Total removals of red snapper (*Lutjanus campechanus*) in 2012 from the US South Atlantic

SEDAR41-RD10

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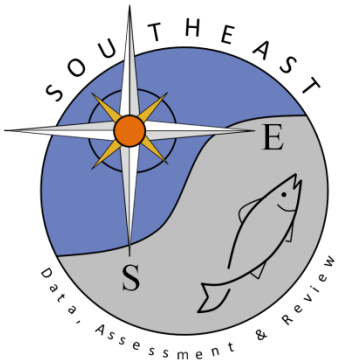

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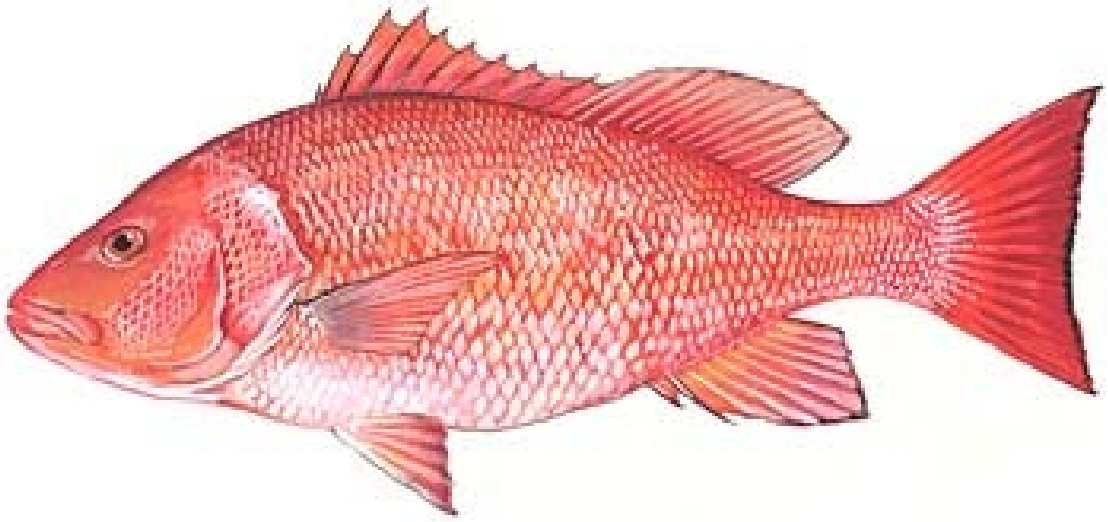

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Introduction

This report provides 2012 estimates of the total removals (landings and dead discards) of red snapper (*Lutjanus campechanus*) from the South Atlantic Fisheries Management Council's (SAFMC) jurisdiction. These estimates were compiled for the dominant commercial and recreational fleets in the fishery and from several data sources, as described below.

Assessment Analysis History

The last benchmark stock assessment for red snapper was completed as part of SEDAR 24 in October 2010 using the Beaufort Assessment Model (BAM). The Review Panel for SEDAR 24, which included Center for Independent Experts (CIE) reviewers, concluded that the model was adequate, appropriate, and applied correctly to the red snapper stock. The base run in the SEDAR 24 report was based on a headboat index likelihood component weight of 0.11. During the review of this stock assessment by the Scientific and Statistical Committee (SSC) at their November, 2010 meeting, the SSC selected a set of equally plausible runs that applied a range of likelihood component weights for the headboat index of 0.2-0.3. Increasing the weight on the headboat index resulted in more optimistic stock status outcomes, although all runs indicated the stock was severely overfished and undergoing overfishing. The SAFMC selected the projection analysis using the headboat index weight of 0.3 for management purposes.

The SAFMC manages red snapper using an F_{MSY} proxy of $F_{30\%SPR}$. This proxy is less than the $F_{40\%SPR}$ proxy recommended by the SEDAR 24 review panel and the SSC. Should the SAFMC's choices of headboat weight and F_{MSY} proxy turn out to be overly-optimistic, then acceptable biological catches (ABC) summarized in this document may result in a higher risk of overfishing.

