northern GRA
5. Modify the timing of the southern GRA
6. Eliminate the northern GRA
7. Eliminate the southern GRA

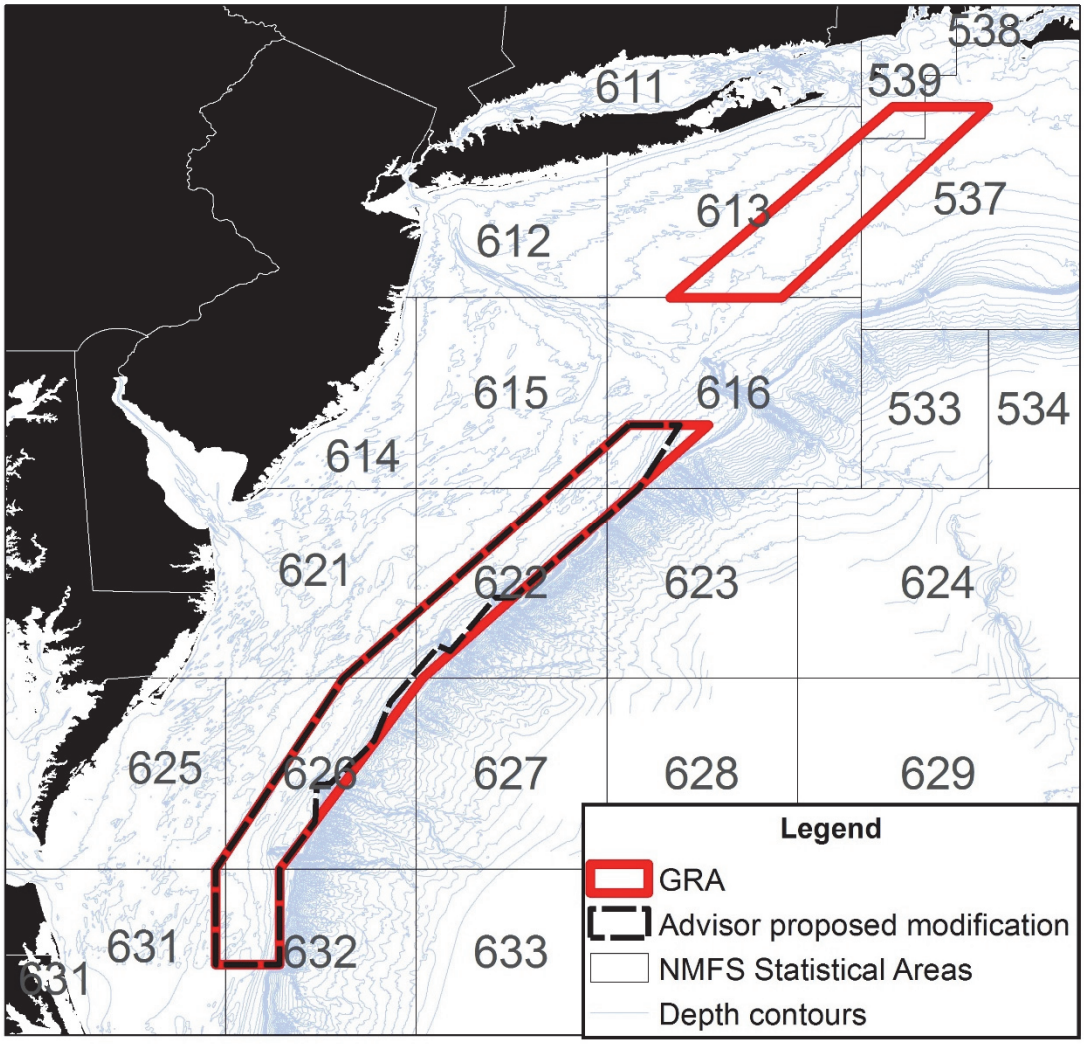


Figure 1: The northern and southern scup Gear Restricted Areas (GRAs), shown with the modification to the southern GRA boundary proposed by Hank Lackner.

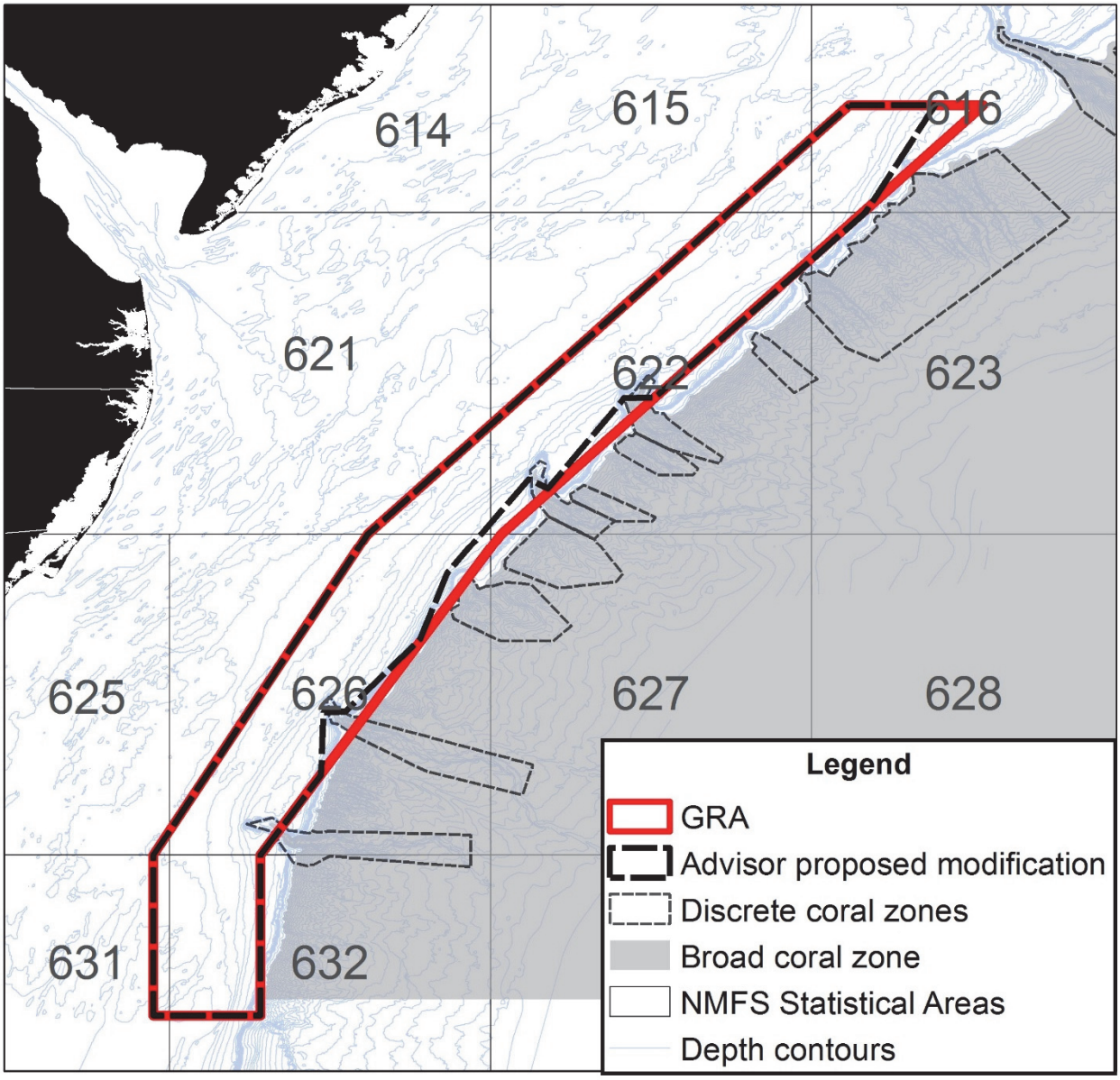


Figure 2: The southern scup GRA, overlain with the boundary modification proposed by Hank Lackner, and the discrete and broad coral protection zones chosen by the Council in June 2015. (Only those coral areas which border the southern GRA are shown.)

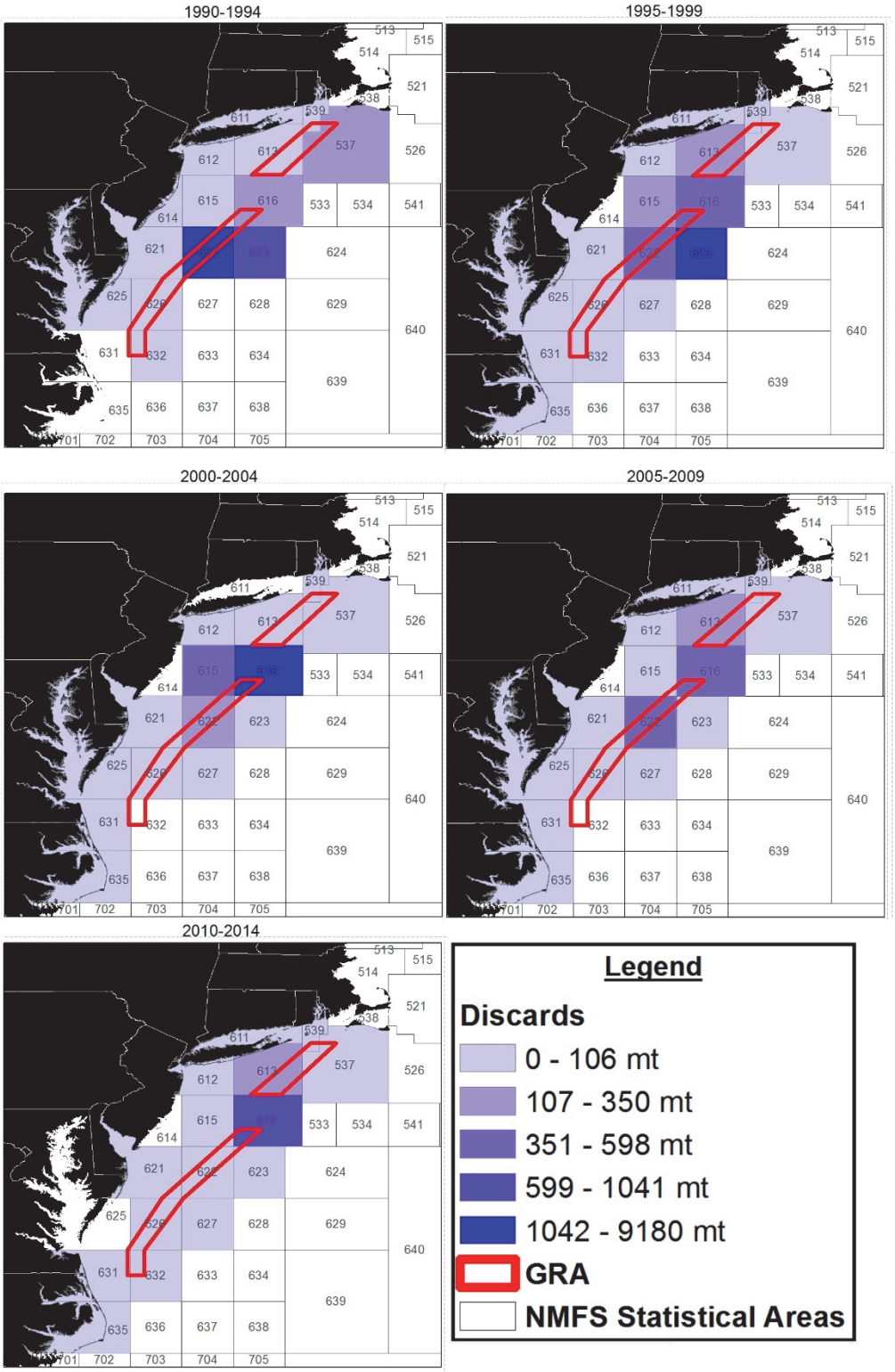


Figure 3: Scup discards on small mesh (i.e. smaller than the minimum mesh size for scup) tows on trips with scup catch during the first quarter of the year, as shown in NMFS observer data. Discard observations are grouped by natural breaks (jenks) and aggregated by NMFS statistical area and 5-year time blocks. This figure includes the time of year during which the southern GRA is in effect (January 1 – March 15 from 2001 through the present).

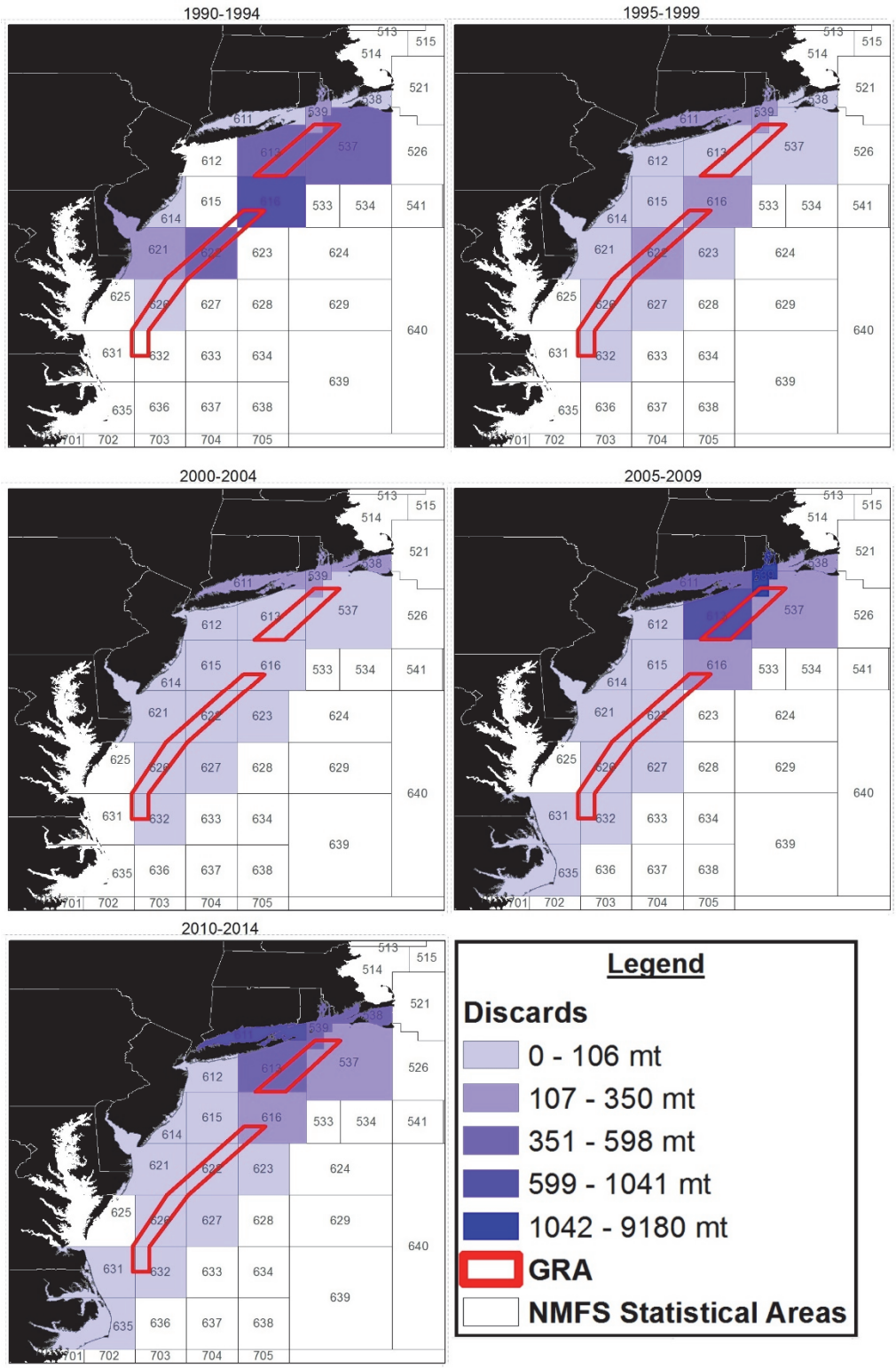


Figure 4: Scup discards on small mesh (i.e. smaller than the minimum mesh size for scup) tows on trips with scup catch during the second quarter of the year, as shown in NMFS observer data. Discard observations are grouped by natural breaks (jenks) and aggregated by NMFS statistical area and 5-year time blocks. Neither GRA is in effect during this time of year.

