

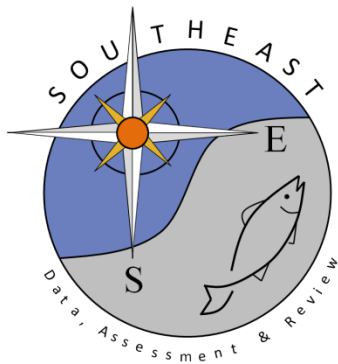
**Discards of Red Snapper Calculated for Commercial Vessels with
Federal Fishing Permits in the US South Atlantic**

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SEDAR41-DW36

Submitted: 1 September 2014

Updated with 2014 Data: 4 August 2015



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Please cite this document as:

McCarthy, K. 2015. Discards of Red Snapper Calculated for Commercial Vessels with Federal Fishing Permits in the US South Atlantic. SEDAR41-DW36. SEDAR, North Charleston, SC. 16 pp.

Discards of Red Snapper Calculated for Commercial Vessels with Federal Fishing Permits in the US South Atlantic

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August, 2015

Discard calculations were updated to include 2014 totals (Tables 7-10). For the 2015 workshop, discards from dive, trap, and trolling vessels were also calculated because a small number of red snapper discards were reported from those vessels. The total number of calculated discards from vessels fishing each of those gears, however, accounted for only 0.2-1.4 percent of the total calculated discards. Approximately 97% of all calculated discards were from vertical line vessels. Beginning in 2010, dive and trap vessels combined accounted for 2.2 to 14.3 percent of calculated discards in a single year.

Very few red snapper were reported as kept for bait or eaten. There was a total over all gears of 54 red snapper calculated as kept as bait or eaten in 2003; all other years had less than 12 fish kept for bait. Yearly totals are not presented here.

Introduction

In August 2001, the Southeast Fisheries Science Center (SEFSC) initiated a program to collect discard data from commercial fishing vessels landing federally managed species in the Gulf of Mexico and US South Atlantic. A reporting form was developed as a supplement to the mandatory coastal logbook forms for commercial vessels with federal fishing permits (Poffenberger and McCarthy, 2004). Discard data from the SEFSC coastal fisheries logbook program were used to calculate the number of red snapper that were discarded in the US South Atlantic during the period January 1, 2002 through December 31, 2013.

Data collection for the discard logbook program involves, each year, a 20% sample of vessels with Federal fishing permits. To assure that the sample was representative of permitted vessels, the universe of those vessels was stratified by region and gear fished. A random sample, weighted by vessel effort reported the previous year, was selected from each stratum. The US South Atlantic was defined as extending from approximately the North Carolina-Virginia border (37° N) to the ocean-side (south and east) of the Florida Keys-Dry Tortugas. Fishing gear strata included handline, electric reel (bandit rig), trolling, longline, trap, gillnet, and diving. The selected fishers were instructed to complete a supplemental discard form for every fishing trip that they made. Trips with no discards were to be reported as such.

Reported data included the numbers of discards by species, estimated condition of the fish when released, reason for release (due to regulations or unmarketable/unwanted), and the fishing area where the animal was discarded. To calculate species specific discard rates, discard data were matched to the effort data reported to the coastal logbook program. Condition of released fish could be reported as: all animals dead, majority of animals dead, all animals alive when released, majority of animals alive, fish kept but not sold, and the condition of animals unknown.

Methods

The objective of these analyses was to calculate the numbers of red snapper discarded by vessels that fish commercially for species other than shrimp or other shellfish. Data were also restricted to exclude information from pelagic longline vessels that typically fish for swordfish, pelagic sharks, tunas, and other

highly migratory species. Discards were calculated using the methods of SEDAR24 (continuity case) where discard rates were calculated using a delta-lognormal model. Two alternative methods in which nominal discard rates were calculated are also presented.

2010 model based (continuity) method

The data set for these analyses included all trips from vertical line (handline and electric/hydraulic reel) vessels that reported discards between January 1, 2002 and December 31, 2013. The data were filtered following the methods of SEDAR24 (McCarthy, 2010) and included removing clearly erroneous records (e.g., fishing more than 24 hours per day). As in SEDAR24, the data set was further filtered to remove records from fishers who reported “no discards” of any species for 75% or more of reported trips during years with four or more trips reported by the fisher. This data filter was necessary due to consistent non-reporting of discards by some fishers. Including effort from those fishers would result in discard rates that were erroneously low. Fishers may report “no discards” to the discard logbook program and remain in reporting compliance, however, the SEDAR24 working group noted that commercial fishing trips with no discards of any species are rare in the reef fish observer data, suggesting that trips reporting no discards should be much less common than has been found in the self-reported discard logbook data.

