Scup discarding in the NEFSC statistical areas that include 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. The NEFSC Observer 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 likely reduce the discard mortality of small scup, and are responsible for the improved post-recruitment survival of these small scup.

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.

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 (158,000 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.

In summary, the NEFSC Observer 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 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).

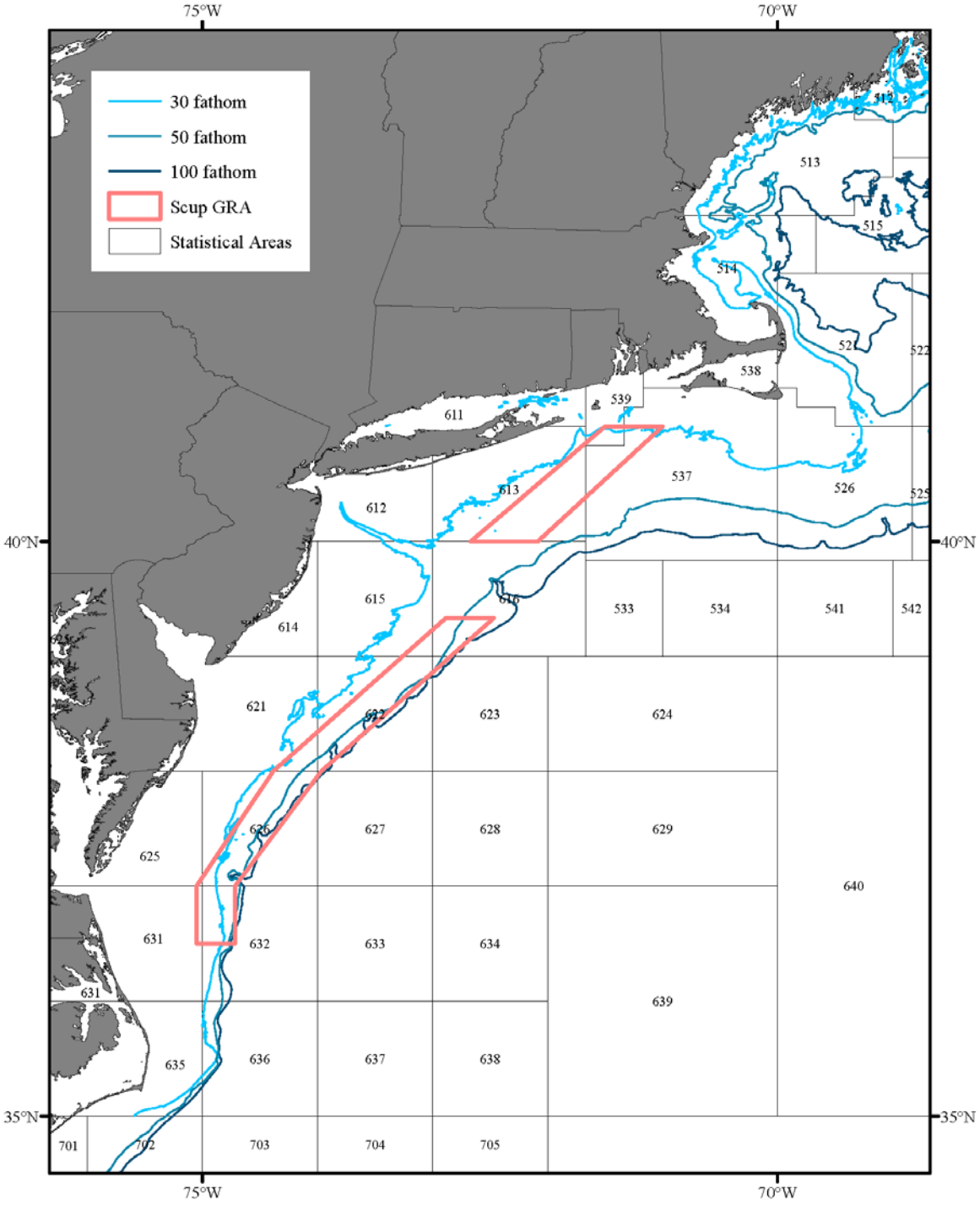


Figure 2. Observed scup discards (lbs) by NEFSC Statistical Area.

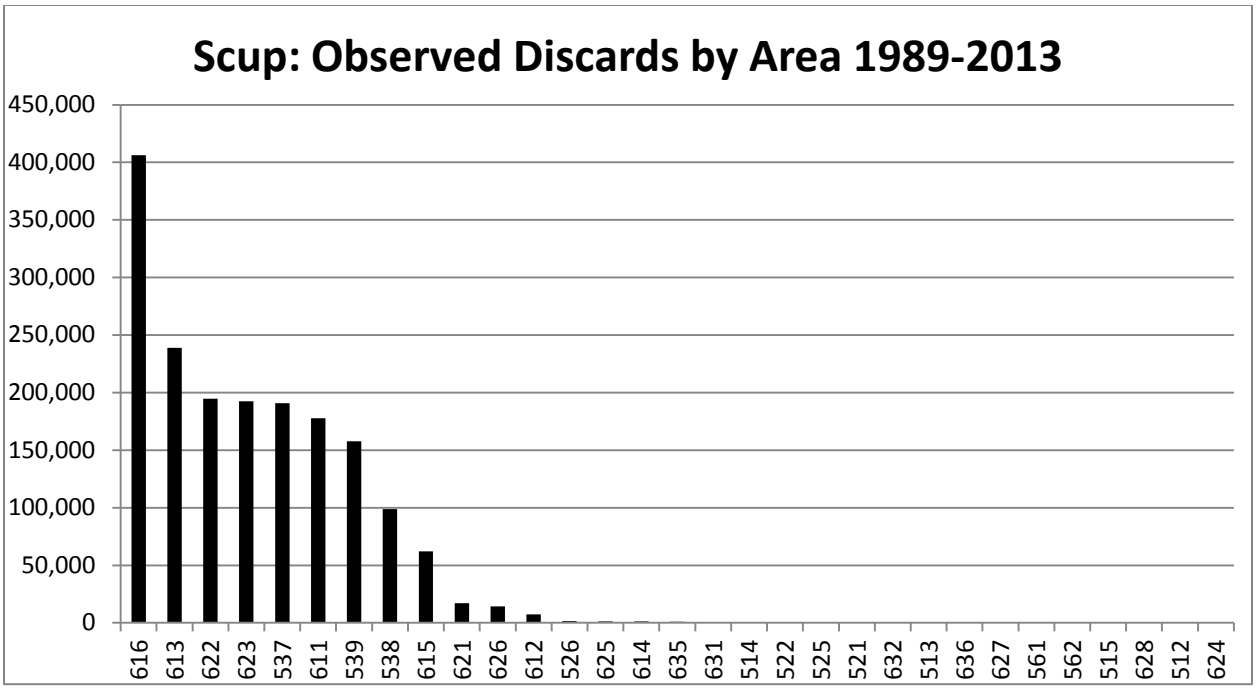


Figure 3. Observed scup discards (lbs) for statistical areas within the GRAs with time series total greater than 10,000 lbs.

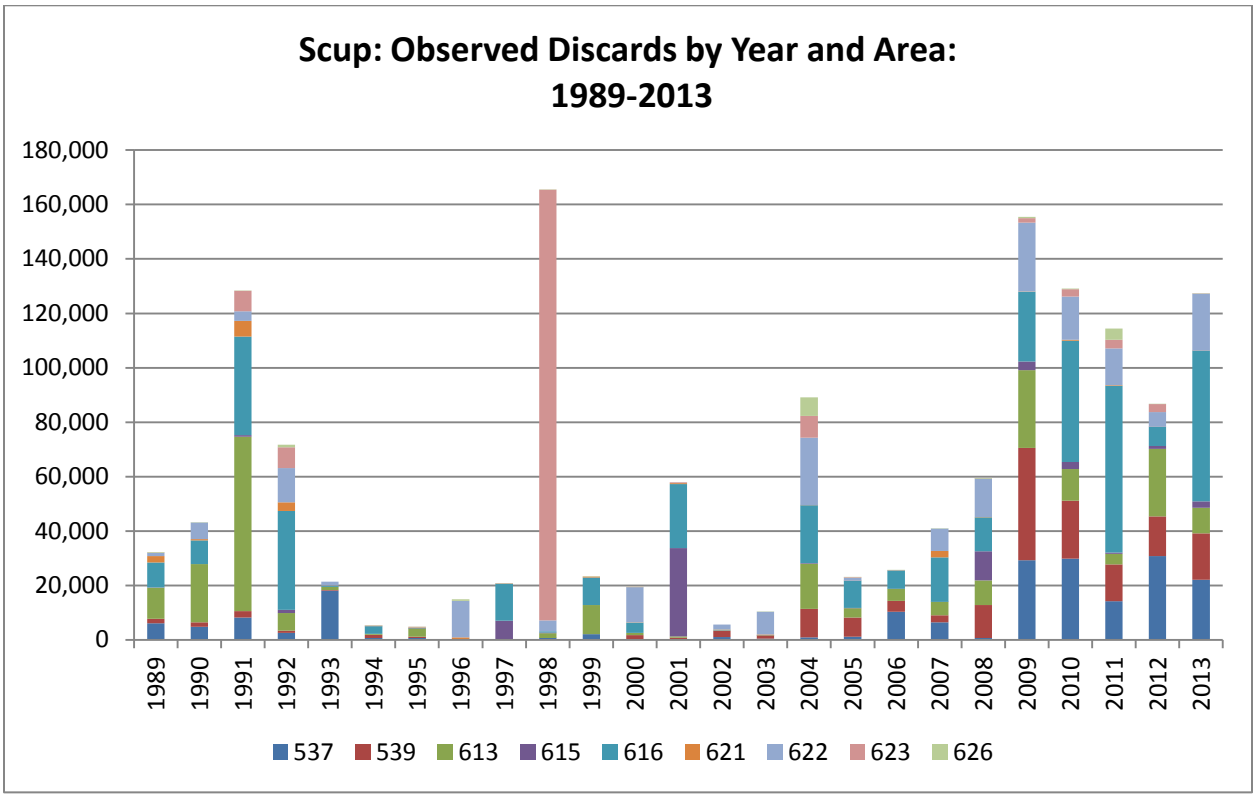


Figure 4. Estimated (metric tons) and Observed (lbs) scup discard trends.