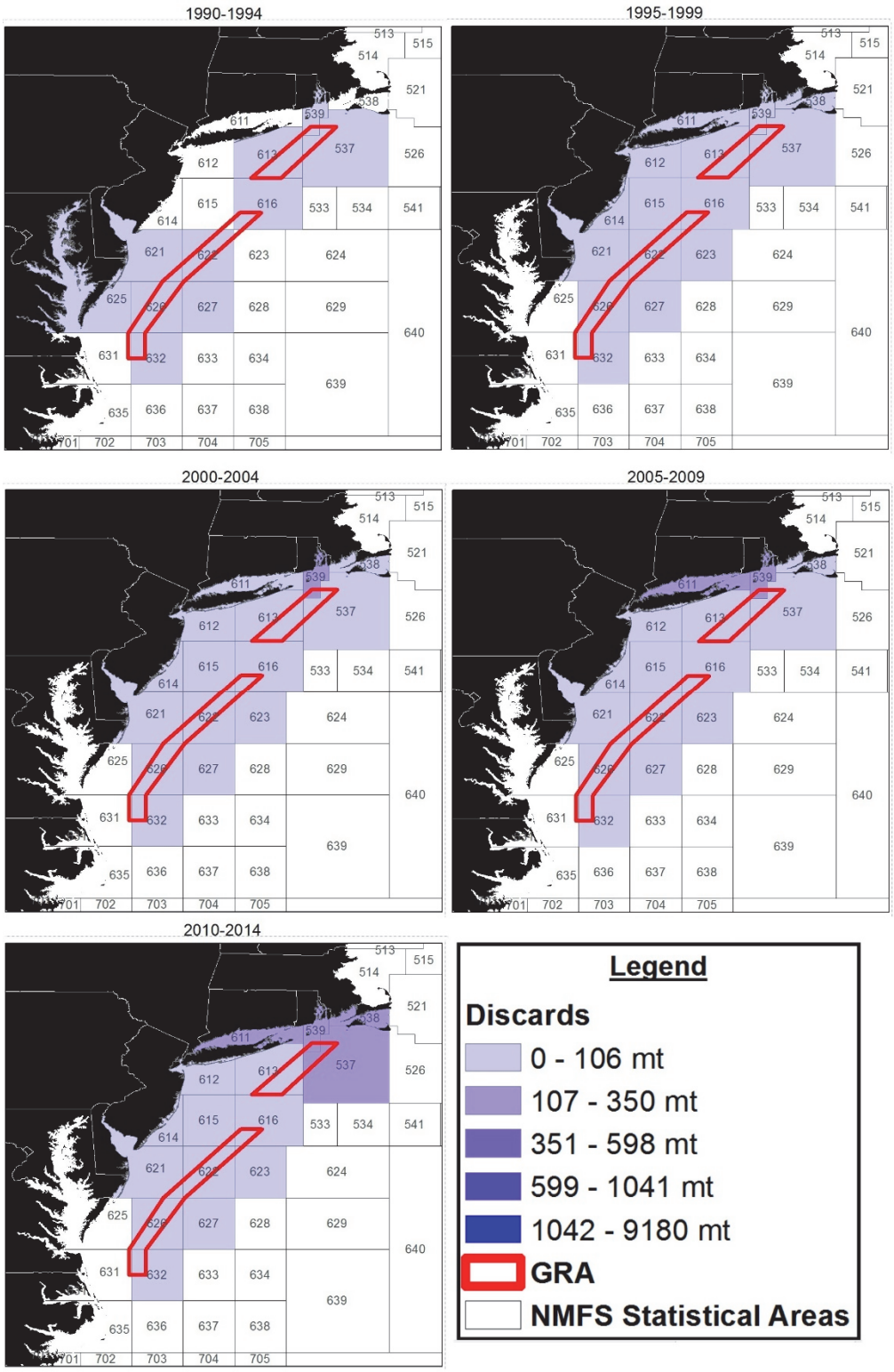


Figure 5: Scup discards on small mesh (i.e. smaller than the minimum mesh size for scup) tows on trips with scup catch during the third quarter of the year, as shown in NMFS observer data. Discard observations are grouped by natural breaks (jenks) and aggregated by NMFS statistical area and 5-year time blocks. Neither GRA is in effect during this time of year.

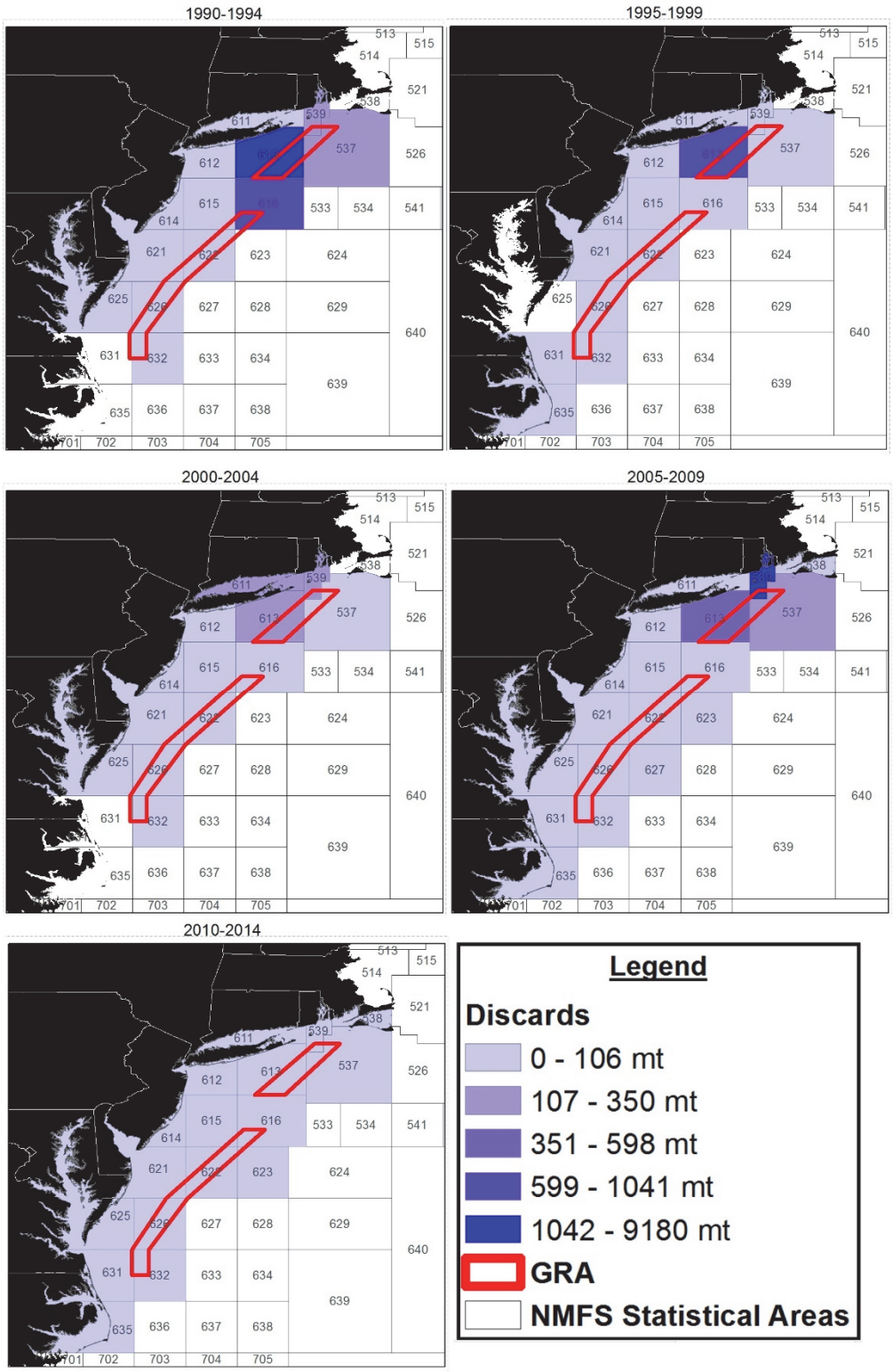


Figure 6: Scup discards on small mesh (i.e. smaller than the minimum mesh size for scup) tows on trips with scup catch during the fourth quarter of the year, as shown in NMFS observer data. Discard observations are grouped by natural breaks (jenks) and aggregated by NMFS statistical area and 5-year time blocks. This figure includes the time of year during which the northern GRA is in effect (November and December from 2001 through the present).

Commercial fishery scup discarding and the Gear Restricted Areas (GRAs)

by
Mark Terceiro and Alicia Miller
NEFSC Population Dynamics Branch

Executive Summary: The NEFSC Observer data show that since 1989 most of the observed commercial fishery scup discards occurred in small mesh tows in the Statistical Areas that include the GRAs. SBRM estimates of scup discards have been reduced in the GRA areas and months since 2001. Relatively high scup discards have occurred recently (2009-2010) outside the GRA areas and months. The NEFSC Fishery Observer, Dealer, Vessel and Trawl Survey data, and the stock size and mortality estimates that result once this information is integrated within the stock assessment, indicate that the GRAs have likely reduce the discard mortality of small scup, and are responsible for the improved post-recruitment survival of these small scup.

Introduction

Broad scale Gear Restricted Areas (GRAs) for scup were implemented in November 2000 under the framework provisions of the FMP to reduce discards of scup in the small mesh fisheries for *Loligo* squid and silver hake. Initially two Northern Areas off Long Island were implemented for November through January, while a Southern Area off the mid-Atlantic coast was implemented for January through April. The size, boundaries, and other measures of the GRAs were modified in late 2000 and again in 2001 and 2005 in response to commercial fishing industry recommendations. Currently the single Northern GRA restricts the use of codend mesh less than 5.0 inches (127 mm) during November and December, while a Southern GRA is in effect from January 1 through March 15.

Observer Data

The Northern and Southern GRAs lie mainly in NEFSC statistical reporting areas (statistical areas) 537, 539, and 613 (Northern GRA) and 615, 616, 621, 622, 623, 626, and 632 (Southern GRA; Figure 1). Over the 1989-2013 (preliminary) time series, very little scup discard was observed in statistical area 632. Statistical areas 611 and 538, which are not included in the GRAs, also were the source of 'significant' discards (cumulative total observed scup discards > 10,000 lbs; Figure 2). The other nine statistical areas that include the GRAs accounted for 1.474 million (84%) of the 1.767 million lbs of cumulative total observed scup discards from January 1989 through December 2013 (Figure 3). It should be noted that about 80% of the cumulative total observed scup discards in area 623 occurred in a single tow (~150,000 lbs) in 1998 (Figure 3).

Both the observed discards (as a function of both increased fishing activity for scup and increased sampled trip number) and estimated fishery discards (as a function of increased fishery quotas and therefore increased fishing activity for scup) have generally increased as the fishery quotas have increased since 2005 (Figure 4), although the observed discard percentage of total catch has decreased (Figures 5-6). Scup commercial fishery estimated discards remain an important component of the commercial fishery removals and averaged about 25% of the

estimated commercial catch during 2010-2012 (100% commercial fishery discard mortality is assumed).

Within the nine important GRA statistical areas that account for 84% of observed scup discards over the 1989-2013 time series, 24% was observed in 'large' mesh tows (codend or liner < 4.5 [114 mm] or 5.0 in [127 mm], 35% in 'small' mesh tows (larger than 2.125 in [54 mm] and smaller than 4.5 or 5.0 inch), and 41% in 'squid' mesh tows (equal to or less than 2.125 inch; Figure 7). The distribution of observed discards varies by statistical area, season, and mesh size. In the northern GRA statistical areas (537, 539, 613) 'large' mesh discards were observed mainly in November and December, although large mesh discards also occur in January and May in area 613 (Figure 8). Northern GRA area 'small' mesh discards were observed mainly in November and December in area 613 (Figure 9). Northern GRA area 'squid' mesh discards were observed mainly in May and June in areas 537 and 539 and in November and December in area 613 (Figure 10). In the important southern GRA statistical areas (615, 616, 621, 622, 623, 626), 'large', 'small' and 'squid' mesh discards were observed mainly in January through April (Figures 11-13).

The NEFSC Observer data show that since 1989 most of the observed scup discards occurred in small mesh tows in the Statistical Areas that include the GRAs. In the winter-spring (February-April in NEFSC survey data; January-March in Observer data) during the pre-GRA years of 1998-2000, most scup were distributed within the eventual Southern GRA (Figure 14). Observer data indicated scup discards both within the eventual Southern GRA and northward into the eventual Northern GRA. During 2010-2012, scup continued to be distributed within the Southern GRA. Observer data continued to indicate scup discards both within and along the northeastern boundaries of the Southern GRA and northward along the 50 fathom depth contour into the Northern GRA (Figure 15).

In the fall (September-October in NEFSC survey data; November-December in Observer data) during the pre-GRA years of 1998-2000, survey data indicated that nearly all scup were distributed well inshore of the eventual Northern GRA (Figure 16). Observer data from 1-2 months later in the year, however, indicated scup discards both within the eventual Southern GRA and northward along the border of the eventual Northern GRA. During 2010-2012, scup continued to be distributed inshore of the GRAs at the time of the fall survey. Observer data continued to indicate scup discards within the Southern GRA and northward along the 50 fathom depth contour into and around the Northern GRA (Figure 17).

Observed discard length frequencies for both the pre-GRA years of 1998-2000 and the most recent years of 2010-2012 within the important Northern and Southern GRA Areas indicate the observed discards at length consist of sublegal fish (less than 9 inches total length <= 8 inches fork length <= 20 cm fork length; Figures 18-19). NEFSC survey length data indicated that during 1998-2000 most of the fish sampled from offshore Long Island and to the south in the winter, spring and fall were fish <= 20 cm fork length (ages 1 and 2 in the spring, ages 0 and 1 in the fall; Figures 20-22). During 2010-2012, increased numbers of fish > 20 cm fork length were evident in waters north of Hudson Canyon (Figures 23-24). In the winter and spring surveys, scup were distributed mostly within the Southern GRA. Fish sampled in the fall survey during September-October were nearly all still outside the Northern GRA, but as noted earlier, the Observer data indicate that by November significant amounts of scup were discarded within the Northern GRA.

Current Assessment Discard Estimates

The NEFSC Fishery Observer Program has collected information on landings and discards in the commercial fishery since 1989. The method currently used in the scup stock assessment uses geometric mean scup discards to scup landings (GMDL) ratios for trips catching scup to estimate discards. The ratios of discards to landings are stratified by landings level (for trip landings < 300 kg (661 lbs), the 'bycatch fishery'; or => 300 kg, the 'directed fishery') and half-year, and then multiplied by corresponding observed scup landings from the NEFSC Dealer Report database to provide estimates of scup discards. Geometric mean rates (re-transformed, uncorrected, mean ln-transformed Discards to Landings per trip) are used because the distributions of landings, discards and the ratio of discards to landings on a per-trip basis in the scup fishery are highly variable and positively skewed. Observed trips with both scup landings and discard were used to calculate per trip discard to landings ratios. Only trips with both non-zero scup landings could be used for this approach to avoid division by zero, which limits the amount of data that can be used in the estimation.

Of particular note is an extremely large 1998 'directed fishery' ratio and subsequent very high annual discard estimate (111,973 mt) based on the previously noted single trawl gear trip, with 93% of the discard from that trip attributable to a single tow in which an estimated 68 mt (~150,000 lbs.) of scup were captured. This tow was not lifted from the water and the captain of the vessel estimated the weight of the catch. There has been debate concerning the validity of the catch weight estimate and whether or not it was representative of other vessels or trips in the fishery. However, the observation was reported by a trained NEFSC observer and was therefore included in the initial calculation of the estimate of scup discards. Peer reviews of the scup assessment have since concluded that the 1998 estimate (173,690 mt) is infeasible, and it has been replaced by the mean of the 1997 and 1999 estimates (3,331 mt; Figure 4). Despite the uncertainty of the discard data, recent peer review panels (e.g, NEFSC 2008) have concluded that commercial discarding of scup has been high during most of the last twenty years, generally approaching or exceeding the commercial landings. Since the full implementation of the GRAs in 2001, estimated discards have averaged 35%-40% of the total commercial catch.

Estimated discards using the Standardized Bycatch Reporting Method (SBRM)

For this work, alternative estimates of scup discards using the SBRM were developed to ensure adequate sample size and better precision in developing fine temporal and spatial scale estimates of scup discards with which to evaluate to effect of the GRAs on the magnitude and pattern of discarding. SBRM estimates of scup discards (the ratio of trip scup discards to trip all species landings, raised by all species landings) were made by calendar quarter (4), stat area (20), and three mesh categories (large, small, squid). This provided 240 annual estimation strata, compared to the 4 strata used in the current assessment discard method (2 half years, directed trips, non-directed trips). Data were not sufficient to develop SBRM monthly estimates (i.e., too many of the 720 annual strata with no data).

This SBRM approach indicates that scup discards decreased from about 3,300 mt in 1991 to about 500 mt in 2000, with most discards (59%) occurring in areas that would eventually be in the GRAs (615, 616, 621, 622, 625, 626 in quarter 1; 537, 539, 613 in quarter 4). Discards have ranged between 500 and 1,500 mt since 2001, with the exception of 2009 and 2010 (3,200 and 2,600 mt, respectively). Since 2001, 53% of the discards have occurred outside the GRAs. The large discards in 2009-2010 were due mostly to squid mesh discards outside the GRAs: in squid mesh trips in the Northern GRA areas but in quarter 2.

The total scup discards and percent of discards in the GRAs is shown in Figure 25. Discard components in the Northern and Southern GRAs compared to discards in all other stat areas and quarters are shown in Figure 26, presented in a 100% stacked histogram. The SBRM indicates that estimated scup discards have been reduced in the GRA areas and months since 2001. Relatively high scup discards have occurred recently (2009-2010) outside the GRA areas and months.

Summary

The NEFSC Fishery Observer, Dealer, Vessel and Trawl Survey data, and the stock size and mortality estimates that result once this information is integrated within the stock assessment, indicate that the GRAs have likely reduce the discard mortality of small scup, and are responsible for the improved post-recruitment survival of these small scup.

Figure 1. NEFSC Statistical Reporting Areas and Scup Gear Restricted Areas (GRAs).

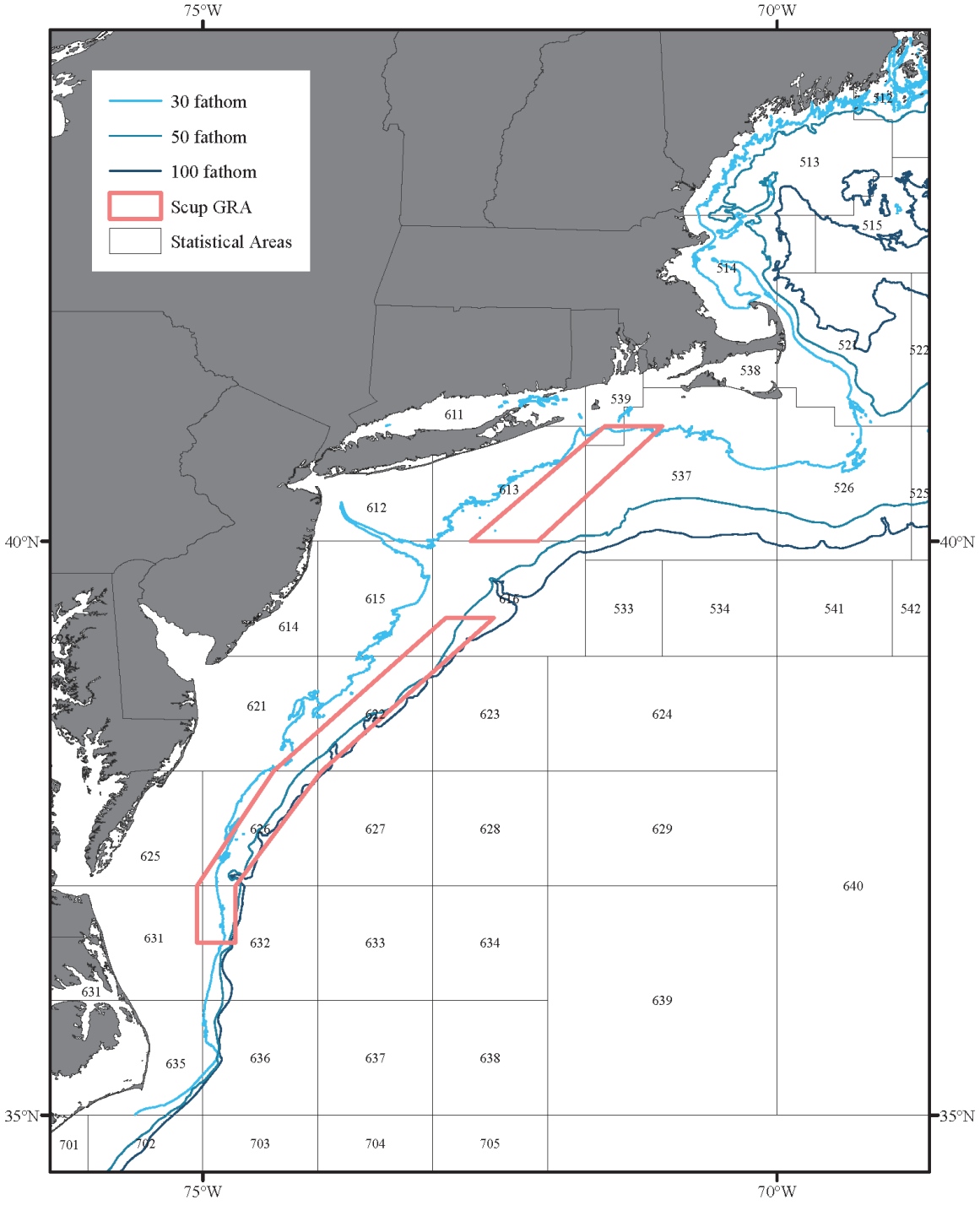


Figure 2. Observed scup discards (lbs) by NEFSC Statistical Area.