Management in 2012

Based on the preferred SEDAR 24 stock assessment projections selected by the SAFMC, total ABC and sector-specific quotas were established for the 2012 fishing year (Table 1).

Table 1. Acceptable Biological Catch (ABC) and sector specific quotas established by the SAFMC for the 2012 fishing year.

	Quota
Total ABC (landings + dead discards)	86,000 (dead fish)
Commercial landings	20,818 (pounds) = 3,668 (dead fish)
Recreational landings	9,399 (dead fish)

In order to harvest the quota shown in Table 1, the SAFMC allowed for short duration seasons for both the recreational and commercial sectors. The recreational sector was open on two, three-day weekends (September 14-17 and 21-24, 2012), while the commercial sector was open for two week long periods (September 17-24 and December 12-19, 2012). During these openings there was no minimum size limit in place and the recreational bag limit was set at one fish per person per day, while the commercial sector was restricted to a 50 pound trip limit.

The purpose of this report is to provide the best estimate of total removals of red snapper from the SAFMC's jurisdiction so that it might be compared to the 2012 ABC and quota values in Table 1 for determination of future management actions.

Data Sources

The total removal (landings and dead discards) estimates for the U.S. South Atlantic federal fisheries come from several different survey sources. These sources focus on particular sectors of the overall snapper-grouper fishery. Landings and discard data sources are broken out by commercial, recreational headboat, recreational charter boat, private boat, and shore modes. This report is structured along the lines of the representative data collection systems for each, with reports of additional or auxiliary data sources included as well.

Commercial Landings

Commercial landings for the Atlantic coast are maintained in the Atlantic Coastal Cooperative Statistics Program (ACCSP) Data Warehouse. These data were queried for 2012 to obtain the landings estimate for the states of Florida, Georgia, South Carolina, and North Carolina by month. These data by month or state are confidential, and therefore, only the total landings of 8,695 (lb whole weight) can be presented in this report. Based on the average weight (5.68 lb whole weight) used for computing the quotas in Table 1, this commercial landings weight estimate equates to 1,532 fish.

The monthly landings estimates suggested some non-compliance to regulations occurred during 2012. Red snapper were landed outside of the open seasons during several months. The non-compliant landings accounted for about 34% of the total landings. Of all our fishery-dependent data, the commercial landings are thought to be the most accurate. Despite that fact, there remains the possibility of some unknown amount of unreported or misreported catch that may have occurred.

Commercial Discards

Commercial discards were calculated for vertical line (handline and electric reel) vessels in the U.S. South Atlantic using the commercial logbooks. These self-reported logbooks are largely unverified. The annual discard estimate from these logbooks is computed using a delta-lognormal model to compute year-specific discard rates, which were then applied to total effort to calculate annual discards for the period 2002-2012 (Table 2). Data included in the calculation were 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. The fact that this step is necessary indicates the potential bias due to under-reporting, particularly for discard information from self-reported data.

A potential rationale for under-reporting discards lies in the management regulations themselves. In the case of red snapper, the ABC was based on total removals and the management accountability measures are based on the ABC. This establishes a link between reported discards and the accountability measures, which dictate the opening and closing of the fishery, creating an incentive for under-reporting discards. That incentive may be enhanced by the lack of appropriate validation or verification. The degree to which this potential incentive for under-reporting might be affecting red snapper data is unclear. It is likely that estimates of commercial discards in this report represent a lower bound for the true value. Despite the filtering of data to remove consistent non-reporting of discards, concerns about the potential bias of the remaining records still remain. In addition, there are other commercial fishing gears (e.g. longline and traps) that likely capture red snapper that are not considered in this discard summary.