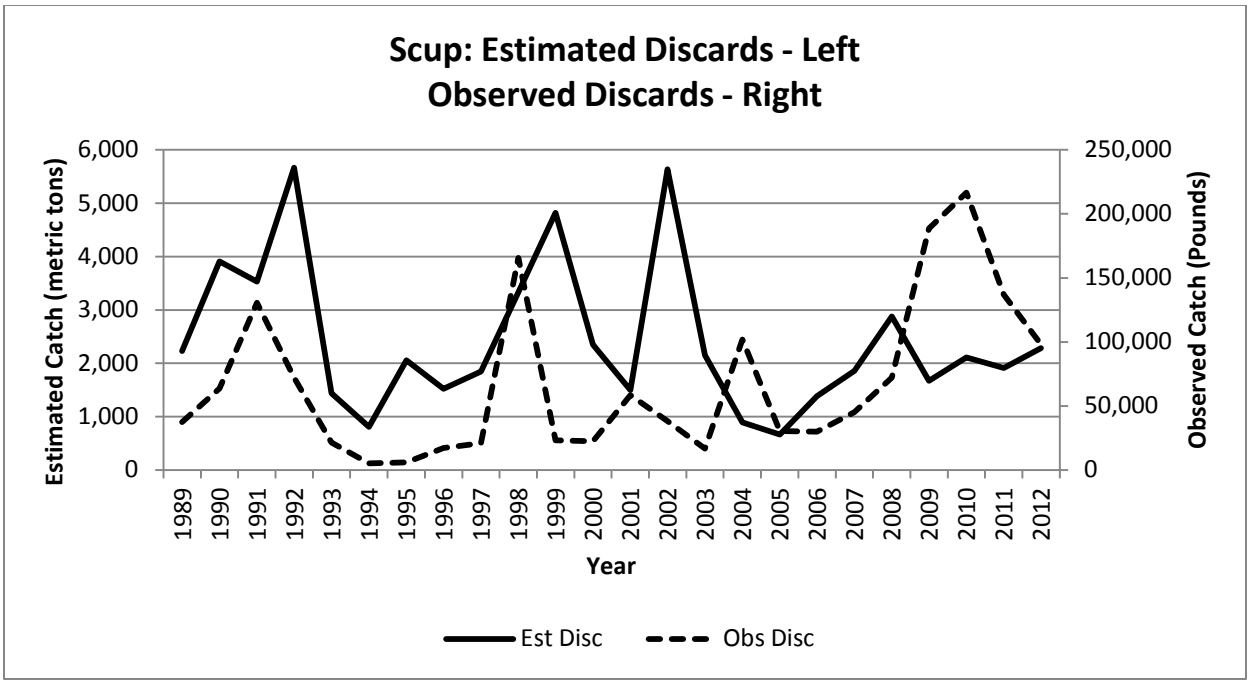


Figure 5. Observed Kept (blue; KLB; Landings) and Discard (red; DLB).

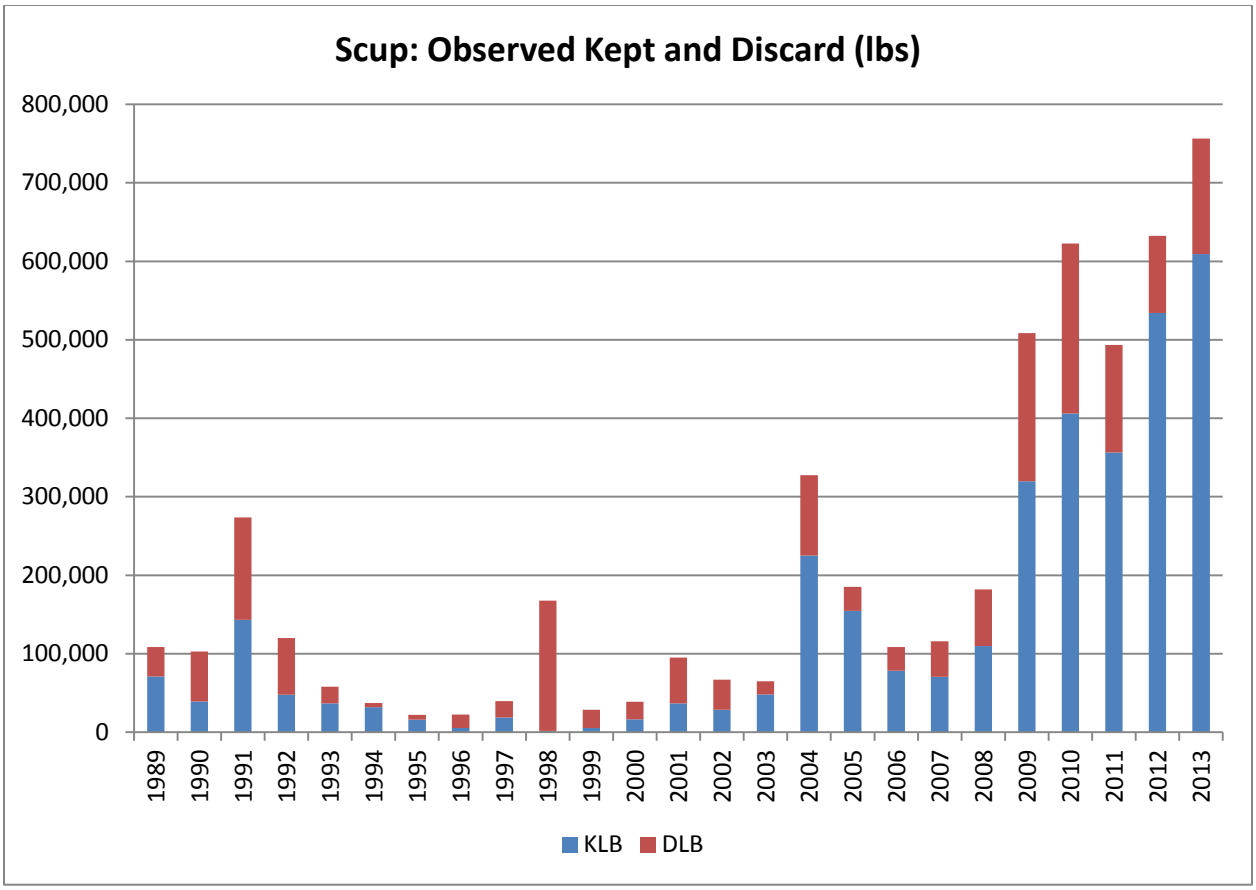


Figure 6. Observed Discard Percentage of Total Scup Catch.

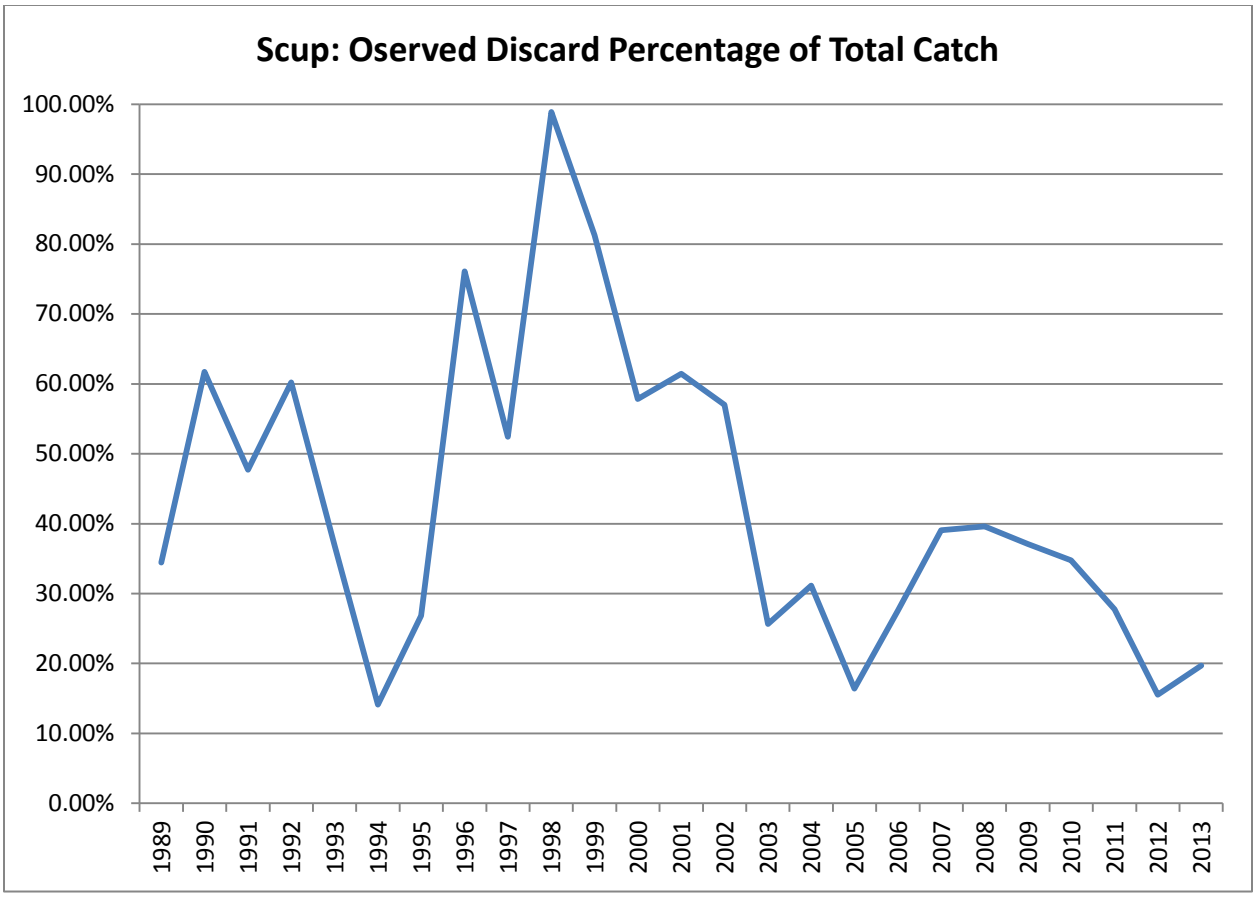


Figure 7. Observed scup discards by statistical area and codend/liner mesh categories. 'Large' is equal to or larger than 4.5 or 5.0 inch, depending on year; 'small' is between 2.125 and 4.5 or 5.0 inch; 'squid' is equal or smaller than 2.125 inch.