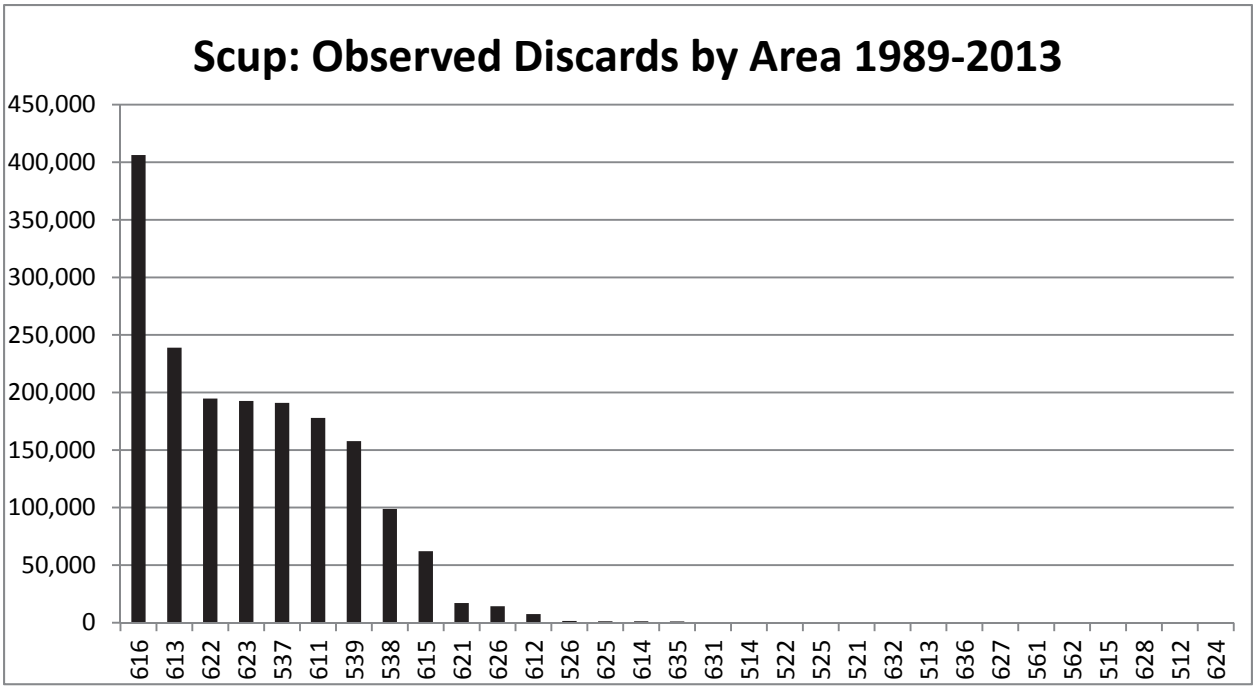


Figure 3. Observed scup discards (lbs) for statistical areas within the GRAs with time series total greater than 10,000 lbs.

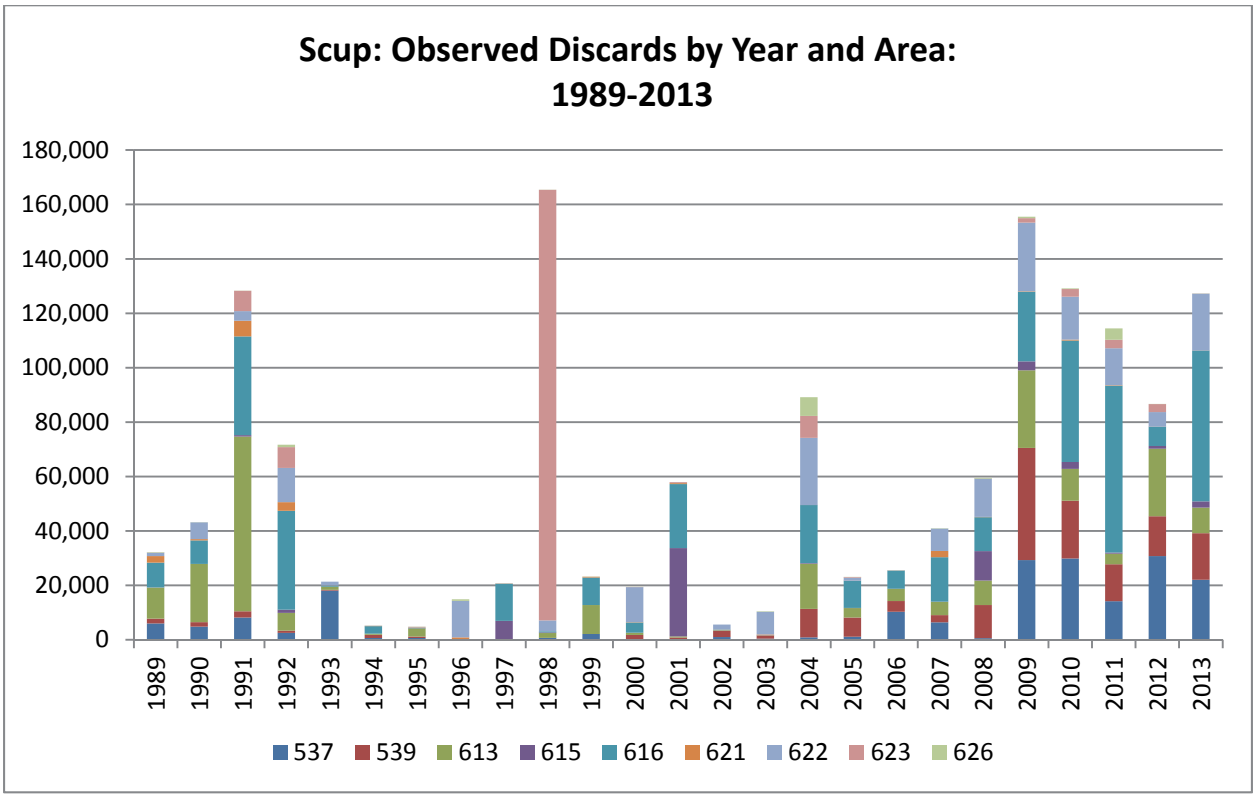


Figure 4. Estimated (metric tons) and Observed (lbs) scup discard trends.

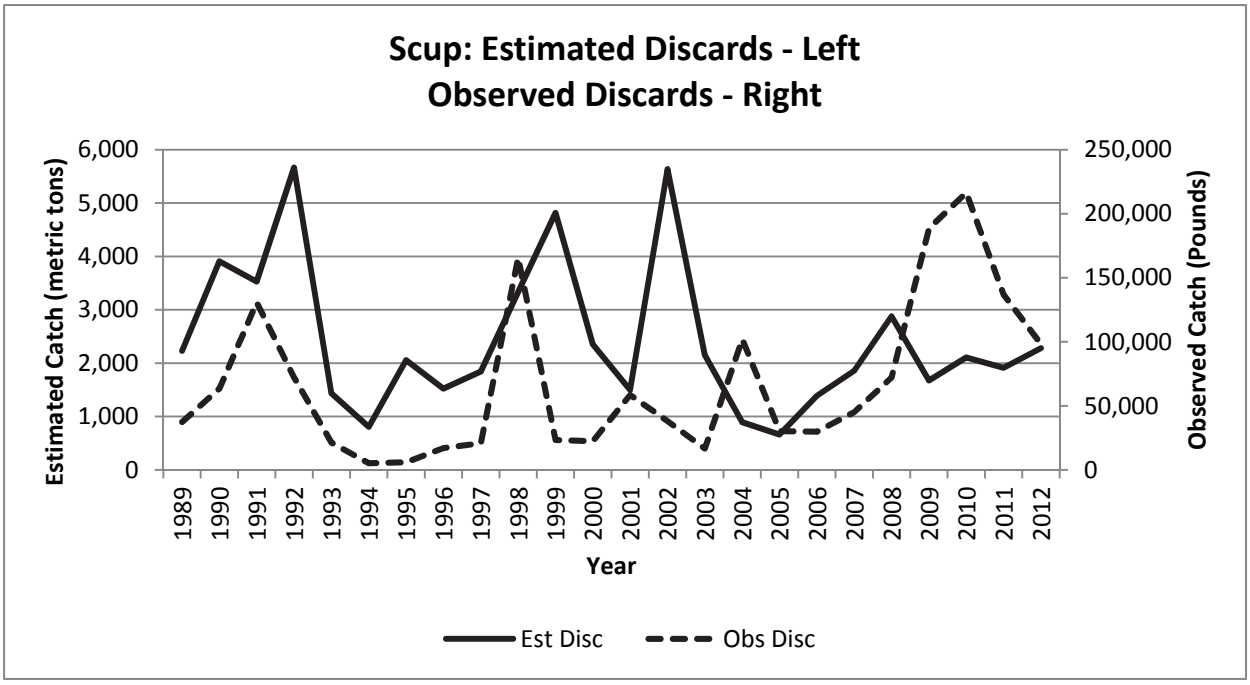


Figure 5. Observed Kept (blue; KLB; Landings) and Discard (red; DLB).

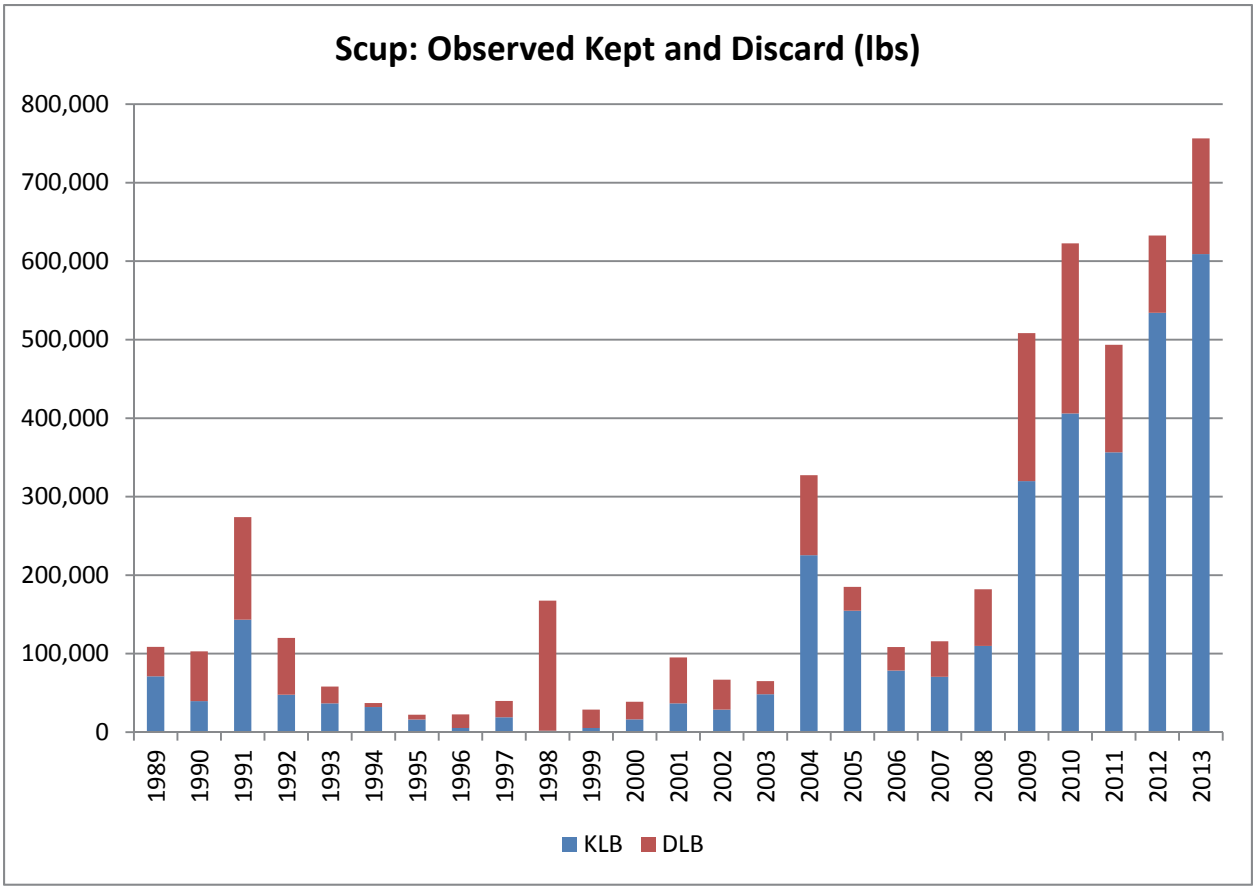


Figure 6. Observed Discard Percentage of Total Scup Catch.

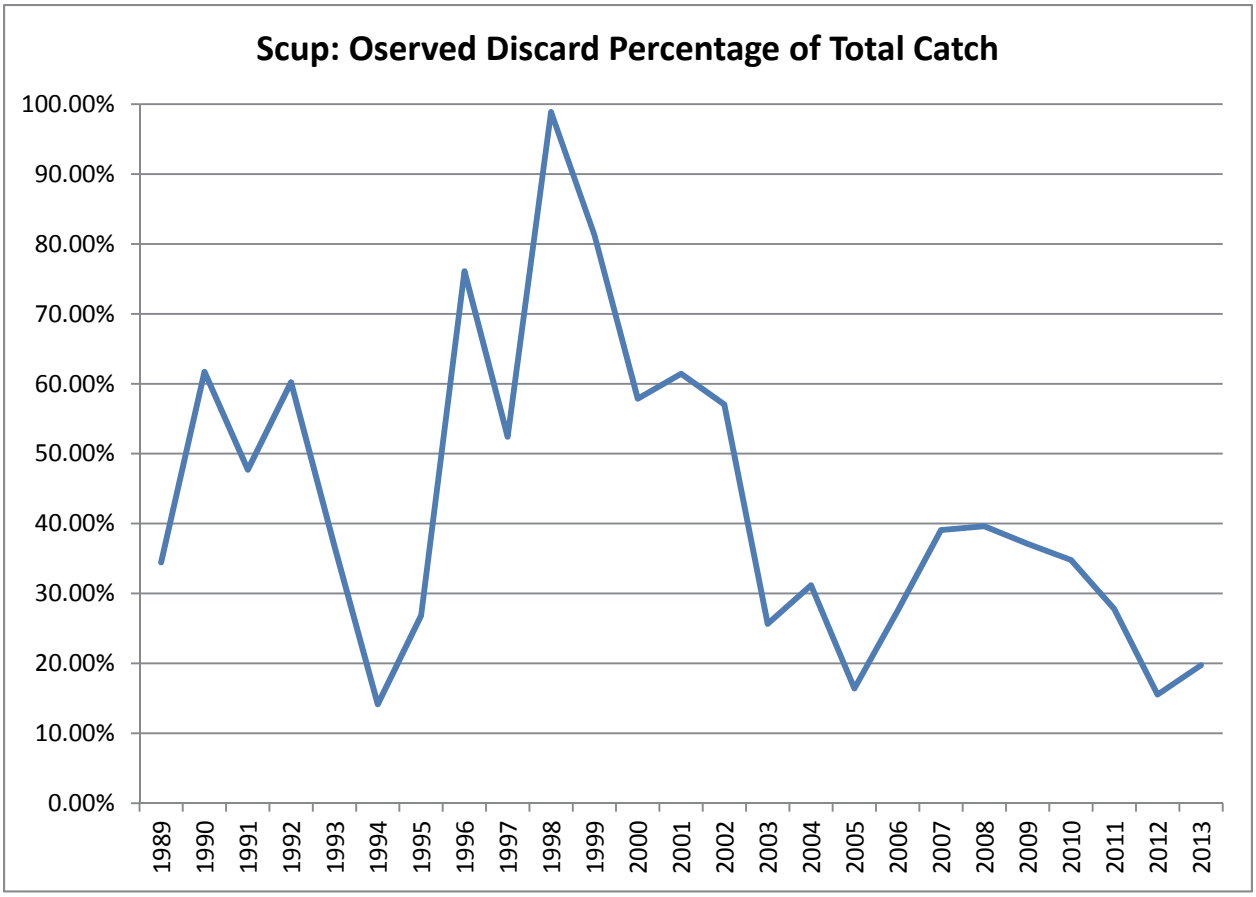


Figure 7. Observed scup discards by statistical area and codend/liner mesh categories. 'Large' is equal to or larger than 4.5 or 5.0 inch, depending on year; 'small' is between 2.125 and 4.5 or 5.0 inch; 'squid' is equal or smaller than 2.125 inch.

