

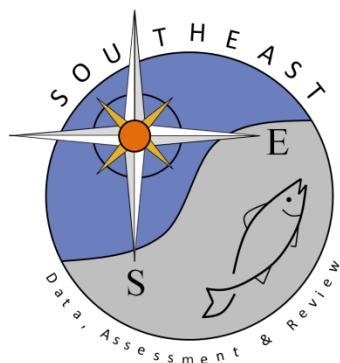
General Recreational Survey Data for Red Grouper in the South Atlantic

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SEDAR86-WP04

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General Recreational Survey Data for Red Grouper in the
South Atlantic

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Updated

08-22-2023

Additional tables (17-19) added to summarize catch, size, and effort by two regions (NCSC and GAFL).

General recreational catch estimates for Red Grouper are compiled from the Marine Recreational Information Program (MRIP). Details on MRIP can be found in SEDAR68-DW-13.

Parameters for data prepared for SEDAR 86 recreational catch data:

- Species: Red Grouper
- Year Range: 1981 - 2022
- Geographic Range: South Atlantic states from North Carolina to eastern Florida, including the Florida Key. The South Atlantic was separated into two regions: NCSC and GAFL.
- Fishing Modes: Charter, Private, Shore
- MRIP Survey Methodology: Fully calibrated estimates that take into account the change in the Fishing Effort Survey (FES), the redesigned Access Point Angler Intercept Survey (APAIS), and the For Hire Survey (FHS)

- MRIP Data Gaps from COVID: Missing 2020 intercepts were imputed from all APAIS data collected in 2018 and 2019 from the same strata as the 2020 data gap, with original sample weights reduced by a factor of two to account for using two years of data (Cody 2021).
 - SEFSC Data QAQC: Size records above an allowable (max size) threshold are excluded from average weight estimation and the summary tables included in this working paper (Tables 8-12). For SEDAR 86 Red Grouper, this includes any weights heavier than 53.235 pounds.
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Catch and Sample Size Information for Particular Domains:

Domains were selected based on strata-level catch estimates (year-state-mode-wave-area) that have a disproportionately large contribution to those total (annual) catch estimates that appear relatively large/small, as compared to adjacent years. Selected domains are more likely to be high catch estimates given the inherent zero-boundary constraint in all catch/effort data ($>= 0$) that complicates identification of low catch estimates.

- 1984 landings estimate: 3,902,143 fish
- 1984 discard estimate: 1,244,253 fish
 - Strata: western Florida, private, wave 6, and ocean ≤ 10 miles
 - Intercept Records: a total of 10 angler trips resulted in a landings estimate of 957,456 fish and discard estimate of 606,589 fish
 - One angler trip harvested 3 Red Grouper (seen by interviewer)
 - One angler trip harvested 10 Red Grouper (NOT seen by interviewer)
 - One angler trip harvested 4 Red Grouper (NOT seen by interviewer)
 - Four angler trips harvested 1 Red Grouper (NOT seen by interviewer)
 - One angler trip released 6 live Red Grouper
 - One angler trip released 5 live Red Grouper
 - One angler trip released 2 live Red Grouper
 - Strata: western Florida, private, wave 6, and ocean > 10 miles
 - Intercept Records: a total of 5 angler trips resulted in a landings estimate of 1,464,555 fish and a discard estimate of 429,745 fish
 - One angler trip harvested 10 Red Grouper (NOT seen by interviewer)
 - One angler trip harvested 5 Red Grouper (NOT seen by interviewer)
 - One angler trip harvested 3 Red Grouper (NOT seen by interviewer)
 - One angler trip harvested 5 Red Grouper (NOT seen by interviewer) and released 4 live Red Grouper
 - One angler trip harvested 1 Red Grouper (NOT seen by interviewer) and released 4 live Red Grouper
- 1996 discard estimate: 1,260,992 fish

- Strata: western Florida, private, wave 6, and ocean <= 10 miles
- Intercept Records: a total of 37 angler trips that resulted in a discard estimate of 248,110 fish

<i>Catch Observation</i>	<i>Minimum</i>	<i>Median</i>	<i>Mean</i>	<i>Maximum</i>
<i>Harvest seen by interviewer</i>	0	0	0.27	3
<i>Harvest not seen by interviewer</i>	0	0	0	0
<i>Released live fish</i>	0	1	3.38	15

- Strata: western Florida, private, wave 6, and ocean > 10 miles
- Intercept Records: a total of 22 angler trips that resulted in a discard estimate of 260,832 fish

<i>Catch Observation</i>	<i>Minimum</i>	<i>Median</i>	<i>Mean</i>	<i>Maximum</i>
<i>Harvest seen by interviewer</i>	0	0	0.09	1
<i>Harvest not seen by interviewer</i>	0	0	0	0
<i>Released live fish</i>	1	3	3.64	8

- 1997 discard estimate: 1,319,455 fish
 - Strata: western Florida, private, wave 2, and ocean > 10 miles
 - Intercept Records: a total of 8 angler trips that resulted in a discard estimate of 286,096 fish
 - One angler trip released 6 live Red Grouper
 - Four angler trips released 5 live Red Grouper
 - Three angler trips released 3 live Red Grouper
- Strata: western Florida, private, wave 6, and ocean <= 10 miles
- Intercept Records: a total of 39 angler trips that resulted in a discard estimate of 295,705 fish

<i>Catch Observation</i>	<i>Minimum</i>	<i>Median</i>	<i>Mean</i>	<i>Maximum</i>
<i>Harvest seen by interviewer</i>	0	0	0.05	1
<i>Harvest not seen by interviewer</i>	0	0	0.18	6
<i>Released live fish</i>	0	3	5.38	50

Tables

Table 1. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by state and year (MRIP).

Table 2. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by mode and year (MRIP).

Table 3. Red Grouper landings in numbers of fish (AB1) with associated coefficients of variation (CV; Dettloff et al. 2020) by mode and year (MRIP). Sample size is provided both as the total number of primary sampling units (PSU) and angler trips (Trp) intercepted by dockside samplers within a specified strata and, in parentheses, the number of PSUs and angler trips that intercepted Red Grouper.

Table 4. Red Grouper discards in numbers of fish (B2) with associated coefficients of variation (CV; Dettloff et al. 2020) by mode and year (MRIP). Sample size is provided both as the total number of primary sampling units (PSU) and angler trips (Trp) intercepted by dockside samplers within a specified strata and, in parentheses, the number of PSUs and angler trips that intercepted Red Grouper.

Table 5. Red Grouper landings (AB1) and discards (B2), in numbers of fish, with associated coefficients of variation (CV; Dettloff et al. 2020) by year for all modes combined (MRIP). Sample size is provided both as the total number of primary sampling units (PSU) and angler trips (Trp) intercepted by dockside samplers within a specified strata and, in parentheses, the number of PSUs and angler trips that intercepted Red Grouper.

Table 6. Estimated landings of Red Grouper in pounds whole weight by state and year (MRIP). Average weight estimates are calculated by strata using the following hierarchy: species, region, year, state, mode, wave, and area (Matter and Rios 2013). The minimum number of weights used at each level of substitution is fifteen fish, except for the final species level where the minimum is one fish (Dettloff and Matter 2019b).

Table 7. Red Grouper landings in pounds whole weight (LBS) with associated coefficients of variation (CV; Approach 2 described in Nuttall and Dettloff 2022) by year and mode (MRIP).

Table 8. Summary of length measurements (millimeters fork length) from MRIP-intercepted Red Grouper by state and year. Summaries include the number of fish measured by MRIP and, in parentheses, the number of angler trips from which those fish

were measured (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish lengths.

Table 9. Summary of weight measurements (pounds whole weight) from MRIP-intercepted Red Grouper by state and year. Summaries include the number of fish weighed by MRIP and, in parentheses, the number of angler trips from which those fish were weighed (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish weights.

Table 10. Summary of length measurements (millimeters fork length) from MRIP-intercepted Red Grouper by mode and year. Summaries include the number of fish measured by MRIP and, in parentheses, the number of angler trips from which those fish were measured (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish lengths.

Table 11. Summary of weight measurements (pounds whole weight) from MRIP-intercepted Red Grouper by mode and year. Summaries include the number of fish weighed by MRIP and, in parentheses, the number of angler trips from which those fish were weighed (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish weights.

Table 12. Summary of length (millimeters fork length) and weight measurements (pounds whole weight) from MRIP-intercepted Red Grouper by year. Summaries include the number of fish for which size information was collected by MRIP and, in parentheses, the number of angler trips from which those fish were sampled (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish lengths and weights.

Table 13. Estimated average weights of landed Red Grouper in pounds whole weight (WGT) with associated coefficients of variation (CV; Approach 2 described in Nuttall and Dettloff 2022) by year and mode (MRIP). Average weight estimates are calculated from annual estimates (by-mode) of landings-in-weight (Table 7) divided by estimates of landings-in-number (Table 2). Sample size (N) is provided as the total number of angler trips and, in parentheses, number of fish from which weight information was collected.

Table 14. Resolution of landings-in-weight estimates (pounds whole weight) for South Atlantic Red Grouper by year and hierarchy level (MRIP), defined by **species**, **region**, **year**, **state**, **mode**, **wave**, and **area**. Average weight estimates are calculated at the finest strata meeting a minimum sample size threshold (Dettloff and Matter 2019b). Larger sample sizes therefore allow average weights to be calculated at finer stratifications, the finest being at the srysmwa level (Matter and Rios 2013). Annual summaries include the number of fish and angler trips from which weight information was collected (N) and the landings-in-weight estimates (AB1.lbs) by hierarchy level. As an example, (srysmw) summarizes those landings-in-weight estimates originating from cells where average weights are specific to a particular **species**, **region**, **year**, **state**, **mode**, and **wave** (i.e., weight observations collapsed across areas).

Table 15. Recreational Fishing Effort (in angler trips) for South Atlantic anglers by state and year (MRIP). These effort estimates depict all (general) recreational fishing activity in the South Atlantic and are not specific to Red Grouper.

Table 16. Recreational Fishing Effort (in angler trips) for South Atlantic anglers by mode and year (MRIP). These effort estimates depict all (general) recreational fishing activity in the South Atlantic and are not specific to Red Grouper.

Table 17. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by Stock-ID boundary and year (MRIP).

Table 18. Summary of fish weights (in pounds whole weight) from intercepted Red Grouper by Stock-ID boundary and year (MRIP). Summaries include the number of fish and, in parentheses, number of angler trips providing information on fish weight (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) of these weight records.

Table 19. Recreational Fishing Effort (in angler trips) for South Atlantic anglers by Stock-ID boundary and year (MRIP).

Figures

Figure 1. Comparison of Charterboat landings (AB1) and discard (B2) estimates (with standard error intervals shown) for Red Grouper from the Coastal Household Telephone Survey (CHTS) and For-Hire Survey (FHS) from the South Atlantic between 1981 and 2003 (MRIP). The Charterboat calibration approach is discussed in Dettloff and Matter (2019a).

Figure 2. MRIP Base (BASE), APAIS Calibrated (ACAL), and Fully Calibrated APAIS and FES (FCAL) catch estimates for Red Grouper in the South Atlantic between 1981 and 2017. Landings (AB1) and discard (B2) estimates are in thousands of fish. Estimates in this figure do not include the Florida Keys as that domain is not available from the MRIP online comparison tool (NMFS pers comm). The Headboat mode is also included as uncertainty estimates for catch across multiple modes are only available when all modes are selected.

Figure 3. Comparison of total general recreational landings (AB1) and discard estimates (B2) for South Atlantic Red Grouper between SEDAR 86 and SEDAR 53, the terminal years of which are 2022 and 2015 respectively. Differences in catch estimates, which are in thousands of fish, are largely a function of changes in the MRIP survey (i.e., FES in 2018).

Figure 4. Annual Red Grouper landings (AB1) and discards (B2), in thousands of fish, by state from 1981 to 2022 (MRIP).

Figure 4a. Proportion of Red Grouper landings (AB1) and discards (B2), in numbers of fish, from each state by year (bar graph) and overall (pie chart) between 1981 and 2022 (MRIP).

Figure 5. Annual Red Grouper landings (AB1) and discards (B2), in thousands of fish, by mode from 1981 to 2022 (MRIP).

Figure 5a. Proportion of Red Grouper landings (AB1) and discards (B2), in numbers of fish, from each mode by year (bar graph) and overall (pie chart) between 1981 and 2022 (MRIP).

Figure 6. Estimates of annual landings for Red Grouper in the South Atlantic (MRIP): estimated landings in thousands of fish (top), estimated landings in thousands of pounds whole weight (middle), and average weight of landed fish (estimated lbs/estimated fish) (bottom). Average weight estimates are calculated by strata using the following hierarchy: species, region, year, state, mode, wave, and area (Matter and Rios 2013). The minimum number of weights used at each level of substitution is fifteen fish, except for the final species level where the minimum is one fish (Dettloff and Matter 2019b).

Figure 7. Annual landings estimates of South Atlantic Red Grouper in thousands of pounds whole weight by hierarchy level (MRIP), defined by **species**, **region**, **year**, **state**, **mode**, **wave**, and **area**. Landings are grouped by the strata at which average weights were estimated, the finest stratification being at the srysmwa level (Matter and Rios 2013). As an example, (srysmw) summarizes those landings-in-weight estimates originating from cells where average weights are specific to a particular **species**, **region**, **year**, **state**, **mode**, and **wave** (i.e., weight observations collapsed across areas). Landings are provided (A) in absolute pounds and (B) as a percentage of total landings-in-weight, which is summarized by year (stacked bar graph) and across all years (pie chart).

Figure 8. COVID data gaps in the MRIP APAIS and associated imputations for (positive) fishing trips that intercepted South Atlantic Red Grouper. No 2020 data were imputed for the FES or FHS. (A) Number of positive intercepts in 2020 from the APAIS (RAW) vs. those imputed from intercepts in adjacent years (IMP). (B) Distribution of APAIS catch observations in years with no imputed catch data (in 2015-2019 and 2021-2022), in raw 2020 APAIS data, and in 2020 imputations. Refer to Cody (2021) for more information on COVID data gaps in MRIP.

Appendices

Appendix A. Additional Details of Survey Data and SEFSC Estimation

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Table 1. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by state and year (MRIP).