Table 2. Estimates of total commercial red snapper discards (numbers of fish) for vertical line vessels from the commercial logbook data for the U.S. South Atlantic.

year	total effort	nobs	discard rate	discards (number of fish)
2002	1,206,635	692	0.037	44,548
2003	1,029,722	973	0.014	14,028
2004	919,298	621	0.005	4,796
2005	844,769	877	0.005	4,165
2006	946,733	520	0.007	6,390
2007	1,009,208	746	0.013	13,340
2008	1,049,433	1,338	0.013	13,962
2009	1,090,646	939	0.019	20,439
2010	896,354	1,218	0.041	36,892
2011	835,850	1,285	0.055	46,118
2012	697,872	1,310	0.035	24,551

The SEDAR 24 report contains fleet-specific discard mortality rates that were used to compute the number of dead fish based on total releases. In the case of commercial caught fish the discard mortality rate of 0.48 was used. When applied to the data in this report, the estimate of total dead discards is 0.48 * 24,551 = 11,785 dead fish.

Recreational Headboat Landings and Discards

The Southeast Region Headboat Survey (SRHS) estimates landings and discards for headboats in the U.S. South Atlantic and Gulf of Mexico. The estimates are computed from required, self-

reported logbooks. The estimates of landings from the SRHS are not verified by dockside sampling, although occasionally red snapper were observed during the SRHS biological sampling on trips for which the captain has reported "none" in their logbook; in those instances the catch reports are edited to reflect the observed landing. The estimates of headboat landings and discards are shown in Tables 3 and 4, respectively. The best estimate of total landings from headboats is 2,127 fish. Using the SEDAR 24 discard mortality rate of 0.41 on for-hire vessels, the best estimate of dead discards from headboats is 2,479 fish. The monthly estimates indicate at least 21% of the landings were caught out of season. This is comparable to the 34% estimate of non-compliance from the commercial fishery.

Table 3. Estimates of total landings (numbers) of red snapper in the U.S. South Atlantic from the Southeast Region Headboat Survey.

State\Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
NC	0	0	0	0	0	0	28	0	79	3	0	0	110
SC	0	0	0	0	0	0	0	0	11	0	0	0	11
GA\NEFL	0	0	3	0	0	2	40	1	1512	0	0	0	1558
SEFL	1	0	1	0	124	227	6	4	85	0	0	0	448
Total	1	0	4	0	124	229	74	5	1687	3	0	0	2127

Table 4. Estimates of total discards (numbers) of red snapper in the U.S. South Atlantic from the Southeast Region Headboat Survey.

State\Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
NC	0	0	0	0	0	0	0	0	16	0	0	0	16
SC	0	0	0	0	0	0	0	0	22	0	0	0	22
GA\NEFL	0	0	47	0	0	433	1490	404	3170	0	0	0	5544
SEFL	0	0	0	0	335	0	120	6	3	0	0	0	464
Total	0	0	47	0	335	433	1610	410	3211	0	0	0	6046

The estimates of landings from the SRHS are only partially verified by dockside sampling which would be able to correct a few instances where red snapper were sampled, but none reported on the logbook. In the case of discards, dockside sampling provides no verification. A very limited at-sea observer program provides some verification; however, the number of trips observed is very low and the trips that are observed may only involve a sub-sample of the anglers on board. Nonetheless we can use the presence/absence of these data, which represents direct verification, to examine possible under-reporting of discards in the SRHS logbooks. Table 5 indicates that there are many months in which red snapper were discarded from headboats, but not reported on the logbooks (compare to Table 4). This suggests that the SRHS discard estimates are likely biased low and probably best treated as a lower bound for the true value. Much like the commercial logbook discard reporting, the SRHS logbook reporting is likely subject to under-reporting, having similar incentives.

Table 5. Presence (+) or absence (-) of red snapper discards aboard headboats by at-sea observers during 2012. Bold (+) indicates months where the SRHS logbooks reported zero discards.