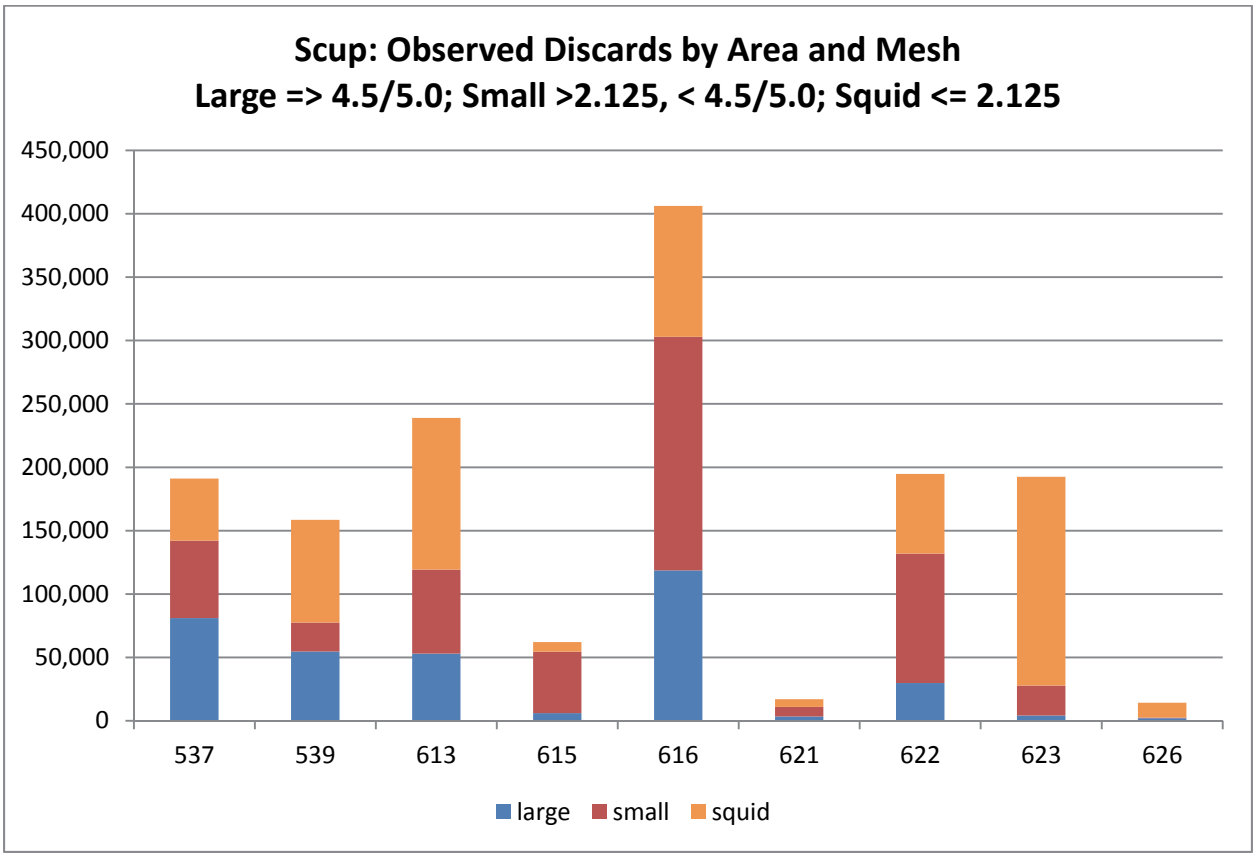


Figure 8. Northern GRA statistical areas 'large' mesh (equal to or larger than 4.5 or 5.0 inch, depending on year) Observed discards by month (Jan = 1, Dec = 12).

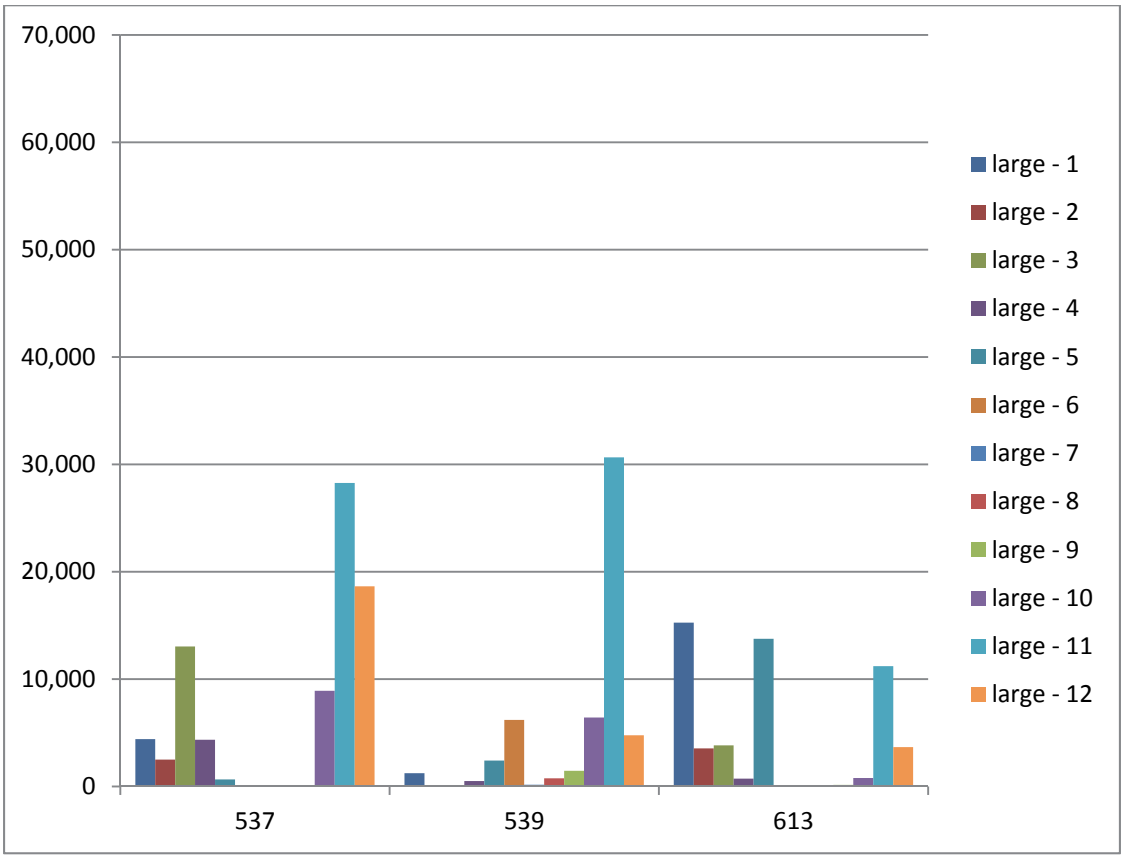


Figure 9. Northern GRA statistical area 'small' mesh (between 2.125 and 4.5 or 5.0 inch) Observed discards by month (Jan = 1, Dec = 12).

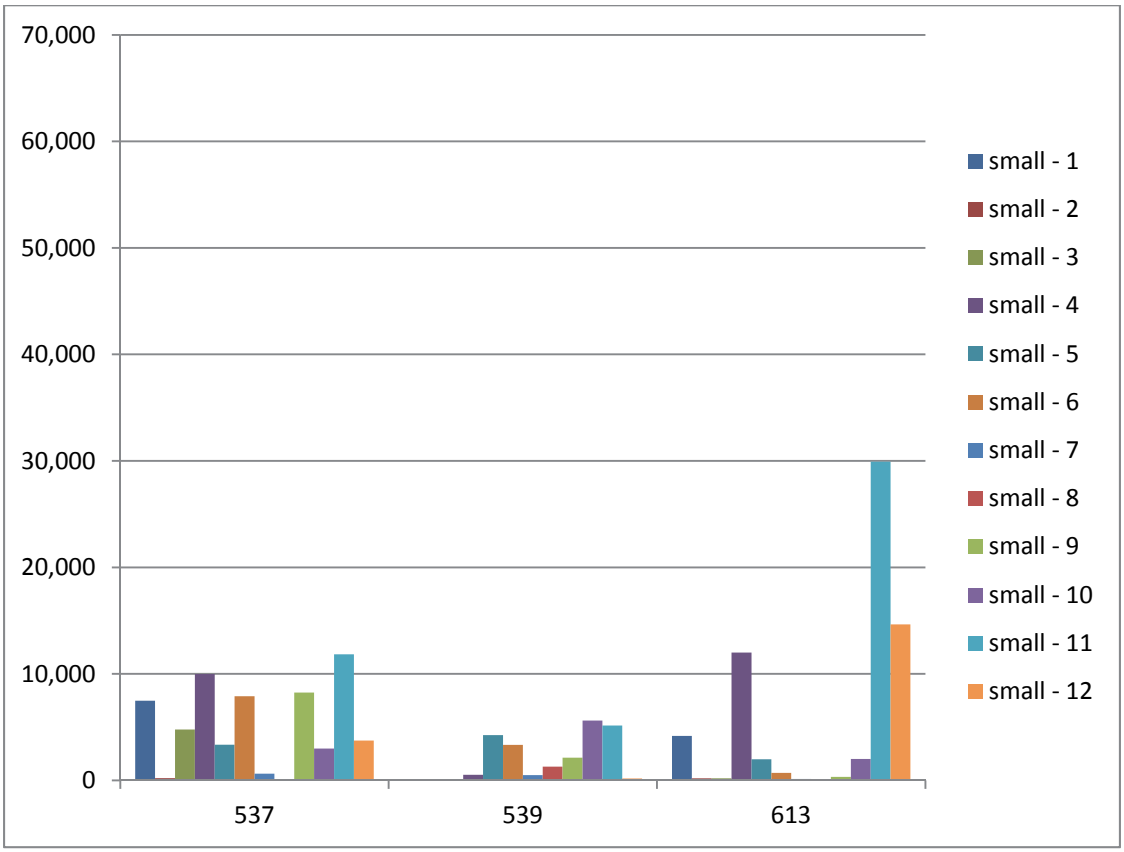


Figure 10. Northern GRA statistical area 'squid' mesh (equal to or smaller than 2.125 inch) Observed discards by month (Jan = 1, Dec = 12).

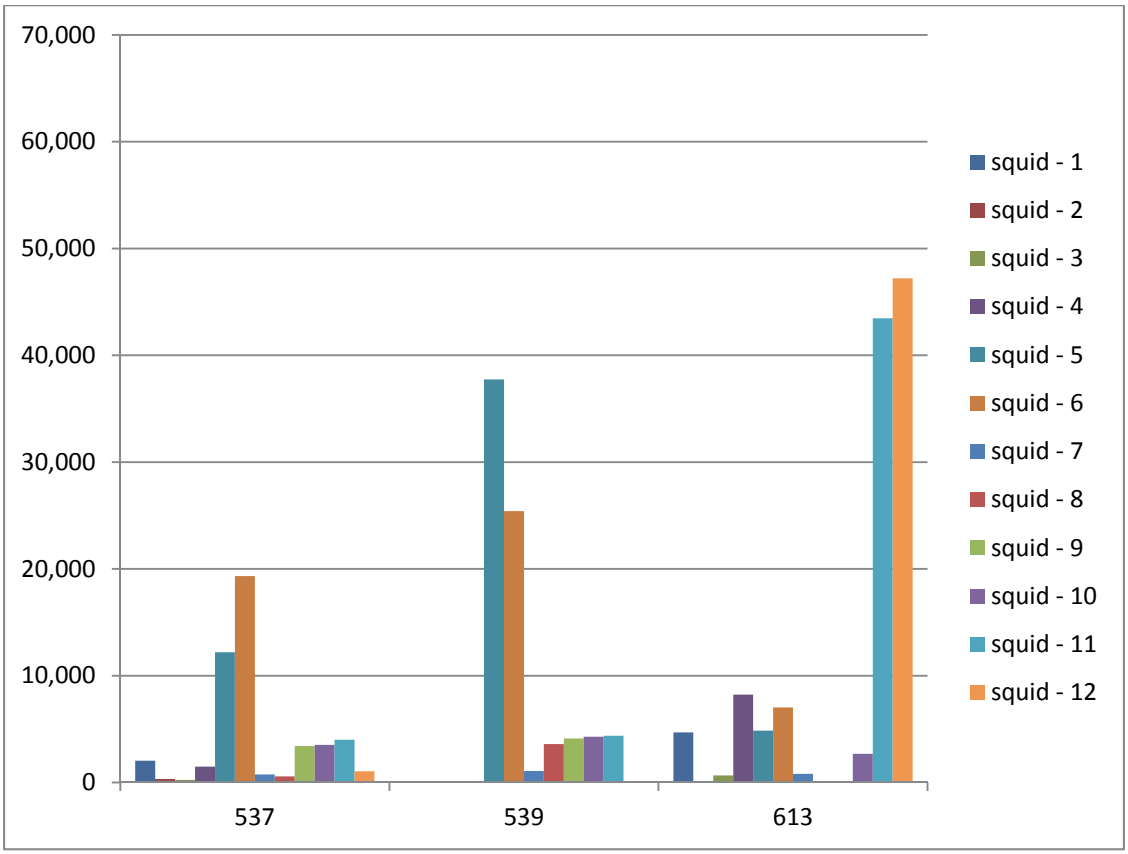


Figure 11. Southern GRA statistical areas 'large' mesh (equal to or larger than 4.5 or 5.0 inch, depending on year) Observed discards by month (Jan = 1, Dec = 12).

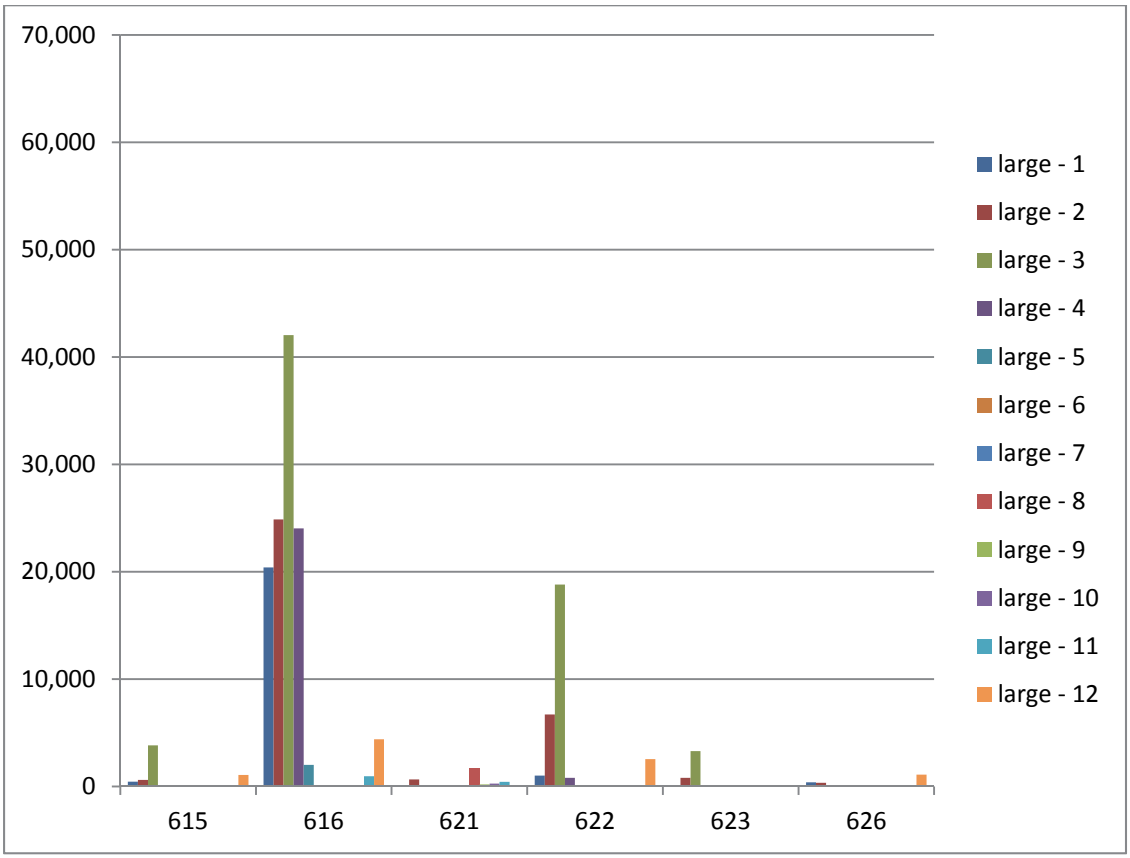


Figure 12. Southern GRA statistical area 'small' mesh (between 2.125 and 4.5 or 5.0 inch) Observed discards by month (Jan = 1, Dec = 12).