As per SEDAR24, a delta lognormal modelling method (Lo et al. 1992) was used to calculate the yearly red snapper discard rate. This method combined separate general linear model (GLM) analyses of the proportion of trips that discarded red snapper and the discard rates of trips that discarded red snapper to construct a single standardized discard rate. Fishing effort was available from the coastal logbook data set. Total discards for each year (2002-2013) were then calculated as:

$$\text{Yearly discards} = \text{Yearly standardized discard rate} * \text{reported yearly total effort}$$

The available discard data included six factors that were considered for their possible influence on the proportion of vertical line trips that discarded red snapper and on the discard rate of vertical line trips. In order to develop a well balanced sample design, the factors were categorized as:

Factor	Levels	Value
Year	12	2002-2013
Season	4	Jan-Mar, Apr-Jun, Jul-Sep, Oct-Dec
Areas fished	2	24°N-30°N, 31°N-35°N
Days at sea	3	1-2, 3-6, 7-12
Crew	2	1-2, 3-6
Number of hook hours fished*	3	1-120, 121-480, >481

*Number of hook hours fished was included as a factor in the binomial analysis only

The models developed for SEDAR24 were used for the 2014 analysis, no new models were constructed. The SEDAR24 model construction used generalized linear model analyses to test the above factors for significant effects on discard rate and proportion of trips reporting discards. Parameterization of each model was accomplished using GENMOD (Version 8.02 of the SAS System for Windows © 2000. SAS Institute Inc., Cary, NC, USA). A type3 model assuming lognormal error distribution was employed. The linking function selected was “normal”, and the response variable was $\log(\text{CPUE}) = \log(\text{number of red snapper/hook hour})$. For each GLM analysis of proportion of trips reporting red snapper discards, a type-3 model was fit, a binomial error distribution was assumed, and the logit link was selected. The response variable was proportion red snapper discard trips. Only main effects were examined.

For the SEDAR24 assessment, a forward stepwise regression procedure was used to determine the set of fixed factors that explained a significant portion of the observed variability. Each potential factor was added to the null model sequentially and the resulting reduction in deviance per degree of freedom was examined. The factor that caused the greatest reduction in deviance per degree of freedom was added to the base model if the factor was significant based upon a Chi-Square test ($p < 0.05$), and the reduction in

deviance per degree of freedom was $\geq 1\%$. This model then became the base model, and the process was repeated, adding factors individually until no factor met the criteria for incorporation into the final model.

The final delta-lognormal model was fit using a SAS macro, GLIMMIX (Russ Wolfinger, SAS Institute). The yearly least squares means, calculated using GLIMMIX, were included in the year-specific total discards calculation for the years 2002-2013. Discards were calculated for the years 1992-2001 as:

$$\text{Yearly discards (1992-2001)} = \text{Mean discard rate (2002-13)} * \text{year specific vertical line effort (1992-2001)}$$

Where mean discard rate (2002-13) was the 2002-13 mean discard rate weighted by sample size.

2014 alternate (nominal rate) methods

Two alternative methods for calculating red snapper discards from commercial fishing vessels used nominal discard rates along with total effort reported from the fishery. Nominal discard rates were used because the objective of the analyses was to calculate total discards from the commercial fishery and fisher behavior and other factors affecting catchability are likely important influences of discard rates. Analyses that standardize discard rates, similar to index standardization as was the approach in SEDAR24 and the 2014 continuity method, are inappropriate for discard calculation. A standardization procedure is appropriate when attempting to detect relative changes in population size (reflected as changes in CPUE) while accounting for the influence of factors that affect changes in catch rates unrelated to population size (e.g., number of crew). Nominal discard rates which include the range of discard rates due to differing fishing practices across the fishery will likely provide better estimates of the actual discard rates in the fleet and are more appropriate for use in calculating total discards.

Data filtering was identical for the two 2014 alternate methods; however, the first alternate method did not consider red snapper fishing season while the second alternate approach involved separate open and closed season calculations. Available data for those alternative analyses were identical to those used in the model based continuity analysis, although data filtering methods differed. The data sets included discard and effort information from commercial vertical line fishing trips from federally permitted vessels that reported discards between January 1, 2002 and December 31, 2013 in the US South Atlantic (statistical areas 2300-3700; Figure 1). Data from 2013 may have been incomplete when the analyses were conducted. Available red snapper discard data for other gears were too few for total discards to be reliably calculated. In addition, total effort reported from the vertical line fishery was available for the years 1992-2013. The 1992 data included only a 20 percent sample of commercial fishing vessels in Florida; all vessels in other states were required to report in 1992. All Florida vessels were required to report effort data beginning in 1993.

Commercial discards may be under reported. The percentage of discard reports returned with “no discards” from vertical line trips has increased from 32 to 68 percent in the US South Atlantic over the period 2002-2013. During the SEDAR32 gray triggerfish and blueline tilefish data workshop the issue of possible underreporting of commercial discards was discussed at length. The working group recommended that data be filtered to remove records from vessels that never reported discards of any species during a year. The maximum number of trips without a report of discards was also discussed. The SEDAR32 commercial working group recommended excluding data from vertical line vessels that reported more than 17 trips without reporting discards of any species (the mean number of reported trips prior to the first trip with reported discard plus two standard deviations of that mean). Those data filters were included in the current analyses and differ from the data filters used in the continuity method described above.