Year	FLKeys		FLE		GA		SC		NC		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2
1981	220,959	128,096	155,488	0	0	0	0	0	0	0	376,447	128,096
1982	799,004	203,878	10,083	1,288	0	0	0	0	0	0	809,087	205,166
1983	493,753	273,479	43,564	14,506	0	0	0	0	0	0	537,317	287,984
1984	3,824,722	1,217,128	77,422	27,125	0	0	0	0	0	0	3,902,143	1,244,253
1985	82,045	0	13,480	14,343	0	0	0	0	0	0	95,525	14,343
1986	1,046,438	109,223	43,005	20,464	0	0	0	0	0	0	1,089,443	129,688
1987	161,242	371,820	57,863	176,893	0	0	0	0	230	0	219,335	548,713
1988	52,108	155,348	48,616	22,258	0	0	0	0	2,197	0	102,921	177,607
1989	616,657	11,835	9,307	7,259	0	0	0	0	5,227	0	631,191	19,094
1990	2,247	1,553	6,786	14,760	0	0	0	0	17,262	0	26,295	16,312
1991	8,293	478,769	2,730	63,563	0	0	0	0	1,967	709	12,990	543,041
1992	35,274	823,666	10,151	87,906	0	0	0	0	2,265	569	47,690	912,142
1993	79,654	151,009	53,447	45,658	0	0	0	0	6,931	0	140,032	196,667
1994	75,884	315,938	23,430	60,250	0	0	0	0	1,872	7,144	101,186	383,333
1995	110,926	305,482	12,340	39,831	0	0	0	0	2,518	897	125,784	346,210
1996	129,408	1,114,229	24,416	141,835	0	0	0	0	796	4,928	154,620	1,260,992
1997	74,313	1,114,605	27,907	203,623	0	0	0	0	263	1,228	102,484	1,319,455
1998	40,699	275,917	33,860	45,620	46	0	39	0	697	884	75,340	322,421
1999	9,380	280,324	26,081	122,396	0	0	277	0	1,935	331	37,673	403,051
2000	19,705	159,296	19,752	565,525	0	0	45	0	385	0	39,887	724,821
2001	8,998	174,832	25,143	294,184	0	0	0	0	5,230	10,977	39,371	479,993
2002	62,999	44,649	50,982	212,635	0	0	0	0	18,530	15,571	132,511	272,855
2003	96,136	282,052	29,059	99,492	0	0	0	0	14,684	5,783	139,878	387,326
2004	96,445	764,461	14,993	128,509	0	0	229	0	38,251	28,137	149,919	921,106

Year	FLKeys		FLE		GA		SC		NC		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2
2005	1,453	11,681	25,847	188,990	0	40	0	0	37,471	49,882	64,771	250,593
2006	115,279	759,529	22,472	136,930	0	0	646	0	67,905	39,628	206,302	936,087
2007	15,683	212,955	49,068	19,250	0	0	1,717	0	98,661	49,451	165,129	281,656
2008	12,962	99,505	10,428	86,713	0	0	102	0	121,728	17,394	145,219	203,612
2009	59,610	158,484	12,408	165,646	0	0	210	0	85,986	144	158,214	324,275
2010	2,969	62,444	5,008	150,378	0	0	0	0	8,610	3,459	16,588	216,281
2011	27,469	48,721	12,260	37,332	19	0	0	0	4,173	552	43,921	86,605
2012	121,600	214,750	17,713	52,269	0	0	0	0	1,436	898	140,749	267,918
2013	27,030	160,447	38,228	137,535	0	0	0	0	3,108	947	68,367	298,929
2014	57,695	141,493	11,361	187,063	0	0	0	0	585	0	69,641	328,556
2015	34,170	99,485	43,162	142,783	0	0	0	0	2,317	0	79,649	242,268
2016	25,312	37,413	27,063	87,725	0	0	0	0	0	0	52,375	125,138
2017	22,254	73,229	33,152	74,145	0	0	0	0	0	0	55,406	147,374
2018	17,968	10,141	42,175	226,723	0	0	0	0	0	0	60,142	236,864
2019	11,456	13,575	25,770	38,255	0	2,707	0	0	201	0	37,427	54,536
2020	98,060	195,114	13,634	32,333	0	0	0	0	62	0	111,756	227,447
2021	15,620	130,228	10,354	86,352	0	0	0	2,530	0	0	25,974	219,109
2022	13,481	42,183	13,414	131,789	0	0	0	0	34	0	26,929	173,973

Table 2. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by mode and year (MRIP).

Year	Cbt		Priv		Shore		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2
1981	10,347	3,774	322,936	111,728	43,163	12,594	376,447	128,096
1982	9,371	0	793,292	205,166	6,425	0	809,087	205,166
1983	2,205	2,372	500,574	285,612	34,538	0	537,317	287,984
1984	6,206	1,540	3,832,595	1,177,980	63,342	64,734	3,902,143	1,244,253
1985	6,443	1,038	89,081	13,304	0	0	95,525	14,343
1986	113	0	1,089,330	129,688	0	0	1,089,443	129,688
1987	2,622	350	207,010	458,228	9,703	90,134	219,335	548,713
1988	2,197	0	72,082	177,607	28,642	0	102,921	177,607
1989	8,139	0	623,052	19,094	0	0	631,191	19,094
1990	1,804	1,553	8,841	14,760	15,650	0	26,295	16,312
1991	734	858	12,256	542,183	0	0	12,990	543,041
1992	937	13,388	41,235	898,754	5,519	0	47,690	912,142
1993	7,078	537	117,047	196,129	15,907	0	140,032	196,667
1994	2,500	6,460	97,002	369,191	1,684	7,682	101,186	383,333
1995	4,623	1,238	118,547	327,713	2,614	17,259	125,784	346,210
1996	4,039	19,394	150,581	1,203,197	0	38,402	154,620	1,260,992
1997	10,601	5,752	87,487	1,308,560	4,395	5,143	102,484	1,319,455
1998	2,818	3,810	63,361	284,606	9,162	34,005	75,340	322,421
1999	3,860	4,045	33,813	376,377	0	22,630	37,673	403,051
2000	664	2,034	39,223	703,790	0	18,997	39,887	724,821
2001	5,179	18,415	34,192	453,168	0	8,411	39,371	479,993
2002	26,862	21,407	105,649	181,870	0	69,579	132,511	272,855
2003	17,512	19,547	120,538	326,290	1,828	41,490	139,878	387,326
2004	14,033	31,158	135,885	889,948	0	0	149,919	921,106
2005	6,930	33,500	57,841	211,318	0	5,775	64,771	250,593
2006	23,099	14,994	183,203	914,810	0	6,283	206,302	936,087
2007	26,881	25,416	137,785	256,240	463	0	165,129	281,656
2008	16,149	24,280	129,070	179,332	0	0	145,219	203,612
2009	3,167	24,798	155,047	299,476	0	0	158,214	324,275
2010	2,236	21,405	14,352	185,145	0	9,731	16,588	216,281
2011	2,216	14,052	41,705	72,553	0	0	43,921	86,605
2012	1,579	19,049	139,170	239,544	0	9,325	140,749	267,918
2013	5,429	14,154	62,938	284,775	0	0	68,367	298,929
2014	5,701	14,223	63,940	197,844	0	116,489	69,641	328,556

Year	Cbt		Priv		Shore		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2
2015	5,136	18,215	74,514	224,053	0	0	79,649	242,268
2016	6,752	7,983	45,623	117,155	0	0	52,375	125,138
2017	2,455	9,116	52,952	136,731	0	1,527	55,406	147,374
2018	813	5,084	59,330	193,560	0	38,220	60,142	236,864
2019	1,255	4,112	36,172	42,831	0	7,593	37,427	54,536
2020	11,809	8,621	99,947	218,826	0	0	111,756	227,447
2021	5,122	22,481	20,853	194,098	0	2,530	25,974	219,109
2022	5,365	17,904	21,563	156,068	0	0	26,929	173,973

Table 3. Red Grouper landings in numbers of fish (AB1) with associated coefficients of variation (CV; Dettloff et al. 2020) by mode and year (MRIP). Sample size is provided both as the total number of primary sampling units (PSU) and angler trips (Trp) intercepted by dockside samplers within a specified strata and, in parentheses, the number of PSUs and angler trips that intercepted Red Grouper.

Year	Cbt				Priv				Shore			
	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp
1981	10,347	0.69	63 (3)	583 (3)	322,936	0.38	187 (12)	1,522 (18)	43,163	0.45	333 (6)	2,112 (6)
1982	9,371	0.96	57 (2)	520 (3)	793,292	0.71	422 (13)	3,872 (22)	6,425	0.72	590 (2)	4,642 (2)
1983	2,205	0.46	169 (9)	1,886 (11)	500,574	0.49	258 (10)	2,269 (16)	34,538	0.71	538 (2)	4,413 (3)
1984	6,206	0.56	226 (15)	2,592 (19)	3,832,595	0.52	260 (16)	2,673 (41)	63,342	0.62	514 (3)	4,856 (5)
1985	6,443	0.49	161 (8)	1,625 (14)	89,081	0.91	510 (2)	4,095 (3)	0	0.00	736 (0)	5,593 (0)
1986	113	1.00	249 (1)	2,260 (1)	1,089,330	0.69	832 (16)	7,551 (21)	0	0.00	360 (0)	2,398 (0)
1987	2,622	0.74	396 (4)	3,626 (4)	207,010	0.32	1,184 (23)	11,293 (33)	9,703	1.00	582 (1)	4,361 (1)
1988	2,197	0.74	422 (4)	3,560 (4)	72,082	0.45	1,174 (16)	10,464 (20)	28,642	1.00	728 (1)	5,725 (1)
1989	8,139	0.49	447 (7)	4,258 (8)	623,052	0.69	1,102 (9)	10,497 (11)	0	0.00	676 (0)	6,608 (0)
1990	1,804	0.50	323 (5)	3,440 (6)	8,841	0.61	929 (4)	10,380 (5)	15,650	0.86	507 (2)	5,252 (3)
1991	734	0.55	409 (6)	4,108 (6)	12,256	0.53	890 (6)	10,502 (6)	0	0.00	850 (0)	10,384 (0)
1992	937	0.38	561 (9)	5,127 (10)	41,235	0.35	1,303 (17)	14,472 (22)	5,519	1.00	1,008 (1)	11,350 (1)
1993	7,078	0.60	400 (9)	4,334 (11)	117,047	0.26	1,152 (31)	13,021 (34)	15,907	0.91	1,413 (2)	15,522 (2)
1994	2,500	0.36	491 (11)	6,263 (12)	97,002	0.25	1,363 (26)	15,411 (31)	1,684	1.00	1,530 (1)	18,074 (1)
1995	4,623	0.41	459 (14)	5,646 (15)	118,547	0.35	1,345 (19)	14,585 (26)	2,614	1.00	1,666 (1)	19,306 (2)
1996	4,039	0.58	640 (11)	8,359 (13)	150,581	0.27	1,512 (35)	16,349 (37)	0	0.00	1,492 (0)	18,267 (0)
1997	10,601	0.73	806 (14)	9,062 (16)	87,487	0.26	1,516 (24)	17,058 (27)	4,395	1.00	1,399 (1)	16,448 (1)
1998	2,818	0.37	912 (30)	9,812 (35)	63,361	0.23	1,419 (26)	16,805 (32)	9,162	1.00	1,309 (1)	16,125 (1)
1999	3,860	0.34	998 (24)	9,372 (31)	33,813	0.24	1,559 (29)	18,267 (30)	0	0.00	1,457 (0)	16,896 (0)
2000	664	0.31	1,065 (18)	11,745 (21)	39,223	0.38	1,433 (19)	17,985 (19)	0	0.00	1,209 (0)	14,888 (0)
2001	5,179	0.31	950 (41)	11,686 (51)	34,192	0.30	1,618 (21)	21,475 (22)	0	0.00	1,299 (0)	16,767 (0)
2002	26,862	0.25	1,002 (62)	11,144 (71)	105,649	0.26	1,468 (33)	19,771 (37)	0	0.00	1,304 (0)	16,858 (0)
2003	17,512	0.35	883 (52)	10,036 (62)	120,538	0.50	1,407 (26)	18,297 (30)	1,828	1.00	1,281 (1)	15,085 (1)
2004	14,033	0.34	682 (48)	8,098 (49)	135,885	0.43	1,260 (26)	15,854 (32)	0	0.00	1,036 (0)	12,378 (0)

Year	Cbt				Priv				Shore			
	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp
2005	6,930	0.50	626 (28)	7,891 (37)	57,841	0.31	1,203 (24)	15,416 (26)	0	0.00	896 (0)	10,890 (0)
2006	23,099	0.59	560 (23)	6,706 (31)	183,203	0.50	1,538 (30)	20,214 (41)	0	0.00	846 (0)	10,489 (0)
2007	26,881	0.38	582 (26)	6,600 (35)	137,785	0.38	1,374 (25)	18,473 (28)	463	1.00	1,015 (1)	11,904 (1)
2008	16,149	0.37	729 (46)	7,170 (54)	129,070	0.29	1,304 (18)	17,083 (19)	0	0.00	1,113 (0)	12,620 (0)
2009	3,167	0.44	600 (20)	5,439 (23)	155,047	0.45	1,303 (21)	15,845 (23)	0	0.00	1,067 (0)	10,820 (0)
2010	2,236	0.64	775 (11)	7,402 (13)	14,352	0.48	1,780 (9)	20,068 (10)	0	0.00	1,514 (0)	14,612 (0)
2011	2,216	0.31	741 (16)	7,067 (17)	41,705	0.65	1,672 (12)	18,062 (12)	0	0.00	1,569 (0)	13,881 (0)
2012	1,579	0.37	761 (11)	7,074 (13)	139,170	0.49	1,865 (21)	20,413 (29)	0	0.00	1,773 (0)	14,835 (0)
2013	5,429	0.95	418 (7)	3,310 (8)	62,938	0.38	1,508 (26)	13,826 (34)	0	0.00	979 (0)	9,791 (0)
2014	5,701	0.71	757 (18)	6,660 (21)	63,940	0.36	1,561 (28)	16,227 (33)	0	0.00	900 (0)	9,922 (0)
2015	5,136	0.70	818 (11)	6,976 (13)	74,514	0.54	1,599 (16)	16,293 (19)	0	0.00	951 (0)	9,929 (0)
2016	6,752	0.71	814 (11)	6,694 (12)	45,623	0.37	1,578 (17)	14,590 (20)	0	0.00	1,065 (0)	9,547 (0)
2017	2,455	0.43	731 (9)	6,129 (12)	52,952	0.43	1,619 (17)	15,873 (20)	0	0.00	1,135 (0)	9,697 (0)
2018	813	0.47	857 (7)	7,754 (8)	59,330	0.49	1,546 (16)	15,127 (16)	0	0.00	1,074 (0)	9,943 (0)
2019	1,255	0.50	814 (5)	6,371 (5)	36,172	0.61	1,538 (9)	14,155 (10)	0	0.00	1,092 (0)	9,201 (0)
2020	11,809	0.61	1,023 (13)	8,615 (16)	99,947	0.67	1,997 (12)	17,729 (13)	0	0.00	1,316 (0)	10,864 (0)
2021	5,122	0.83	1,120 (7)	9,423 (8)	20,853	0.39	2,179 (10)	19,320 (10)	0	0.00	1,471 (0)	11,161 (0)
2022	5,365	0.79	972 (13)	7,466 (15)	21,563	0.50	1,961 (9)	15,053 (12)	0	0.00	1,190 (0)	8,408 (0)

Table 4. Red Grouper discards in numbers of fish (B2) with associated coefficients of variation (CV; Dettloff et al. 2020) by mode and year (MRIP). Sample size is provided both as the total number of primary sampling units (PSU) and angler trips (Trp) intercepted by dockside samplers within a specified strata and, in parentheses, the number of PSUs and angler trips that intercepted Red Grouper.