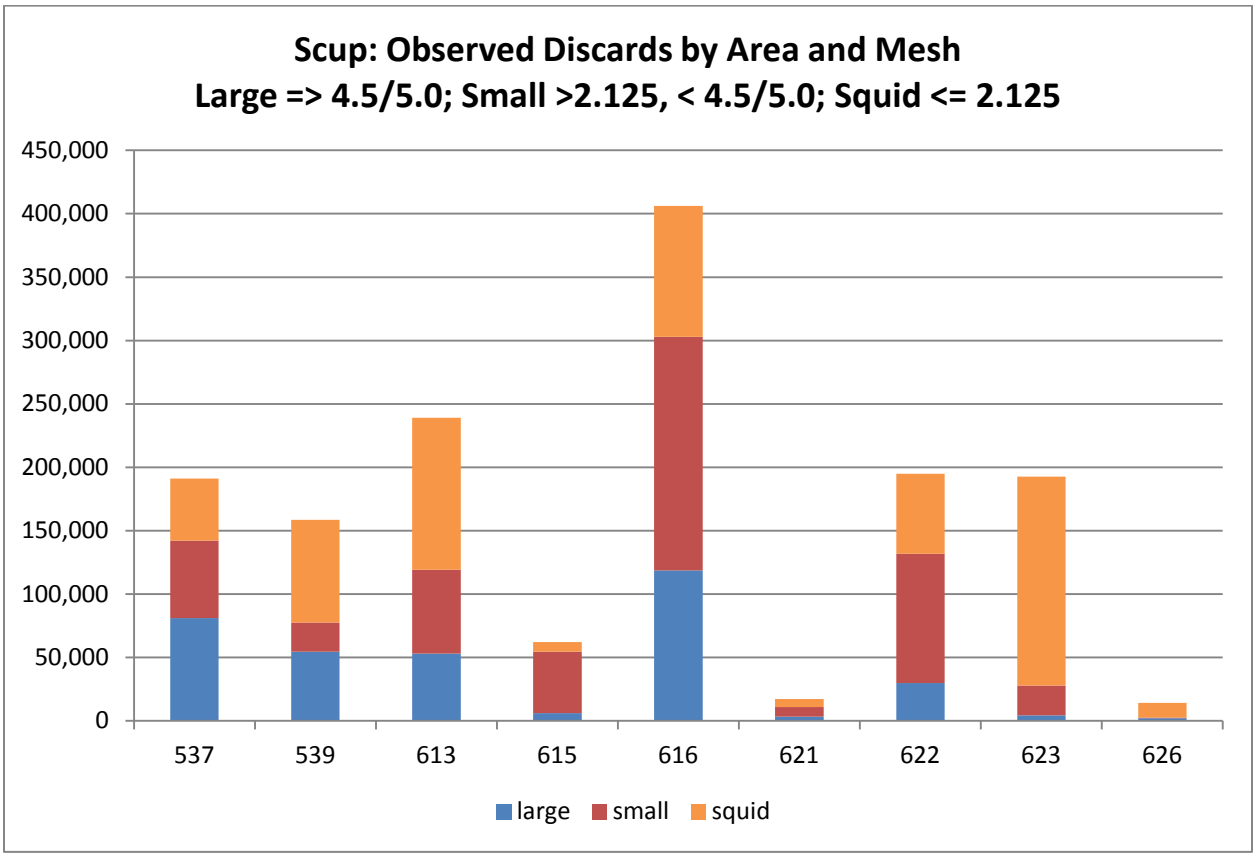


Figure 8. Northern GRA statistical areas ‘large’ mesh (equal to or larger than 4.5 or 5.0 inch, depending on year) Observed discards by month (Jan = 1, Dec = 12).

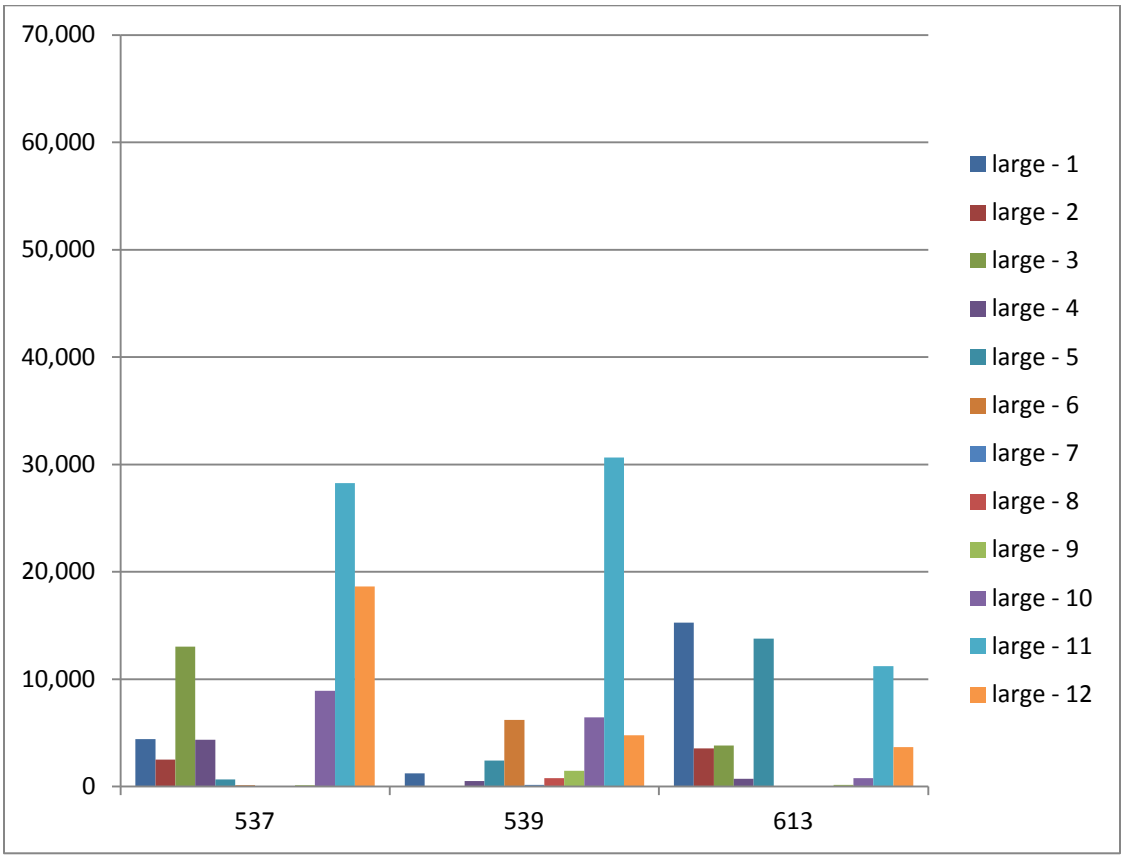


Figure 9. Northern GRA statistical area ‘small’ mesh (between 2.125 and 4.5 or 5.0 inch) Observed discards by month (Jan = 1, Dec = 12).

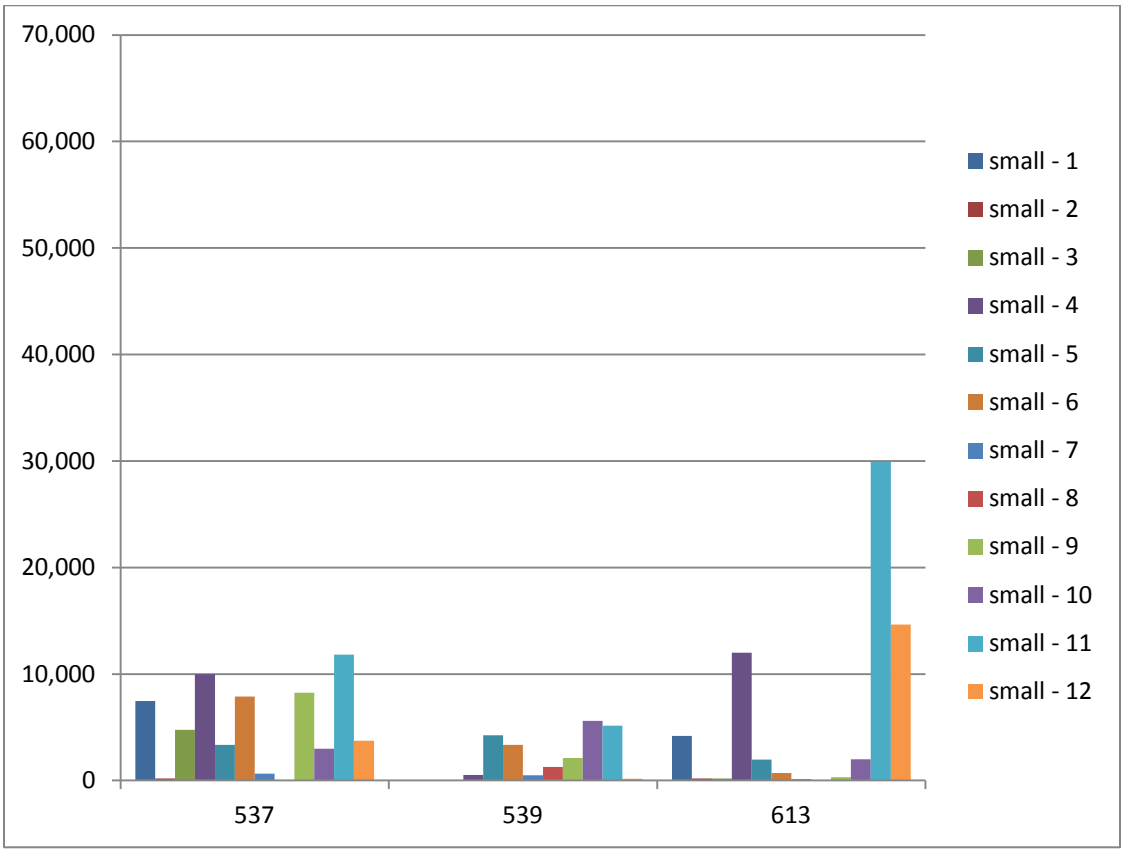


Figure 10. Northern GRA statistical area ‘squid’ mesh (equal to or smaller than 2.125 inch) Observed discards by month (Jan = 1, Dec = 12).

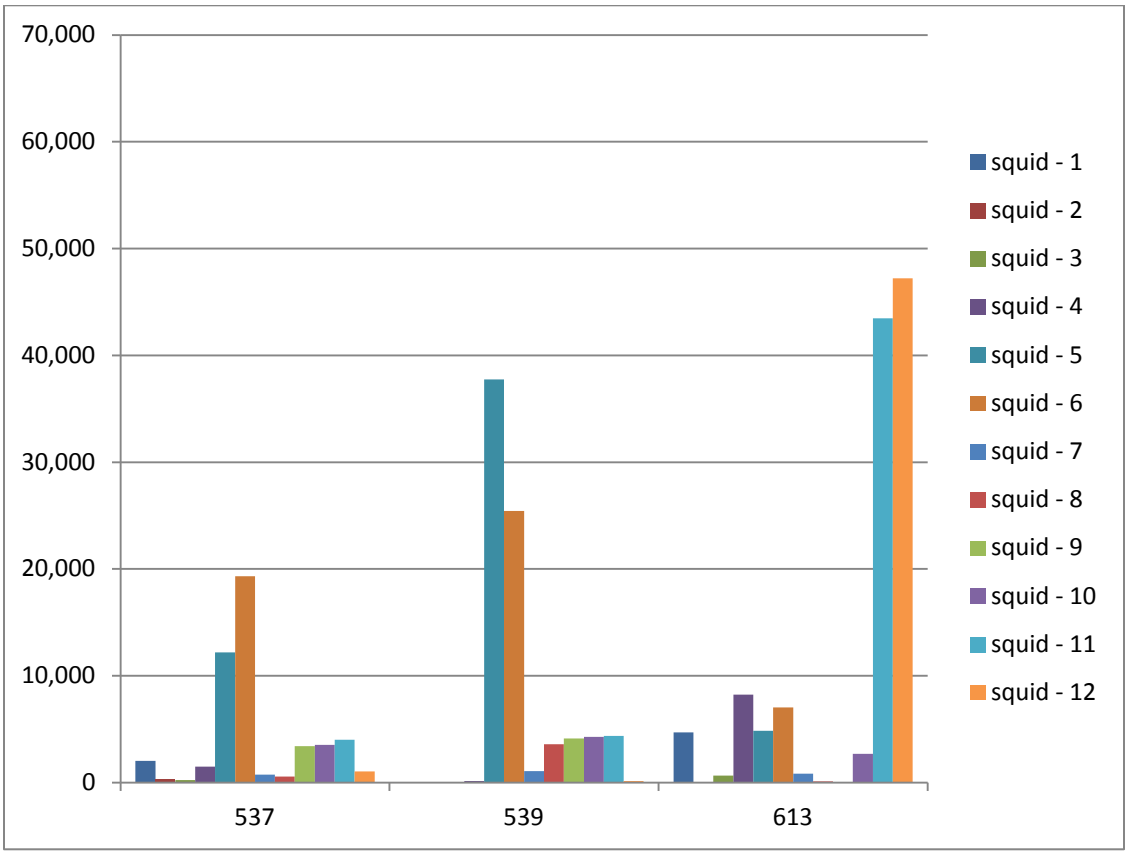


Figure 11. Southern GRA statistical areas ‘large’ mesh (equal to or larger than 4.5 or 5.0 inch, depending on year) Observed discards by month (Jan = 1, Dec = 12).