A further data filter, also recommended during SEDAR32, was to exclude from the total effort summary those trips that reported only mackerel landings. The assumption was that such trips were unlikely to have red snapper discards. The opinion of the SEDAR32 data workshop working group was that including effort from those trips in discard calculations was inappropriate and that recommendation was followed for these analyses.

Discard logbook and coastal logbook data were also filtered to remove clearly erroneous data (values of gear-specific effort data beyond the 99.9 percentile of the data). Discard logbook data with multiple gears fished on a trip were also excluded because discards could not be unambiguously attributed to a gear. That data filtering step was not necessary when summing total effort from the logbook data because reported effort data was gear-specific.

The first alternative method (2014 nominal discard rate) for calculating discards used nominal discard rates calculated by year for commercial vertical line trips that reported to the discard logbook program over the period 2002-2013. Those year specific discard rates were then multiplied by the corresponding yearly total fishing effort (hook hours fished) reported by the vertical line fishery to the coastal logbook program. Discard rate used to calculate discards during the years 1992-2001 was the mean discard rate of the years 2002-2013 weighted by sample size.

An additional method (2014 seasonal discard rate) for discard calculation followed a data workshop recommendation that nominal discard rates be calculated separately for open and closed red snapper seasons. Discards were calculated using nominal rates as described above with separate rates and effort totals calculated for each year/season combination. Mean discard rates for the years 2002-2009, the years with no seasonal closures, were used to calculate discards for the years 1992-2001.

Results and Discussion

Red snapper discards were reported from 51 or fewer trips for the years 2002-2013 combined from any single gear other than vertical line vessels. Approximately 94 percent of all trips with reported red snapper discards and 97 percent of discarded red snapper were reported from vertical line vessels. The number of vertical line trips that reported discards of red snapper was too low for data stratification beyond year specific stratification. Stratification by year and red snapper fishing season was included in the second alternative analysis. The data set for discard rate calculation, therefore, was limited to data from trips by vertical line vessels that reported to the discard logbook program between January 1, 2002 and December 31, 2013 in the US South Atlantic. During this period discard forms were submitted for 73,296 trips (pre-filtering, trips with multiple gears reported were counted more than once). Discards of red snapper were reported on 2,546 trips (3.5%). By way of comparison, there were 343,594 trips reported to the coastal logbook program (pre-filtering, trips with multiple gears fished were counted more than once) by vessels issued a federal permit to fish in the South Atlantic during 2002-2013, of which 13,570 trips landed red snapper (3.9%).

Continuity method

The models for the lognormal on discard rate and binomial on proportion of trips reporting discards were those developed for the SEDAR24 assessment in 2010:

$$\text{LOG(Discard rate)} = \text{DAYS} + \text{YEAR} + \text{SEASON} + \text{AREAS FISHED}$$

$$\text{Portion trips reporting discards} = \text{HOOK HOURS FISHED} + \text{YEAR} + \text{CREW}$$

Calculated total discards by year are provided in Table 1 for commercial vertical line fishing trips. Total discards calculated using the continuity method differed from the discard totals calculated during SEDAR24, but the pattern of discarding red snapper over time were similar between the two analyses. Total discards calculated using the continuity method were very high in 2002 relative to other years. Examination of the data suggested that a small number of trips with high discard rates may have resulted in the high 2002 calculated discards. No defensible justification could be identified that would allow dropping those records with high discard rates. Low calculated discards for the years 2003-2007 were due to low year specific discard rates.

Alternate (nominal rate) methods

Yearly discards, calculated using the 2014 nominal discard rate method, are provided in Table 2 for commercial vertical line fishing trips. A single nominal discard rate was calculated for each year for the years 2002-2013; red snapper fishing season was not considered in calculating those rates. The fewest discards were calculated for the years 2003-06 and resulted from a combination of low discard rates and low effort. The discard rates in 2002 and 2011-13 were higher than during 2003-06 and resulted in higher calculated discards during those years. Yearly variability in discards during 1992-2001 was entirely due to annual differences in reported effort because the mean discard rate for the years 2002-13 was used in calculating 1992-2001 yearly discards.

Table 3 includes the results from the 2014 seasonal discard rate method where separate calculations of discards for red snapper open and closed fishing seasons were completed. During the years 2010-2013, nearly all discards were reported during periods when red snapper fishing was prohibited. The fewest discards during years with no closed season were calculated for the years 2003-06; due to low discard rates.