Year	Cbt				Priv				Shore			
	B2	CV	PSU	Trp	B2	CV	PSU	Trp	B2	CV	PSU	Trp
1981	3,774	1.00	63 (1)	583 (1)	111,728	1.00	187 (1)	1,522 (1)	12,594	1.00	333 (1)	2,112 (3)
1982	0	0.00	57 (0)	520 (0)	205,166	0.99	422 (2)	3,872 (6)	0	0.00	590 (0)	4,642 (0)
1983	2,372	1.00	169 (1)	1,886 (4)	285,612	0.77	258 (3)	2,269 (9)	0	0.00	538 (0)	4,413 (0)
1984	1,540	0.73	226 (4)	2,592 (5)	1,177,980	0.88	260 (5)	2,673 (10)	64,734	0.42	514 (6)	4,856 (7)
1985	1,038	1.00	161 (1)	1,625 (1)	13,304	1.00	510 (1)	4,095 (1)	0	0.00	736 (0)	5,593 (0)
1986	0	0.00	249 (0)	2,260 (0)	129,688	0.71	832 (7)	7,551 (7)	0	0.00	360 (0)	2,398 (0)
1987	350	1.00	396 (1)	3,626 (1)	458,228	0.68	1,184 (21)	11,293 (36)	90,134	1.00	582 (1)	4,361 (1)
1988	0	0.00	422 (0)	3,560 (0)	177,607	0.57	1,174 (17)	10,464 (20)	0	0.00	728 (0)	5,725 (0)
1989	0	0.00	447 (0)	4,258 (0)	19,094	0.69	1,102 (3)	10,497 (3)	0	0.00	676 (0)	6,608 (0)
1990	1,553	0.77	323 (2)	3,440 (3)	14,760	0.44	929 (7)	10,380 (7)	0	0.00	507 (0)	5,252 (0)
1991	858	0.84	409 (2)	4,108 (2)	542,183	0.58	890 (26)	10,502 (34)	0	0.00	850 (0)	10,384 (0)
1992	13,388	0.91	561 (8)	5,127 (12)	898,754	0.82	1,303 (38)	14,472 (65)	0	0.00	1,008 (0)	11,350 (0)
1993	537	1.00	400 (1)	4,334 (1)	196,129	0.32	1,152 (31)	13,021 (47)	0	0.00	1,413 (0)	15,522 (0)
1994	6,460	0.51	491 (10)	6,263 (16)	369,191	0.36	1,363 (37)	15,411 (65)	7,682	0.76	1,530 (2)	18,074 (5)
1995	1,238	0.48	459 (5)	5,646 (6)	327,713	0.54	1,345 (27)	14,585 (51)	17,259	0.55	1,666 (5)	19,306 (6)
1996	19,394	0.44	640 (11)	8,359 (27)	1,203,197	0.28	1,512 (63)	16,349 (142)	38,402	0.37	1,492 (8)	18,267 (8)
1997	5,752	0.45	806 (13)	9,062 (23)	1,308,560	0.28	1,516 (75)	17,058 (156)	5,143	0.71	1,399 (2)	16,448 (2)
1998	3,810	0.33	912 (19)	9,812 (29)	284,606	0.28	1,419 (35)	16,805 (70)	34,005	0.39	1,309 (7)	16,125 (7)
1999	4,045	0.43	998 (21)	9,372 (28)	376,377	0.32	1,559 (59)	18,267 (92)	22,630	0.69	1,457 (3)	16,896 (3)
2000	2,034	0.25	1,065 (27)	11,745 (39)	703,790	0.19	1,433 (73)	17,985 (180)	18,997	0.59	1,209 (3)	14,888 (4)
2001	18,415	0.32	950 (44)	11,686 (84)	453,168	0.53	1,618 (42)	21,475 (72)	8,411	1.00	1,299 (1)	16,767 (1)
2002	21,407	0.35	1,002 (45)	11,144 (69)	181,870	0.17	1,468 (62)	19,771 (93)	69,579	1.00	1,304 (1)	16,858 (1)
2003	19,547	0.27	883 (53)	10,036 (109)	326,290	0.37	1,407 (41)	18,297 (64)	41,490	1.00	1,281 (1)	15,085 (2)
2004	31,158	0.32	682 (43)	8,098 (133)	889,948	0.49	1,260 (56)	15,854 (98)	0	0.00	1,036 (0)	12,378 (0)

Year	Cbt				Priv				Shore			
	B2	CV	PSU	Trp	B2	CV	PSU	Trp	B2	CV	PSU	Trp
2005	33,500	0.48	626 (47)	7,891 (142)	211,318	0.18	1,203 (61)	15,416 (115)	5,775	1.00	896 (1)	10,890 (1)
2006	14,994	0.40	560 (30)	6,706 (70)	914,810	0.75	1,538 (68)	20,214 (130)	6,283	1.00	846 (1)	10,489 (1)
2007	25,416	0.61	582 (28)	6,600 (55)	256,240	0.45	1,374 (24)	18,473 (31)	0	0.00	1,015 (0)	11,904 (0)
2008	24,280	0.28	729 (54)	7,170 (134)	179,332	0.29	1,304 (36)	17,083 (56)	0	0.00	1,113 (0)	12,620 (0)
2009	24,798	0.36	600 (36)	5,439 (102)	299,476	0.27	1,303 (48)	15,845 (91)	0	0.00	1,067 (0)	10,820 (0)
2010	21,405	0.23	775 (58)	7,402 (208)	185,145	0.21	1,780 (49)	20,068 (80)	9,731	1.00	1,514 (1)	14,612 (1)
2011	14,052	0.30	741 (39)	7,067 (102)	72,553	0.48	1,672 (21)	18,062 (25)	0	0.00	1,569 (0)	13,881 (0)
2012	19,049	0.49	761 (46)	7,074 (96)	239,544	0.39	1,865 (30)	20,413 (46)	9,325	0.94	1,773 (2)	14,835 (2)
2013	14,154	0.32	418 (34)	3,310 (86)	284,775	0.25	1,508 (53)	13,826 (81)	0	0.00	979 (0)	9,791 (0)
2014	14,223	0.71	757 (15)	6,660 (25)	197,844	0.29	1,561 (45)	16,227 (90)	116,489	0.98	900 (2)	9,922 (2)
2015	18,215	0.70	818 (25)	6,976 (41)	224,053	0.57	1,599 (40)	16,293 (65)	0	0.00	951 (0)	9,929 (0)
2016	7,983	0.37	814 (22)	6,694 (36)	117,155	0.24	1,578 (34)	14,590 (44)	0	0.00	1,065 (0)	9,547 (0)
2017	9,116	0.44	731 (14)	6,129 (35)	136,731	0.44	1,619 (24)	15,873 (33)	1,527	1.00	1,135 (1)	9,697 (1)
2018	5,084	0.43	857 (12)	7,754 (28)	193,560	0.28	1,546 (31)	15,127 (52)	38,220	1.00	1,074 (1)	9,943 (1)
2019	4,112	0.49	814 (6)	6,371 (15)	42,831	0.32	1,538 (15)	14,155 (19)	7,593	1.00	1,092 (1)	9,201 (1)
2020	8,621	0.47	1,023 (15)	8,615 (33)	218,826	0.60	1,997 (24)	17,729 (38)	0	0.00	1,316 (0)	10,864 (0)
2021	22,481	0.36	1,120 (21)	9,423 (54)	194,098	0.38	2,179 (38)	19,320 (54)	2,530	1.00	1,471 (1)	11,161 (1)
2022	17,904	0.46	972 (19)	7,466 (35)	156,068	0.40	1,961 (34)	15,053 (52)	0	0.00	1,190 (0)	8,408 (0)

Table 5. Red Grouper landings (AB1) and discards (B2), in numbers of fish, with associated coefficients of variation (CV; Dettloff et al. 2020) by year for all modes combined (MRIP). Sample size is provided both as the total number of primary sampling units (PSU) and angler trips (Trp) intercepted by dockside samplers within a specified strata and, in parentheses, the number of PSUs and angler trips that intercepted Red Grouper.

Year	AB1				B2			
	Total	CV	PSU	Trp	Total	CV	PSU	Trp
1981	376,447	0.32	583 (21)	4,217 (27)	128,096	0.90	583 (3)	4,217 (5)
1982	809,087	0.70	1,069 (17)	9,034 (27)	205,166	0.99	1,069 (2)	9,034 (6)
1983	537,317	0.39	965 (21)	8,568 (30)	287,984	0.77	965 (4)	8,568 (13)
1984	3,902,143	0.45	1,000 (34)	10,121 (65)	1,244,253	0.83	1,000 (15)	10,121 (22)
1985	95,525	0.85	1,407 (10)	11,313 (17)	14,343	0.93	1,407 (2)	11,313 (2)
1986	1,089,443	0.69	1,441 (17)	12,209 (22)	129,688	0.71	1,441 (7)	12,209 (7)
1987	219,335	0.29	2,162 (28)	19,280 (38)	548,713	0.59	2,162 (23)	19,280 (38)
1988	102,921	0.42	2,324 (21)	19,749 (25)	177,607	0.56	2,324 (17)	19,749 (20)
1989	631,191	0.68	2,225 (16)	21,363 (19)	19,094	0.69	2,225 (3)	21,363 (3)
1990	26,295	0.55	1,759 (11)	19,072 (14)	16,312	0.40	1,759 (9)	19,072 (10)
1991	12,990	0.50	2,149 (12)	24,994 (12)	543,041	0.58	2,149 (28)	24,994 (36)
1992	47,690	0.33	2,872 (27)	30,949 (33)	912,142	0.80	2,872 (46)	30,949 (77)
1993	140,032	0.24	2,965 (42)	32,877 (47)	196,667	0.30	2,965 (32)	32,877 (48)
1994	101,186	0.24	3,384 (38)	39,748 (44)	383,333	0.34	3,384 (49)	39,748 (86)
1995	125,784	0.31	3,470 (34)	39,537 (43)	346,210	0.50	3,470 (37)	39,537 (63)
1996	154,620	0.26	3,644 (46)	42,975 (50)	1,260,992	0.25	3,644 (82)	42,975 (177)
1997	102,484	0.23	3,721 (39)	42,568 (44)	1,319,455	0.23	3,721 (90)	42,568 (181)
1998	75,340	0.22	3,640 (57)	42,742 (68)	322,421	0.23	3,640 (61)	42,742 (106)
1999	37,673	0.22	4,014 (53)	44,535 (61)	403,051	0.30	4,014 (83)	44,535 (123)
2000	39,887	0.38	3,707 (37)	44,609 (40)	724,821	0.18	3,707 (103)	44,609 (223)
2001	39,371	0.27	3,867 (62)	49,928 (73)	479,993	0.50	3,867 (87)	49,928 (157)
2002	132,511	0.20	3,774 (95)	47,773 (108)	272,855	0.28	3,774 (108)	47,773 (163)
2003	139,878	0.41	3,571 (79)	43,418 (93)	387,326	0.32	3,571 (95)	43,418 (175)
2004	149,919	0.39	2,978 (74)	36,330 (81)	921,106	0.47	2,978 (99)	36,330 (231)
2005	64,771	0.28	2,725 (52)	34,197 (63)	250,593	0.16	2,725 (109)	34,197 (258)
2006	206,302	0.45	2,944 (53)	37,409 (72)	936,087	0.73	2,944 (99)	37,409 (201)
2007	165,129	0.32	2,971 (52)	36,977 (64)	281,656	0.40	2,971 (52)	36,977 (86)
2008	145,219	0.25	3,146 (64)	36,873 (73)	203,612	0.26	3,146 (90)	36,873 (190)
2009	158,214	0.44	2,970 (41)	32,104 (46)	324,275	0.21	2,970 (84)	32,104 (193)
2010	16,588	0.43	4,069 (20)	42,082 (23)	216,281	0.19	4,069 (108)	42,082 (289)
2011	43,921	0.62	3,982 (28)	39,010 (29)	86,605	0.40	3,982 (60)	39,010 (127)

Year	AB1				B2			
	Total	CV	PSU	Trp	Total	CV	PSU	Trp
2012	140,749	0.47	4,399 (32)	42,322 (42)	267,918	0.34	4,399 (78)	42,322 (144)
2013	68,367	0.36	2,905 (33)	26,927 (42)	298,929	0.24	2,905 (87)	26,927 (167)
2014	69,641	0.33	3,218 (46)	32,809 (54)	328,556	0.39	3,218 (62)	32,809 (117)
2015	79,649	0.51	3,368 (27)	33,198 (32)	242,268	0.53	3,368 (65)	33,198 (106)
2016	52,375	0.33	3,457 (28)	30,831 (32)	125,138	0.21	3,457 (56)	30,831 (80)
2017	55,406	0.41	3,485 (26)	31,699 (32)	147,374	0.41	3,485 (39)	31,699 (69)
2018	60,142	0.47	3,477 (23)	32,824 (24)	236,864	0.28	3,477 (44)	32,824 (81)
2019	37,427	0.59	3,444 (14)	29,727 (15)	54,536	0.29	3,444 (22)	29,727 (35)
2020	111,756	0.60	4,336 (25)	37,208 (29)	227,447	0.57	4,336 (39)	37,208 (71)
2021	25,974	0.35	4,770 (17)	39,904 (18)	219,109	0.34	4,770 (60)	39,904 (109)
2022	26,929	0.43	4,123 (22)	30,927 (27)	173,973	0.36	4,123 (53)	30,927 (87)

Table 6. Estimated landings of Red Grouper in pounds whole weight by state and year (MRIP). Average weight estimates are calculated by strata using the following hierarchy: species, region, year, state, mode, wave, and area (Matter and Rios 2013). The minimum number of weights used at each level of substitution is fifteen fish, except for the final species level where the minimum is one fish (Dettloff and Matter 2019b).

Year	FLKeys	FLE	GA	SC	NC	Total
1981	769,237	458,794	0	0	0	1,228,031
1982	2,143,973	83,425	0	0	0	2,227,398
1983	1,693,292	360,430	0	0	0	2,053,722
1984	16,938,277	160,737	0	0	0	17,099,014
1985	254,694	26,318	0	0	0	281,012
1986	4,084,129	66,375	0	0	0	4,150,503
1987	373,923	153,133	0	0	638	527,694
1988	154,147	402,232	0	0	18,180	574,559
1989	2,136,217	38,984	0	0	22,470	2,197,672
1990	12,942	33,618	0	0	85,517	132,078
1991	58,765	22,585	0	0	16,277	97,626
1992	223,257	77,548	0	0	19,344	320,149
1993	461,202	424,655	0	0	43,388	929,245
1994	494,215	128,323	0	0	10,029	632,567
1995	729,735	78,956	0	0	19,624	828,315
1996	838,146	181,439	0	0	5,951	1,025,536
1997	504,475	226,541	0	0	2,304	733,320
1998	306,012	266,114	345	295	5,260	578,027
1999	59,106	205,186	0	2,281	8,388	274,960
2000	142,858	165,764	0	366	3,152	312,140
2001	62,459	192,883	0	0	56,481	311,823
2002	453,027	366,366	0	0	175,975	995,368
2003	634,970	206,309	0	0	128,591	969,870
2004	660,977	100,571	0	1,750	279,614	1,042,912
2005	10,083	134,328	0	0	493,752	638,163
2006	821,504	121,927	0	6,311	865,998	1,815,740
2007	109,609	489,672	0	12,674	853,714	1,465,668
2008	83,617	78,448	0	1,082	1,594,450	1,757,597
2009	435,224	124,798	0	2,111	944,628	1,506,760
2010	19,611	59,663	0	0	102,542	181,816
2011	166,536	148,231	235	0	55,120	370,122
2012	777,176	113,869	0	0	15,853	906,898

Year	FLKeys	FLE	GA	SC	NC	Total
2013	164,961	274,411	0	0	32,913	472,285
2014	378,377	96,847	0	0	6,875	482,098
2015	247,322	357,106	0	0	19,172	623,600
2016	168,363	180,746	0	0	0	349,108
2017	177,276	186,871	0	0	0	364,147
2018	136,226	348,939	0	0	0	485,164
2019	71,129	213,213	0	0	1,665	286,007
2020	709,492	112,807	0	0	509	822,808
2021	129,622	85,665	0	0	0	215,287
2022	113,598	110,982	0	0	279	224,860

Table 7. Red Grouper landings in pounds whole weight (LBS) with associated coefficients of variation (CV; Approach 2 described in Nuttall and Dettloff 2022) by year and mode (MRIP).