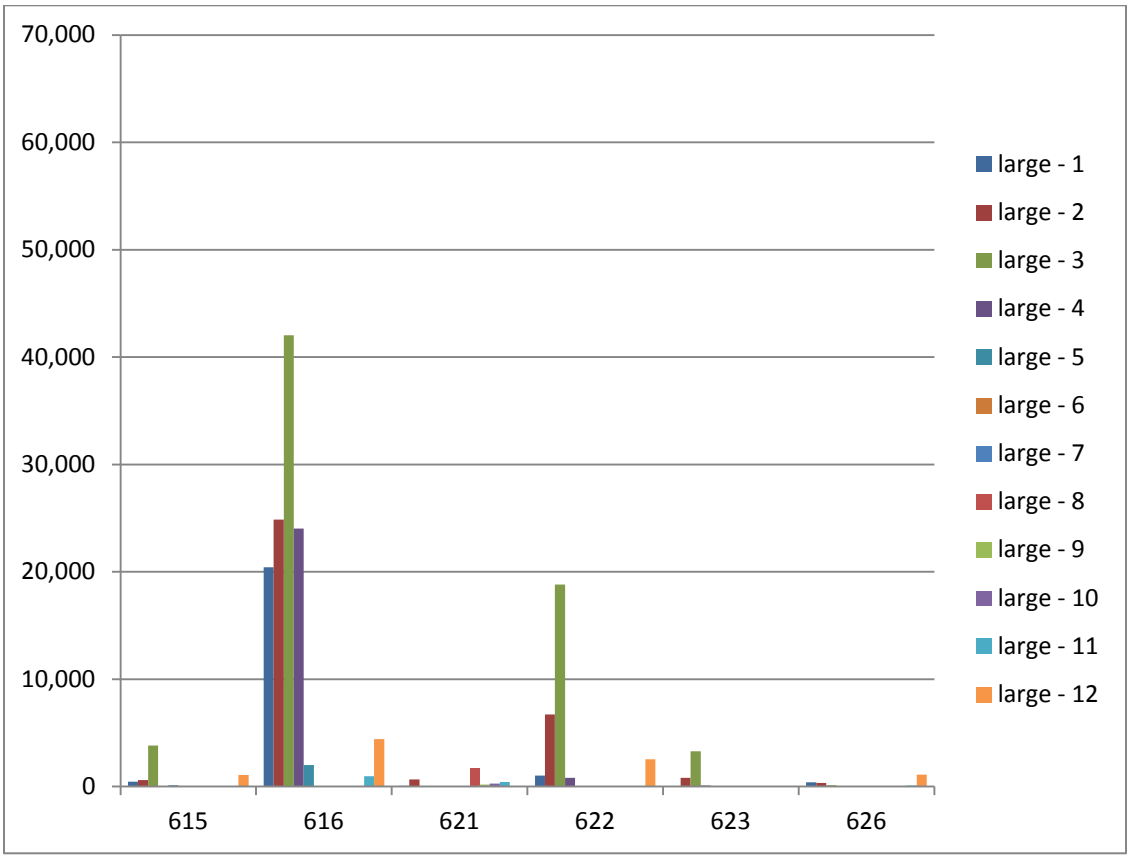


Figure 12. Southern GRA statistical area ‘small’ mesh (between 2.125 and 4.5 or 5.0 inch) Observed discards by month (Jan = 1, Dec = 12).

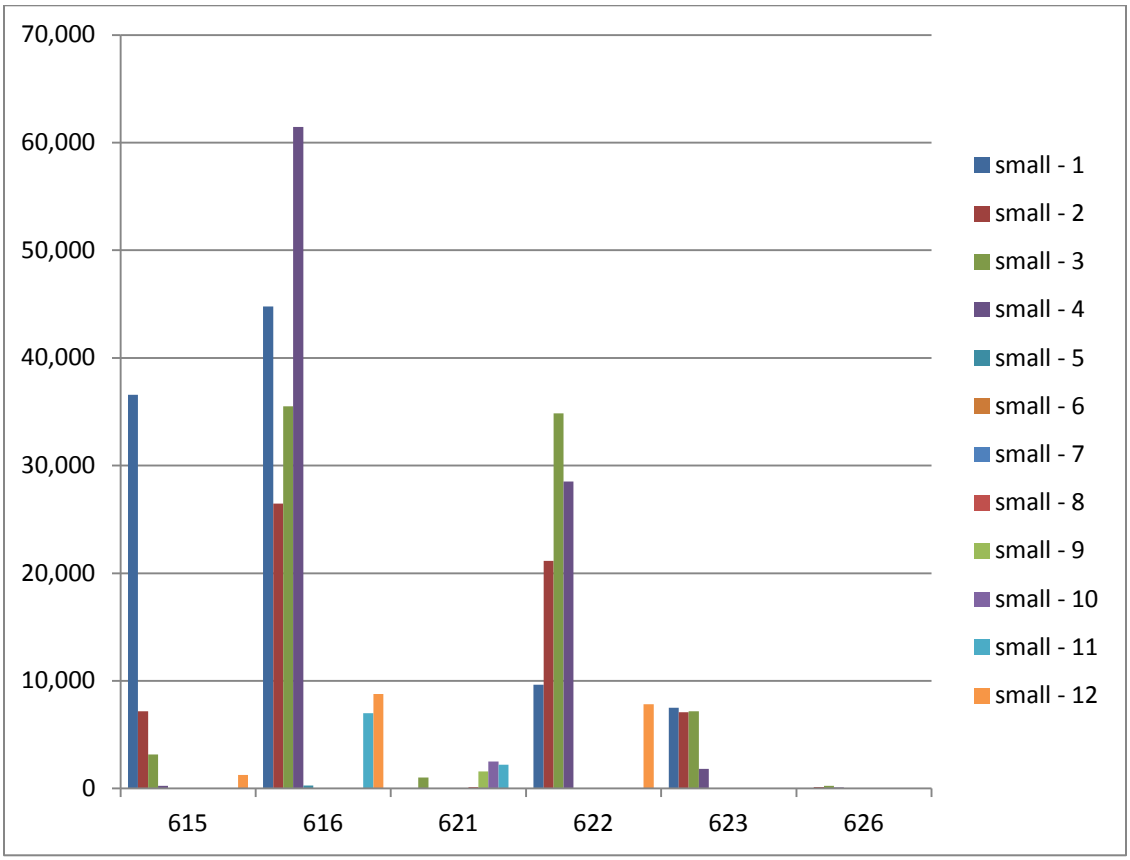


Figure 13. Southern GRA statistical area ‘squid’ mesh (equal to or smaller than 2.125 inch) Observed discards by month (Jan = 1, Dec = 12). The large bar in area 623 in March is a single tow discard event in 1998 that was observed to be an estimated 158,000 lbs.

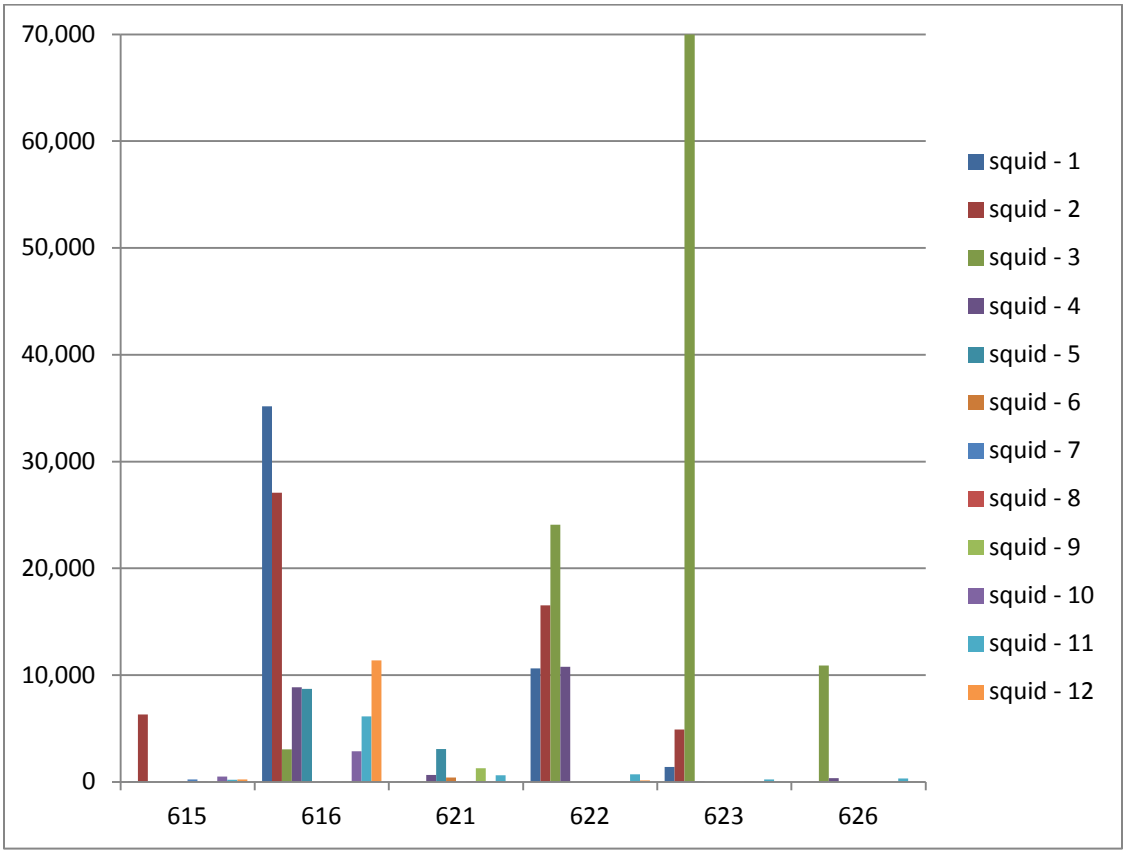


Figure 14. NEFSC winter and spring trawl survey catches of scup (kg/tow; February-March) and Observed scup aggregate discard (metric tons; January-March) during 1998-2000. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