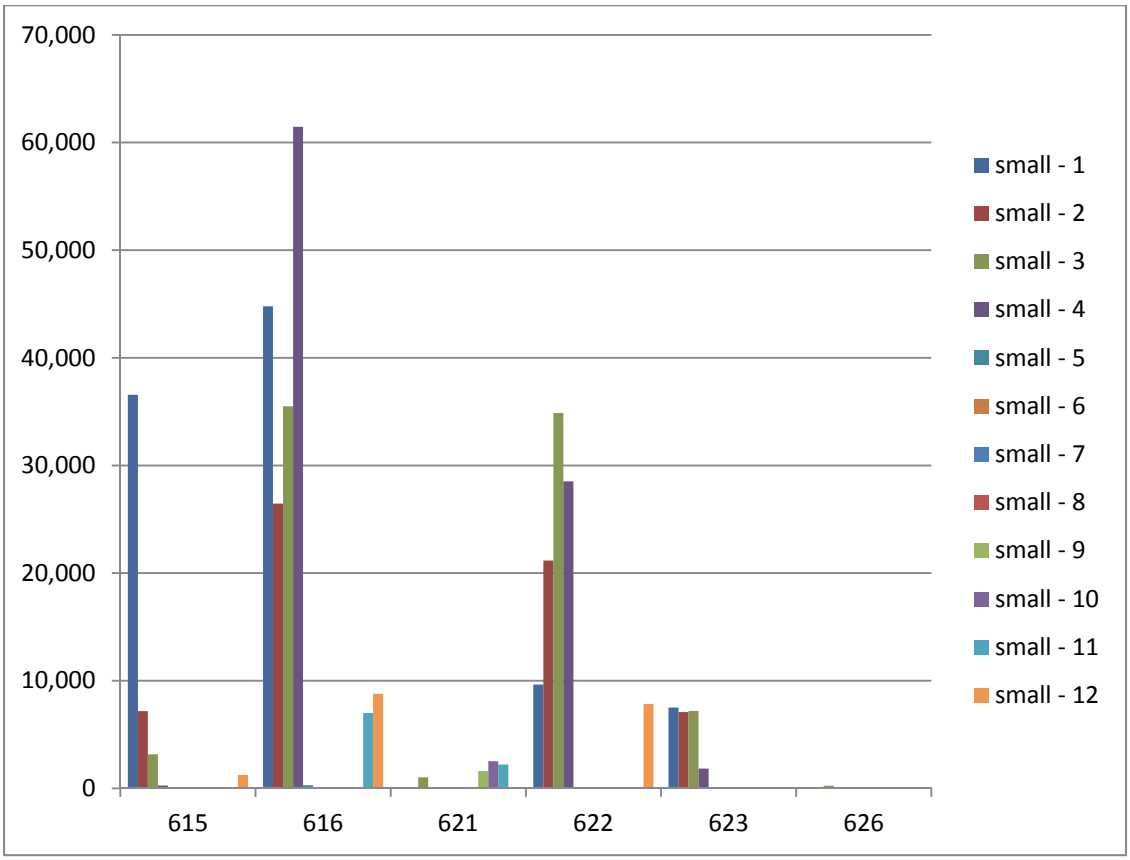


Figure 13. Southern GRA statistical area 'squid' mesh (equal to or smaller than 2.125 inch) Observed discards by month (Jan = 1, Dec = 12). The large bar in area 623 in March is a single tow discard event in 1998 that was observed to be an estimated 150,000 lbs.

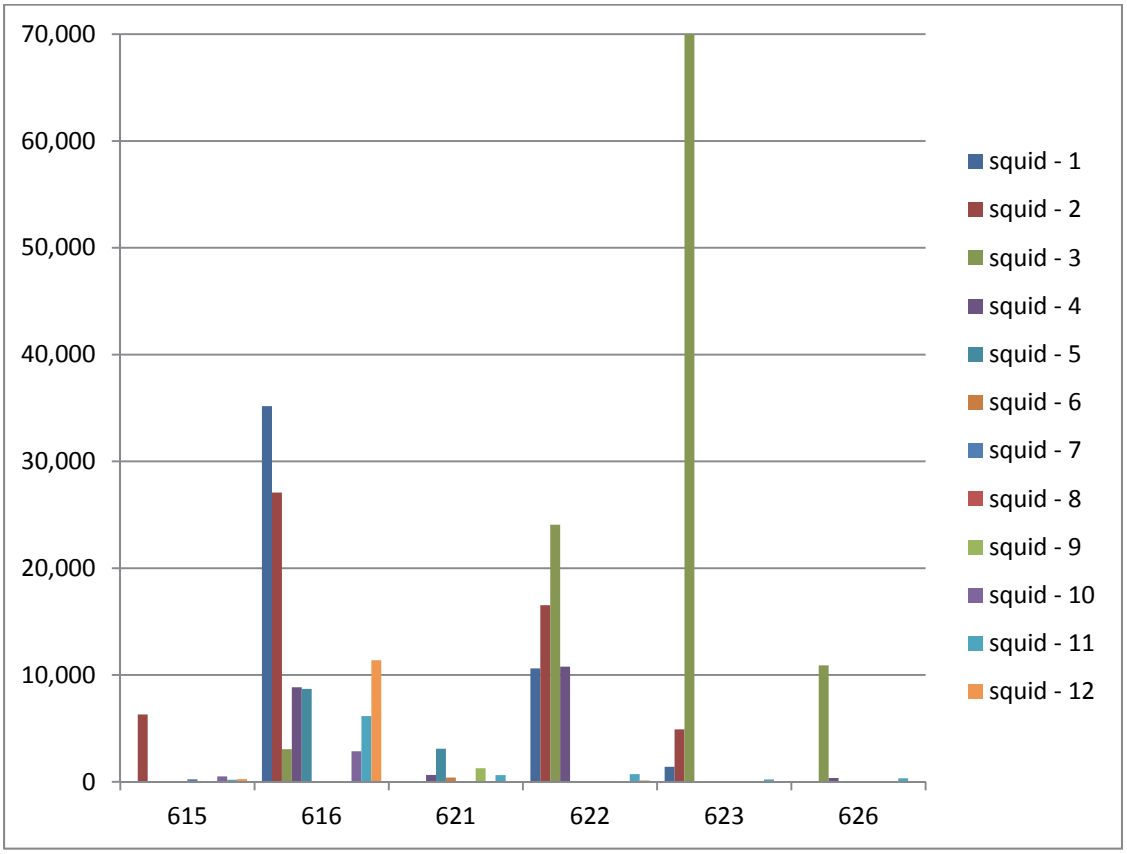


Figure 14. NEFSC winter and spring trawl survey catches of scup (kg/tow; February-March) and Observed scup aggregate discard (metric tons; January-March) during 1998-2000. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

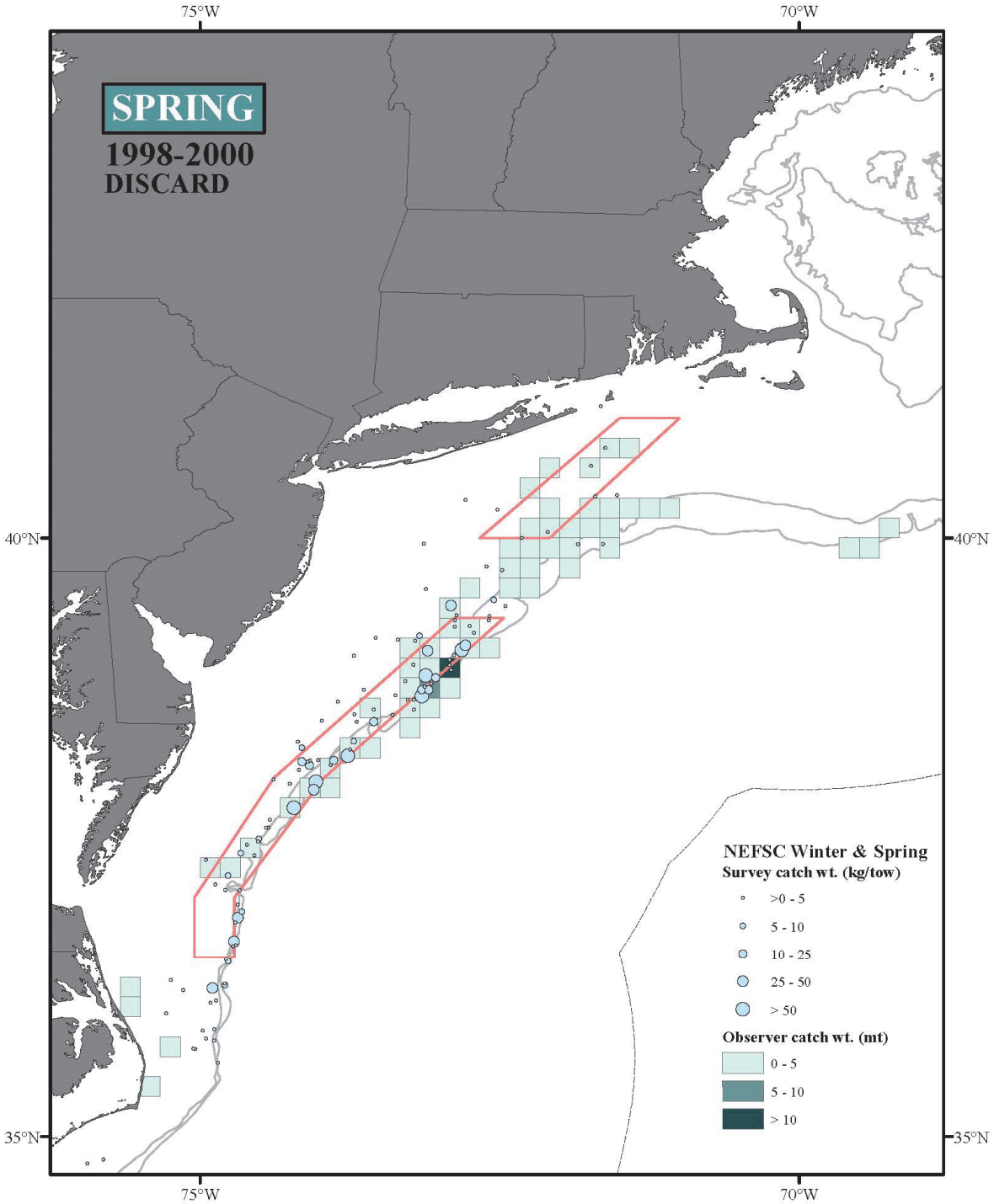


Figure 15. NEFSC winter and spring trawl survey catches of scup (kg/tow; February-March) and Observed scup aggregate discard (metric tons; January-March) during 2010-2012. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

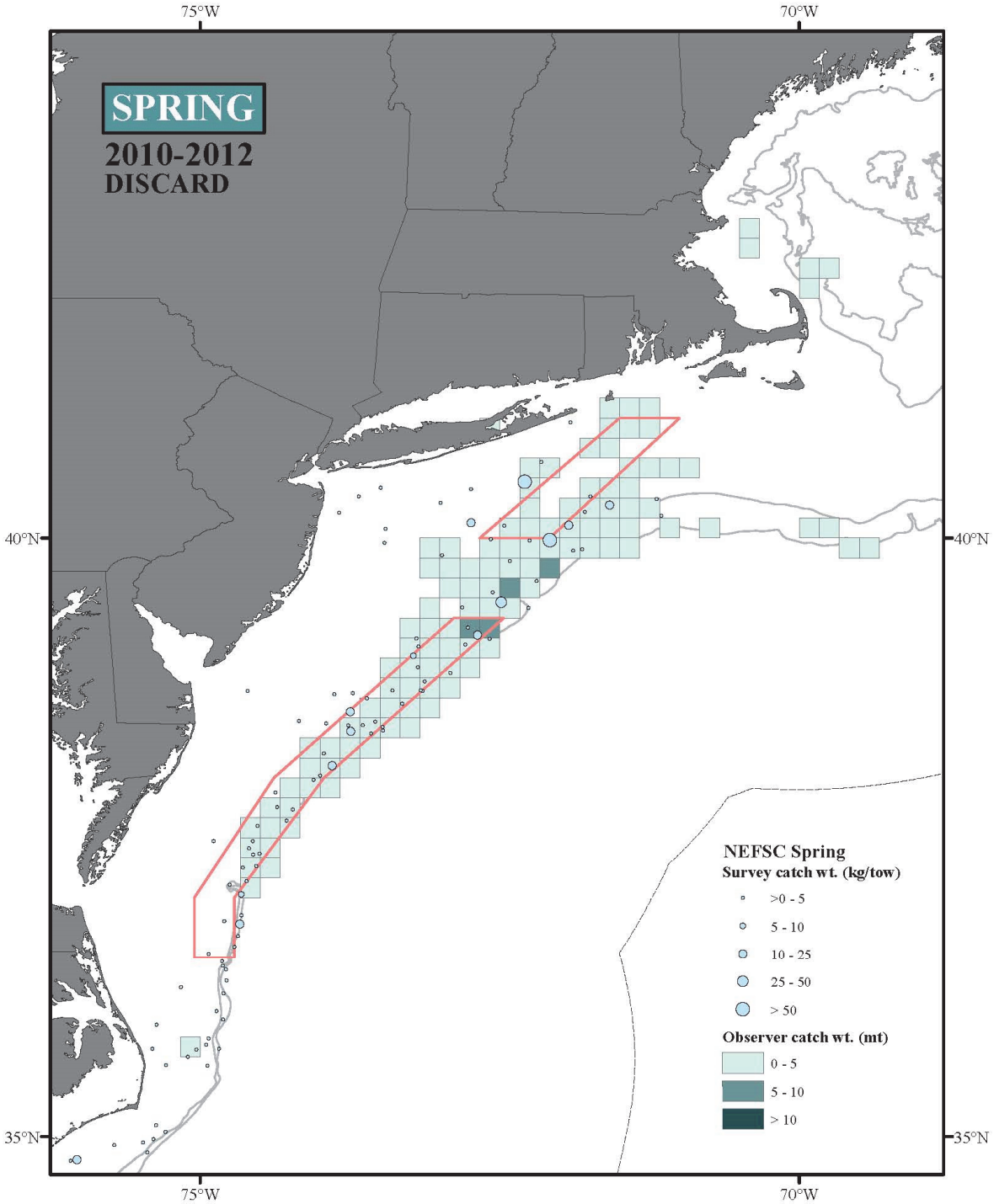


Figure 16. NEFSC fall trawl survey catches of scup (kg/tow; September-October) and Observed scup aggregate discard (metric tons; November-December) during 1998-2000. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

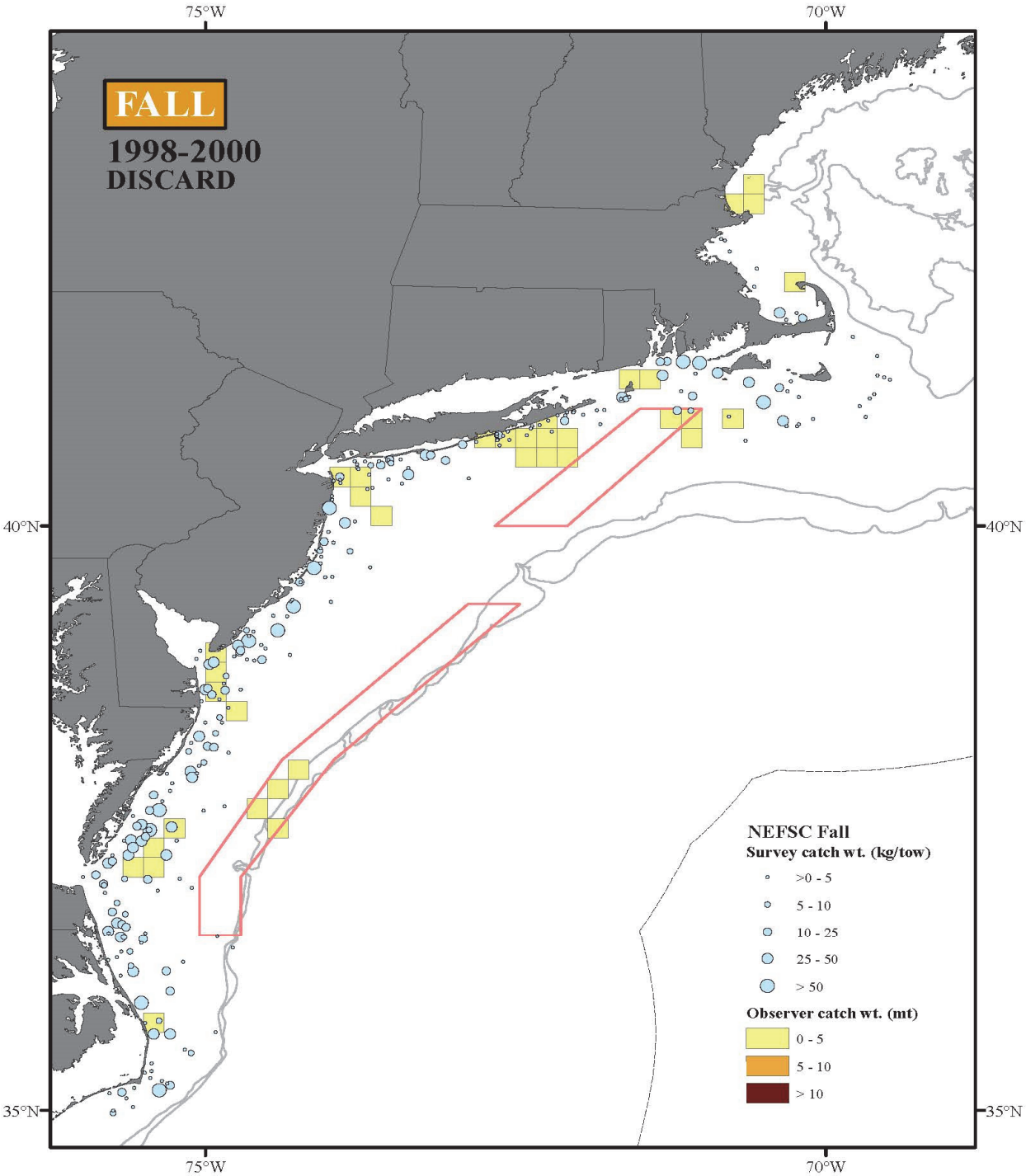


Figure 17. NEFSC fall trawl survey catches of scup (kg/tow; September-October) and Observed scup aggregate discard (metric tons; November-December) during 2010-2012. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

