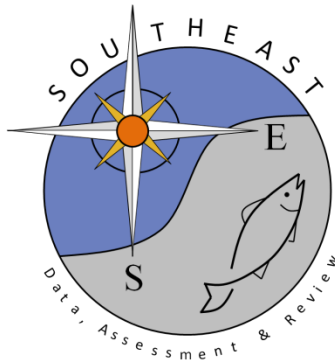


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## Recreational Survey Data for Red Grouper in the South Atlantic

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### Recreational Landings

#### *Introduction*

The recreational landings for red grouper were obtained from the following separate sampling programs:

- 1) Marine Recreational Fisheries Statistics Survey (MRFSS) and the Marine Recreational Information Program (MRIP)
- 2) Southeast Region Headboat Survey (SRHS)

MRFSS/MRIP provides a long time series of estimated catch per unit effort, total effort, landings, and discards for six two-month periods (waves) each year. MRFSS/MRIP provides estimates for three recreational fishing modes: shore-based fishing (SH), private and rental boat fishing (PR), and for-hire charter and guide fishing (CH). When the survey first began in Wave 2 (Mar/Apr), 1981, headboats were included in the for-hire mode, but were excluded after 1985 in the South Atlantic and Gulf of Mexico to avoid overlap with the Southeast Region Headboat Survey (SRHS) conducted by the NMFS Beaufort, NC lab. The MRFSS/MRIP survey covers coastal Atlantic states from Maine to Florida.

The Southeast Region Headboat Survey (SRHS) estimates landings and effort for headboats in the South Atlantic and Gulf of Mexico. The Headboat Survey was started in 1972; however, logbook reporting did not begin until 1973 and only included vessels from North Carolina and South Carolina until 1975. In 1976 it was expanded to northeast Florida, followed by southeast Florida in 1978 and finally to the Gulf of Mexico in 1986. Landings estimates in the South Atlantic are available beginning in 1981. These estimates were generated using correction factors

to account for non-reporting on logbooks. The South Atlantic and Gulf of Mexico Headboat Surveys generally include 70-80 vessels participating in each region annually.

*Adjustments and modifications*

- The For-Hire Telephone Survey (FHS) was developed to estimate effort in the for-hire mode Conversion factors have been estimated to calibrate the traditional MRFSS charter boat estimates with the FHS for 1986-2003 in the South Atlantic (SEDAR25-Data Workshop Report). To calibrate the MRFSS combined charter boat and headboat mode effort estimates in 1981-1985, conversion factors were estimated using 1986-1990 effort estimates from both modes, in equivalent effort units, an angler trip (SEDAR28-DW-12). These conversion factors are updated conversion factors from the ones used in SEDAR 19.
- **Table 1.** Atlantic MRFSS charterboat conversion factors and standard errors (in parentheses).

Table 1a) Apply to 1981-1985 charterboat/headboat mode in the South Atlantic.

	WAVE					
STATE	1	2	3	4	5	6
NC	-	2.151 (0.12)	2.294 (0.12)	1.444 (0.12)	1.763 (0.12)	0.857 (0.12)
SC	-	1.035 (0.04)	1.085 (0.04)	1.437 (0.04)	0.891 (0.04)	0.750 (0.04)
GFE	0.845 (0.02)	0.951 (0.02)	0.985 (0.02)	1.016 (0.02)	0.811 (0.02)	0.696 (0.02)

Table 1b) Apply to 1986- 2002 charterboat mode in FLE

\*FHS began in the east coast of Florida in 2003.

	WAVE					
AREA	1	2	3	4	5	6
INSHORE	1.600 (0.65)	2.786 (0.65)	2.201 (0.65)	2.894 (0.65)	1.630 (0.65)	2.386 (0.65)
OCEAN	0.664 (0.10)	0.852 (0.10)	0.828 (0.10)	1.006 (0.10)	0.478 (0.10)	0.549 (0.10)

Table 1c) Apply to 1986- 2003 charterboat mode in GA and SC

	WAVE				
AREA	2	3	4	5	6
INSHORE	1.635 (0.90)	3.100 (0.90)	2.092 (0.90)	0.931 (0.90)	0.757 (0.90)
OCEAN	0.939 (0.36)	1.272 (0.33)	2.161 (0.32)	0.835 (0.33)	0.638 (0.36)

Table 1d) Apply to 1986- 2003 charterboat mode in NC

AREA	WAVE				
	2	3	4	5	6
INSHORE	11.850(3.48)	10.026(2.63)	6.616(2.84)	3.766 (2.84)	9.415 (3.11)
OCEAN	2.188 (0.58)	2.504 (0.58)	1.565 (0.60)	2.102 (0.60)	0.661 (0.60)