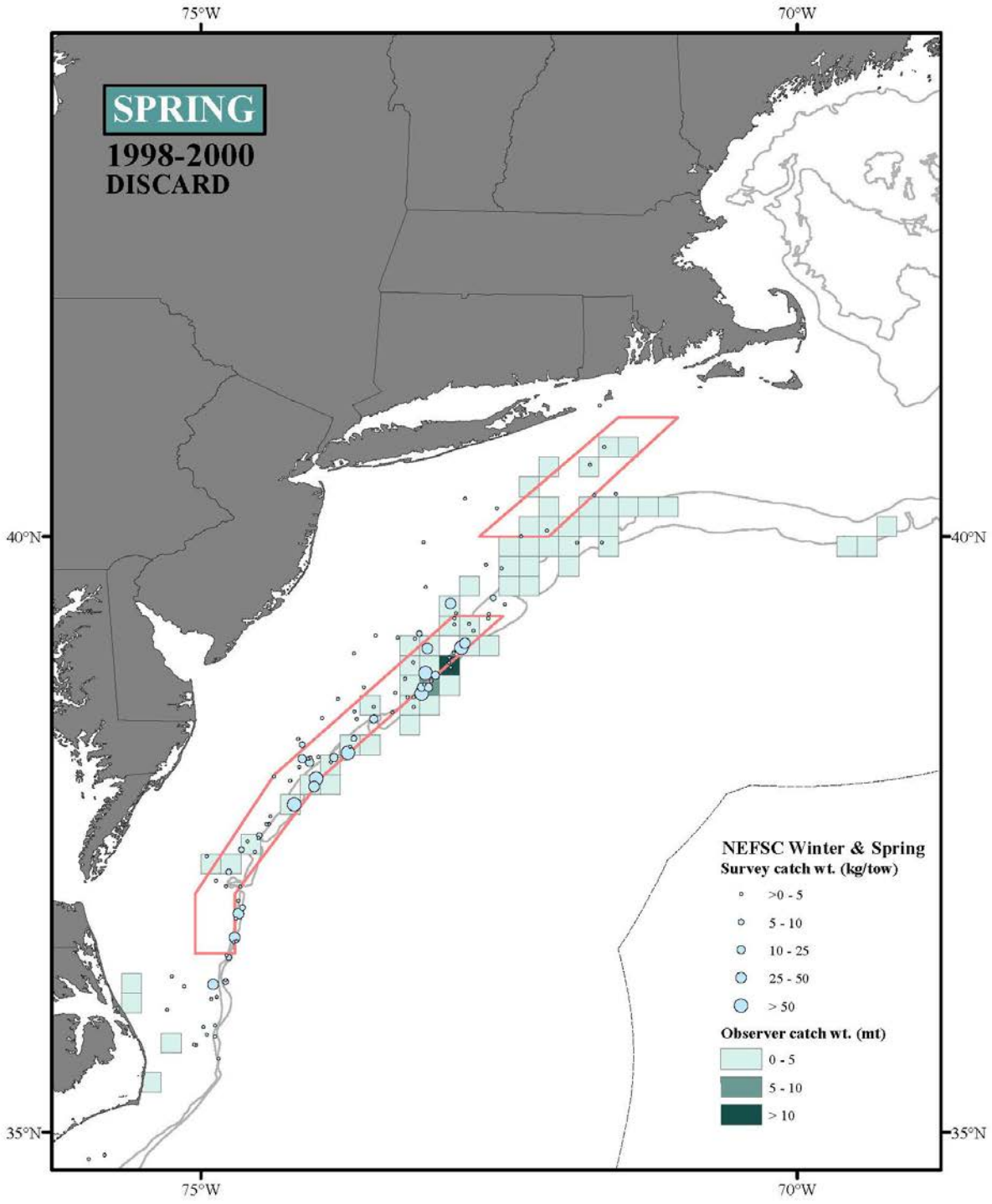


Figure 15. NEFSC winter and spring trawl survey catches of scup (kg/tow; February-March) and Observed scup aggregate discard (metric tons; January-March) during 2010-2012. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

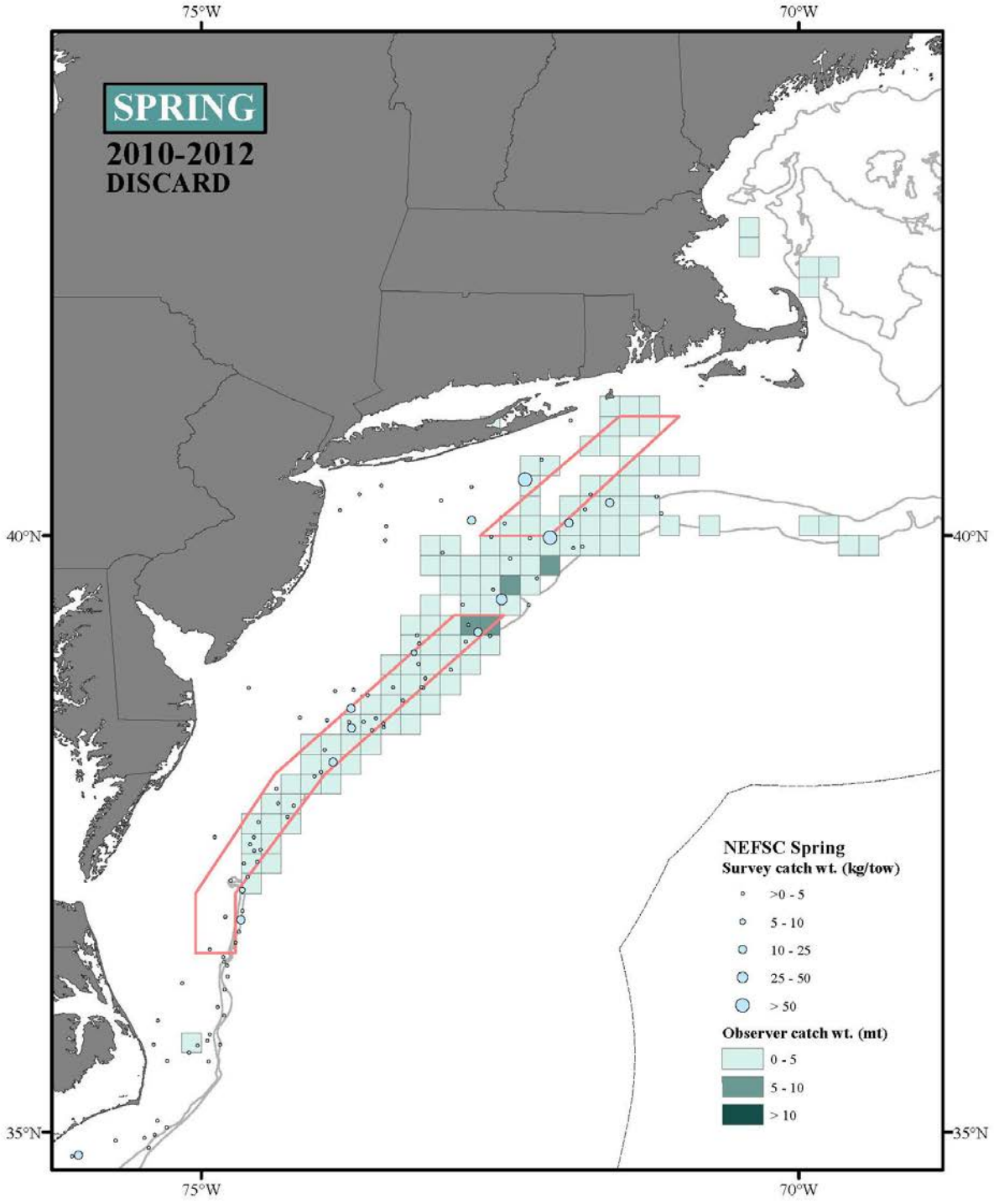


Figure 16. NEFSC fall trawl survey catches of scup (kg/tow; September-October) and Observed scup aggregate discard (metric tons; November-December) during 1998-2000. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

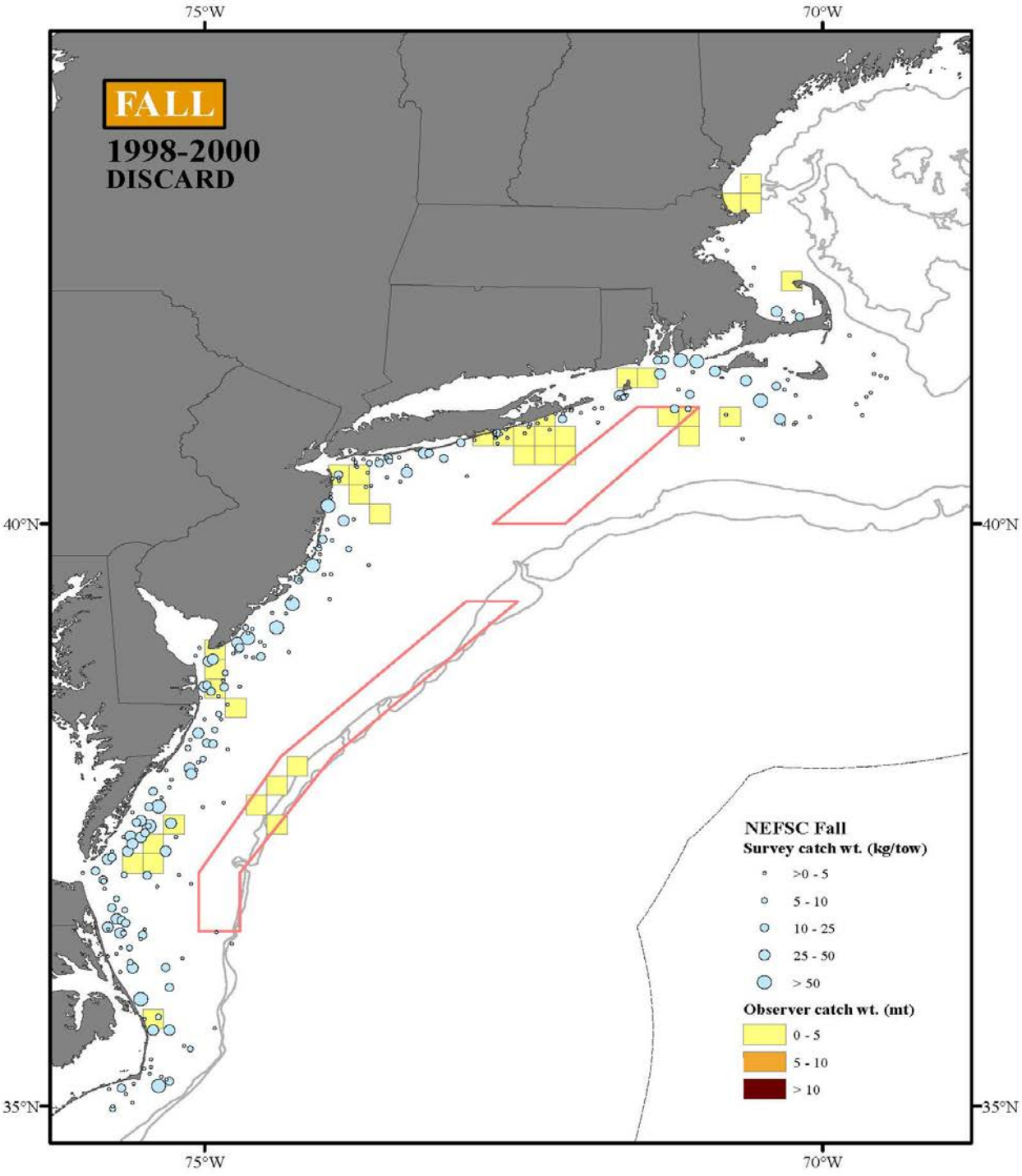


Figure 17. NEFSC fall trawl survey catches of scup (kg/tow; September-October) and Observed scup aggregate discard (metric tons; November-December) during 2010-2012. Gear Restricted Areas (GRAs) outlined in red; depth contours in gray are 50 and 100 fathoms.