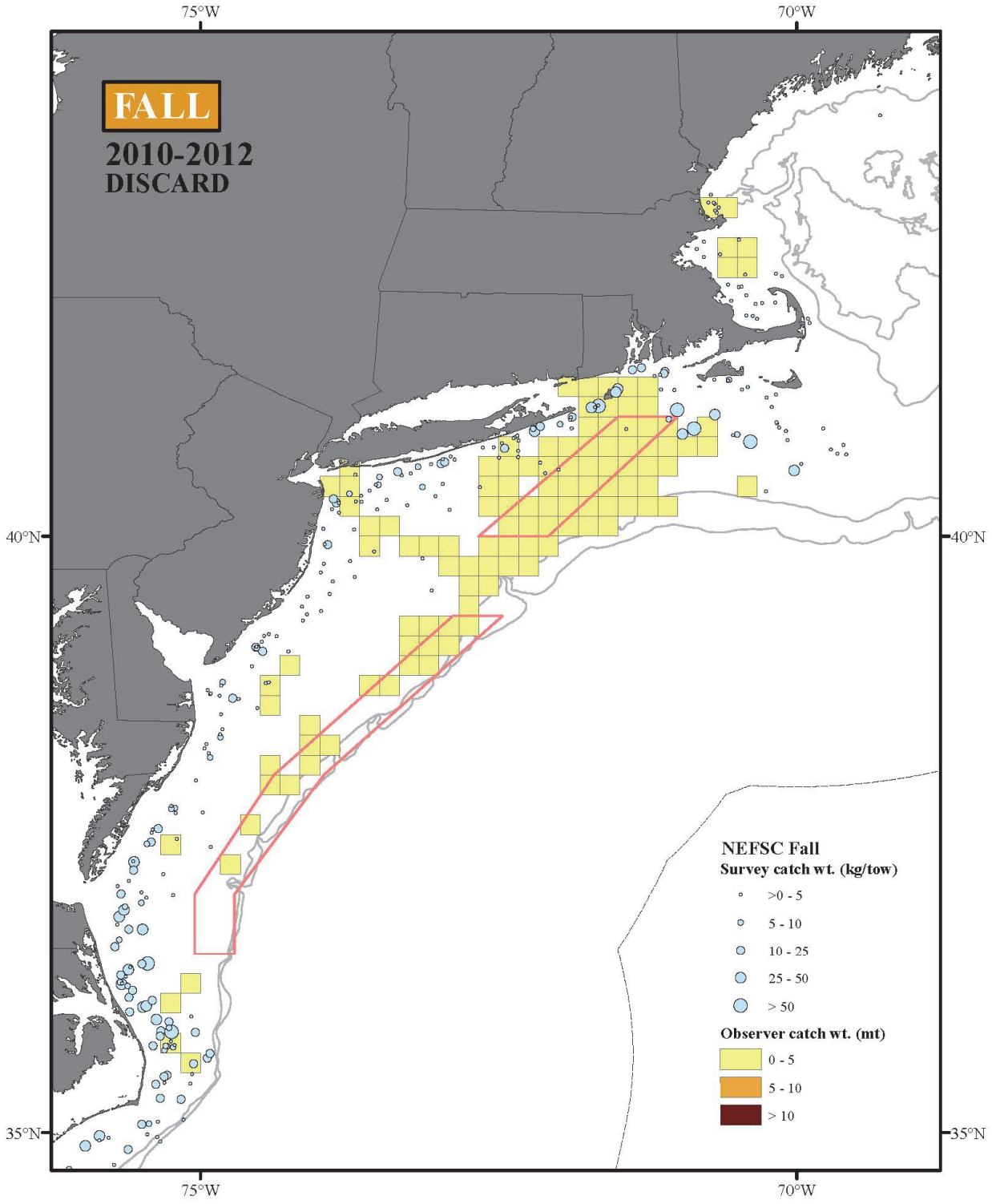
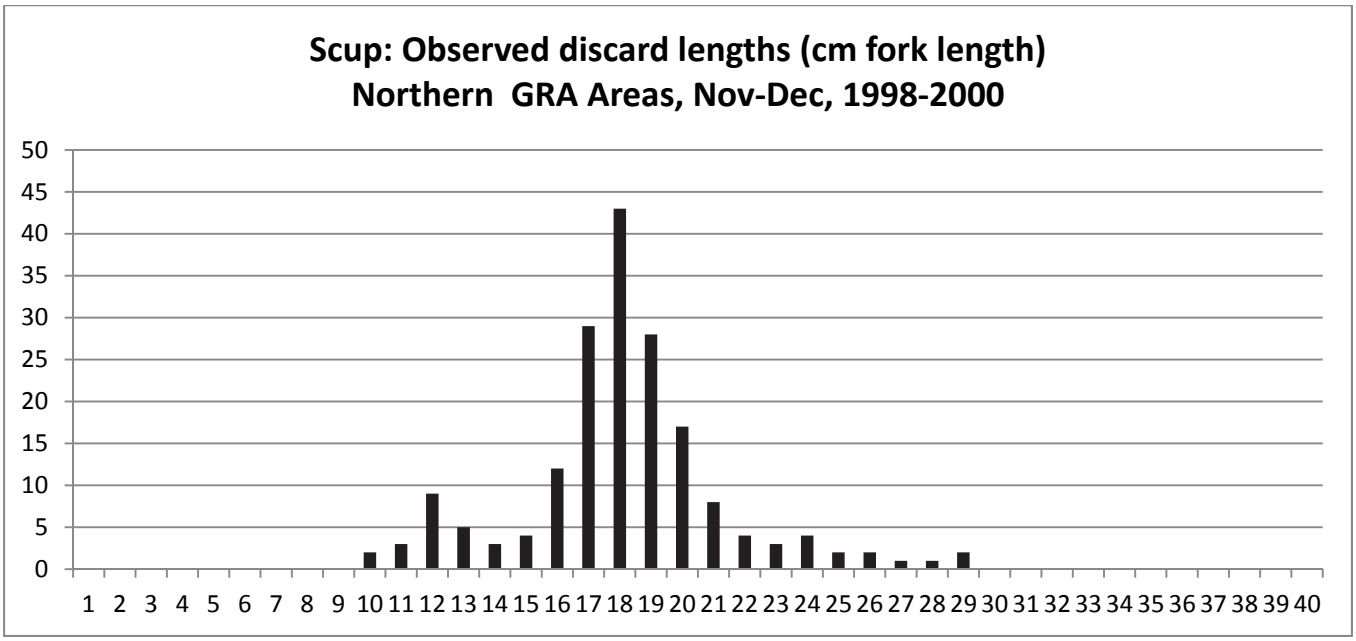


Figure 18. Observed scup discard lengths (cm fork length) in Northern GRA statistical areas during November-December: top 1998-2000, bottom 2010-2012.



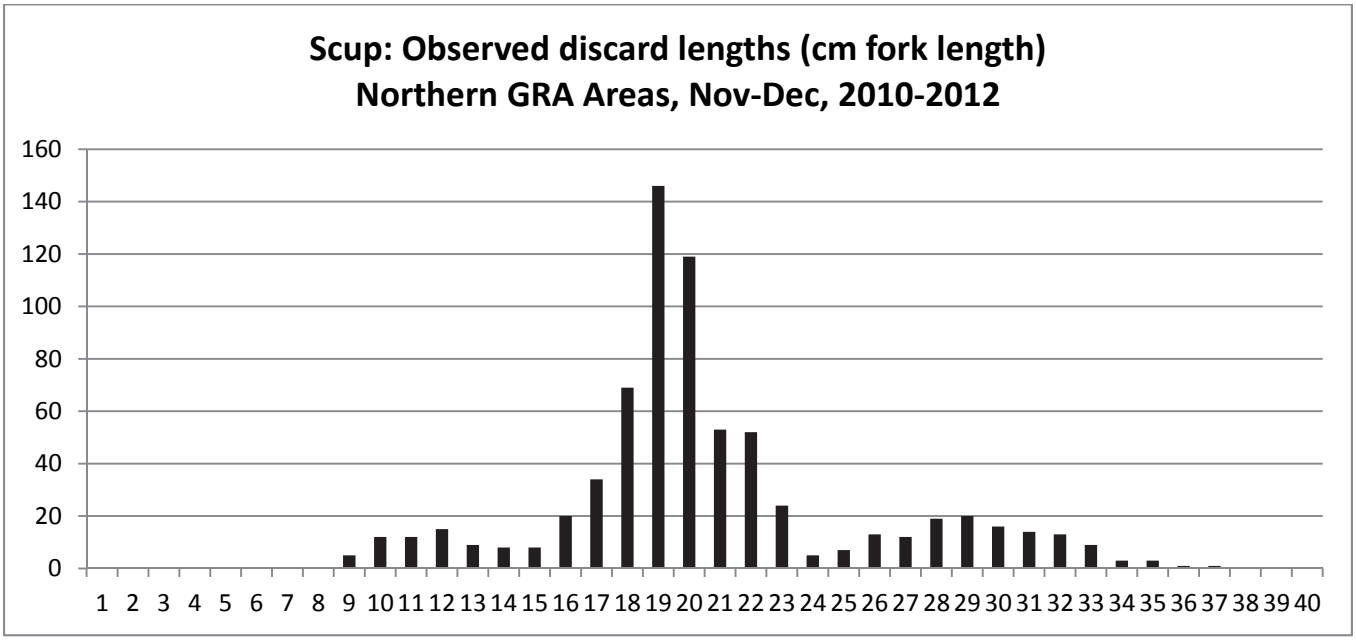
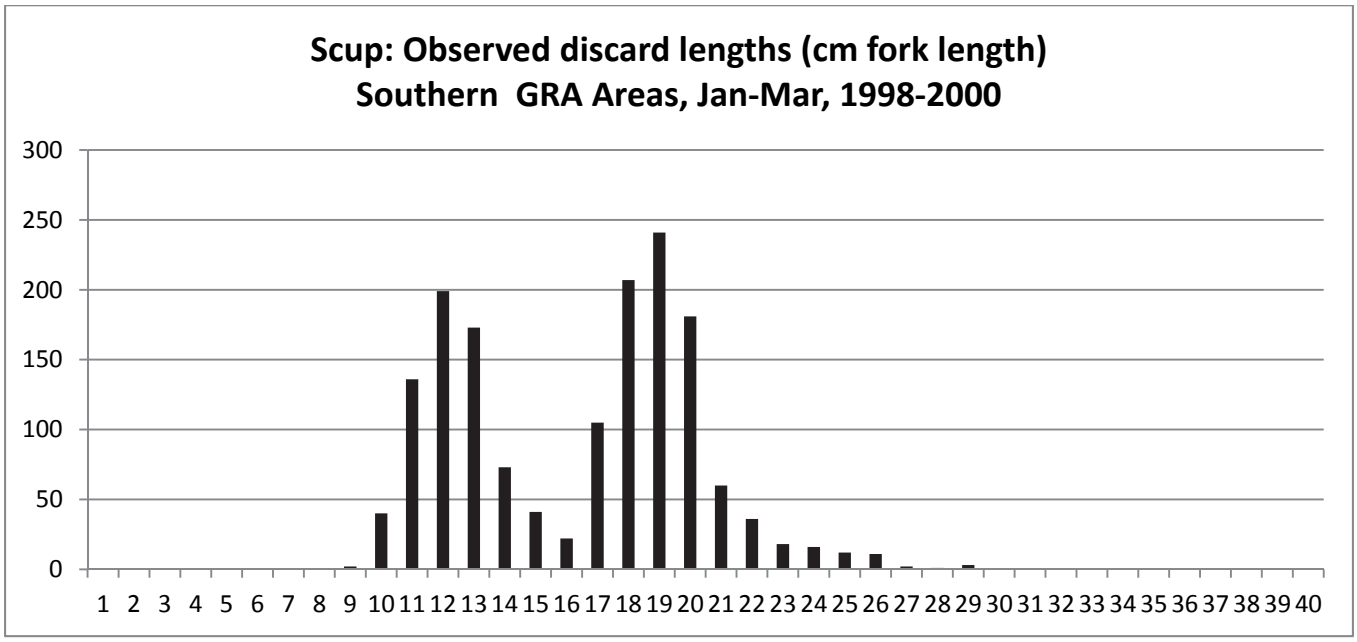


Figure 19. Observed scup discard lengths (cm fork length) in Southern GRA statistical areas during January-March: top 1998-2000, bottom 2010-2012.



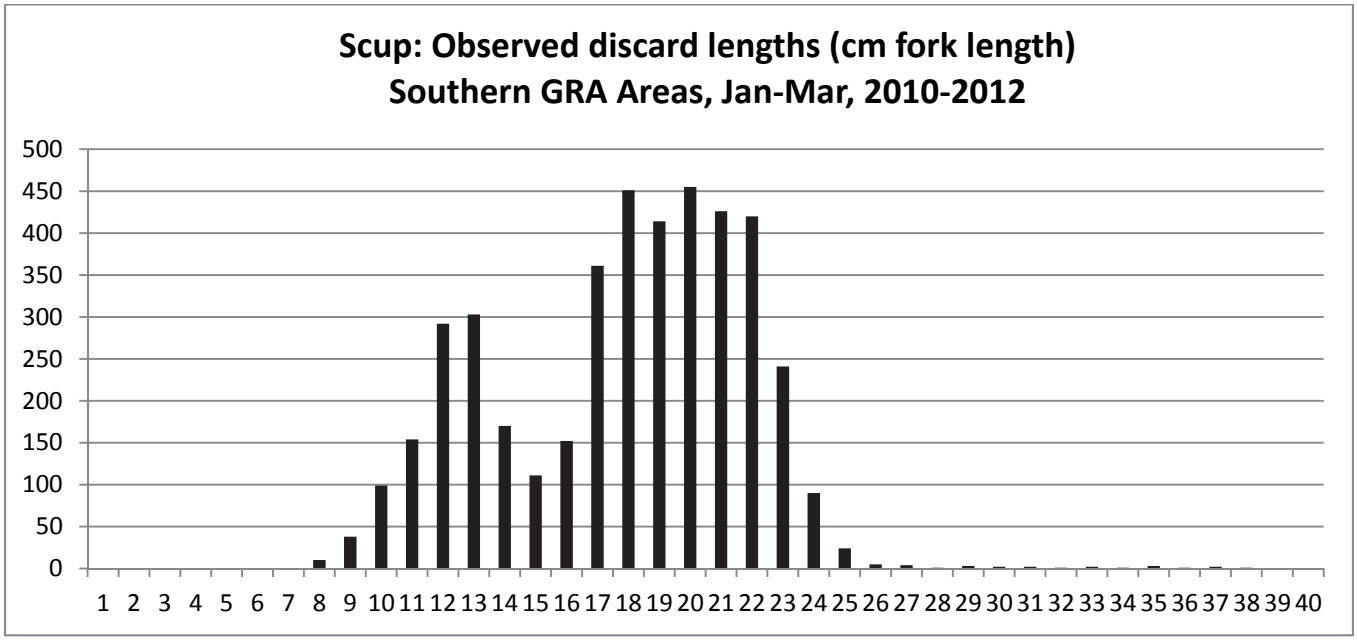


Figure 20. Size distributions of scup in NEFSC winter surveys 1998-2000. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

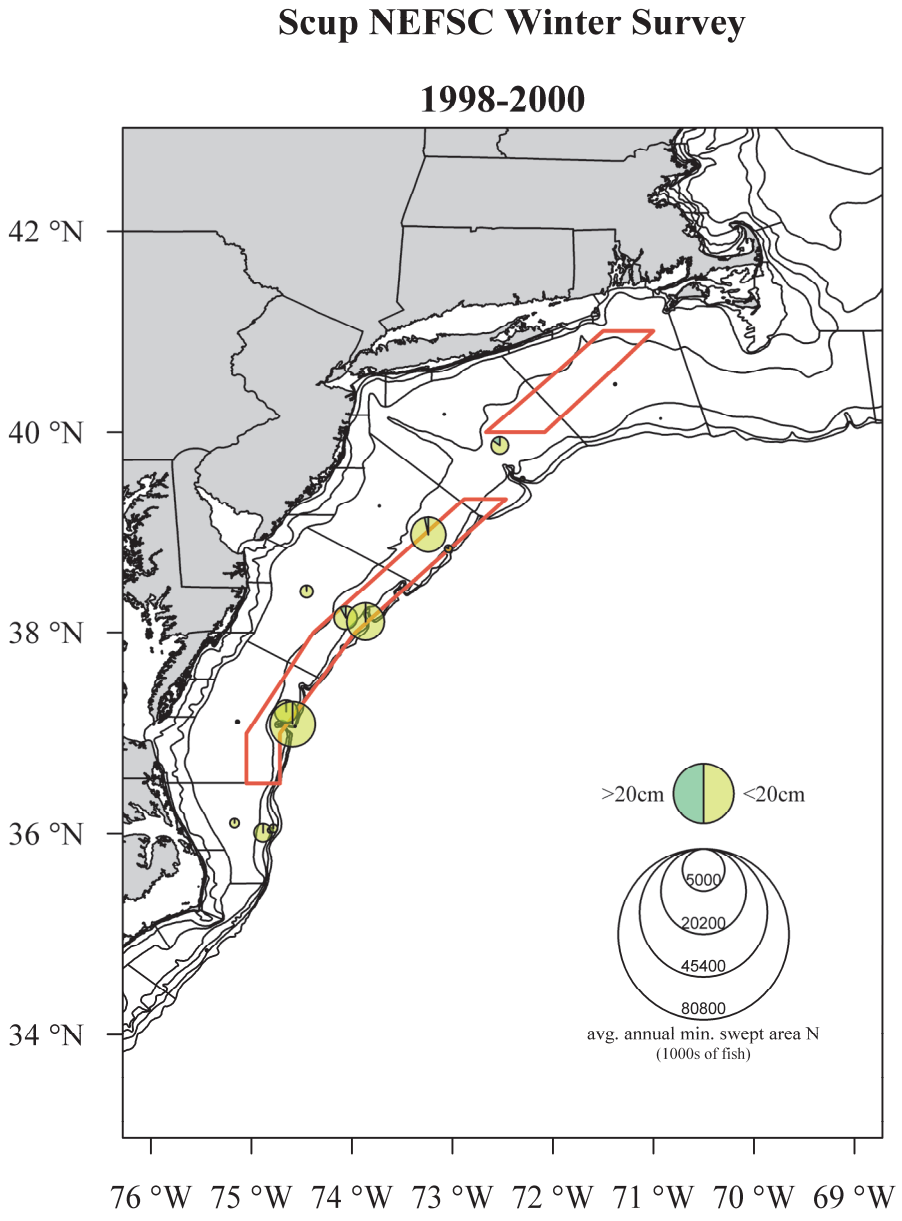


Figure 21. Size distributions of scup in NEFSC spring surveys 1998-2000. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