- The Marine Recreational Information Program (MRIP) was developed to generate more accurate recreational catch rates by re-designing the MRFSS sampling protocol to address potential biases including port activity and time of day. Starting in 2013, wave 2, the MRIP Access Point Angler Intercept Survey (APAIS) implemented a revised sampling design. As new MRIP APAIS estimates are available for a portion of the recreational time series that the MRFSS covers, conversion factors between the MRFSS estimates and the MRIP APAIS estimates were developed in order to maintain one consistent time series for the recreational catch estimates. Ratio estimators, based on the ratios of the means, were developed for South Atlantic red grouper to hind-cast catch and variance estimates by fishing mode. In order to apply the charter boat ratio estimator back in time to 1981, charter boat landings were isolated from the combined charter boat /headboat mode for 1981-1985. The MRFSS to MRIP APAIS calibration process is the same as the original MRFSS to MRIP adjustment that has been used since 2012, which is detailed in SEDAR31-DW25 and SEDAR32-DW02. In SEDAR 33, MRIP estimation adjustment factors were used to maintain a consistent time series of recreational catch. In this update MRIP APAIS adjustment factors, shown in Table 1 below are used to reflect the most current methodologies.
  - **Table 2.** South Atlantic red grouper ratio estimators for adjusting MRFSS numbers and variance estimates (AB1 and B2) to MRIP APAIS numbers and variances for 1981-2003. The variances of the numbers ratio estimators are also shown.

MODE	Numbers Ratio Estimator		Variance Ratio Estimator		Variance of Numbers Ratio Estimator	
	AB1	B2	AB1	B2	AB1	B2
Charter boat	0.825619	0.814272	1.711048	1.154641	0.037563	0.008132219
Private	3.122002	0.970538	56.54667	2.949216	0.275222	0.002512363
Shore	0.155609	0.80946	0.024665	1.029026	-5.4E-18	0.113102352

- The MRFSS and the MRIP surveys use different methodologies to estimate landings in weight. To apply a consistent methodology over the entire recreational time series, the Southeast Fisheries Science Center (SEFSC) implemented a method for calculating average weights for the MRIP (and MRIP adjusted) landings. This method is detailed in SEDAR32-DW-02.

- Following SEDAR 19 recommendations, Monroe County estimates were included in the South Atlantic stock. Monroe County MRFSS landings from 1981 to 2003 can be post-stratified to separate them from the MRFSS West Florida estimates. Originally, during the first MRIP re-estimation, Monroe County landings (2004+) could be estimated separately from the remaining West Florida estimates using domain estimation. The Monroe County domain includes only intercepted trips returning to that county as identified in the intercept survey data. Estimates are then calculated within this domain using standard design-based estimation which incorporates the MRIP design stratification, clustering, and sample weights. However, the new MRIP APAIS calibration does not allow for domain estimation at this time for adjusted estimates from 2004 to 2012. The approach used for this update is to use the annual proportions from the original MRIP domain estimates (panhandle and peninsula over total FLW) and apply those proportions to the new West Florida MRIP APAIS estimates in order to remove Monroe County. This approach was used in SEDAR 42, Gulf of Mexico red grouper. Traditional MRIP domain estimation is available for estimates 2013+ and is used in this standard assessment to include Monroe County in the South Atlantic for that time period.
- Missing estimates from MRIP 1981, wave 1 have been filled in using the proportion of catch in wave 1 to catch in all other waves for 1982-1984 by fishing mode and area.
- Variances are provided by MRFSS/MRIP for their recreational catch estimates. Variances are adjusted to take into account the variance of the conversion factor when an adjustment to the estimate has been made (FHS and MRIP conversions). However, the variance estimates of the charter and headboat modes in 1981-1985 are missing. This is due to the MRIP calibration procedure, which requires the combined charter/headboat mode to be split in order to apply the MRIP adjustment to the charter mode back to 1981. In addition, variance estimates are not available for weight estimates generated through the SEFSC method described above.
- Following SEDAR 19 recommendations, SRHS landings are provided beginning in 1973. A correction factor for non-reporting was derived by calculating the estimated landings to the reported landings for 1981-1983. This correction factor was applied to reported landings from 1978-1980 when full coverage was present.
- For areas not covered in the SRHS an average for the first 3 years of reported landings was calculated for that area. The correction factor was then applied to the average back to 1973.
- Total SRHS pounds landed for years prior to 1981 were calculated by using the average mean weight by area from 1981-1983 and applying this value to numbers landed back to 1973.

## Recreational Discards

Discarded live fish are reported by the anglers interviewed by the MRIP/MRFSS. Consequently, neither the identity nor the quantities reported are verified. MRFSS/MRIP estimates of live released fish (B2 fish) were adjusted in the same manner as the landings (i.e., using charter boat calibration factors, MRIP adjustment, substitutions, etc. described in section above).