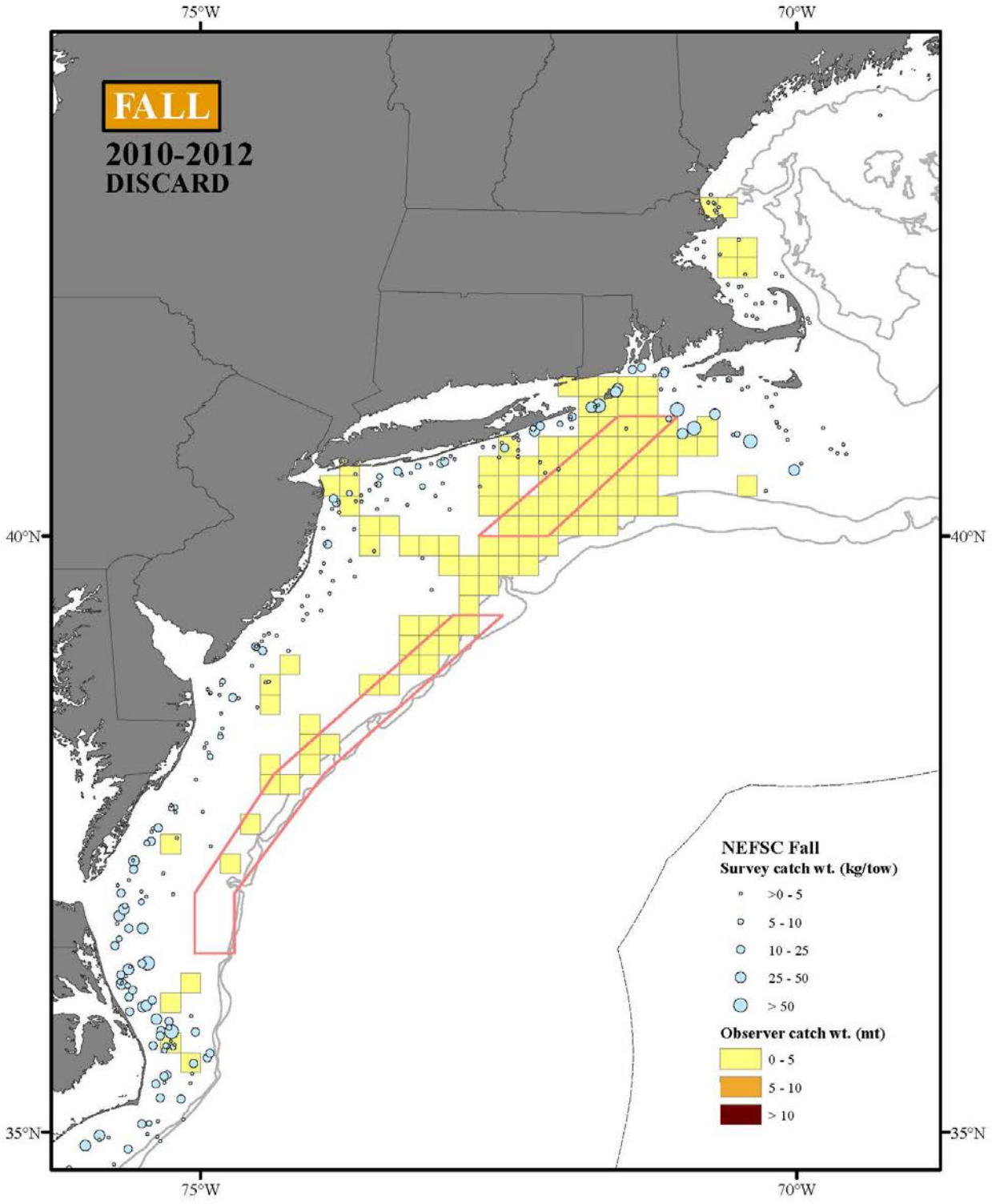
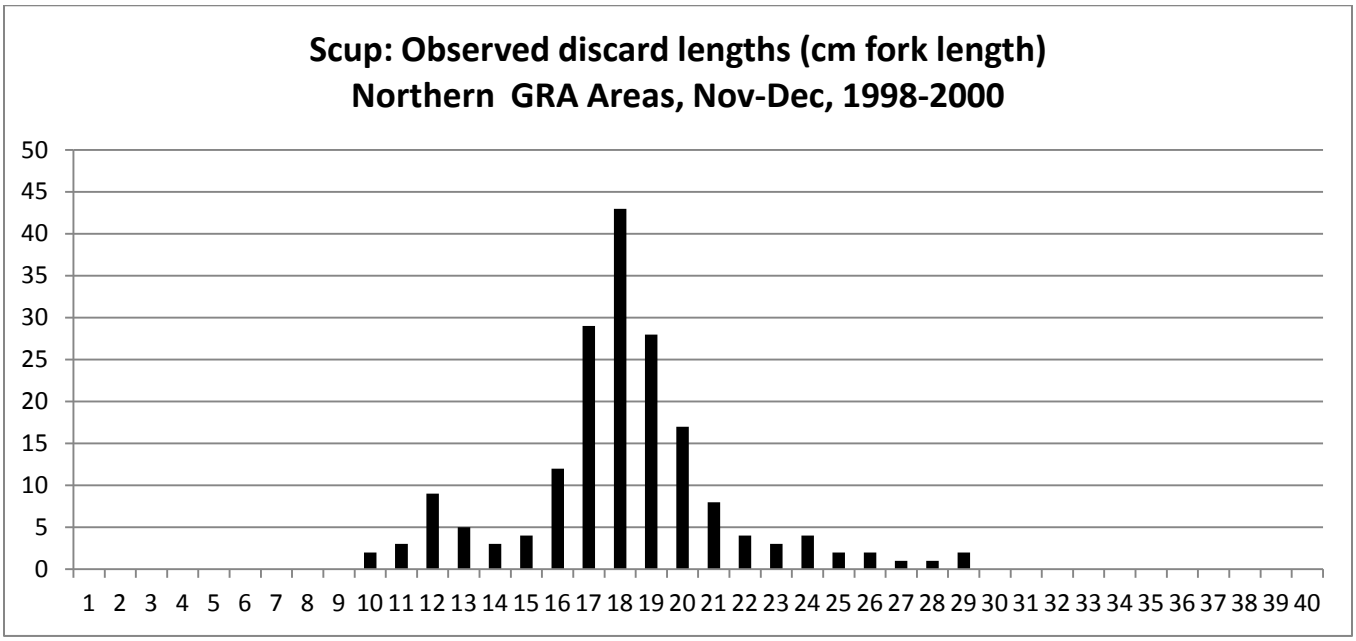


Figure 18. Observed scup discard lengths (cm fork length) in Northern GRA statistical areas during November-December: top 1998-2000, bottom 2010-2012.



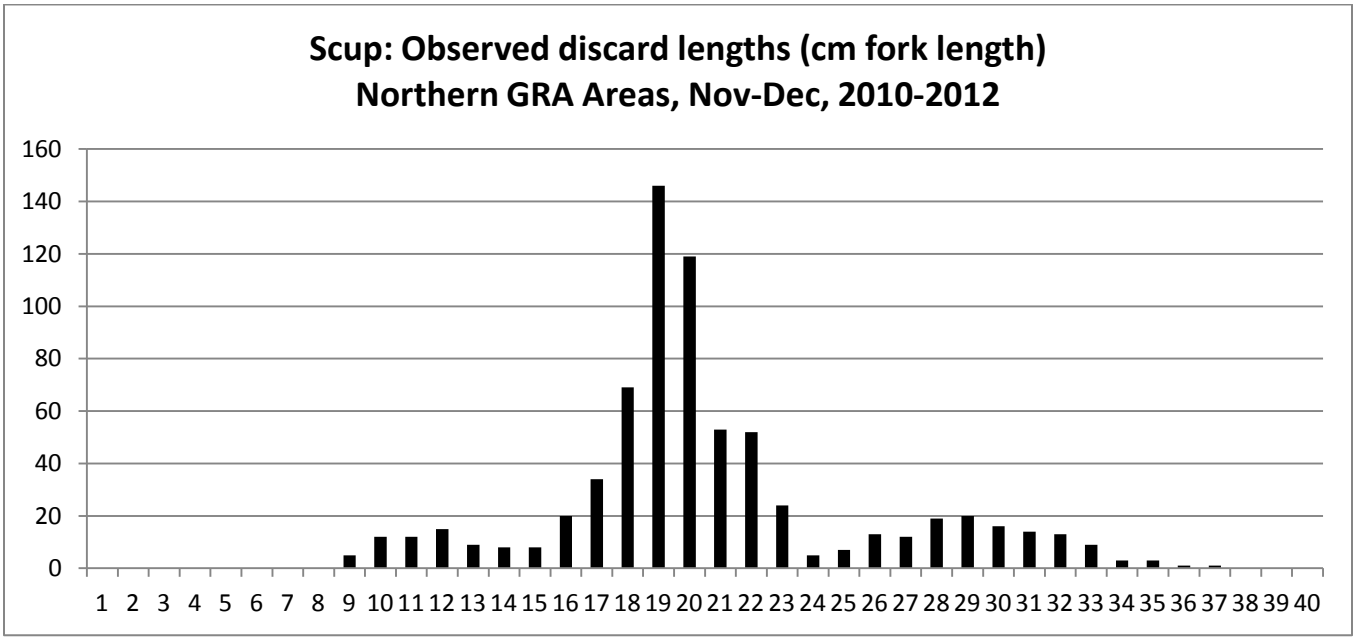
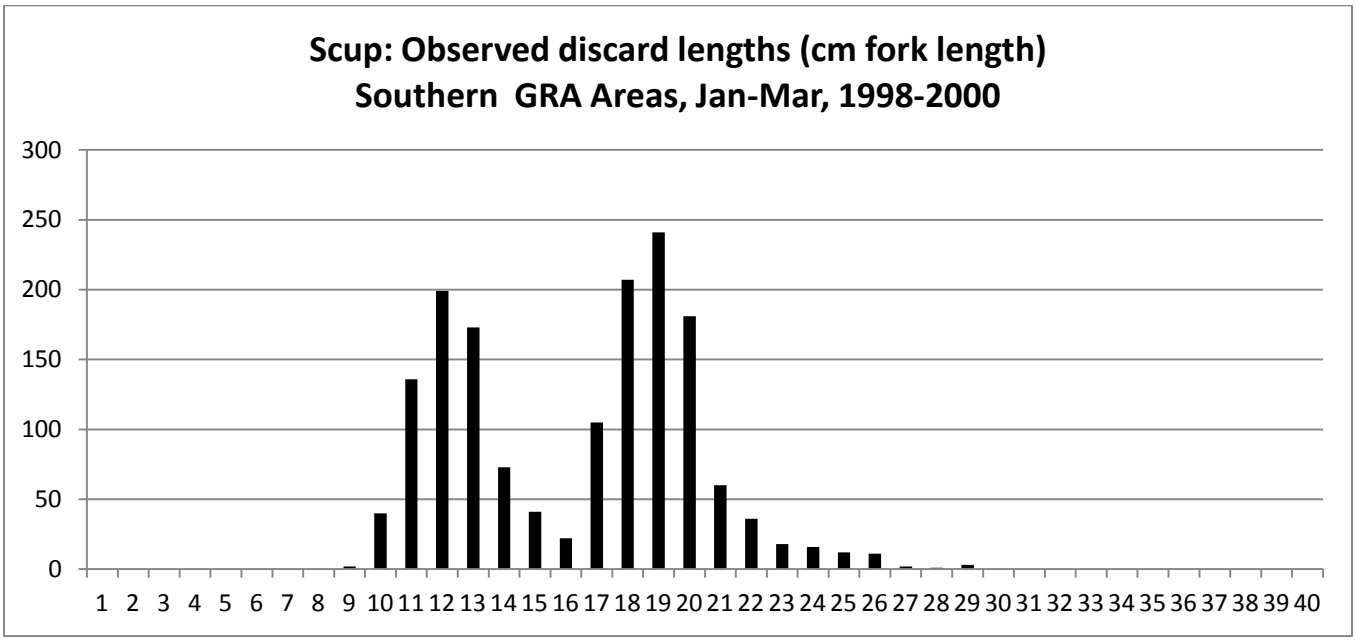


Figure 19. Observed scup discard lengths (cm fork length) in Southern GRA statistical areas during January-March: top 1998-2000, bottom 2010-2012.