Year	Cbt		Priv		Shore		Total	
	LBS	CV	LBS	CV	LBS	CV	LBS	CV
1981	31,884	0.69	1,115,904	0.42	80,244	0.49	1,228,031	0.36
1982	40,309	0.96	2,160,539	0.74	26,550	0.80	2,227,398	0.74
1983	21,789	0.46	1,808,248	0.54	223,686	0.73	2,053,722	0.45
1984	35,170	0.58	16,766,491	0.53	297,353	0.66	17,099,014	0.46
1985	17,599	0.63	263,413	0.95	0	0.00	281,012	0.87
1986	183	1.00	4,150,321	0.70	0	0.00	4,150,503	0.70
1987	13,749	0.81	481,798	0.35	32,147	1.00	527,694	0.35
1988	18,180	0.74	319,407	0.45	236,972	1.00	574,559	0.68
1989	34,468	0.50	2,163,204	0.69	0	0.00	2,197,672	0.68
1990	9,210	0.57	45,338	0.65	77,530	0.87	132,078	0.57
1991	6,076	0.56	91,550	0.58	0	0.00	97,626	0.51
1992	8,118	0.41	274,568	0.37	37,463	1.00	320,149	0.35
1993	48,254	0.61	760,525	0.27	120,466	0.97	929,245	0.25
1994	13,752	0.38	607,132	0.26	11,684	1.00	632,567	0.25
1995	34,442	0.42	776,307	0.36	17,566	1.00	828,315	0.32
1996	29,916	0.58	995,620	0.27	0	0.00	1,025,536	0.26
1997	93,857	0.74	602,928	0.28	36,535	1.00	733,320	0.24
1998	21,658	0.38	485,671	0.26	70,697	1.00	578,027	0.23
1999	25,657	0.35	249,303	0.26	0	0.00	274,960	0.23
2000	5,688	0.32	306,452	0.39	0	0.00	312,140	0.38
2001	47,013	0.31	264,810	0.32	0	0.00	311,823	0.27
2002	236,059	0.25	759,309	0.27	0	0.00	995,368	0.20
2003	150,095	0.35	801,710	0.50	18,065	1.00	969,870	0.41
2004	85,411	0.35	957,501	0.44	0	0.00	1,042,912	0.39
2005	43,308	0.50	594,855	0.33	0	0.00	638,163	0.29
2006	140,350	0.59	1,675,390	0.51	0	0.00	1,815,740	0.45
2007	171,642	0.38	1,289,241	0.39	4,785	1.00	1,465,668	0.32
2008	128,146	0.37	1,629,451	0.30	0	0.00	1,757,597	0.25
2009	24,176	0.45	1,482,584	0.46	0	0.00	1,506,760	0.45
2010	21,639	0.65	160,177	0.51	0	0.00	181,816	0.44
2011	21,512	0.34	348,610	0.67	0	0.00	370,122	0.63
2012	13,383	0.40	893,515	0.50	0	0.00	906,898	0.48
2013	35,989	0.96	436,296	0.38	0	0.00	472,285	0.37

Year	Cbt		Priv		Shore		Total	
	LBS	CV	LBS	CV	LBS	CV	LBS	CV
2014	39,197	0.71	442,902	0.37	0	0.00	482,098	0.34
2015	34,956	0.71	588,643	0.55	0	0.00	623,600	0.52
2016	39,765	0.71	309,344	0.38	0	0.00	349,108	0.34
2017	17,538	0.44	346,609	0.43	0	0.00	364,147	0.41
2018	6,487	0.48	478,678	0.51	0	0.00	485,164	0.48
2019	9,377	0.60	276,630	0.62	0	0.00	286,007	0.61
2020	84,730	0.62	738,079	0.68	0	0.00	822,808	0.61
2021	36,649	0.83	178,638	0.44	0	0.00	215,287	0.37
2022	41,236	0.79	183,624	0.51	0	0.00	224,860	0.43

Table 8. Summary of length measurements (millimeters fork length) from MRIP-intercepted Red Grouper by state and year. Summaries include the number of fish measured by MRIP and, in parentheses, the number of angler trips from which those fish were measured (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish lengths.

Year	FLKeys					FLE					GA					SC					NC				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	26 (15)	160	422	110	630	13 (9)	330	406	104	720	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1982	52 (20)	185	382	78	595	7 (5)	360	646	176	830	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1983	38 (14)	240	443	142	830	9 (6)	256	427	203	780	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1984	91 (37)	250	448	117	570	18 (12)	235	399	90	655	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1985	4 (3)	290	539	185	717	6 (4)	335	421	72	550	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1986	27 (8)	300	446	82	570	17 (14)	280	357	57	485	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1987	47 (26)	230	395	150	750	21 (11)	270	364	127	600	0 (0)	0	0	0	0	0 (0)	0	0	0	0	3 (1)	410	443	42	490
1988	11 (8)	329	499	120	770	16 (14)	445	553	98	710	0 (0)	0	0	0	0	0 (0)	0	0	0	0	9 (3)	300	402	106	641
1989	34 (7)	305	436	61	578	6 (6)	424	481	72	615	0 (0)	0	0	0	0	0 (0)	0	0	0	0	16 (6)	320	460	73	590
1990	3 (3)	382	478	90	561	3 (3)	460	480	26	509	0 (0)	0	0	0	0	0 (0)	0	0	0	0	13 (8)	234	478	110	640
1991	2 (2)	498	570	102	643	1 (1)	515	515	0	515	0 (0)	0	0	0	0	0 (0)	0	0	0	0	13 (9)	234	542	118	735
1992	13 (13)	476	566	101	865	10 (9)	402	529	106	735	0 (0)	0	0	0	0	0 (0)	0	0	0	0	15 (11)	392	575	84	760
1993	29 (20)	448	533	50	668	24 (18)	270	584	114	735	0 (0)	0	0	0	0	0 (0)	0	0	0	0	25 (9)	502	561	53	650
1994	28 (20)	466	525	42	610	16 (14)	388	536	85	674	0 (0)	0	0	0	0	0 (0)	0	0	0	0	19 (10)	491	556	60	670
1995	42 (28)	450	555	68	750	9 (8)	382	476	75	621	0 (0)	0	0	0	0	0 (0)	0	0	0	0	18 (7)	542	593	34	660
1996	41 (30)	458	548	56	674	24 (15)	490	555	57	655	0 (0)	0	0	0	0	0 (0)	0	0	0	0	9 (5)	525	585	59	655
1997	40 (26)	299	556	73	812	27 (17)	325	578	122	840	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	655	655	0	655
1998	52 (35)	340	561	97	863	37 (28)	500	568	89	830	2 (1)	459	556	138	654	1 (1)	600	600	0	600	3 (3)	510	537	25	560
1999	32 (18)	318	545	84	755	41 (35)	446	589	80	740	0 (0)	0	0	0	0	4 (3)	559	596	40	632	19 (5)	505	534	32	610
2000	29 (20)	466	567	71	731	27 (18)	380	568	96	680	0 (0)	0	0	0	0	1 (1)	560	560	0	560	1 (1)	660	660	0	660
2001	49 (29)	474	556	54	705	44 (35)	410	553	83	717	0 (0)	0	0	0	0	0 (0)	0	0	0	0	21 (9)	442	623	98	800

Year	FLKeys					FLE					GA					SC					NC				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2002	59 (44)	418	567	68	762	70 (50)	462	548	60	729	0 (0)	0	0	0	0	0 (0)	0	0	0	0	67 (14)	480	593	88	750
2003	102 (51)	469	570	66	744	33 (30)	395	592	95	757	0 (0)	0	0	0	0	0 (0)	0	0	0	0	49 (12)	508	604	56	810
2004	69 (38)	468	559	71	753	29 (25)	395	576	76	751	0 (0)	0	0	0	0	2 (2)	515	518	4	520	67 (16)	495	581	90	825
2005	35 (21)	475	569	69	755	31 (27)	412	524	72	776	0 (0)	0	0	0	0	0 (0)	0	0	0	0	48 (15)	482	625	113	851
2006	41 (24)	492	594	73	727	34 (26)	398	512	58	662	0 (0)	0	0	0	0	5 (4)	548	673	145	878	100 (18)	491	642	118	878
2007	27 (19)	490	604	90	920	29 (19)	537	630	67	767	0 (0)	0	0	0	0	3 (2)	550	618	118	755	173 (24)	487	559	67	746
2008	61 (37)	471	566	62	730	15 (10)	500	570	48	651	0 (0)	0	0	0	0	1 (1)	635	635	0	635	186 (25)	497	641	81	831
2009	32 (21)	461	540	64	682	14 (12)	332	485	132	729	0 (0)	0	0	0	0	1 (1)	602	602	0	602	48 (12)	520	648	59	818
2010	10 (6)	489	553	56	659	6 (6)	315	601	175	818	0 (0)	0	0	0	0	0 (0)	0	0	0	0	37 (11)	495	669	104	839
2011	19 (9)	468	553	58	705	13 (11)	315	596	149	896	1 (1)	704	704	0	704	0 (0)	0	0	0	0	22 (8)	510	683	126	896
2012	22 (16)	481	558	58	720	18 (16)	368	524	91	678	0 (0)	0	0	0	0	0 (0)	0	0	0	0	16 (10)	493	632	137	896
2013	25 (18)	459	530	54	669	20 (17)	476	552	64	675	0 (0)	0	0	0	0	0 (0)	0	0	0	0	15 (7)	500	620	124	899
2014	58 (31)	454	558	56	671	17 (17)	358	581	101	737	0 (0)	0	0	0	0	0 (0)	0	0	0	0	12 (6)	500	700	139	857
2015	60 (22)	470	582	75	724	12 (8)	358	528	107	680	0 (0)	0	0	0	0	0 (0)	0	0	0	0	2 (2)	678	741	89	804
2016	21 (19)	481	575	70	696	15 (13)	358	545	85	690	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2017	22 (14)	500	590	58	712	21 (18)	485	525	35	622	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2018	21 (15)	485	595	86	800	10 (9)	314	445	133	642	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2019	17 (7)	466	535	63	684	8 (6)	330	507	119	753	0 (0)	0	0	0	0	0 (0)	0	0	0	0	2 (0)	750	846	136	943
2020	51 (19)	450	570	71	785	8 (4)	330	598	199	943	0 (0)	0	0	0	0	0 (0)	0	0	0	0	2 (1)	750	846	136	943
2021	18 (11)	486	584	87	773	7 (7)	305	468	114	574	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2022	24 (16)	494	561	60	707	12 (10)	305	561	98	692	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	769	769	0	769

Table 9. Summary of weight measurements (pounds whole weight) from MRIP-intercepted Red Grouper by state and year. Summaries include the number of fish weighed by MRIP and, in parentheses, the number of angler trips from which those fish were weighed (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish weights.

Year	FLKeys					FLE					GA					SC					NC				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	26 (15)	0.2	3.2	2.1	8.4	13 (9)	1.1	2.5	2.4	10.1	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
1982	52 (20)	0.2	2.2	1.3	7.2	7 (5)	1.9	15.9	13.4	41.7	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
1983	38 (14)	0.9	4.0	4.7	18.7	9 (6)	0.4	4.2	4.8	11.9	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
1984	91 (37)	0.4	3.5	2.1	7.3	18 (12)	0.4	2.3	1.4	6.6	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
1985	4 (3)	1.1	8.1	5.7	13.9	6 (4)	1.1	2.8	1.8	6.2	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
1986	27 (8)	1.0	4.4	2.1	8.0	17 (14)	0.7	1.6	1.0	3.7	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
1987	47 (26)	0.5	3.9	5.6	26.2	21 (11)	0.9	2.6	2.5	8.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	3 (1)	2.6	3.7	1.3	5.1
1988	0 (0)	0.0	0.0	0.0	0.0	1 (1)	3.1	3.1	0.0	3.1	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	12.0	12.0	0.0	12.0
1989	34 (7)	1.1	3.8	1.7	9.6	6 (6)	3.0	3.9	1.3	6.2	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	16 (6)	1.2	4.3	2.1	8.5
1990	3 (3)	2.6	5.6	2.6	7.3	3 (3)	3.1	4.6	1.5	6.2	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	13 (8)	0.7	5.0	3.2	13.1
1991	2 (2)	5.3	7.9	3.7	10.5	1 (1)	4.9	4.9	0.0	4.9	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	13 (9)	0.7	7.2	4.3	17.2
1992	10 (10)	4.0	5.9	1.4	8.5	9 (8)	2.5	6.1	4.7	17.3	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	15 (11)	1.6	8.5	4.6	20.9
1993	29 (20)	3.3	5.9	1.6	10.6	24 (18)	0.7	7.7	3.7	17.3	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	25 (9)	3.7	5.9	2.9	12.6
1994	28 (20)	3.8	5.5	1.3	8.3	16 (14)	1.7	5.9	3.1	12.1	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	19 (10)	3.5	5.4	2.2	11.1
1995	42 (28)	2.6	6.4	2.4	15.9	9 (8)	1.5	3.9	2.3	9.3	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	18 (7)	4.2	7.6	1.7	9.6
1996	41 (30)	3.3	6.2	1.9	11.6	24 (15)	3.4	7.4	2.9	13.2	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	9 (5)	5.1	7.7	1.7	9.8
1997	40 (26)	0.7	7.5	3.3	16.1	27 (17)	1.2	8.7	6.3	28.3	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	8.8	8.8	0.0	8.8
1998	52 (35)	1.7	8.4	4.5	25.1	37 (28)	4.5	7.7	4.8	23.1	2 (1)	4.3	7.1	4.0	9.9	1 (1)	9.9	9.9	0.0	9.9	3 (3)	3.6	5.0	1.2	5.8
1999	32 (18)	1.1	7.3	3.3	15.8	41 (35)	3.1	9.9	5.4	20.3	0 (0)	0.0	0.0	0.0	0.0	4 (3)	7.7	9.5	2.1	11.4	19 (5)	3.4	4.3	1.1	6.5
2000	29 (20)	3.9	7.7	3.2	17.1	27 (18)	2.0	8.1	3.5	13.1	0 (0)	0.0	0.0	0.0	0.0	1 (1)	6.0	6.0	0.0	6.0	1 (1)	12.7	12.7	0.0	12.7
2001	49 (29)	4.1	7.3	2.3	14.1	44 (35)	2.5	7.4	3.5	16.8	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	21 (9)	3.4	11.2	5.8	22.3