Methods compared

Calculated red snapper yearly discards were compared across five analyses: the SEDAR24 assessment, the 2013 update assessment, the 2014 continuity method, the 2014 nominal rate method, and the 2014 seasonal rate method. The 2013 update and 2014 continuity model based methods resulted in nearly identical calculated red snapper discards (Table 4, Figure 2). Results from those two analyses also closely matched those of the SEDAR24 analysis for the years 2002-2009, but the SEDAR24 calculated discards were lower for the years 1992-2001. The SEDAR24 mean discard rate used to calculate 1992-2001 discards was lower than the mean discard rates calculated for the 2013 update and 2014 continuity analyses due to additional years of data in those post-SEDAR24 calculations. The additional years of data included years with closed fishing seasons. Discard rates during closed seasons were higher than open season discard rates. Including closed season data resulted in the higher mean discard rates used in the 2013 update and 2014 continuity analyses.

The number of discards calculated using the two 2014 alternative methods were identical during the years 2002-2009 (Table 4, Figure 2). The year specific sum of open season and closed season discards calculated using the 2014 seasonal rate method was very close to the corresponding yearly discards calculated using the 2014 nominal discard rate method. Discards calculated for the period 1992-2001 differed greatly, however, between the two 2014 alternative methods. Those dissimilarities in yearly discards were due to differences in the years over which mean discard rates were calculated. The mean discard rate used in the 2014 nominal rate method included data from the years 2002-2013, but the mean discard rate used in the 2014 seasonal rate method was calculated using data from 2002-2009 to exclude years with closed seasons. Including data from closed seasons, as noted above, resulted in higher mean discard rates used in the 2014 nominal rate method.

Numbers of discards calculated using either of the 2014 alternative methods were lower for most years of the time series compared to those calculated using the 2013 update or 2014 continuity methods. Discards calculated using the SEDAR24 method were also higher than discards calculated using the 2014 nominal rate method during 2002-2009 and the 2014 seasonal rate method during 1996-2009 (except in 2005). The 2014 alternative methods excluded effort data reported from mackerel trips and that lower effort resulted in lower calculated discards compared to the other methods over most of the time series. Mackerel trips were not required to be reported during the initial years of the coastal logbook program when results of the 2013 update, 2014 continuity, and 2014 nominal rate methods were very similar. The SEDAR24 and 2014 seasonal rate method results were also similar at the beginning of the time series, but diverge after 1995 due to filtering mackerel trip effort in the 2014 analyses.

Release condition and reason for discarding

The release condition of discarded red snapper is reported in Table 5. There were 49,845 vertical line red snapper discards reported to the coastal logbook discard program. Overall, less than 6.5% of discarded red

snapper were reported as “all dead” or “majority dead” while more than 93% of discards were reported as “all alive” or “majority alive”. Only 15 (0.03 percent) reported red snapper discards during the years 2002-2013 were identified as “kept as bait or eaten”. Calculation of the total number of “kept as bait” red snapper was not attempted.

Nearly all red snapper discards were reported as due to regulatory restrictions (Table 6). Of those regulatory discards, 16.8% were reported as discarded due to size restrictions and 42.7% were reported as due to “out of season”. Approximately 40% of discards were reported as due to other regulations. Those percentages may be misleading, however. Prior to 2008 the discard form provided only two options for the reason for discarding an animal: “regulations” or “market conditions”. Regulatory discards reported before 2008 were categorized as “other regulations” once additional discard categories were introduced in 2008.

The yearly number of trips reporting red snapper discards in the US South Atlantic during the period 2002-2013 was low, but has exceeded 400 trips per year from 2011-2013. Stratification of the available data was limited because of small sample sizes in most years and likely does not capture much of the variation in numbers of discards within the red snapper commercial fishery. Although clear instances of nonreporting of discards were identified and excluded from the 2010 calculations, other cases of nonreporting and underreporting have not been quantified. The effect this may have had on the discard calculations is unknown. Actual red snapper discards may be higher than the calculated totals presented here due to underreporting.

Literature Cited

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Table 1. Calculated yearly total discards of red snapper (in numbers of fish) by vertical line vessels following 2010 model based methods (continuity method). Effort is in hook hours fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2013.

Year	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*		4,387	0.025257207		957,304	24,179
1993		11,648	0.025257207		1,003,897	25,356
1994		14,212	0.025257207		1,388,083	35,059
1995		14,329	0.025257207		1,307,319	33,019
1996		16,413	0.025257207		1,672,560	42,244
1997		18,840	0.025257207		1,846,834	46,646
1998		18,511	0.025257207		1,419,588	35,855
1999		16,868	0.025257207		1,302,584	32,900
2000		15,445	0.025257207		1,275,587	32,218
2001		16,231	0.025257207		1,277,425	32,264
2002	692	16,709	0.03717202	0.26	1,204,493	44,773
2003	975	16,993	0.013387074	0.38	1,029,714	13,785
2004	621	15,757	0.005152518	0.49	919,308	4,737
2005	877	14,202	0.004674786	0.38	844,992	3,950
2006	520	15,269	0.006485942	0.41	946,269	6,137
2007	746	16,144	0.012633039	0.32	1,009,208	12,749
2008	1,336	16,606	0.012801839	0.18	1,049,463	13,435
2009	939	18,752	0.018975265	0.23	1,090,646	20,695
2010	1,218	16,305	0.039893878	0.13	896,178	35,752
2011	1,285	16,307	0.05388573	0.12	837,675	45,139
2012	1,340	15,025	0.035304418	0.13	752,711	26,574
2013	1,207	14,170	0.031473902	0.14	771,444	24,280

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

Table 2. Calculated yearly total discards of red snapper (in numbers of fish) by vertical line vessels using the 2014 nominal rate method. Effort is in hook hours fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2013.