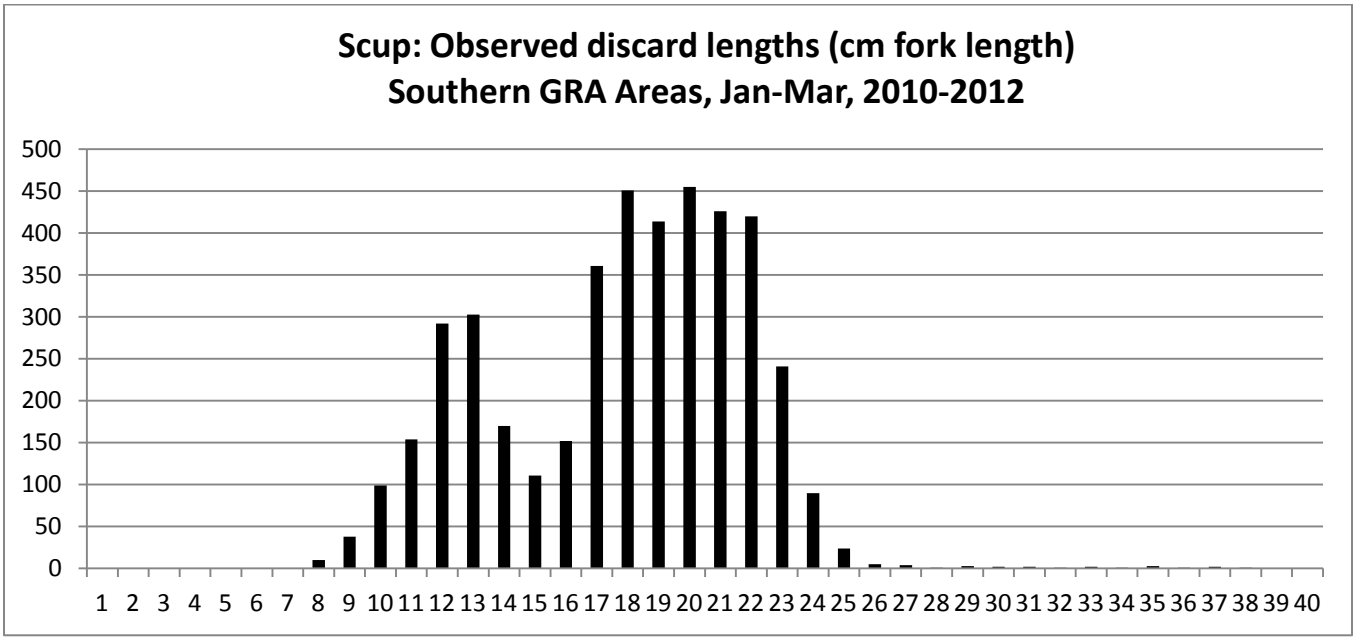


Figure 20. Size distributions of scup in NEFSC winter surveys 1998-2000. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

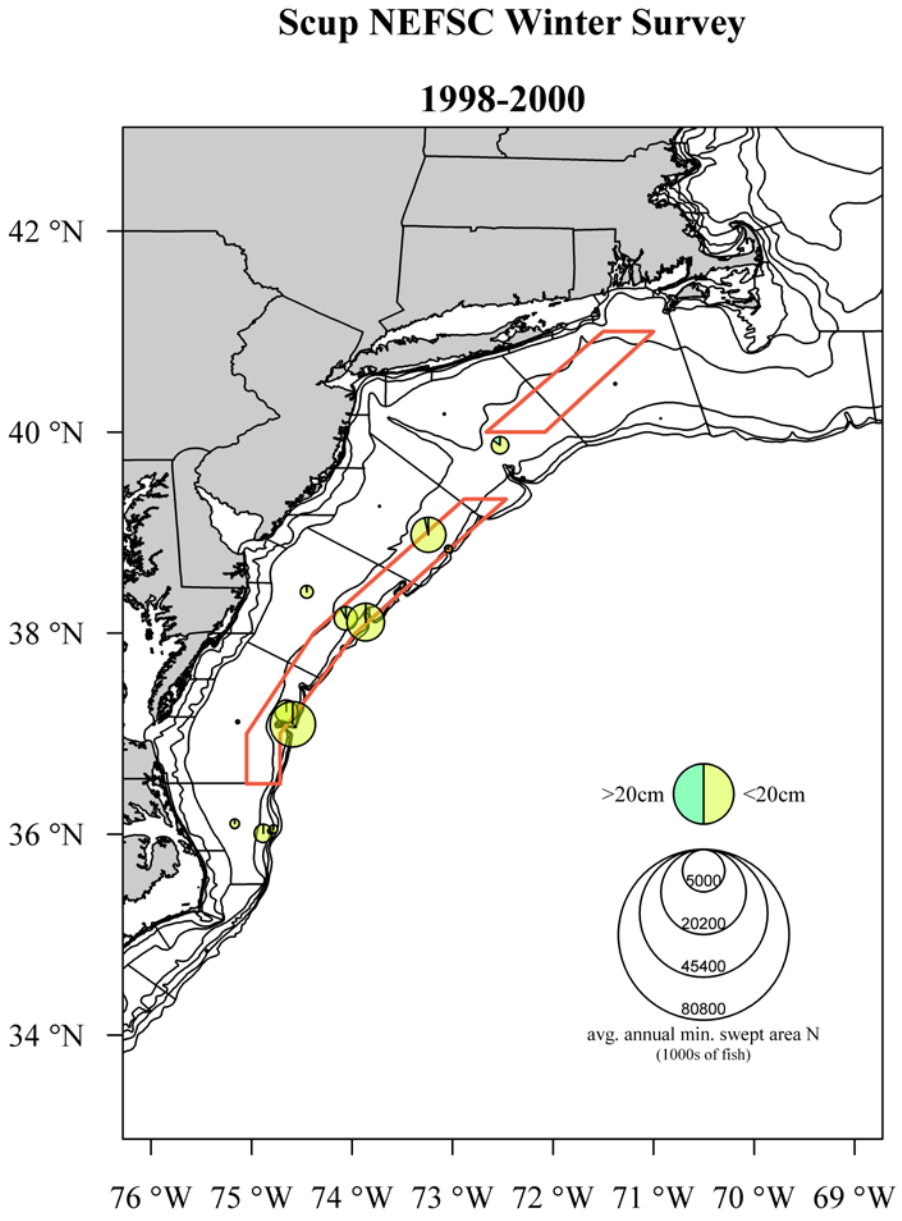


Figure 21. Size distributions of scup in NEFSC spring surveys 1998-2000. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

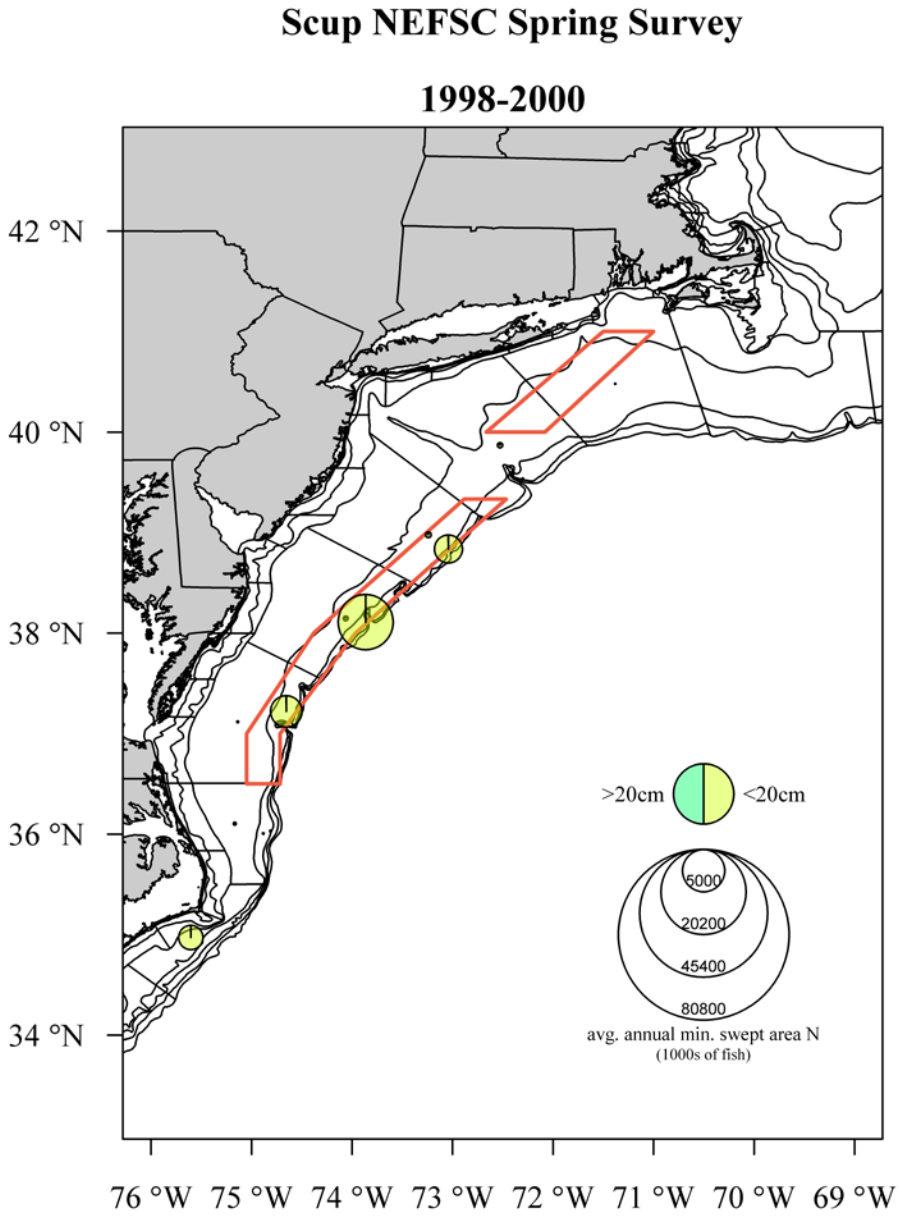


Figure 22. Size distributions of scup in NEFSC fall surveys 1998-2000. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