Year	FLKeys					FLE					GA					SC					NC				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2002	59 (44)	3.2	7.2	2.6	14.5	70 (50)	4.0	7.2	3.1	17.7	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	67 (14)	3.3	9.6	4.8	20.5
2003	102 (51)	3.7	7.5	3.0	16.9	33 (30)	2.6	9.9	6.0	23.7	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	49 (12)	5.0	8.8	2.9	21.5
2004	69 (38)	3.4	7.1	3.5	19.2	29 (25)	2.6	7.6	3.6	17.9	0 (0)	0.0	0.0	0.0	0.0	2 (2)	5.5	5.6	0.2	5.7	67 (16)	3.7	7.7	4.3	21.2
2005	35 (21)	3.9	7.1	3.0	16.7	31 (27)	2.6	5.8	2.3	13.9	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	48 (15)	3.2	10.4	6.4	27.2
2006	41 (24)	3.7	7.6	2.9	14.5	34 (26)	2.3	5.3	2.0	9.7	0 (0)	0.0	0.0	0.0	0.0	5 (4)	7.6	13.4	6.9	21.5	100 (18)	4.0	11.1	6.7	27.2
2007	27 (19)	4.4	8.7	5.3	31.4	29 (19)	5.9	10.3	4.0	20.2	0 (0)	0.0	0.0	0.0	0.0	3 (2)	6.6	10.8	6.9	18.8	173 (24)	3.6	6.8	3.5	21.3
2008	61 (37)	3.5	7.2	2.7	14.6	15 (10)	5.4	7.5	1.8	11.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	9.7	9.7	0.0	9.7	186 (25)	4.2	10.9	5.0	25.4
2009	32 (21)	3.2	6.2	2.4	12.6	14 (12)	1.3	5.6	4.6	15.2	0 (0)	0.0	0.0	0.0	0.0	1 (1)	11.7	11.7	0.0	11.7	48 (12)	4.7	11.3	3.3	22.2
2010	10 (6)	4.4	6.7	3.0	12.1	6 (6)	1.1	10.0	7.2	22.2	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	37 (11)	4.3	12.2	5.9	24.8
2011	19 (9)	4.0	6.7	2.8	15.5	13 (11)	1.1	10.1	7.8	26.3	1 (1)	13.2	13.2	0.0	13.2	0 (0)	0.0	0.0	0.0	0.0	22 (8)	4.1	13.2	7.5	26.5
2012	22 (16)	3.8	7.0	2.5	13.4	18 (16)	1.7	6.5	3.2	11.5	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	16 (10)	4.1	11.0	7.3	26.5
2013	25 (18)	3.5	5.7	2.1	11.6	20 (17)	3.8	7.2	3.0	13.1	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	15 (7)	5.5	10.6	6.7	26.6
2014	58 (31)	3.1	7.0	2.5	15.4	17 (17)	1.5	8.5	4.3	15.8	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	12 (6)	5.3	16.3	10.0	30.9
2015	60 (22)	3.3	7.7	3.0	14.6	12 (8)	1.5	6.3	3.9	13.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	2 (2)	13.0	17.4	6.2	21.8
2016	21 (19)	4.0	7.2	2.7	12.7	15 (13)	1.5	6.7	3.5	14.4	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
2017	22 (14)	4.8	8.1	2.2	13.0	21 (18)	4.3	5.4	1.0	8.8	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
2018	21 (15)	4.3	8.1	3.2	16.7	10 (9)	0.7	4.2	3.9	9.7	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
2019	17 (7)	3.7	6.0	2.3	12.5	8 (6)	0.7	5.9	5.9	19.9	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	2 (0)	18.7	21.9	4.5	25.1
2020	51 (19)	3.0	7.3	3.0	16.9	8 (4)	0.7	10.6	9.4	25.1	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	2 (1)	18.7	21.9	4.5	25.1
2021	18 (11)	3.9	7.6	3.8	18.5	7 (7)	1.0	4.5	2.5	6.9	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0
2022	24 (16)	4.1	6.8	2.4	12.1	12 (10)	1.0	7.7	3.5	14.5	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	13.0	13.0	0.0	13.0

Table 10. Summary of length measurements (millimeters fork length) from MRIP-intercepted Red Grouper by mode and year. Summaries include the number of fish measured by MRIP and, in parentheses, the number of angler trips from which those fish were measured (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish lengths.

Year	Cbt					Priv					Shore				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	0 (0)	0	0	0	0	32 (18)	160	430	111	720	7 (6)	250	359	66	414
1982	1 (1)	645	645	0	645	56 (22)	230	417	119	830	2 (2)	185	210	35	235
1983	1 (1)	780	780	0	780	43 (16)	256	439	148	830	3 (3)	240	347	92	400
1984	5 (3)	343	487	120	655	96 (41)	235	441	114	570	8 (5)	260	393	107	560
1985	6 (4)	380	470	97	630	4 (3)	290	466	195	717	0 (0)	0	0	0	0
1986	1 (1)	420	420	0	420	43 (21)	280	412	86	570	0 (0)	0	0	0	0
1987	9 (4)	255	469	190	735	61 (33)	230	378	131	750	1 (1)	270	270	0	270
1988	10 (4)	300	439	154	770	25 (20)	329	519	100	710	1 (1)	589	589	0	589
1989	31 (8)	320	448	67	590	25 (11)	305	447	67	615	0 (0)	0	0	0	0
1990	6 (6)	355	475	103	640	5 (5)	234	447	125	561	8 (3)	344	501	73	585
1991	7 (6)	505	566	54	650	9 (6)	234	526	140	735	0 (0)	0	0	0	0
1992	14 (10)	519	613	98	865	23 (22)	392	530	81	735	1 (1)	509	509	0	509
1993	24 (11)	475	567	51	650	52 (34)	402	558	79	735	2 (2)	270	435	233	600
1994	22 (12)	491	564	61	674	40 (31)	388	523	57	621	1 (1)	493	493	0	493
1995	26 (15)	474	589	52	750	41 (26)	382	533	74	700	2 (2)	515	548	46	580
1996	19 (13)	511	574	51	655	55 (37)	458	548	58	674	0 (0)	0	0	0	0
1997	29 (16)	440	578	92	840	38 (27)	325	565	90	812	1 (1)	299	299	0	299
1998	51 (35)	340	550	81	751	43 (32)	445	578	102	863	1 (1)	590	590	0	590
1999	63 (31)	474	562	70	755	33 (30)	318	567	89	740	0 (0)	0	0	0	0
2000	29 (21)	451	561	74	731	29 (19)	380	576	91	680	0 (0)	0	0	0	0
2001	86 (51)	449	563	68	750	28 (22)	410	579	107	800	0 (0)	0	0	0	0
2002	145 (71)	418	575	79	762	51 (37)	480	552	57	692	0 (0)	0	0	0	0
2003	140 (62)	477	593	69	810	43 (30)	395	548	69	744	1 (1)	629	629	0	629
2004	118 (49)	468	563	67	753	49 (32)	395	589	103	825	0 (0)	0	0	0	0
2005	66 (37)	424	562	67	776	48 (26)	412	606	128	851	0 (0)	0	0	0	0
2006	87 (31)	463	559	67	773	93 (41)	398	653	126	878	0 (0)	0	0	0	0
2007	170 (35)	487	560	70	920	61 (28)	511	611	78	767	1 (1)	628	628	0	628
2008	159 (54)	471	585	56	732	104 (19)	500	671	89	831	0 (0)	0	0	0	0
2009	50 (23)	347	590	92	762	45 (23)	332	585	106	818	0 (0)	0	0	0	0
2010	35 (13)	489	604	93	836	18 (10)	315	708	124	839	0 (0)	0	0	0	0
2011	35 (17)	468	607	118	896	20 (12)	315	636	139	896	0 (0)	0	0	0	0

Year	Cbt					Priv					Shore				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2012	18 (13)	450	556	74	804	38 (29)	368	574	116	896	0 (0)	0	0	0	0
2013	16 (8)	461	571	135	899	44 (34)	459	555	62	733	0 (0)	0	0	0	0
2014	35 (21)	492	634	103	857	52 (33)	358	547	68	737	0 (0)	0	0	0	0
2015	42 (13)	470	576	82	804	32 (19)	358	579	94	720	0 (0)	0	0	0	0
2016	14 (12)	481	567	71	696	22 (20)	358	560	82	690	0 (0)	0	0	0	0
2017	18 (12)	485	555	68	712	25 (20)	495	561	50	637	0 (0)	0	0	0	0
2018	13 (8)	485	624	89	800	18 (16)	314	490	117	651	0 (0)	0	0	0	0
2019	10 (4)	430	596	163	943	17 (9)	330	523	80	684	0 (0)	0	0	0	0
2020	35 (13)	450	593	104	943	26 (11)	330	568	112	943	0 (0)	0	0	0	0
2021	14 (8)	486	556	62	685	11 (10)	305	547	149	773	0 (0)	0	0	0	0
2022	24 (15)	494	573	71	769	13 (12)	305	555	97	707	0 (0)	0	0	0	0

Table 11. Summary of weight measurements (pounds whole weight) from MRIP-intercepted Red Grouper by mode and year. Summaries include the number of fish weighed by MRIP and, in parentheses, the number of angler trips from which those fish were weighed (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish weights.

Year	Cbt					Priv					Shore				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	0 (0)	0.0	0.0	0.0	0.0	32 (18)	0.2	3.2	2.3	10.1	7 (6)	0.2	1.7	0.9	2.7
1982	1 (1)	41.7	41.7	0.0	41.7	56 (22)	0.7	3.3	4.0	19.4	2 (2)	0.2	0.4	0.3	0.7
1983	1 (1)	11.9	11.9	0.0	11.9	43 (16)	0.4	4.1	4.7	18.7	3 (3)	0.9	1.6	0.6	2.0
1984	5 (3)	1.4	3.8	2.1	6.6	96 (41)	0.4	3.4	2.1	7.3	8 (5)	0.9	2.5	1.6	4.9
1985	6 (4)	2.0	4.5	3.8	11.5	4 (3)	1.1	5.5	6.0	13.9	0 (0)	0.0	0.0	0.0	0.0
1986	1 (1)	2.9	2.9	0.0	2.9	43 (21)	0.7	3.3	2.3	8.0	0 (0)	0.0	0.0	0.0	0.0
1987	9 (4)	0.8	9.0	10.5	26.2	61 (33)	0.5	2.7	2.5	11.7	1 (1)	0.9	0.9	0.0	0.9
1988	1 (1)	12.0	12.0	0.0	12.0	1 (1)	3.1	3.1	0.0	3.1	0 (0)	0.0	0.0	0.0	0.0
1989	31 (8)	1.2	4.2	2.0	9.6	25 (11)	1.1	3.6	1.4	7.1	0 (0)	0.0	0.0	0.0	0.0
1990	6 (6)	1.7	5.5	4.2	13.1	5 (5)	0.7	4.3	2.6	7.3	8 (3)	1.6	5.2	2.0	7.9
1991	7 (6)	5.1	7.4	3.0	12.9	9 (6)	0.7	6.9	4.8	17.2	0 (0)	0.0	0.0	0.0	0.0
1992	13 (9)	6.0	9.4	4.2	20.9	20 (19)	1.6	5.7	3.4	17.3	1 (1)	5.5	5.5	0.0	5.5
1993	24 (11)	4.1	6.7	2.7	12.6	52 (34)	2.4	6.4	3.0	17.3	2 (2)	0.7	4.2	5.0	7.8
1994	22 (12)	3.5	5.8	2.5	12.1	40 (31)	1.7	5.5	2.0	9.6	1 (1)	5.1	5.1	0.0	5.1
1995	26 (15)	3.5	7.8	2.3	15.9	41 (26)	1.5	5.6	2.2	11.5	2 (2)	4.8	5.8	1.4	6.9
1996	19 (13)	3.4	7.4	2.3	11.6	55 (37)	3.3	6.6	2.3	13.2	0 (0)	0.0	0.0	0.0	0.0
1997	29 (16)	2.9	9.4	5.9	28.3	38 (27)	1.2	7.2	3.1	16.1	1 (1)	0.7	0.7	0.0	0.7
1998	51 (35)	1.7	8.1	3.8	23.4	43 (32)	3.4	7.9	5.3	25.1	1 (1)	8.8	8.8	0.0	8.8
1999	63 (31)	3.4	8.0	4.8	20.2	33 (30)	1.1	7.8	4.0	20.3	0 (0)	0.0	0.0	0.0	0.0
2000	29 (21)	3.9	7.6	3.2	17.1	29 (19)	2.0	8.3	3.4	13.1	0 (0)	0.0	0.0	0.0	0.0
2001	86 (51)	3.4	7.9	3.4	18.1	28 (22)	2.5	8.7	5.2	22.3	0 (0)	0.0	0.0	0.0	0.0
2002	145 (71)	3.2	8.3	4.0	20.5	51 (37)	4.2	7.2	3.2	17.5	0 (0)	0.0	0.0	0.0	0.0
2003	140 (62)	3.7	8.8	4.0	23.7	43 (30)	2.6	6.6	2.6	15.5	1 (1)	8.8	8.8	0.0	8.8
2004	118 (49)	3.4	7.0	3.2	19.2	49 (32)	2.6	8.4	4.9	21.2	0 (0)	0.0	0.0	0.0	0.0
2005	66 (37)	3.1	6.8	2.7	16.7	48 (26)	2.6	10.0	6.7	27.2	0 (0)	0.0	0.0	0.0	0.0
2006	87 (31)	3.6	6.7	3.0	20.3	93 (41)	2.3	11.7	6.9	27.2	0 (0)	0.0	0.0	0.0	0.0
2007	170 (35)	3.6	6.8	3.7	31.4	61 (28)	4.6	9.5	4.3	21.3	1 (1)	10.0	10.0	0.0	10.0
2008	159 (54)	3.5	7.8	2.5	15.2	104 (19)	4.7	13.0	5.5	25.4	0 (0)	0.0	0.0	0.0	0.0
2009	50 (23)	1.5	8.7	3.9	19.2	45 (23)	1.3	8.9	4.4	22.2	0 (0)	0.0	0.0	0.0	0.0
2010	35 (13)	4.3	8.9	4.7	24.7	18 (10)	1.1	14.8	6.4	24.8	0 (0)	0.0	0.0	0.0	0.0
2011	35 (17)	4.0	9.6	6.6	26.3	20 (12)	1.1	11.3	7.3	26.5	0 (0)	0.0	0.0	0.0	0.0

Year	Cbt					Priv					Shore				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2012	18 (13)	3.7	7.2	3.7	20.5	38 (29)	1.7	8.4	5.4	26.5	0 (0)	0.0	0.0	0.0	0.0
2013	16 (8)	3.5	8.1	7.4	26.6	44 (34)	3.8	7.2	2.6	13.7	0 (0)	0.0	0.0	0.0	0.0
2014	35 (21)	4.9	11.5	7.1	30.9	52 (33)	1.5	6.6	2.8	15.8	0 (0)	0.0	0.0	0.0	0.0
2015	42 (13)	3.3	7.7	3.7	21.8	32 (19)	1.5	7.8	3.5	14.3	0 (0)	0.0	0.0	0.0	0.0
2016	14 (12)	3.9	6.9	2.7	11.9	22 (20)	1.5	7.1	3.3	14.4	0 (0)	0.0	0.0	0.0	0.0
2017	18 (12)	4.3	6.8	2.6	13.0	25 (20)	4.3	6.8	1.8	10.1	0 (0)	0.0	0.0	0.0	0.0
2018	13 (8)	4.3	9.0	3.4	16.7	18 (16)	0.7	5.3	3.5	9.7	0 (0)	0.0	0.0	0.0	0.0
2019	10 (4)	2.6	9.5	8.3	25.1	17 (9)	0.7	5.7	2.6	12.5	0 (0)	0.0	0.0	0.0	0.0
2020	35 (13)	3.0	8.5	5.1	25.1	26 (11)	0.7	7.8	5.1	25.1	0 (0)	0.0	0.0	0.0	0.0
2021	14 (8)	3.9	6.3	2.0	9.8	11 (10)	1.0	7.3	5.3	18.5	0 (0)	0.0	0.0	0.0	0.0
2022	24 (15)	4.1	7.3	2.9	14.5	13 (12)	1.0	7.2	3.1	11.9	0 (0)	0.0	0.0	0.0	0.0

Table 12. Summary of length (millimeters fork length) and weight measurements (pounds whole weight) from MRIP-intercepted Red Grouper by year. Summaries include the number of fish for which size information was collected by MRIP and, in parentheses, the number of angler trips from which those fish were sampled (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) size of fish lengths and weights.