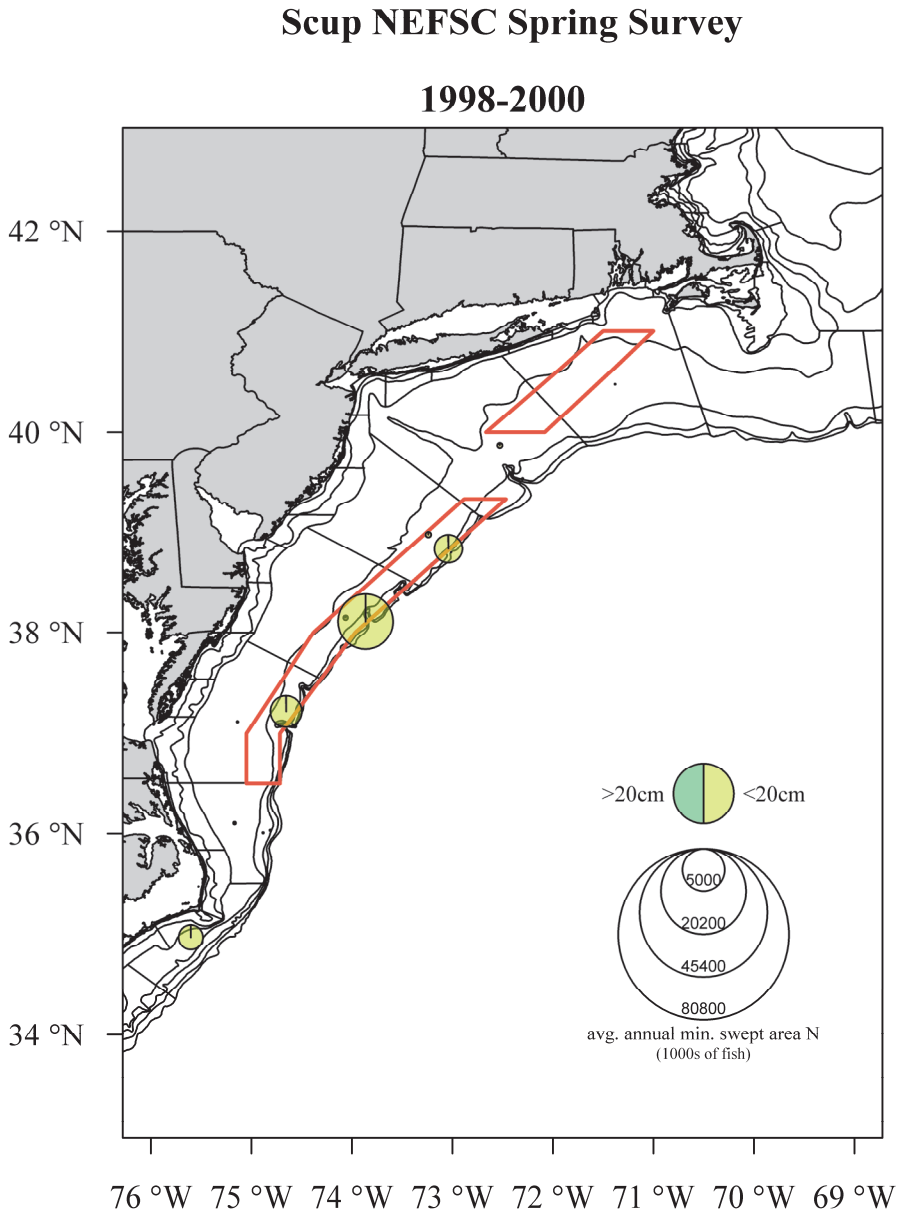


Figure 22. Size distributions of scup in NEFSC fall surveys 1998-2000. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

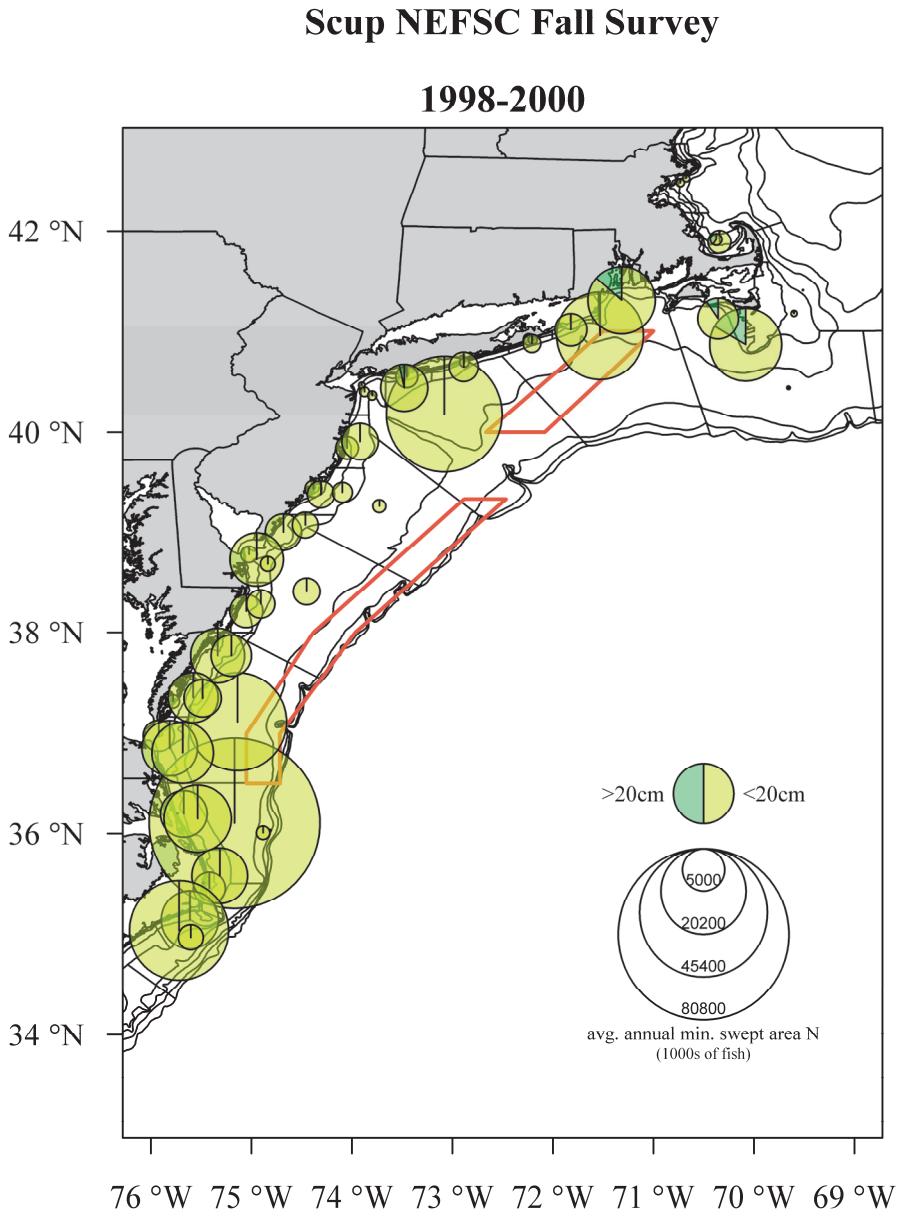


Figure 23. Size distributions of scup in NEFSC spring surveys 2010-2012. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

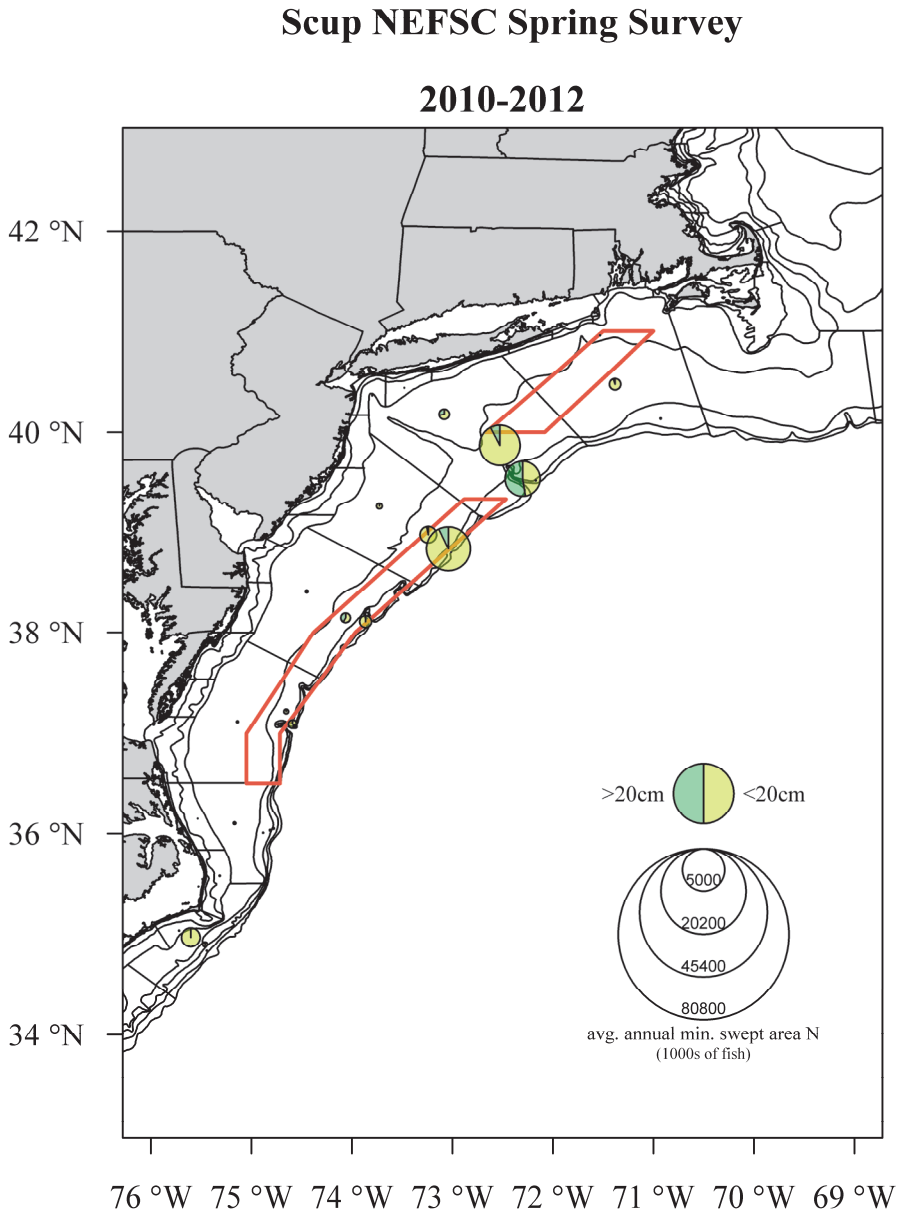


Figure 24. Size distributions of scup in NEFSC fall surveys 2010-2012. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

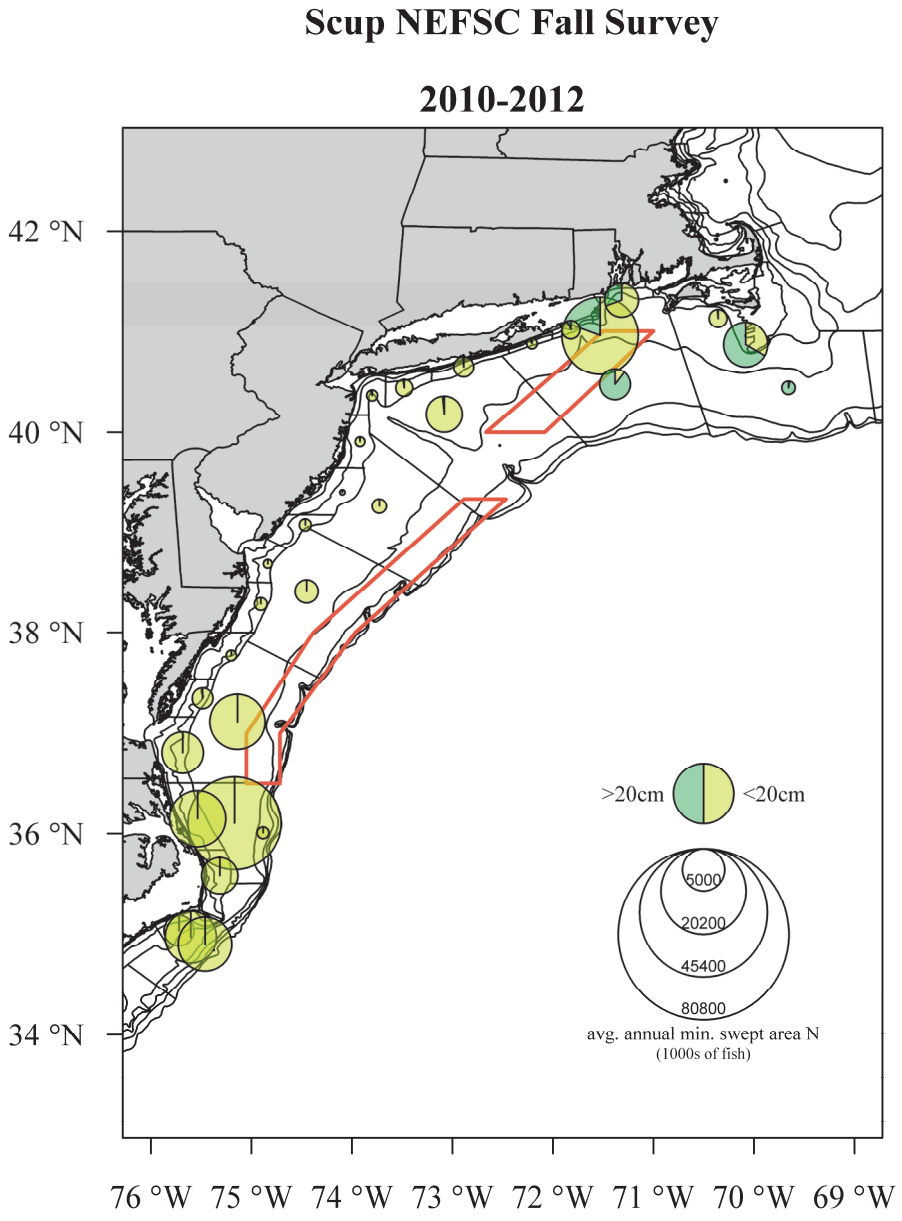


Figure 25. The total scup discards and percent of discards in the GRAs.