Year	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*		4,428	0.020691		1,557,323	32,223
1993		11,846	0.020691		1,331,155	27,543
1994		14,446	0.020691		1,680,269	34,766
1995		14,468	0.020691		1,676,441	34,687
1996		15,395	0.020691		1,647,052	34,079
1997		17,642	0.020691		1,778,302	36,794
1998		15,865	0.020691		1,280,813	26,501
1999		14,462	0.020691		1,079,870	22,343
2000		13,299	0.020691		1,155,958	23,918
2001		13,932	0.020691		1,202,137	24,873
2002	1,176	14,575	0.024888	10.0	1,156,630	28,787
2003	1,541	14,063	0.008538	14.6	982,471	8,389
2004	1,036	13,178	0.002493	7.5	874,447	2,180
2005	1,233	11,843	0.011618	14.8	807,361	9,380
2006	865	11,654	0.005522	10.5	880,385	4,861
2007	1,746	12,801	0.010674	14.8	946,780	10,106
2008	3,119	13,040	0.01333	10.0	962,229	12,827
2009	1,720	14,353	0.014301	7.6	1,007,201	14,404
2010	2,961	12,778	0.017312	8.8	820,228	14,199
2011	3,219	13,093	0.048914	8.3	784,566	38,376
2012	3,286	12,334	0.025964	8.2	702,282	18,234
2013	2,802	11,728	0.024336	7.2	727,686	17,709

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

Table 3. Calculated yearly total discards of red snapper (in numbers of fish) by vertical line vessels. Yearly nominal discard rates calculated separately for open and closed red snapper seasons. Effort is in hook hours fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2009.

Year	Season	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*	Open		4,428	0.011975		1,557,323	18,649
1993	Open		11,846	0.011975		1,331,155	15,941
1994	Open		14,446	0.011975		1,680,269	20,121
1995	Open		14,468	0.011975		1,676,441	20,075
1996	Open		15,395	0.011975		1,647,052	19,724
1997	Open		17,642	0.011975		1,778,302	21,295
1998	Open		15,865	0.011975		1,280,813	15,338
1999	Open		14,462	0.011975		1,079,870	12,932
2000	Open		13,299	0.011975		1,155,958	13,843
2001	Open		13,932	0.011975		1,202,137	14,396
2002	Open	1,176	14,575	0.024888	10.0	1,156,630	28,787
2003	Open	1,541	14,063	0.008538	14.6	982,471	8,389
2004	Open	1,036	13,178	0.002493	7.5	874,447	2,180
2005	Open	1,233	11,843	0.011618	14.8	807,361	9,380
2006	Open	865	11,654	0.005522	10.5	880,385	4,861
2007	Open	1,746	12,801	0.010674	14.8	946,780	10,106
2008	Open	3,119	13,040	0.01333	10.0	962,229	12,827
2009	Open	1,720	14,353	0.014301	7.6	1,007,201	14,404
2010	Open	153	760	0.047125	11.0	35,864	1,690
2011	Open**						
2012	Open	222	706	0.005368	5.8	38,923	209
2013	Open	324	1,360	0.009733	9.3	93,991	915
2010	Closed	2,808	12,018	0.015687	6.3	784,364	12,304
2011	Closed	3,219	13,093	0.048914	8.3	784,566	38,376
2012	Closed	3,064	11,628	0.027456	8.0	663,359	18,213
2013	Closed	2,478	10,368	0.026246	7.0	633,695	16,632

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

**No open season for red snapper during 2011

Table 4. Calculated yearly South Atlantic vertical line vessel red snapper discards from SEDAR 24, from the 2013 update assessment, the 2014 model-based continuity calculation, calculation using nominal rates, and discards calculated separately during open and closed seasons using nominal discard rates. Discards are reported in number of fish.