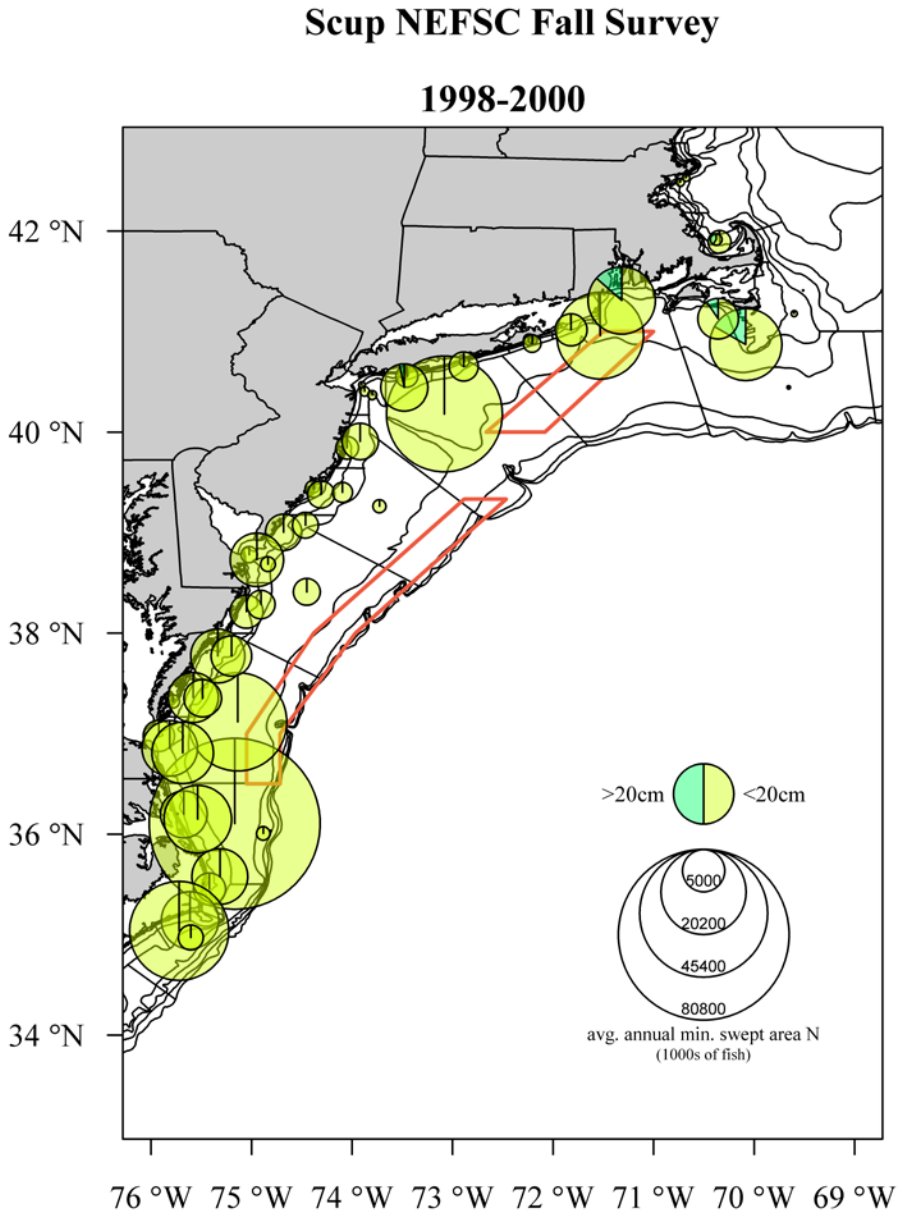


Figure 23. Size distributions of scup in NEFSC spring surveys 2010-2012. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.

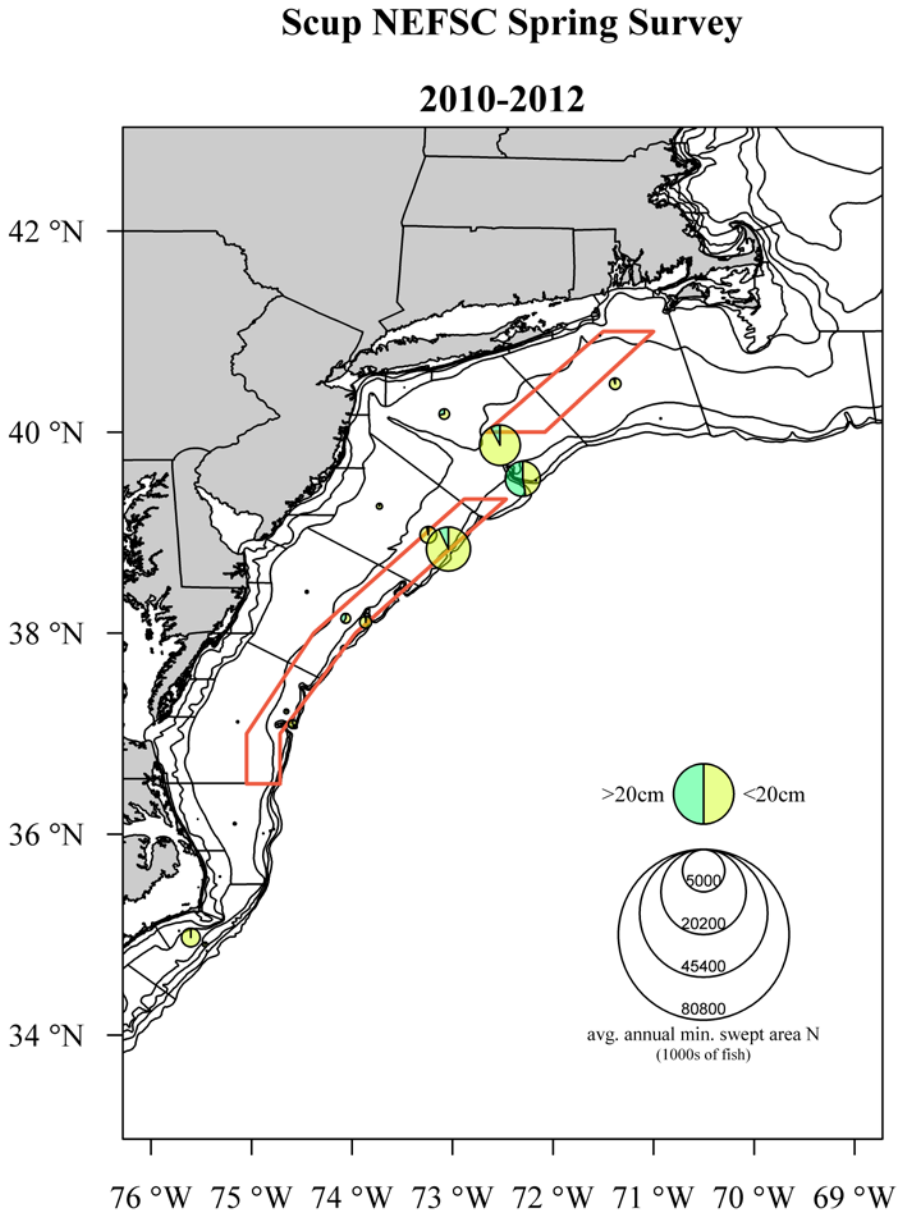
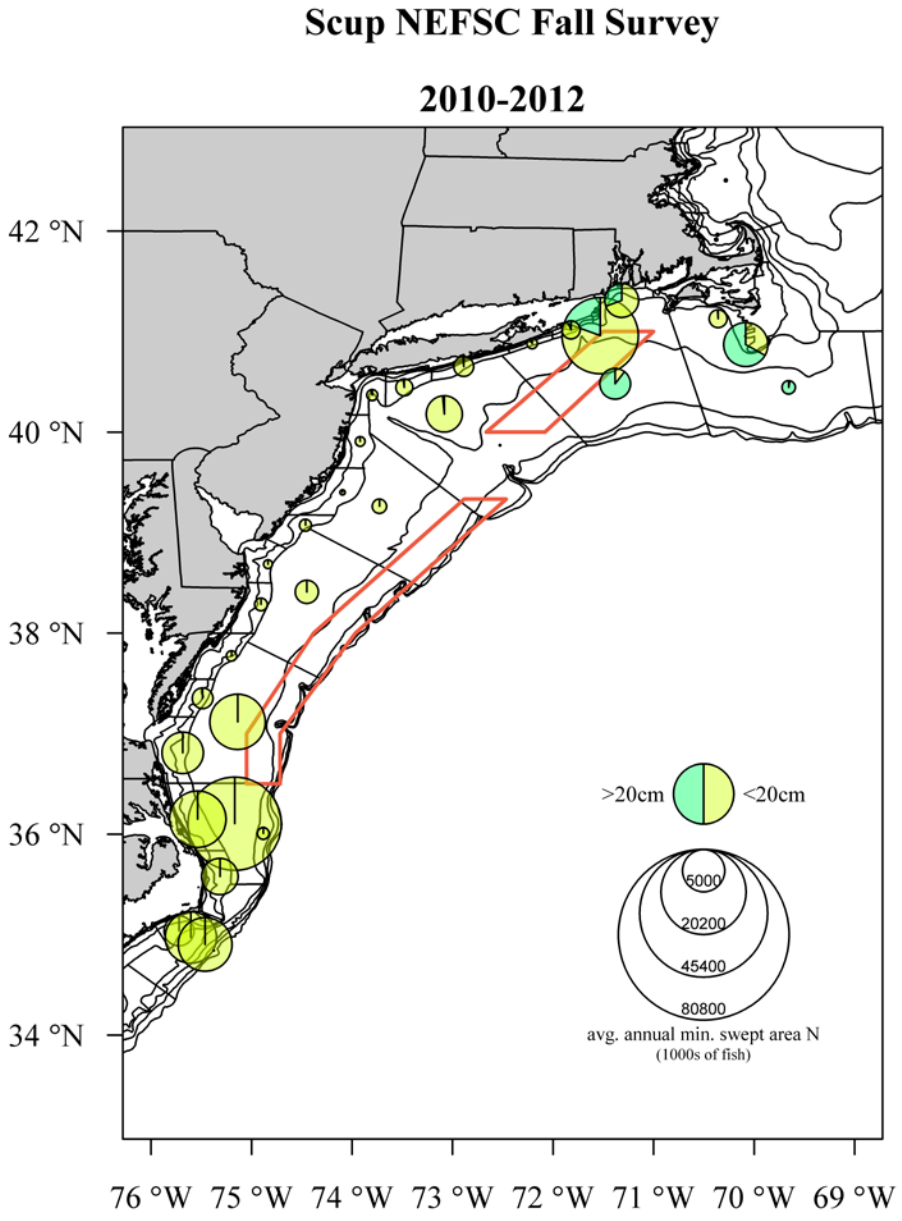



Figure 24. Size distributions of scup in NEFSC fall surveys 2010-2012. Yellow parts of the circles are fish <=20 cm fork length and ages 0 and 1 fish; green slices are fish > 20 cm fork length and ages 2 and older. Size of the circle is proportional to stock size in numbers.