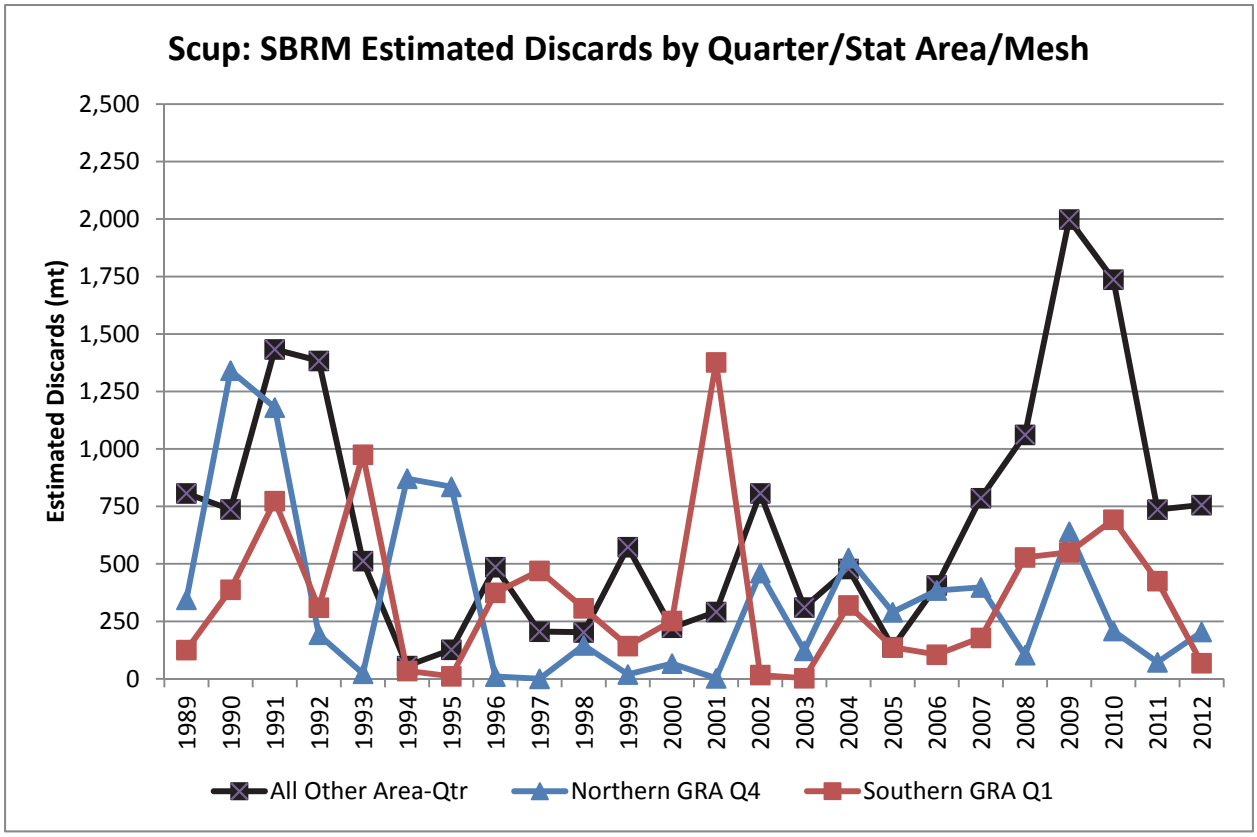
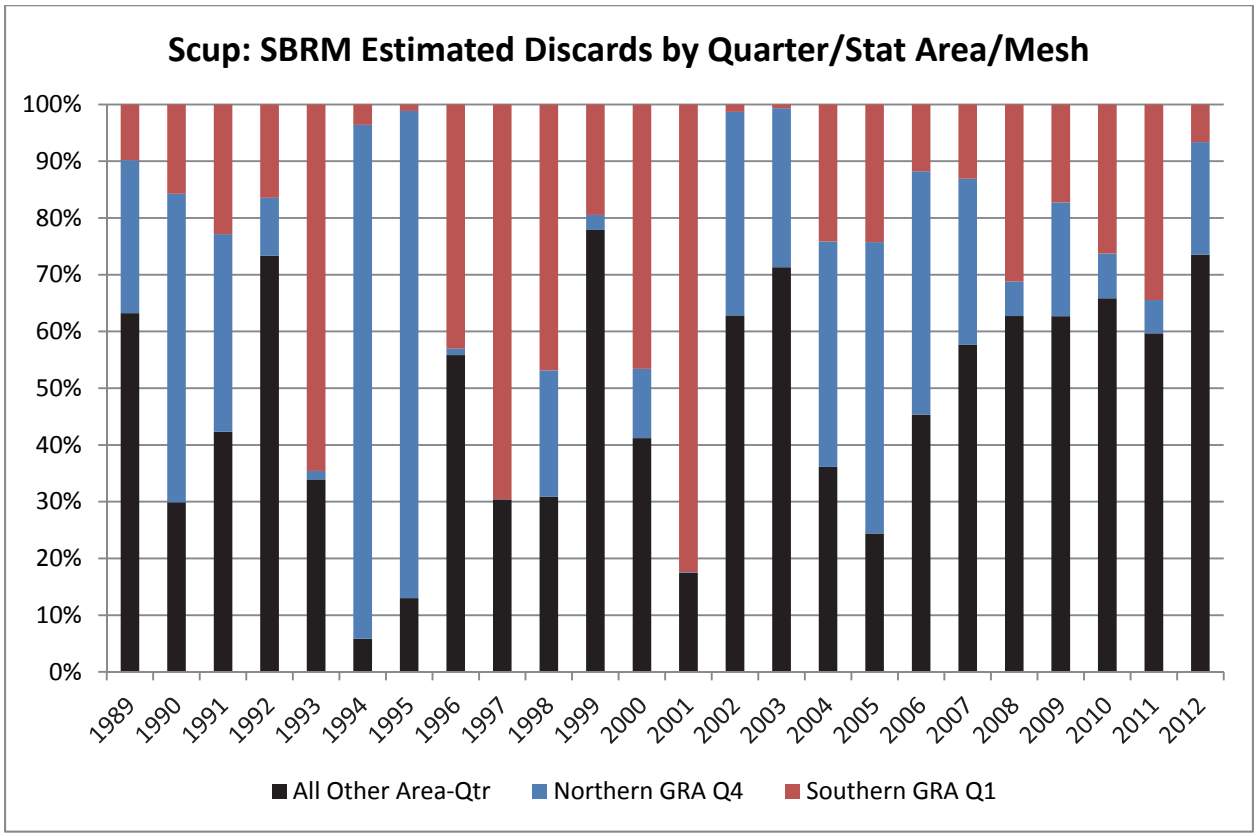
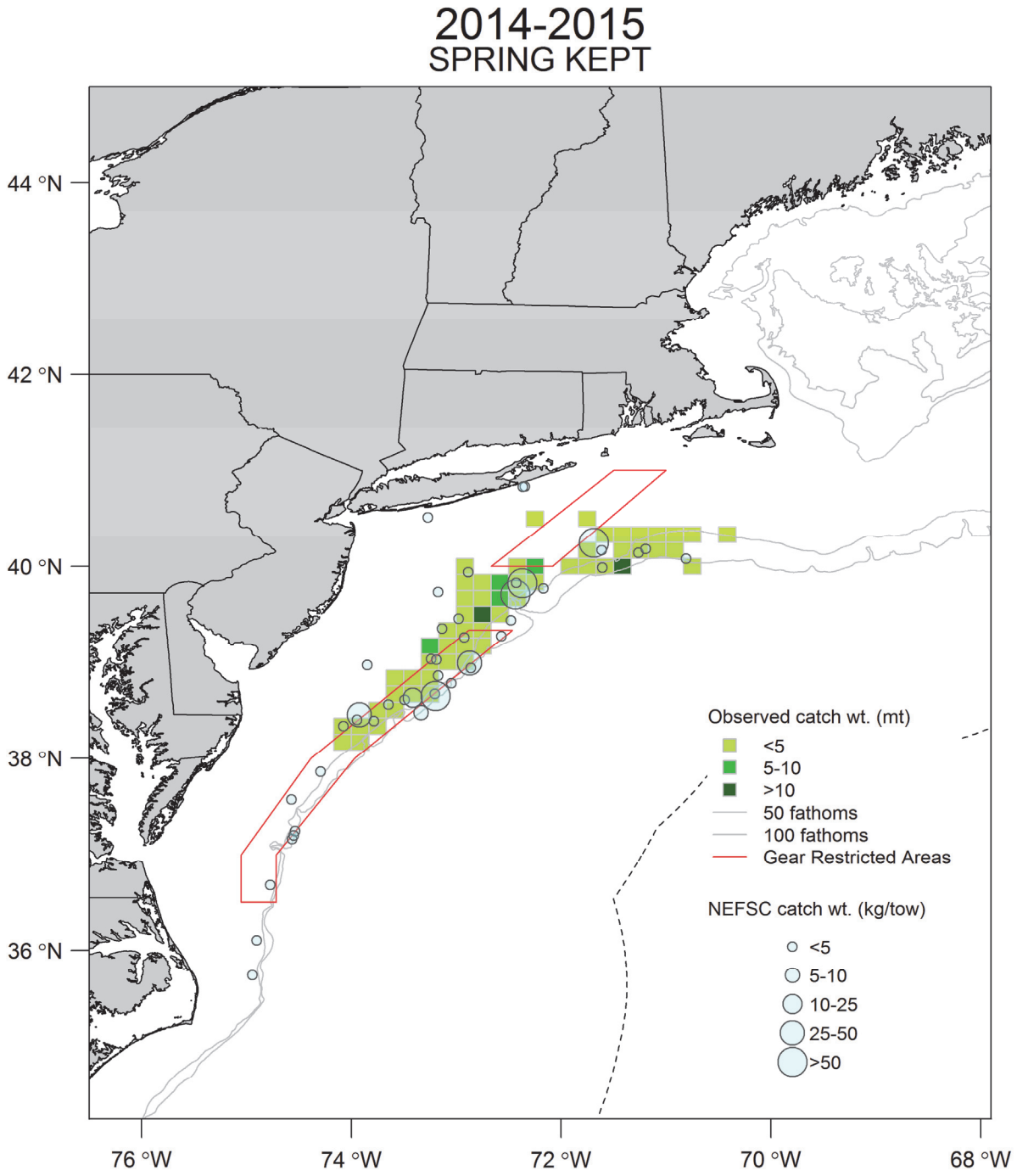


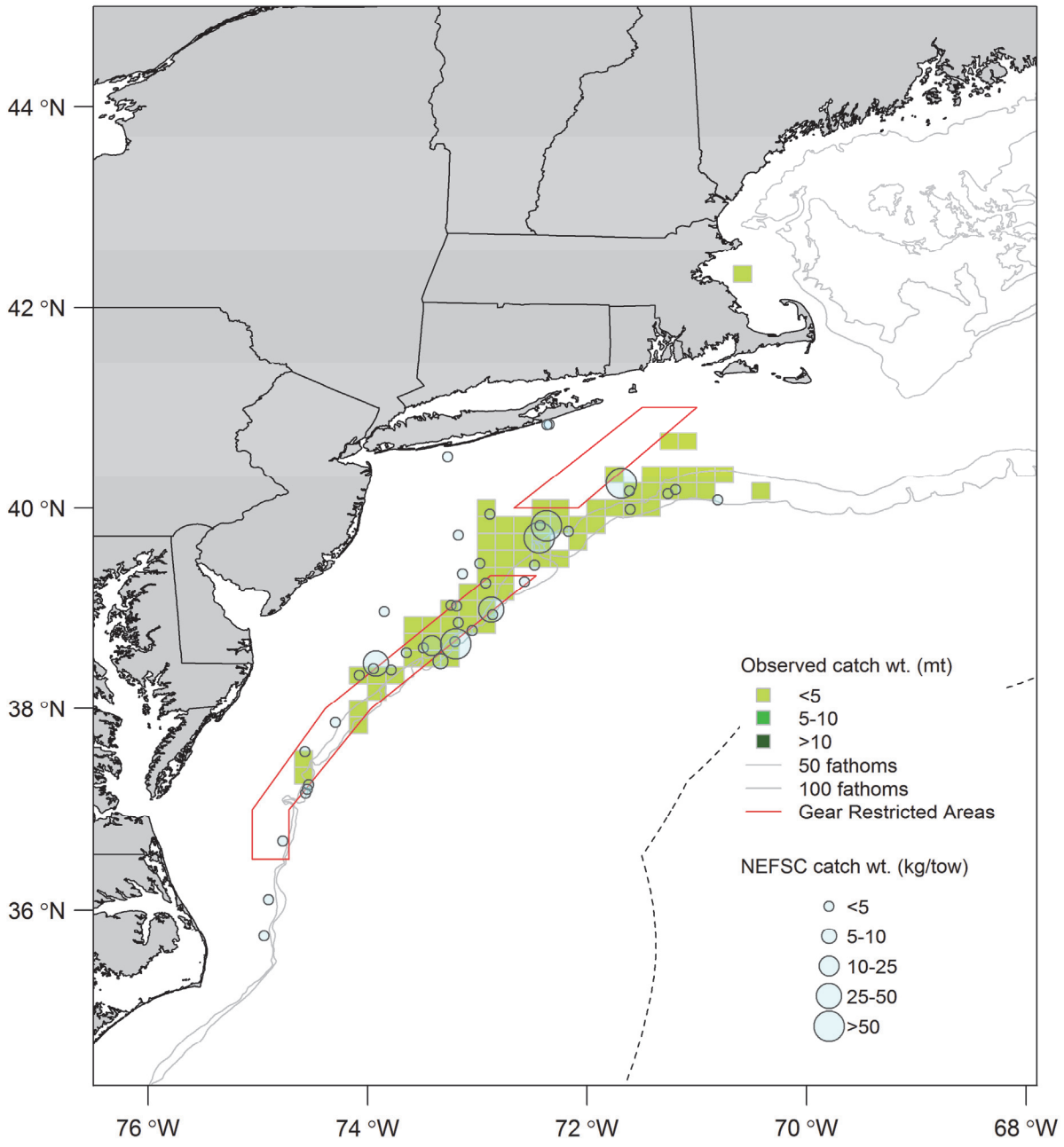
Figure 26. Discard components in the Northern and Southern GRAs compared to discards in all other statistical areas and quarters: 100% stacked histogram.



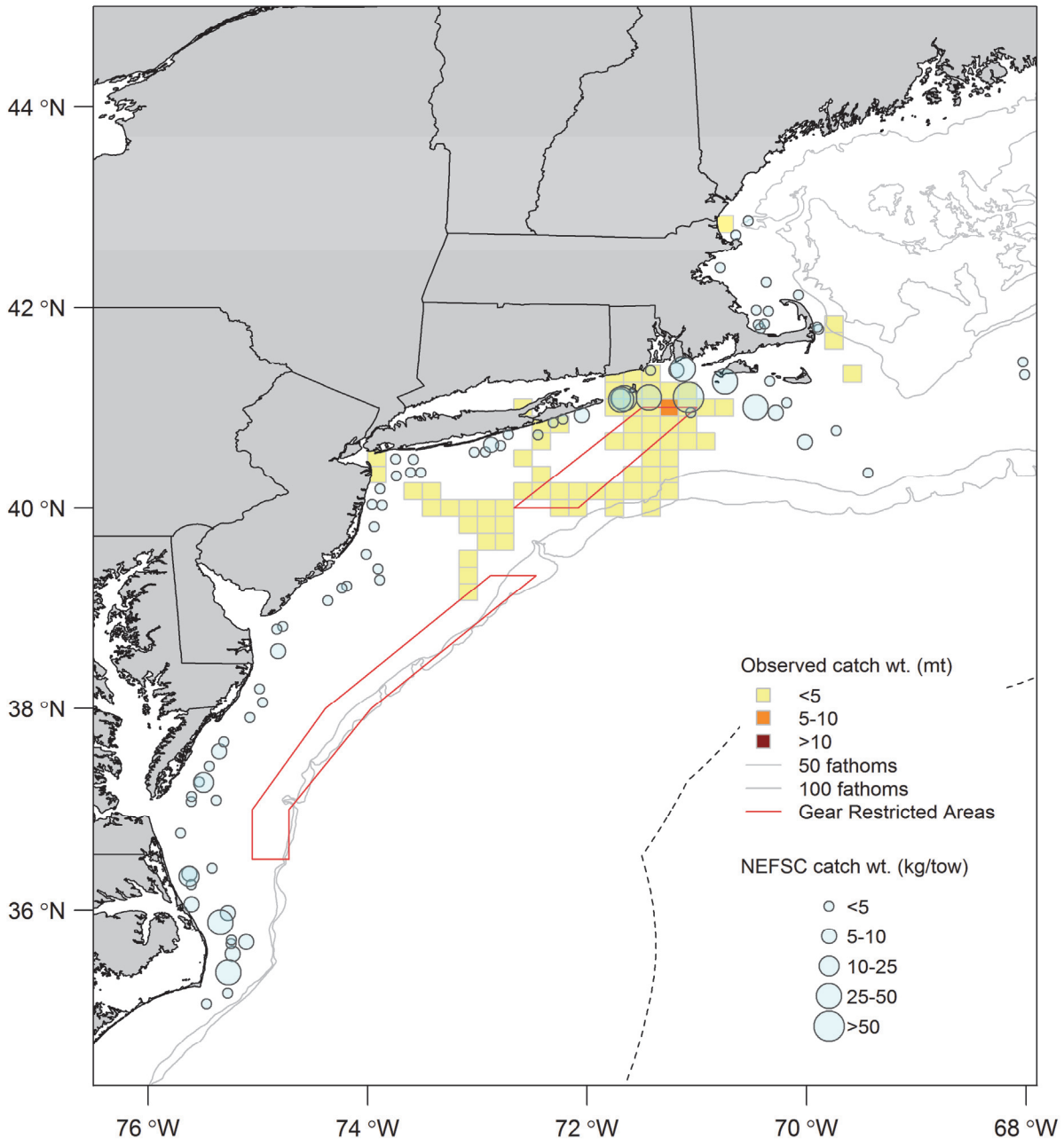
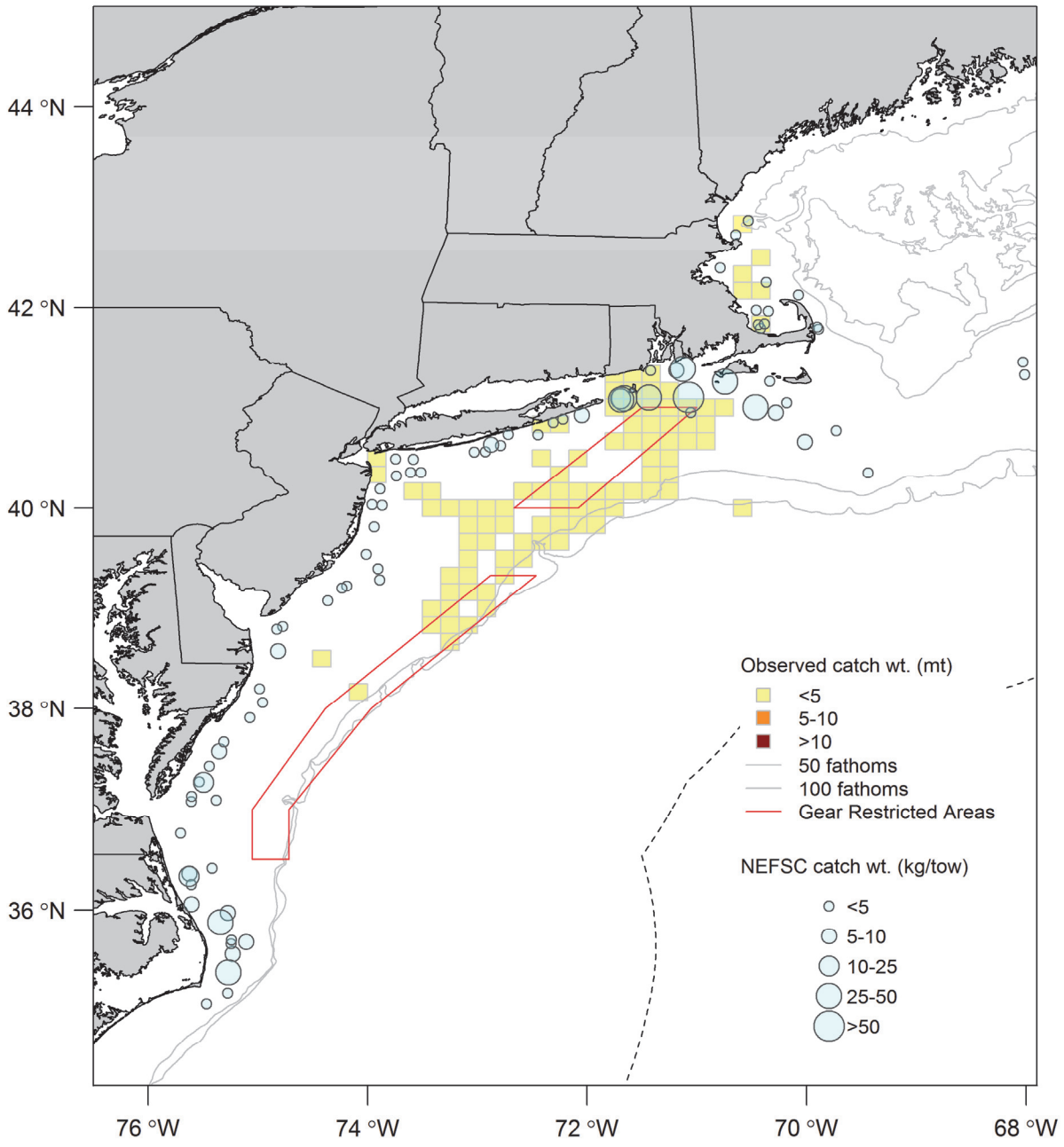
The following figures show the northern and southern scup Gear Restricted Areas (GRAs), along with observed scup catch and discards aggregated by ten-minute squares for spring 2014 and 2015 and fall 2014. "Spring" refers to January-March, when the southern scup GRA is in effect. "Fall" refers to November-December, when the northern GRA is in effect. Northeast Fisheries Science Center survey catches of scup are also shown. (Figures provided by Alicia Miller and Mark Terceiro, NMFS Northeast Fisheries Science Center.)



2014-2015
SPRING DISCARD



2014
FALL KEPT



2014
FALL DISCARD