State/Month	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
NC	-	-	**+**	**+**	-	+	+	-	+	-	-	-
SC	-	-	-	+	-	-	-	-	-	-	-	-
GA	-	-	-	-	**+**	+	-	-	-	**+**	-	-
FL	**+**	**+**	**+**	**+**	+	**+**	+	+	+	**+**	**+**	**+**
	+	+	+	+	+	+	+	+	+	+	+	+

Recreational Charter Boat, Private Boat, and Shore Mode: Landings and Discards

During SEDAR 24, Marine Recreational Fisheries Statistics Survey (MRFSS) estimates for charter boats and private recreational boats were used in the stock assessment and projections. MRFSS estimates were recalculated as part of the Marine Recreational Improvement Program (MRIP); however, recalculated estimates for red snapper did not vary consistently in either direction (estimates increased some years and decreased other years) and for consistency with SEDAR 24, MRFSS estimates are reported here for 2012. The MRFSS covers coastal Atlantic states from Maine to Florida and provides estimated catch per unit effort, total effort, landings, and discards for six two-month periods (waves) each year. The survey provides estimates for three recreational fishing modes: shore based fishing, private and rental boat fishing, and for-hire charter and guide fishing.

The MRFSS design incorporates three complementary survey methods for estimating catch and effort. Catch data are collected through dockside angler intercept surveys of completed, recreational fishing trips. Effort data are collected using two telephone surveys. The Coastal Household Telephone Survey (CHTS) uses random digit dialing of coastal households to obtain from anglers detailed information about the previous two months of recreational fishing trips. The weekly For-Hire Survey interviews charter boat operators (captains or owners) to obtain the trip information with a one-week recall period. These effort data and estimates are aggregated to produce the wave estimates. Catch rates from dockside intercept surveys are combined with estimates of effort from telephone interviews to estimate total landings and discards by wave, mode, and area fished (inland, state, and federal waters). Because the MRFSS collects information at the wave level, a short duration (e.g. two extended weekends) opening is not ideal for accurate estimation of catch.

Charter Boat Landings and Discards

As indicated by the many blank fields in Tables 6 and 7, the intercept rate for red snapper charter trips is low. The two weekend openings for red snapper occurred in wave 5, yet zero landings were estimated for SC and no intercepts were made for FL. The zero estimate for SC may have occurred in wave 5 because the intercept may have happened outside the red snapper opening or at sites where red snapper was not targeted. It is clear that some of the estimates are biased low due to few or no intercepts. At the same time an estimate based on a single intercept, scaled up

by the effort from that wave, may be too high. It is unclear for a given intercept which way the mis-estimation may go. Examination of state/wave estimates reveals potential biases in both directions, but it is quite certain that missed intercepts in wave 5 for FL resulted in an underestimate of red snapper removals.

Recognizing the limitations of MRFSS to provide reliable catch estimates for short openings, the state of Florida conducted a special study during the recreational red snapper weekend openings (Sauls et al. 2013). Their study estimated for-hire charter boat and private boat landings and releases. The Florida survey adopted the MRFSS for-hire telephone survey methodology, but greatly increased the telephone sampling, resulting in much improved effort estimates for the six-day season. The Florida study also added questions to the telephone survey to gather information on numbers of red snapper harvested and released. The FL study was limited to just the fishery opening, and hence their estimates of discards are certainly an underestimate for wave 5, but the estimates of landings are quite useful. The FL study estimated 984 red snapper landed and 1,752 red snapper released by charter boats. Because these values are believed to be the best available estimates, they were used to replace the empty cells in wave 5 for FL in both the landed and released tables (Table 6 and 7). The best estimate of total charter boat landings and discards were then the sum of estimates from MRFSS (excluding FL wave 5) and the FL study.

The state of Georgia also conducted a special study during the weekend openers. Unfortunately no report of that study's methods and results was available in time for this report. Their estimates indicated 57 red snapper harvested and 25 red snapper released during the two weekend openings. These estimates are comparable to the MRFSS estimates in Tables 6 and 7. Ultimately the MRFSS estimates for Georgia are considered the best available estimates, in part because it covers the whole year and not just the opening period.

In 1993, SCDNR's Marine Resources Division (MRD) initiated a mandatory logbook reporting system for all charter vessels to collect basic catch and effort data. Under state law, vessel owners/operators purchasing South Carolina Charter Vessel Licenses and carrying fishermen on a for-hire basis are required to submit trip level reports of their fishing activity in waters off of SC. Logbook reports are submitted to the SCDNR Fisheries Statistics section monthly. Compliance is tracked by staff and charter vessel owners/operators failing to submit reports can be charged with a misdemeanor.