Year	Length					Weight				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	39 (24)	160	417	107	720	39 (24)	0.2	3.0	2.2	10.1
1982	59 (25)	185	414	126	830	59 (25)	0.2	3.8	6.4	41.7
1983	47 (20)	240	440	153	830	47 (20)	0.4	4.1	4.7	18.7
1984	109 (49)	235	440	114	655	109 (49)	0.4	3.3	2.1	7.3
1985	10 (7)	290	468	134	717	10 (7)	1.1	4.9	4.5	13.9
1986	44 (22)	280	412	85	570	44 (22)	0.7	3.3	2.2	8.0
1987	71 (38)	230	388	141	750	71 (38)	0.5	3.5	4.8	26.2
1988	36 (25)	300	499	120	770	2 (2)	3.1	7.6	6.3	12.0
1989	56 (19)	305	448	66	615	56 (19)	1.1	3.9	1.8	9.6
1990	19 (14)	234	479	95	640	19 (14)	0.7	5.1	2.8	13.1
1991	16 (12)	234	544	110	735	16 (12)	0.7	7.1	4.0	17.2
1992	38 (33)	392	560	95	865	34 (29)	1.6	7.1	4.1	20.9
1993	78 (47)	270	558	78	735	78 (47)	0.7	6.4	2.9	17.3
1994	63 (44)	388	537	61	674	63 (44)	1.7	5.6	2.1	12.1
1995	69 (43)	382	555	70	750	69 (43)	1.5	6.4	2.5	15.9
1996	74 (50)	458	555	57	674	74 (50)	3.3	6.8	2.3	13.2
1997	68 (44)	299	566	95	840	68 (44)	0.7	8.0	4.7	28.3
1998	95 (68)	340	563	91	863	95 (68)	1.7	8.0	4.5	25.1
1999	96 (61)	318	564	77	755	96 (61)	1.1	7.9	4.5	20.3
2000	58 (40)	380	569	82	731	58 (40)	2.0	7.9	3.3	17.1
2001	114 (73)	410	567	79	800	114 (73)	2.5	8.1	3.9	22.3
2002	196 (108)	418	569	75	762	196 (108)	3.2	8.0	3.8	20.5
2003	184 (93)	395	583	71	810	184 (93)	2.6	8.3	3.8	23.7
2004	167 (81)	395	570	80	825	167 (81)	2.6	7.4	3.8	21.2
2005	114 (63)	412	580	99	851	114 (63)	2.6	8.1	5.0	27.2
2006	180 (72)	398	608	112	878	180 (72)	2.3	9.3	5.9	27.2
2007	232 (64)	487	574	75	920	232 (64)	3.6	7.5	4.1	31.4
2008	263 (73)	471	619	82	831	263 (73)	3.5	9.9	4.7	25.4
2009	95 (46)	332	587	99	818	95 (46)	1.3	8.8	4.2	22.2
2010	53 (23)	315	639	115	839	53 (23)	1.1	10.9	6.0	24.8

Year	Length					Weight				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2011	55 (29)	315	618	126	896	55 (29)	1.1	10.2	6.8	26.5
2012	56 (42)	368	568	104	896	56 (42)	1.7	8.0	4.9	26.5
2013	60 (42)	459	560	87	899	60 (42)	3.5	7.4	4.4	26.6
2014	87 (54)	358	582	94	857	87 (54)	1.5	8.6	5.5	30.9
2015	74 (32)	358	577	87	804	74 (32)	1.5	7.7	3.6	21.8
2016	36 (32)	358	563	77	696	36 (32)	1.5	7.0	3.1	14.4
2017	43 (32)	485	559	58	712	43 (32)	4.3	6.8	2.1	13.0
2018	31 (24)	314	547	124	800	31 (24)	0.7	6.9	3.9	16.7
2019	27 (13)	330	550	120	943	27 (13)	0.7	7.1	5.6	25.1
2020	61 (24)	330	583	108	943	61 (24)	0.7	8.2	5.1	25.1
2021	25 (18)	305	552	107	773	25 (18)	1.0	6.7	3.8	18.5
2022	37 (27)	305	567	80	769	37 (27)	1.0	7.3	2.9	14.5

Table 13. Estimated average weights of landed Red Grouper in pounds whole weight (WGT) with associated coefficients of variation (CV; Approach 2 described in Nuttall and Dettloff 2022) by year and mode (MRIP). Average weight estimates are calculated from annual estimates (by-mode) of landings-in-weight (Table 7) divided by estimates of landings-in-number (Table 2). Sample size (N) is provided as the total number of angler trips and, in parentheses, number of fish from which weight information was collected.

Year	Cbt			Priv			Shore			Total		
	WGT	CV	N	WGT	CV	N	WGT	CV	N	WGT	CV	N
1981				3.46	0.19	18 (32)	1.86	0.23	6 (7)	3.26	0.17	24 (39)
1982	4.30	0.00	1 (1)	2.72	0.27	22 (56)	4.13	0.49	2 (2)	2.75	0.35	25 (59)
1983	9.88	0.00	1 (1)	3.61	0.26	16 (43)	6.48	0.23	3 (3)	3.82	0.23	20 (47)
1984	5.67	0.20	3 (5)	4.37	0.12	41 (96)	4.69	0.28	5 (8)	4.38	0.10	49 (109)
1985	2.73	0.45	4 (6)	2.96	0.64	3 (4)				2.94	0.35	7 (10)
1986	1.62	0.00	1 (1)	3.81	0.16	21 (43)				3.81	0.15	22 (44)
1987	5.24	0.47	4 (9)	2.33	0.15	33 (61)	3.31	0.00	1 (1)	2.41	0.20	38 (71)
1988	8.27	0.00	1 (1)	4.43	0.00	1 (1)				5.58	0.59	2 (2)
1989	4.23	0.11	8 (31)	3.47	0.11	11 (25)				3.48	0.08	19 (56)
1990	5.10	0.31	6 (6)	5.13	0.27	5 (5)	4.95	0.19	3 (8)	5.02	0.16	14 (19)
1991	8.27	0.11	6 (7)	7.47	0.28	6 (9)				7.52	0.14	12 (16)
1992	8.67	0.15	9 (13)	6.66	0.13	19 (20)	6.79	0.00	1 (1)	6.71	0.11	29 (34)
1993	6.82	0.12	11 (24)	6.50	0.07	34 (52)	7.57	0.84	2 (2)	6.64	0.06	47 (78)
1994	5.50	0.12	12 (22)	6.26	0.06	31 (40)	6.94	0.00	1 (1)	6.25	0.06	44 (63)
1995	7.45	0.10	15 (26)	6.55	0.08	26 (41)	6.72	0.17	2 (2)	6.59	0.06	43 (69)
1996	7.41	0.09	13 (19)	6.61	0.05	37 (55)				6.63	0.04	50 (74)
1997	8.85	0.13	16 (29)	6.89	0.09	27 (38)	8.31	0.00	1 (1)	7.16	0.08	44 (68)
1998	7.69	0.08	35 (51)	7.67	0.12	32 (43)	7.72	0.00	1 (1)	7.67	0.07	68 (95)
1999	6.65	0.09	31 (63)	7.37	0.09	30 (33)				7.30	0.07	61 (96)
2000	8.56	0.07	21 (29)	7.81	0.09	19 (29)				7.83	0.06	40 (58)
2001	9.08	0.06	51 (86)	7.74	0.12	22 (28)				7.92	0.05	73 (114)
2002	8.79	0.05	71 (145)	7.19	0.06	37 (51)				7.51	0.04	108 (196)
2003	8.57	0.06	62 (140)	6.65	0.06	30 (43)	9.88	0.00	1 (1)	6.93	0.05	93 (184)
2004	6.09	0.06	49 (118)	7.05	0.08	32 (49)				6.96	0.05	81 (167)
2005	6.25	0.06	37 (66)	10.28	0.12	26 (48)				9.85	0.06	63 (114)
2006	6.08	0.07	31 (87)	9.14	0.09	41 (93)				8.80	0.07	72 (180)
2007	6.39	0.07	35 (170)	9.36	0.08	28 (61)	10.33	0.00	1 (1)	8.88	0.05	64 (232)
2008	7.94	0.04	54 (159)	12.62	0.09	19 (104)				12.10	0.04	73 (263)
2009	7.63	0.10	23 (50)	9.56	0.12	23 (45)				9.52	0.08	46 (95)
2010	9.68	0.11	13 (35)	11.16	0.18	10 (18)				10.96	0.12	23 (53)

Year	Cbt			Priv			Shore			Total		
	WGT	CV	N	WGT	CV	N	WGT	CV	N	WGT	CV	N
2011	9.71	0.13	17 (35)	8.36	0.20	12 (20)				8.43	0.11	29 (55)
2012	8.48	0.15	13 (18)	6.42	0.10	29 (38)				6.44	0.08	42 (56)
2013	6.63	0.34	8 (16)	6.93	0.06	34 (44)				6.91	0.08	42 (60)
2014	6.88	0.10	21 (35)	6.93	0.08	33 (52)				6.92	0.07	54 (87)
2015	6.81	0.14	13 (42)	7.90	0.10	19 (32)				7.83	0.08	32 (74)
2016	5.89	0.11	12 (14)	6.78	0.10	20 (22)				6.67	0.07	32 (36)
2017	7.14	0.12	12 (18)	6.55	0.06	20 (25)				6.57	0.06	32 (43)
2018	7.98	0.13	8 (13)	8.07	0.17	16 (18)				8.07	0.13	24 (31)
2019	7.47	0.39	5 (10)	7.65	0.14	10 (17)				7.64	0.19	15 (27)
2020	7.17	0.15	16 (35)	7.38	0.17	13 (26)				7.36	0.11	29 (61)
2021	7.16	0.10	8 (14)	8.57	0.23	10 (11)				8.29	0.14	18 (25)
2022	7.69	0.11	10 (16)	8.52	0.10	10 (11)				8.35	0.07	20 (27)

Table 14. Resolution of landings-in-weight estimates (pounds whole weight) for South Atlantic Red Grouper by year and hierarchy level (MRIP), defined by species, region, year, state, mode, wave, and area. Average weight estimates are calculated at the finest strata meeting a minimum sample size threshold (Dettloff and Matter 2019b). Larger sample sizes therefore allow average weights to be calculated at finer stratifications, the finest being at the srysmwa level (Matter and Rios 2013). Annual summaries include the number of fish and angler trips from which weight information was collected (N) and the landings-in-weight estimates (AB1.lbs) by hierarchy level. As an example, (srysmw) summarizes those landings-in-weight estimates originating from cells where average weights are specific to a particular species, region, year, state, mode, and wave (i.e., weight observations collapsed across areas).

Year	N	AB1.lbs					
		sr	sry	srys	srysm	srysmw	srysmwa
1981	39 (24)	0	0	370,267	313,760	265,349	113,848
1982	59 (25)	83,425	0	63,696	371,213	59,355	1,649,710
1983	47 (20)	360,430	0	223,686	309,379	82,568	1,077,660
1984	109 (49)	0	0	300,973	1,721,468	1,946,680	13,129,893
1985	10 (7)	0	0	26,318	251,845	2,849	0
1986	44 (22)	0	0	183	66,192	76,476	4,007,653
1987	71 (38)	0	638	32,147	153,694	81,405	259,809
1988	2 (2)	420,412	0	0	154,147	0	0
1989	56 (19)	0	38,984	0	22,470	54,412	2,081,806
1990	19 (14)	0	119,136	0	3,042	9,900	0
1991	16 (12)	38,862	0	0	0	58,765	0
1992	34 (29)	0	77,548	19,344	79,635	0	143,622
1993	78 (47)	0	0	144,132	361,875	153,392	269,844
1994	63 (44)	0	0	14,404	264,177	218,255	135,731
1995	69 (43)	0	78,956	17,566	235,160	176,247	320,385
1996	74 (50)	0	5,951	18,856	563,409	344,081	93,240
1997	68 (44)	0	2,304	120,790	334,587	275,587	52
1998	95 (68)	0	5,900	78,485	293,788	115,552	84,302
1999	96 (61)	0	2,281	5,046	208,528	42,338	16,767
2000	58 (40)	0	3,518	1,512	164,252	17,851	125,007
2001	114 (73)	0	0	27,443	275,128	2,071	7,181
2002	196 (108)	0	0	0	394,034	319,842	281,493
2003	184 (93)	0	0	22,794	192,859	543,274	210,944
2004	167 (81)	0	1,750	226,764	149,875	121,430	543,093
2005	114 (63)	0	0	5,200	590,970	0	41,993
2006	180 (72)	0	6,311	0	731,859	132,405	945,165

Year	N	AB1.lbs					
		sr	sry	srys	srysm	srysmw	srysmwa
2007	232 (64)	0	12,674	21,360	844,987	645	586,002
2008	263 (73)	0	1,082	78,448	81,290	83,899	1,512,878
2009	95 (46)	0	126,908	0	1,129,825	94,523	155,504
2010	53 (23)	0	59,663	84,539	2,866	16,486	18,262
2011	55 (29)	0	148,466	55,120	0	256	166,280
2012	56 (42)	0	0	17,076	112,646	488,968	288,208
2013	60 (42)	0	0	32,913	274,411	159	164,802
2014	87 (54)	0	6,875	96,847	375	128,917	249,085
2015	74 (32)	376,278	0	0	45,493	1,798	200,030
2016	36 (32)	0	0	180,746	3,474	27,184	137,704
2017	43 (32)	0	0	2,651	185,943	162,053	13,500
2018	31 (24)	348,939	0	0	111,728	14,037	10,460
2019	27 (13)	214,878	0	0	0	56,854	14,275
2020	61 (24)	113,316	0	0	610,814	0	98,678
2021	25 (18)	85,665	0	0	102,299	0	27,323
2022	37 (27)	111,261	0	0	5,965	18,495	89,138

Table 15. Recreational Fishing Effort (in angler trips) for South Atlantic anglers by state and year (MRIP). These effort estimates depict all (general) recreational fishing activity in the South Atlantic and are not specific to Red Grouper.