Year	Calculated Discards SEDAR24 (model based)	Calculated Discards 2013 Update (model based)	Calculated Discards 2014 (model based continuity)	Calculated Discards 2014 (nominal rates)	Calculated Discards 2014 (nominal rates) Open season	Calculated Discards 2014 (nominal rates) Closed season
1992*	14,233	23,867	24,179	24,422	18,649	
1993	14,926	25,028	25,356	27,543	15,941	
1994	20,638	34,607	35,059	34,766	20,121	
1995	19,437	32,593	33,019	34,687	20,075	
1996	24,867	41,699	42,244	34,079	19,724	
1997	27,458	46,044	46,646	36,794	21,295	
1998	21,106	35,392	35,855	26,501	15,338	
1999	19,387	32,475	32,900	22,343	12,932	
2000	18,975	31,803	32,218	23,918	13,843	
2001	19,014	31,848	32,264	24,873	14,396	
2002	42,356	44,548	44,773	28,787	28,787	
2003	13,973	14,028	13,785	8,389	8,389	
2004	5,170	4,796	4,737	2,180	2,180	
2005	4,999	4,165	3,950	9,380	9,380	
2006	7,425	6,390	6,137	4,861	4,861	
2007	14,759	13,340	12,749	10,106	10,106	
2008	15,512	13,962	13,435	12,827	12,827	
2009	20,402	20,439	20,695	14,404	14,404	
2010		36,892	35,752	14,199	1,690	12,304
2011		46,118	45,139	38,376		38,376
2012		24,551	26,574	18,234	209	18,213
2013			24,280	17,709	915	16,632

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

Table 5. Estimated condition at release of red snapper discards, 2002-2013. Empty cells had no reports of red snapper discards or included data from fewer than three vessels and are confidential.

Gear	All Dead	Majority Dead	All Alive	Majority Alive	Kept	Unknown	Unreported	N fish
Vertical line	0.7%	5.5%	51.5%	42.1%				49,845

Table 6. Reported reasons for discarding red snapper, 2002-2013. Empty cells had no reports of red snapper discards or included data from fewer than three vessels and are confidential.

Gear	Regulations not legal size	Regulations out of season	Regulations other	Market conditions	Not reported	N fish
Vertical line	16.8%	42.7%	40.3%			49,845

Addendum – updated calculated discards with 2014 data included

Table 7. Calculated yearly total discards of red snapper (in numbers of fish) by vertical line vessels including 2014 discards. Vertical line vessels accounted for approximately 97% of calculated discards. Yearly nominal discard rates calculated separately for open and closed red snapper seasons. Effort is in hook hours fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2009. Trips (discards) = trips reporting to the discard logbook program. Trips (total effort) = number of trips reporting to the coastal logbook program.

Year	Season	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*	Open		4,428	0.0124		1,557,323	19,339
1993	Open		11,846	0.0124		1,331,155	16,530
1994	Open		14,446	0.0124		1,680,269	20,865
1995	Open		14,468	0.0124		1,676,441	20,818
1996	Open		15,395	0.0124		1,647,052	20,453
1997	Open		17,642	0.0124		1,778,302	22,083
1998	Open		15,863	0.0124		1,280,778	15,905
1999	Open		14,462	0.0124		1,079,870	13,410
2000	Open		13,298	0.0124		1,155,724	14,352
2001	Open		13,927	0.0124		1,202,087	14,927
2002	Open	1,169	14,575	0.0251	9.97	1,156,630	29,020
2003	Open	1,544	14,062	0.0085	14.57	982,399	8,372
2004	Open	1,032	13,178	0.0025	7.75	874,447	2,192
2005	Open	1,230	11,843	0.0122	14.31	807,361	9,823
2006	Open	880	11,654	0.0054	10.64	880,385	4,739
2007	Open	1,757	12,801	0.0140	21.15	946,780	13,249
2008	Open	3,098	13,036	0.0130	10.28	962,163	12,514
2009	Open	1,715	14,352	0.0144	7.61	1,007,193	14,466
2010	Open	153	757	0.0471	10.96	35,816	1,688
2011	Open**						
2012	Open	232	706	0.0051	5.97	38,923	200
2013	Open	334	1,423	0.0096	9.28	100,868	968
2014	Open	533	2,264	0.0137	5.10	144,207	1,978
2010	Closed	2,800	12,012	0.0167	6.19	783,389	13,121
2011	Closed	3,250	13,093	0.0500	8.16	784,566	39,240
2012	Closed	3,156	11,634	0.0269	8.10	662,827	17,833
2013	Closed	2,516	10,578	0.0258	7.01	650,090	16,798
2014	Closed	2,692	11,822	0.0375	5.06	625,031	23,455

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

**No open season for red snapper during 2011

Table 8. Calculated yearly total discards of red snapper (in numbers of fish) by dive vessels including 2014 discards. Dive vessels accounted for approximately 1.4% of calculated discards. Yearly nominal discard rates calculated separately for open and closed red snapper seasons. Effort is in diver hours fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2009. Trips (discards) = trips reporting to the discard logbook program. Trips (total effort) = number of trips reporting to the coastal logbook program.