For comparison, the estimates of red snapper from SC charter boat logbooks in 2012 was 17 fish landed and 664 released. The data from these logbooks is unverified, so the degree of bias and uncertainty is unknown. Because the MRFSS reported zero catch of red snapper for charter boats from South Carolina for the whole year, the estimate of 17 red snapper from the SCDNR logbooks is deemed a better estimate. Therefore the MRFSS summary of charter boat landings for South Carolina were replaced with the 17 red snapper estimated from logbooks.

Table 6. Estimates of total recreational red snapper landings (numbers of fish) for charter boats from the Marine Recreational Fisheries Statistics Survey (MRFSS) data for the U.S. South Atlantic. A dash indicates no intercepts reporting any red snapper catches or releases.

State\Wave	1	2	3	4	5	6	Total
NC	0	-	0	0	1026	0	1026
SC	-	-	-	0	0	-	0
GA	-	-	0	-	105	-	105
FL	0	0	0	0	-	0	0
Total	0	0	0	0	1131	0	1131

Table 7. Estimates of total recreational red snapper releases (numbers of fish) for charter boats from the Marine Recreational Fisheries Statistics Survey (MRFSS) data for the U.S. South Atlantic. A dash indicates no intercepts reporting any red snapper catches or releases.

State\Wave	1	2	3	4	5	6	Total
NC	35	-	1235	181	0	67	1518
SC	-	-	-	185	647	-	832
GA	-	-	53	-	134	-	188
FL	326	1706	3904	5895	-	1275	13106
Total	361	1706	5192	6260	782	1342	15644

Because of the limited intercepts that did occur, and certainly in the case of wave 5 for FL, it is likely the discard estimates may be biased low. However, the total uncertainty from low sample sizes is likely a greater concern for the utility of these estimates. The FL study estimates should be the better estimates. Given their magnitude in comparison to the other wave/state cells, the total may not be too far off and ultimately represents the best available data.

The best estimate of the total number of red snapper landed by charter boats in 2012 is 1,131 (MRFSS) + 17 (SC logbooks) + 984 (FL study) = 2,132 fish. The best estimate of total discards of red snapper is 15,644 + 1,752 = 17,396, which amounts to 7,132 dead discards, after applying the 41% discard mortality rate for recreational charter boat fishery for red snapper.

Recreational Private Boat Landings and Discards

Because the MRFSS collects information at the wave level, a short duration (e.g. two extended weekends) opening is not ideal for accurate estimation of catch. As indicated by the many blank fields in Tables 8 and 9, the intercept rate for red snapper trips is low. The two weekend openings for red snapper occurred in wave 5, yet zero landings were estimated for NC and no

intercepts were made for SC. The zero estimate for NC may have occurred in wave 5 because the intercept may have happened outside the red snapper opening, as suggested by the matching discard estimate. It is clear that some of the estimates are too low due to few or no intercepts. At the same time an estimate based on a single intercept, scaled up by the effort from that wave, may be too high. It is unclear for a given intercept which way the mis-estimation may go. Examination of state/wave estimates reveals potential biases in both directions, but it is quite certain that zero landings estimates for NC and SC in wave 5 are unrealistically low. However, because there is no other information available, the MRFSS private boat landings and discard estimates for NC, SC, and GA represent the best available data.

The state of Florida conducted a special study during the recreational red snapper weekend openings and produced estimates of recreational private boat landings and releases for red snapper separate from MRFSS (Sauls et al. 2013). The FL study estimated 7,479 red snapper landed and 8,065 red snapper released by private boats. The FL study was limited to just the fishery opening, and hence their estimates of discards are certainly an underestimate for wave 5, but the estimates of landings are quite useful. Because it is believed to be a better estimate, the landed catch estimate from the FL study was used to replace the MRFSS landed catch estimate in wave 5 for FL (Table 8 and 9).