Year	FLKeys	FLE	GA	SC	NC	Total
1981	4,087,356	31,660,427	1,140,686	3,499,698	6,836,050	47,224,217
1982	4,126,072	42,352,017	1,330,594	3,855,423	6,903,669	58,567,775
1983	4,536,545	40,631,469	1,393,987	4,392,586	10,203,830	61,158,417
1984	6,597,179	40,625,068	1,459,467	4,321,818	9,389,910	62,393,442
1985	3,344,156	39,643,873	1,684,391	4,285,327	8,876,360	57,834,107
1986	2,045,161	42,317,136	1,766,834	4,217,620	9,249,981	59,596,732
1987	4,818,584	44,172,997	1,773,450	4,119,771	9,122,728	64,007,530
1988	3,428,017	39,146,830	1,683,851	3,987,476	10,576,270	58,822,444
1989	4,735,258	39,253,969	1,801,763	4,321,550	10,754,246	60,866,786
1990	4,190,519	39,258,351	1,834,320	4,571,431	12,207,378	62,061,999
1991	9,796,902	41,678,398	1,804,463	4,904,800	11,315,841	69,500,404
1992	5,372,429	42,875,507	1,753,767	4,830,569	11,965,169	66,797,441
1993	6,237,753	41,980,014	1,769,651	4,977,833	10,933,941	65,899,192
1994	5,114,358	41,906,013	1,800,943	4,890,627	10,545,102	64,257,043
1995	5,719,470	38,928,615	1,743,589	4,643,418	10,020,835	61,055,927
1996	6,595,290	41,111,552	1,792,198	4,740,103	10,413,771	64,652,914
1997	5,027,584	42,185,109	1,794,338	5,117,321	11,109,149	65,233,501
1998	4,075,040	41,282,599	1,897,330	5,062,297	11,115,182	63,432,448
1999	3,661,112	39,870,443	2,061,785	5,368,897	12,669,214	63,631,451
2000	2,940,339	43,809,306	2,365,941	5,969,116	15,358,914	70,443,616
2001	3,250,891	43,765,525	2,312,729	6,070,604	15,144,269	70,544,018
2002	2,004,492	44,866,670	2,323,023	6,491,172	15,146,182	70,831,539
2003	2,827,229	45,044,832	2,500,555	6,499,483	15,539,344	72,411,443
2004	4,687,327	42,936,332	2,551,027	6,973,606	17,400,870	74,549,162
2005	2,394,525	47,794,997	2,717,106	7,156,559	17,150,375	77,213,562
2006	2,112,327	49,056,377	2,643,209	7,462,121	19,614,943	80,888,977
2007	3,262,066	48,447,259	2,823,131	7,364,699	18,146,146	80,043,301
2008	4,563,931	45,921,204	2,855,466	8,062,558	19,328,098	80,731,257
2009	2,251,195	49,009,618	2,692,566	7,557,887	19,345,187	80,856,453
2010	1,922,802	48,952,258	2,707,465	8,027,939	20,173,323	81,783,787
2011	2,339,547	45,795,256	2,902,422	8,507,040	19,468,850	79,013,115
2012	3,450,091	39,677,797	2,989,846	8,110,949	18,555,348	72,784,031
2013	3,797,787	37,306,011	3,319,694	9,751,329	18,085,862	72,260,683
2014	3,544,628	43,967,506	3,736,954	8,745,715	18,926,498	78,921,301

Year	FLKeys	FLE	GA	SC	NC	Total
2015	3,280,973	42,395,466	4,108,912	8,962,210	20,322,840	79,070,401
2016	2,705,262	38,695,081	3,880,485	9,335,002	21,158,845	75,774,675
2017	2,501,323	40,403,524	4,624,303	9,388,908	22,452,276	79,370,334
2018	2,729,023	43,986,704	4,592,649	9,897,323	16,624,306	77,830,005
2019	2,389,337	35,930,004	4,020,594	11,838,556	17,539,840	71,718,331
2020	3,405,013	40,436,260	4,890,201	8,733,689	16,399,233	73,864,396
2021	3,128,684	42,059,488	5,186,277	11,944,761	17,944,614	80,263,824
2022	3,302,240	35,303,142	5,149,807	10,808,065	20,575,213	75,138,467

Table 16. Recreational Fishing Effort (in angler trips) for South Atlantic anglers by mode and year (MRIP). These effort estimates depict all (general) recreational fishing activity in the South Atlantic and are not specific to Red Grouper.

Year	Cbt	Priv	Shore	Total
1981	443,445	11,061,600	35,719,171	47,224,216
1982	543,344	13,686,090	44,338,341	58,567,775
1983	549,886	12,624,744	47,983,787	61,158,417
1984	631,740	15,880,341	45,881,360	62,393,441
1985	647,288	13,834,345	43,352,474	57,834,107
1986	734,582	15,120,221	43,741,930	59,596,733
1987	684,175	16,117,325	47,206,030	64,007,530
1988	574,659	13,538,214	44,709,569	58,822,442
1989	703,403	15,444,757	44,718,625	60,866,785
1990	594,310	14,473,240	46,994,448	62,061,998
1991	615,933	16,717,086	52,167,385	69,500,404
1992	574,093	16,543,089	49,680,259	66,797,441
1993	617,079	17,777,777	47,504,336	65,899,192
1994	632,200	17,436,754	46,188,088	64,257,042
1995	647,404	16,353,858	44,054,666	61,055,928
1996	632,194	17,329,456	46,691,264	64,652,914
1997	574,241	17,753,982	46,905,278	65,233,501
1998	618,206	17,065,966	45,748,277	63,432,449
1999	555,961	17,628,410	45,447,080	63,631,451
2000	514,365	20,705,579	49,223,672	70,443,616
2001	600,971	19,463,855	50,479,192	70,544,018
2002	693,754	20,401,196	49,736,590	70,831,540
2003	658,098	22,137,279	49,616,067	72,411,444
2004	663,047	21,673,683	52,212,432	74,549,162
2005	614,999	22,332,397	54,266,164	77,213,560
2006	588,260	24,764,335	55,536,380	80,888,975
2007	630,150	25,901,061	53,512,091	80,043,302
2008	545,399	24,141,904	56,043,954	80,731,257
2009	558,034	24,949,760	55,348,659	80,856,453
2010	483,966	26,837,256	54,462,565	81,783,787
2011	509,413	24,406,769	54,096,933	79,013,115
2012	537,932	22,770,757	49,475,343	72,784,032
2013	518,665	22,554,404	49,187,614	72,260,683
2014	619,611	24,333,837	53,967,852	78,921,300

Year	Cbt	Priv	Shore	Total
2015	693,462	23,251,246	55,125,694	79,070,402
2016	716,062	22,540,147	52,518,465	75,774,674
2017	677,522	22,439,930	56,252,882	79,370,334
2018	723,594	23,909,857	53,196,555	77,830,006
2019	971,881	21,995,390	48,751,061	71,718,332
2020	791,319	24,045,393	49,027,684	73,864,396
2021	963,976	23,533,453	55,766,394	80,263,823
2022	811,294	24,102,607	50,224,566	75,138,467

Table 17. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by Stock-ID boundary and year (MRIP).

Year	GAFL		NCSC		Total	
	AB1	B2	AB1	B2	AB1	B2
1981	376,447	128,096	0	0	376,447	128,096
1982	809,087	205,166	0	0	809,087	205,166
1983	537,317	287,984	0	0	537,317	287,984
1984	3,902,14	1,244,25	0	0	3,902,14	1,244,25
1985	95,525	14,343	0	0	95,525	14,343
1986	1,089,44	129,688	0	0	1,089,44	129,688
1987	219,105	548,713	230	0	219,335	548,713
1988	100,724	177,607	2,197	0	102,921	177,607
1989	625,964	19,094	5,227	0	631,191	19,094
1990	9,033	16,312	17,262	0	26,295	16,312
1991	11,023	542,332	1,967	709	12,990	543,041
1992	45,425	911,572	2,265	569	47,690	912,142
1993	133,101	196,667	6,931	0	140,032	196,667
1994	99,314	376,189	1,872	7,144	101,186	383,333
1995	123,266	345,314	2,518	897	125,784	346,210
1996	153,824	1,256,06	796	4,928	154,620	1,260,99
1997	102,220	1,318,22	263	1,228	102,484	1,319,45
1998	74,605	321,538	736	884	75,340	322,421
1999	35,461	402,720	2,212	331	37,673	403,051
2000	39,457	724,821	430	0	39,887	724,821
2001	34,141	469,016	5,230	10,977	39,371	479,993
2002	113,981	257,284	18,530	15,571	132,511	272,855
2003	125,195	381,544	14,684	5,783	139,878	387,326
2004	111,439	892,970	38,480	28,137	149,919	921,106
2005	27,300	200,711	37,471	49,882	64,771	250,593
2006	137,751	896,459	68,551	39,628	206,302	936,087
2007	64,752	232,205	100,378	49,451	165,129	281,656
2008	23,390	186,218	121,829	17,394	145,219	203,612
2009	72,019	324,130	86,196	144	158,214	324,275
2010	7,978	212,821	8,610	3,459	16,588	216,281
2011	39,748	86,053	4,173	552	43,921	86,605
2012	139,313	267,020	1,436	898	140,749	267,918
2013	65,259	297,982	3,108	947	68,367	298,929
2014	69,056	328,556	585	0	69,641	328,556

Year	GAFL		NCSC		Total	
	AB1	B2	AB1	B2	AB1	B2
2015	77,332	242,268	2,317	0	79,649	242,268
2016	52,375	125,138	0	0	52,375	125,138
2017	55,406	147,374	0	0	55,406	147,374
2018	60,142	236,864	0	0	60,142	236,864
2019	37,226	54,536	201	0	37,427	54,536
2020	111,695	227,447	62	0	111,756	227,447
2021	25,974	216,579	0	2,530	25,974	219,109
2022	26,895	173,973	34	0	26,929	173,973

Table 18. Summary of fish weights (in pounds whole weight) from intercepted Red Grouper by Stock-ID boundary and year (MRIP). Summaries include the number of fish and, in parentheses, number of angler trips providing information on fish weight (N), and the minimum (Min), arithmetic mean (Avg), standard deviation (SD), and maximum (Max) of these weight records.

Year	N_South Atlantic - GAFL	Min_South Atlantic – GAFL	Avg_South Atlantic - GAFL	SD_South Atlantic - GAFL	Max_South Atlantic - GAFL	N_South Atlantic - NCSC	Min_South Atlantic - NCSC	Avg_South Atlantic – NCSC	SD_South Atlantic - NCSC	Max_South Atlantic - NCSC
1981	39 (24)	0.2	3.0	2.2	10.1	0 (0)	0.0	0.0	0.0	0.0
1982	59 (25)	0.2	3.8	6.4	41.7	0 (0)	0.0	0.0	0.0	0.0
1983	47 (20)	0.4	4.1	4.7	18.7	0 (0)	0.0	0.0	0.0	0.0
1984	109 (49)	0.4	3.3	2.1	7.3	0 (0)	0.0	0.0	0.0	0.0
1985	10 (7)	1.1	4.9	4.5	13.9	0 (0)	0.0	0.0	0.0	0.0
1986	44 (22)	0.7	3.3	2.2	8.0	0 (0)	0.0	0.0	0.0	0.0
1987	68 (37)	0.5	3.5	4.9	26.2	3 (1)	2.6	3.7	1.3	5.1
1988	1 (1)	3.1	3.1	0.0	3.1	1 (1)	12.0	12.0	0.0	12.0
1989	40 (13)	1.1	3.8	1.6	9.6	16 (6)	1.2	4.3	2.1	8.5
1990	6 (6)	2.6	5.1	2.0	7.3	13 (8)	0.7	5.0	3.2	13.1
1991	3 (3)	4.9	6.9	3.1	10.5	13 (9)	0.7	7.2	4.3	17.2
1992	19 (18)	2.5	6.0	3.3	17.3	15 (11)	1.6	8.5	4.6	20.9
1993	53 (38)	0.7	6.7	2.9	17.3	25 (9)	3.7	5.9	2.9	12.6
1994	44 (34)	1.7	5.7	2.1	12.1	19 (10)	3.5	5.4	2.2	11.1
1995	51 (36)	1.5	6.0	2.6	15.9	18 (7)	4.2	7.6	1.7	9.6
1996	65 (45)	3.3	6.6	2.4	13.2	9 (5)	5.1	7.7	1.7	9.8
1997	67 (43)	0.7	8.0	4.7	28.3	1 (1)	8.8	8.8	0.0	8.8
1998	91 (64)	1.7	8.1	4.6	25.1	4 (4)	3.6	6.2	2.7	9.9
1999	73 (53)	1.1	8.8	4.7	20.3	23 (8)	3.4	5.2	2.4	11.4
2000	56 (38)	2.0	7.9	3.3	17.1	2 (2)	6.0	9.3	4.7	12.7
2001	93 (64)	2.5	7.3	2.9	16.8	21 (9)	3.4	11.2	5.8	22.3
2002	129 (94)	3.2	7.2	2.9	17.7	67 (14)	3.3	9.6	4.8	20.5

Year	N_South Atlantic - GAFL	Min_South Atlantic – GAFL	Avg_South Atlantic - GAFL	SD_South Atlantic - GAFL	Max_South Atlantic - GAFL	N_South Atlantic - NCSC	Min_South Atlantic - NCSC	Avg_South Atlantic – NCSC	SD_South Atlantic - NCSC	Max_South Atlantic - NCSC
2003	135 (81)	2.6	8.1	4.1	23.7	49 (12)	5.0	8.8	2.9	21.5
2004	98 (63)	2.6	7.2	3.5	19.2	69 (18)	3.7	7.6	4.2	21.2
2005	66 (48)	2.6	6.4	2.8	16.7	48 (15)	3.2	10.4	6.4	27.2
2006	75 (50)	2.3	6.6	2.8	14.5	105 (22)	4.0	11.2	6.7	27.2
2007	56 (38)	4.4	9.6	4.7	31.4	176 (26)	3.6	6.9	3.6	21.3
2008	76 (47)	3.5	7.3	2.6	14.6	187 (26)	4.2	10.9	5.0	25.4
2009	46 (33)	1.3	6.0	3.2	15.2	49 (13)	4.7	11.3	3.2	22.2
2010	16 (12)	1.1	7.9	5.0	22.2	37 (11)	4.3	12.2	5.9	24.8
2011	33 (21)	1.1	8.2	5.6	26.3	22 (8)	4.1	13.2	7.5	26.5
2012	40 (32)	1.7	6.8	2.8	13.4	16 (10)	4.1	11.0	7.3	26.5
2013	45 (35)	3.5	6.4	2.6	13.1	15 (7)	5.5	10.6	6.7	26.6
2014	75 (48)	1.5	7.4	3.0	15.8	12 (6)	5.3	16.3	10.0	30.9
2015	72 (30)	1.5	7.5	3.2	14.6	2 (2)	13.0	17.4	6.2	21.8
2016	36 (32)	1.5	7.0	3.1	14.4	0 (0)	0.0	0.0	0.0	0.0
2017	43 (32)	4.3	6.8	2.1	13.0	0 (0)	0.0	0.0	0.0	0.0
2018	31 (24)	0.7	6.9	3.9	16.7	0 (0)	0.0	0.0	0.0	0.0
2019	25 (13)	0.7	5.9	3.7	19.9	2 (0)	18.7	21.9	4.5	25.1
2020	59 (23)	0.7	7.8	4.4	25.1	2 (1)	18.7	21.9	4.5	25.1
2021	25 (18)	1.0	6.7	3.8	18.5	0 (0)	0.0	0.0	0.0	0.0
2022	36 (26)	1.0	7.1	2.8	14.5	1 (1)	13.0	13.0	0.0	13.0

Table 19. Recreational Fishing Effort (in angler trips) for South Atlantic anglers by Stock-ID boundary and year (MRIP).