SRHS discards are available from 2004 to the present. In 2013 the SRHS ceased recording the condition of released fish (live vs dead). All releases are recorded as "Estimated alive" starting that year. For consistency, all discards from 2004 to 2012 are categorized as b2 fish (released alive).

- In SEDAR 19 MRFSS charterboat discard ratios for the period 1981 to 1991 and the values from At-Sea discard data weighted average for 1992 to 2008 were applied to the estimated headboat landings in the respective years. This method attempted to account for regulatory changes prior to 1992 by using the MRFSS charterboat discard ratios, while in turn using the discard data from the At-Sea Observer program for years with a similar regulatory history. However, in the SEDAR 19 assessment discards were only used from the headboat fishery from 2005-2008. The rest of the discards for the time series were generated by the assessment model. For consistency with SEDAR 19, headboat discards were used in the assessment only from 2005-2015.
- In SEDAR 19 the At-Sea Observer discard ratio was found to be closer to the MRFSS/MRIP CH discard ratio, therefore the At-Sea Observer weighted average discards were selected as a proxy for part of the time series. However, possibly due to the MRIP APAIS adjustments to the CH mode landings and discard estimates, the SHRS discard ratios are in closer agreement with the MRFSS/MRIP CH discard ratio. For this reason, SRHS discard estimates are recommended for use from 2005-2015. Discard proxy methods were explored for comparison with the model-generated headboat discard estimates (SEDAR 53-DW07).
- Two sources for proxy discard estimates were considered for years where SRHS discard estimates were not provided (1981-2004). In SEDAR 19 the MRFSS/MRIP CH discard ratio method was used for part of the headboat discard time series. The MRFSS/MRIP CH: SRHS discard ratio method was used to mitigate the differences in magnitude between the MRFSS/MRIP CH discard ratios and the SRHS discard ratios, as is consistent with SEDAR Best Practices. Discard ratios for both sources were compared to the SRHS discard ratios.
- Discards were assumed to be negligible prior to 1981.
- Discard rates were applied both by state and as the overall South Atlantic for each proxy method.

## Recreational Catch Estimates

- **Table 3.** Estimated MRIP catch estimates and coefficients of variations (CV) for red grouper in the South Atlantic. Charterboat estimates use the FHS method or are calibrated to the FHS method. MRIP estimates (or MRFSS estimates adjusted to MRIP APAIS estimates) are used.

YEAR	MRIP Landings			MRIP Discards	
	AB1 (Number)	CV_ab1	AB1 (Pounds)	B2 (Number)	CV_b2
1981	118,149	0.46	747,668	17,271	1.77
1982	144,864	0.49	675,860	16,029	1.15
1983	307,592	0.52	926,082	154,442	0.87
1984	1,229,469	0.49	6,523,959	372,361	0.78
1985	65,986	1.23	398,330	4,933	1.17
1986	265,047	0.99	881,312	32,002	1.04
1987	95,059	0.42	484,483	112,144	0.58
1988	41,667	0.40	264,693	38,270	0.65
1989	109,099	0.65	396,912	5,782	0.96
1990	10,919	0.66	79,900	14,375	0.57
1991	7,544	0.83	53,119	156,161	0.50
1992	26,486	0.33	183,827	190,541	1.18
1993	55,879	0.25	383,107	61,740	0.41
1994	41,425	0.29	293,485	116,094	0.34
1995	42,559	0.29	300,982	97,577	0.41
1996	54,923	0.28	390,774	299,101	0.20
1997	47,346	0.32	340,135	316,276	0.17
1998	39,966	0.36	298,309	87,809	0.27
1999	23,531	0.30	175,045	87,206	0.24
2000	20,986	0.43	158,234	248,461	0.15
2001	21,450	0.32	176,255	135,451	0.39
2002	51,480	0.28	365,691	83,574	0.21
2003	54,064	0.33	378,165	117,300	0.33
2004	71,885	1.29	481,433	354,538	1.18
2005	37,600	0.84	249,412	153,914	1.26
2006	100,097	0.55	816,146	174,752	1.00
2007	137,772	0.57	888,859	90,195	1.56
2008	300,656	0.68	3,964,274	104,404	6.71
2009	170,291	0.60	1,857,481	150,452	2.82
2010	19,501	1.76	209,684	130,218	2.20
2011	36,525	0.73	265,635	42,259	6.64
2012	105,216	0.74	742,125	95,041	2.17
2013	29,602	0.22	206,877	125,041	0.13
2014	26,336	0.36	177,971	105,001	0.26
2015	25,778	0.38	191,909	93,200	0.32



- **Table 4.** SRHS landings and discard estimates for red grouper in the South Atlantic. .  
In 2004 the SRHS began recording condition of released fish (e.g. live or dead), and ceased in 2013. All releases from 2013-present are recorded as live.