Table 8. Estimates of total recreational red snapper landings (numbers of fish) for private boats from the Marine Recreational Fisheries Statistics Survey (MRFSS) data for the U.S. South Atlantic. A dash indicates no intercepts reporting any red snapper catches or releases.

State\Wave	1	2	3	4	5	6	Total
NC	-	-	-	-	0	-	0
SC	-	-	0	-	-	-	0
GA	-	-	-	-	2602	-	2602
FL	-	718	0	0	2430	0	3149
Total	0	718	0	0	5033	0	5751

Table 9. Estimates of total recreational red snapper releases (numbers of fish) for private boats from the Marine Recreational Fisheries Statistics Survey (MRFSS) data for the U.S. South Atlantic. A dash indicates no intercepts reporting any red snapper catches or releases.

State\Wave	1	2	3	4	5	6	Total
NC	-	-	-	-	245	-	245
SC	-	-	9592	-	-	-	9592
GA	-	-	-	-	781	-	781
FL	-	5767	4385	56729	13772	17778	98431
Total	0	5767	13976	56729	14798	17778	109048

Because of the limited intercepts that did occur, and certainly in the case of the landings for NC and SC, it is likely the total estimates may be biased low. However, the total uncertainty from low sample sizes is likely a greater concern for the utility of these estimates. The FL study landings estimates are considered to be the best available. Given their magnitude in comparison to the other wave/state cells, the total appears reasonable.

The best estimate of the total number of red snapper landed by private boats in 2012 is 5,751 – 2,430 + 7,479 = 10,800 fish. The best estimate of total discards of red snapper is 109,048, which amounts to 42,529 dead discards, after applying the 39% discard mortality rate for the recreational private boat fishery for red snapper.

Shore Landings and Discards

Because red snapper is an offshore species with a strong association with reefs and hard bottom, this species would not be landed from shore. Therefore, shore landings for red snapper were omitted from total landings estimates. Several species of nearshore fish are often referred to as "red snapper" by recreational anglers, which occasionally appear as red snapper shore landing estimates in the MRFSS time series.

Summary of Landings and Discards

Based on the methods discussed above from the various data collection programs and accounting for sector specific discard mortality rates, the final estimates are summarized in Table 10 below. Table 1 is repeated here for convenient comparison of totals.

The uncertainty from all these data sources is quite high. Confidence intervals are not reported here because of the difficulty in combining data sources from different estimation designs. We simply note that the uncertainty is high, and likely higher than estimates typically seen for other snapper-grouper species. What may be of more concern for these estimates is possible bias, which has been discussed briefly for each of the datasets. Unfortunately the magnitude of possible biases is largely unknown.

Table 10. Summary of best estimates of U.S. South Atlantic landings and discards for red snapper in the 2012 calendar year. Total removals (equivalent to the ABC) is estimated to be 16,591 (landings) + 63,925 (dead discards) = 80,516 red snapper after accounting for sector specific discard mortality rates.

Sector	Landings (numbers)	Landings (whole pounds)	Discards (numbers)	Dead Discards (numbers)	Total Removals (numbers)
Commercial	1,532	8,695	24,551	11,785	13,317
Recreational Headboat	2,127	-	6,046	2,479	4,606
Recreational Charter Boat	2,132	-	17,396	7,132	9,264
Recreational Private Boat	10,800	-	109,048	42,529	53,329
Total Recreational	15,059	-	132,490	52,140	67,199
Total All Sectors	16,591	-	157,041	63,925	80,516

Table 1. Acceptable Biological Catch (ABC) and sector specific quotas established by the SAFMC for the 2012 fishing year.

	Quota
Total ABC (landings + dead discards)	86,000 (dead fish)
Commercial landings	20,818 (pounds) = 3,668 (dead fish)
Recreational landings	9,399 (dead fish)

Citation

Sauls, B., R. Cody, and B. Cermak. 2013. South Atlantic red snapper (Lutjanus campechanus) monitoring in Florida for the 2012 season. Final Report submitted to National Marine Fisheries Service, Southeast Regional Office, St. Petersburg, Florida, 70 pp.