Year	Season	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*	Open		506	0.0057		22,041	126
1993	Open		976	0.0057		14,084	80
1994	Open		927	0.0057		19,384	111
1995	Open		753	0.0057		17,976	103
1996	Open		978	0.0057		20,472	117
1997	Open		1,243	0.0057		25,297	144
1998	Open		1,196	0.0057		21,984	125
1999	Open		893	0.0057		17,636	101
2000	Open		963	0.0057		17,667	101
2001	Open		1,011	0.0057		17,297	99
2002	Open	10	929	0.0200	3.16	17,330	347
2003	Open	48	894	0.0000		13,609	0
2004	Open	57	772	0.0175	7.55	13,284	233
2005	Open	23	681	0.0290	4.80	12,219	354
2006	Open	20	687	0.0063	4.47	12,369	77
2007	Open	67	856	0.0000		16,941	0
2008	Open	141	745	0.0027	11.87	14,340	38
2009	Open	49	769	0.0000		12,596	0
2010	Open	11	44	0.0000		1,116	0
2011	Open**						
2012	Open	6	83	0.0000		1,105	0
2013	Open	28	199	0.0000		2,779	0
2014	Open	39	280	0.0000		5,094	0
2010	Closed	91	730	0.0680	3.91	14,051	956
2011	Closed	136	926	0.0223	4.13	16,238	362
2012	Closed	120	839	0.0551	3.82	16,263	896
2013	Closed	86	801	0.0518	5.75	13,799	715
2014	Closed	113	744	0.0487	8.23	13,726	668

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

**No open season for red snapper during 2011

Table 9. Calculated yearly total discards of red snapper (in numbers of fish) by trap vessels including 2014 discards. Trap vessels accounted for approximately 1.4% of calculated discards. Yearly nominal discard rates calculated separately for open and closed red snapper seasons. Effort is in traps fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2009. Trips (discards) = trips reporting to the discard logbook program. Trips (total effort) = number of trips reporting to the coastal logbook program.

Year	Season	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*	Open		595	0.0026		52,540	139
1993	Open		1,023	0.0026		43,311	114
1994	Open		1,195	0.0026		59,745	158
1995	Open		1,032	0.0026		55,765	147
1996	Open		1,168	0.0026		59,422	157
1997	Open		1,353	0.0026		62,406	165
1998	Open		1,201	0.0026		53,588	142
1999	Open		1,075	0.0026		49,538	131
2000	Open		829	0.0026		37,859	100
2001	Open		1,096	0.0026		43,626	115
2002	Open	51	826	0.0134	6.31	35,942	482
2003	Open	89	783	0.0000		31,505	0
2004	Open	38	820	0.0000		31,221	0
2005	Open	12	596	0.0000		24,787	0
2006	Open	5	786	0.0000		32,018	0
2007	Open	52	616	0.0200	5.15	26,389	529
2008	Open	209	561	0.0000		18,820	0
2009	Open	197	772	0.0000		28,804	0
2010	Open	18	55	0.0000		1,683	0
2011	Open**						
2012	Open	8	17	0.0000		451	0
2013	Open	55	99	0.0044	5.49	2,494	11
2014	Open	24	44	0.0556	4.90	1,131	63
2010	Closed	136	349	0.1104	11.65	13,878	1,533
2011	Closed	51	237	0.0719	7.14	6,986	502
2012	Closed	127	307	0.0099	4.52	8,284	82
2013	Closed	111	268	0.1068	9.35	6,850	732
2014	Closed	108	218	0.0852	3.36	5,313	453

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

**No open season for red snapper during 2011

Table 10. Calculated yearly total discards of red snapper (in numbers of fish) by trolling vessels including 2014 discards. Trolling vessels accounted for approximately 0.2% of calculated discards. Yearly nominal discard rates calculated separately for open and closed red snapper seasons. Effort is in hook hours fished. Discard rate used for the years 1992-2001 was the weighted mean rate for the years 2002-2009. Trips (discards) = trips reporting to the discard logbook program. Trips (total effort) = number of trips reporting to the coastal logbook program.

Year	Season	Trips (discards)	Trips (total effort)	Discard Rate	Discard Rate CV	Total Effort	Calculated Discards
1992*	Open		576	0.0000		69,458	0
1993	Open		1,095	0.0000		75,520	0
1994	Open		1,241	0.0000		103,442	0
1995	Open		1,435	0.0000		78,334	0
1996	Open		1,181	0.0000		72,067	0
1997	Open		1,295	0.0000		77,154	0
1998	Open		3,227	0.0000		204,204	0
1999	Open		3,470	0.0000		202,641	0
2000	Open		4,576	0.0000		265,989	0
2001	Open		4,781	0.0000		203,199	0
2002	Open	273	4,349	0.0000		172,868	0
2003	Open	241	3,823	0.0000		134,453	0
2004	Open	224	3,123	0.0000		114,811	0
2005	Open	183	2,855	0.0000		101,320	0
2006	Open	125	2,918	0.0000		104,919	0
2007	Open	482	3,668	0.0000		127,460	0
2008	Open	1,009	3,750	0.0000		114,901	0
2009	Open	634	4,107	0.0000		135,729	0
2010	Open	59	302	0.0000		9,295	0
2011	Open**						
2012	Open	54	160	0.0026	7.35	5,157	14
2013	Open	88	309	0.0000		11,854	0
2014	Open	141	547	0.0003	11.87	17,357	5
2010	Closed	854	3,560	0.0013	27.31	111,864	140
2011	Closed	573	3,392	0.0000	23.94	110,991	3
2012	Closed	798	3,090	0.0018	13.59	103,963	189
2013	Closed	661	2,775	0.0009	9.15	92,440	79
2014	Closed	882	3,074	0.0039	5.58	98,811	387