Year	Landings		Discards	
	Number	Pounds	Released live (n)	Released dead (n)
1973	2,841	25,843		
1974	3,116	28,625		
1975	2,915	26,589		
1976	4,596	50,546		
1977	5,611	63,226		
1978	4,770	51,076		
1979	9,383	66,342		
1980	8,137	46,944		
1981	7,964	37,214		225
1982	6,362	31,479		-
1983	9,893	38,907		17,604
1984	8,556	40,479		2,694
1985	8,784	43,270		819
1986	5,810	29,352		-
1987	7,037	34,617		1,102
1988	5,101	23,402		-
1989	3,619	17,915		-
1990	7,326	47,913		31,326
1991	2,726	17,145		1,222
1992	3,976	29,309		20,440
1993	4,786	31,073		710
1994	5,465	35,492		22,316
1995	5,250	35,299		1,688
1996	5,647	37,154		29,354
1997	8,058	55,634		86,947
1998	10,903	74,401		13,481
1999	7,261	57,484		5,746
2000	5,333	40,993		17,653
2001	4,940	39,393		19,587
2002	4,604	31,784		6,147
2003	4,017	26,664		11,636
2004	10,756	74,179	13	9,066
2005	11,470	75,453	229	9,735
2006	5,241	33,245	42	5,000
2007	5,159	43,651	73	4,140
2008	2,443	20,786	90	6,744
2009	1,426	15,693	108	12,274
2010	1,283	9,509	65	14,338
2011	1,558	10,163	33	6,610
2012	1,435	11,516	20	9,775
2013	1,162	11,043	-	9,743
2014	1,854	16,252	-	5,034
2015	1,735	12,527	-	6,419

## Literature Cited

Fisheries Ecosystems Branch, National Marine Fisheries Service, Southeast Fisheries Science Center, Beaufort, NC. 2016. Discards of red grouper (*Epinephelus morio*) for the headboat fishery in the US South Atlantic. SEDAR53-DW07. SEDAR, North Charleston, SC. 16 pp.

Matter, V.M. and A. Rios 2013. SEDAR 32-DW02 MRFSS to MRIP Adjustment Ratios and Weight Estimation Procedures for South Atlantic and Gulf of Mexico Managed Species. National Marine Fisheries Service Southeast Fisheries Science Center, Fisheries Statistics Division, Miami, FL., National Marine Fisheries Service Southeast Fisheries Science Center, Sustainable Fisheries Division, Miami, FL.

Matter, V.M., N. Cummings, J.J. Isely, K. Brennan, and K. Fitzpatrick. 2012. SEDAR 28-DW-12 Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates for the South Atlantic and Gulf of Mexico in 1981-1985 with For Hire Survey estimates with application to Spanish mackerel and cobia landings. National Marine Fisheries Service Southeast Fisheries Science Center, Sustainable Fisheries Division, Miami, FL., National Marine Fisheries Service Southeast Fisheries Science Center, Fisheries Statistics Division, Miami, FL, and National Marine Fisheries Service Southeast Fisheries Science Center, Beaufort Laboratory, Beaufort, NC.

Rios, A, V.M. Matter, J.F. Walter, N. Farmer, and S.J. Turner. 2012. SEDAR31-DW25 Estimated Conversion Factors for Adjusting MRFSS Gulf of Mexico Red Snapper Catch Estimates and Variances in 1981-2003 to MRIP Estimates and Variances. National Marine Fisheries Service Southeast Fisheries Science Center, Sustainable Fisheries Division, Miami, FL, National Marine Fisheries Service Southeast Fisheries Science Center, Fisheries Statistics Division, Miami, FL, and National Marine Fisheries Service Southeast Regional Office, Saint Petersburg, FL.

SEDAR. 2010. SEDAR 19 –South Atlantic Red grouper Stock Assessment Report. SEDAR, North Charleston SC. Available online at:  
[http://sedarweb.org/docs/sar/Red\\_grouper\\_SAR\\_FINAL.pdf](http://sedarweb.org/docs/sar/Red_grouper_SAR_FINAL.pdf)

SEDAR. 2011. SEDAR 25 –South Atlantic Black Sea Bass Stock Assessment Report. SEDAR, North Charleston SC. Available online at:  
[http://sedarweb.org/docs/sar/SEDAR25\\_BlackSeaBass\\_SAR.pdf](http://sedarweb.org/docs/sar/SEDAR25_BlackSeaBass_SAR.pdf)

SEDAR. 2015. SEDAR 42 –Gulf of Mexico Red grouper Stock Assessment Report. SEDAR, North Charleston SC. Available online at:  
<http://sedarweb.org/sedar-42-final-stock-assessment-report-gulf-mexico-red-grouper>