*in 1992 only 20% of vessels in Florida were required to report to the logbook program; effort for areas off Florida were expanded by a factor of five.

**No open season for red snapper during 2011

Figure 1. Coastal logbook statistical areas.

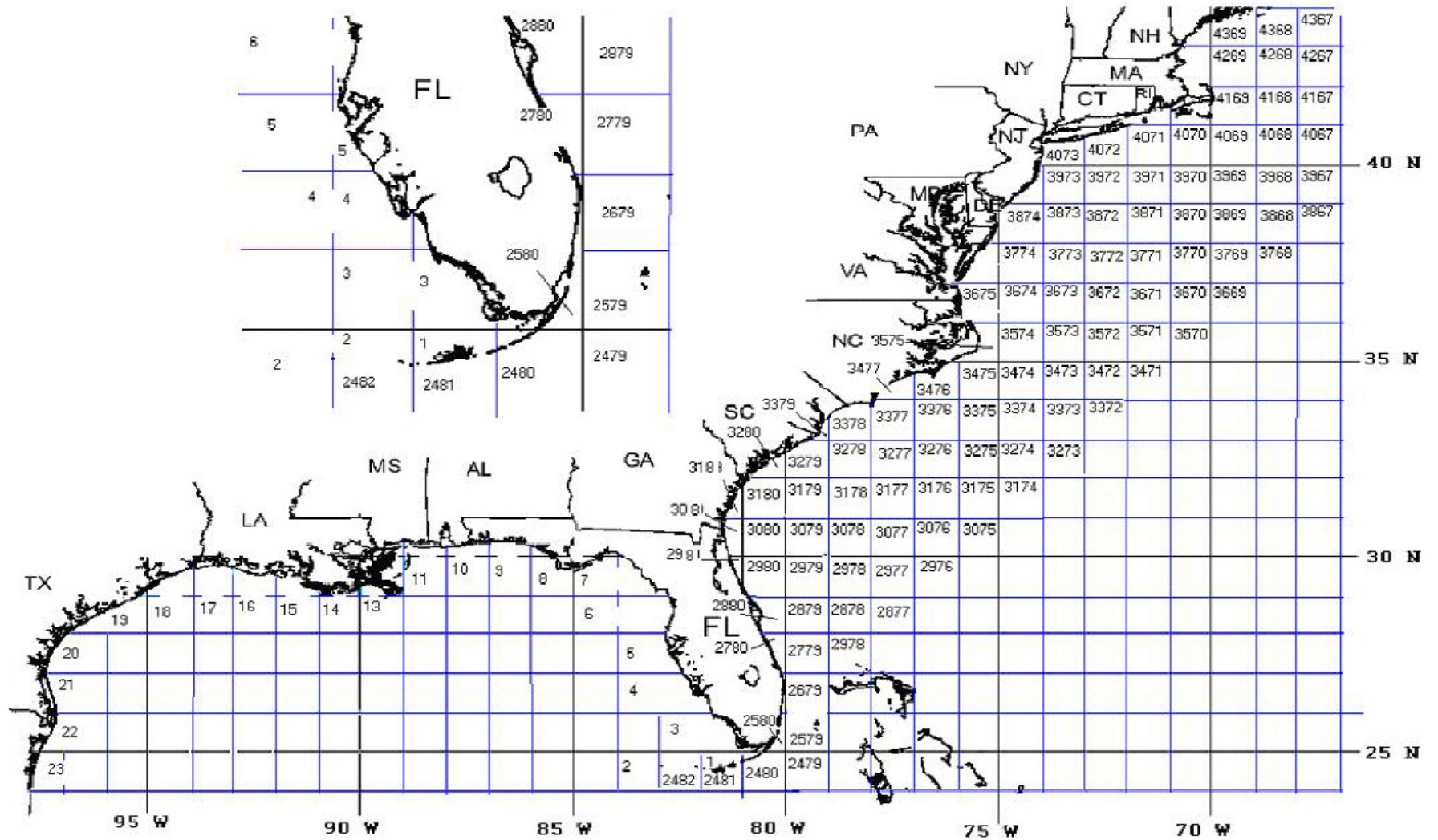


Figure 2. Yearly discards by calculation method.