Year	NCSC	GAFL	Total
1981	10,335,748	36,888,469	47,224,216
1982	10,759,092	47,808,683	58,567,775
1983	14,596,416	46,562,001	61,158,416
1984	13,711,728	48,681,713	62,393,441
1985	13,161,688	44,672,420	57,834,108
1986	13,467,601	46,129,131	59,596,732
1987	13,242,498	50,765,031	64,007,530
1988	14,563,745	44,258,697	58,822,442
1989	15,075,796	45,790,989	60,866,785
1990	16,778,809	45,283,190	62,061,999
1991	16,220,641	53,279,763	69,500,404
1992	16,795,738	50,001,703	66,797,441
1993	15,911,775	49,987,418	65,899,193
1994	15,435,728	48,821,314	64,257,042
1995	14,664,253	46,391,674	61,055,928
1996	15,153,874	49,499,039	64,652,914
1997	16,226,470	49,007,031	65,233,501
1998	16,177,479	47,254,969	63,432,448
1999	18,038,111	45,593,340	63,631,451
2000	21,328,030	49,115,586	70,443,616
2001	21,214,873	49,329,146	70,544,019
2002	21,637,354	49,194,186	70,831,540
2003	22,038,827	50,372,616	72,411,444
2004	24,374,476	50,174,685	74,549,161
2005	24,306,934	52,906,627	77,213,561
2006	27,077,064	53,811,912	80,888,976
2007	25,510,845	54,532,456	80,043,301
2008	27,390,656	53,340,601	80,731,257
2009	26,903,073	53,953,379	80,856,453
2010	28,201,262	53,582,525	81,783,787
2011	27,975,890	51,037,225	79,013,115
2012	26,666,297	46,117,734	72,784,032
2013	27,837,191	44,423,492	72,260,683
2014	27,672,213	51,249,087	78,921,300
2015	29,285,050	49,785,352	79,070,402

Year	NCSC	GAFL	Total
2016	30,493,847	45,280,827	75,774,674
2017	31,841,184	47,529,150	79,370,334
2018	26,521,629	51,308,376	77,830,006
2019	29,378,395	42,339,936	71,718,331
2020	25,132,922	48,731,475	73,864,396
2021	29,889,375	50,374,449	80,263,823
2022	31,383,278	43,755,189	75,138,467

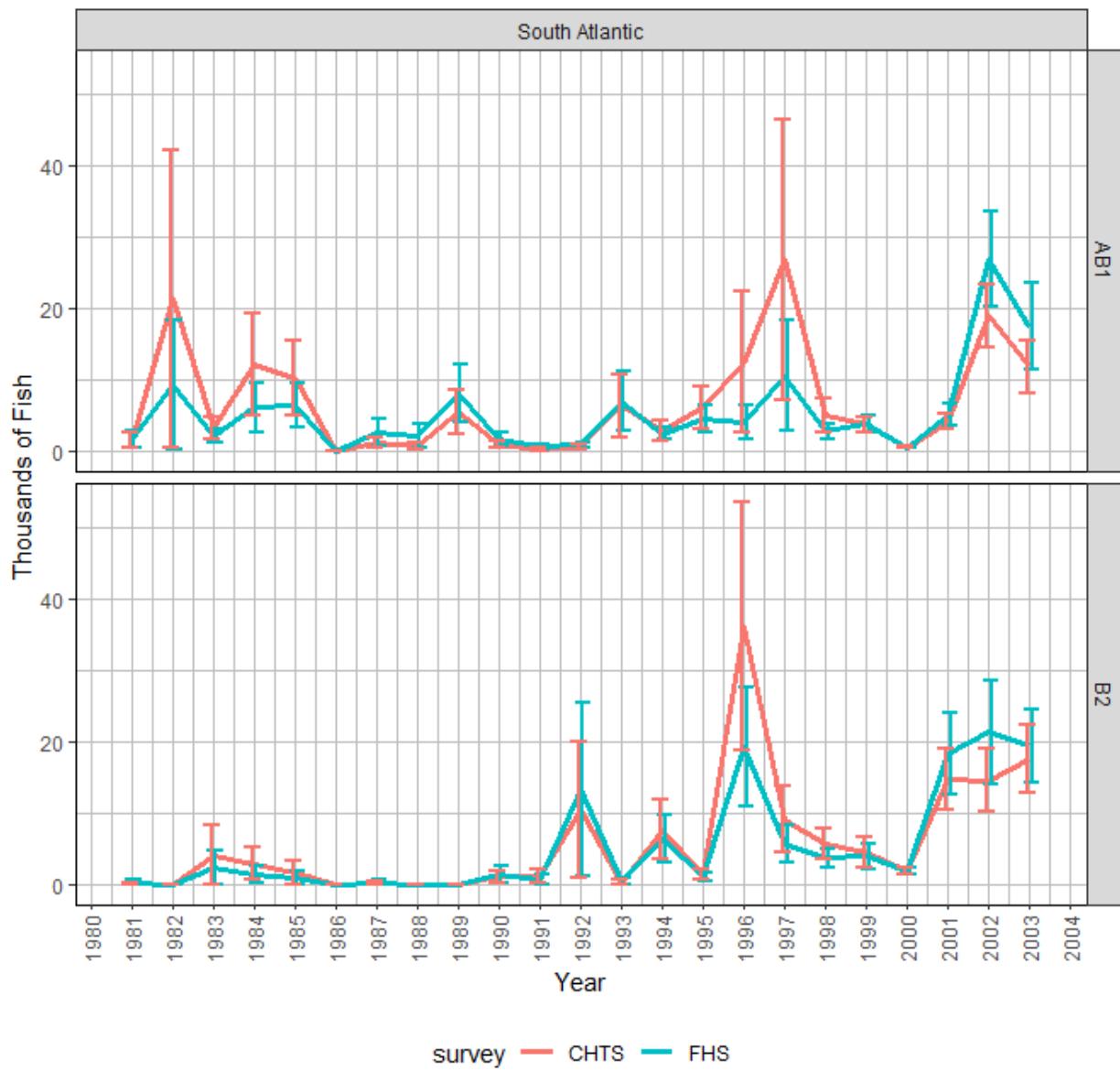


Figure 1. Comparison of Charterboat landings (AB1) and discard (B2) estimates (with standard error intervals shown) for Red Grouper from the Coastal Household Telephone Survey (CHTS) and For-Hire Survey (FHS) from the South Atlantic between 1981 and 2003 (MRIP). The Charterboat calibration approach is discussed in Dettloff and Matter (2019a).

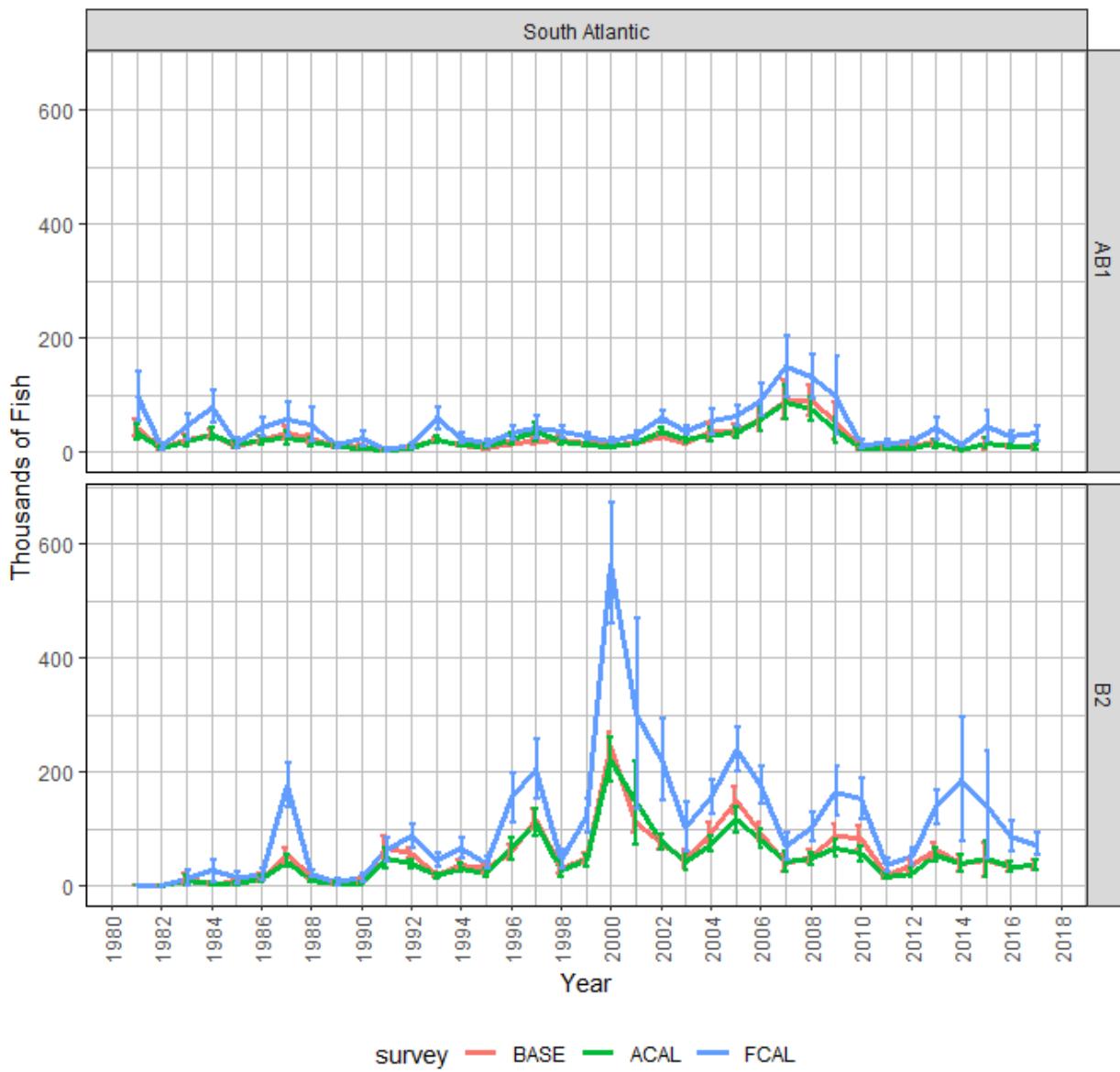


Figure 2. MRIP Base (BASE), APAIS Calibrated (ACAL), and Fully Calibrated APAIS and FES (FCAL) catch estimates for Red Grouper in the South Atlantic between 1981 and 2017. Landings (AB1) and discard (B2) estimates are in thousands of fish. Estimates in this figure do not include the Florida Keys as that domain is not available from the MRIP online comparison tool (NMFS pers comm). The Headboat mode is also included as uncertainty estimates for catch across multiple modes are only available when all modes are selected.

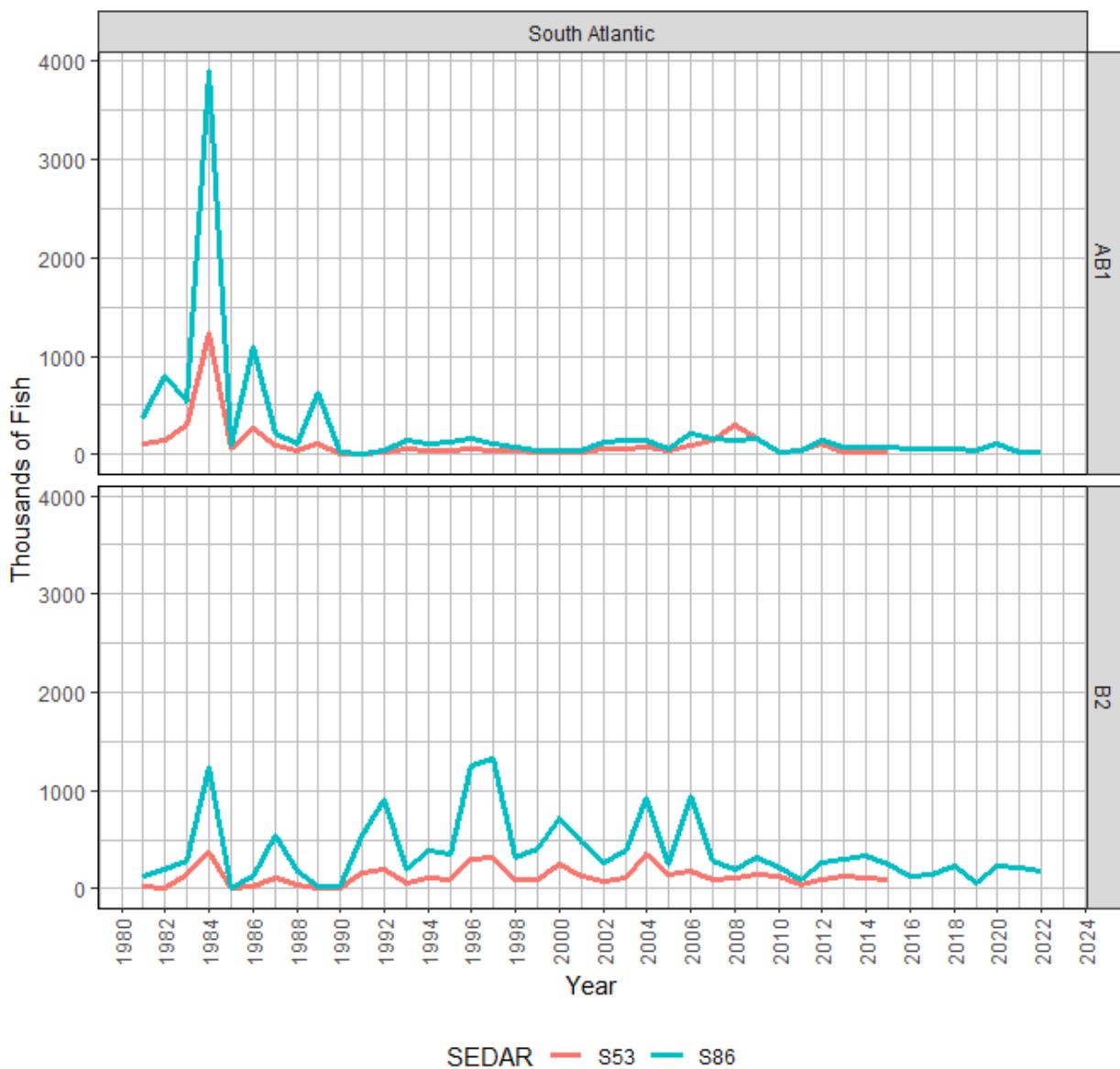


Figure 3. Comparison of total general recreational landings (AB1) and discard estimates (B2) for South Atlantic Red Grouper between SEDAR 86 and SEDAR 53, the terminal years of which are 2022 and 2015 respectively. Differences in catch estimates, which are in thousands of fish, are largely a function of changes in the MRIP survey (*i.e.*, FES in 2018).

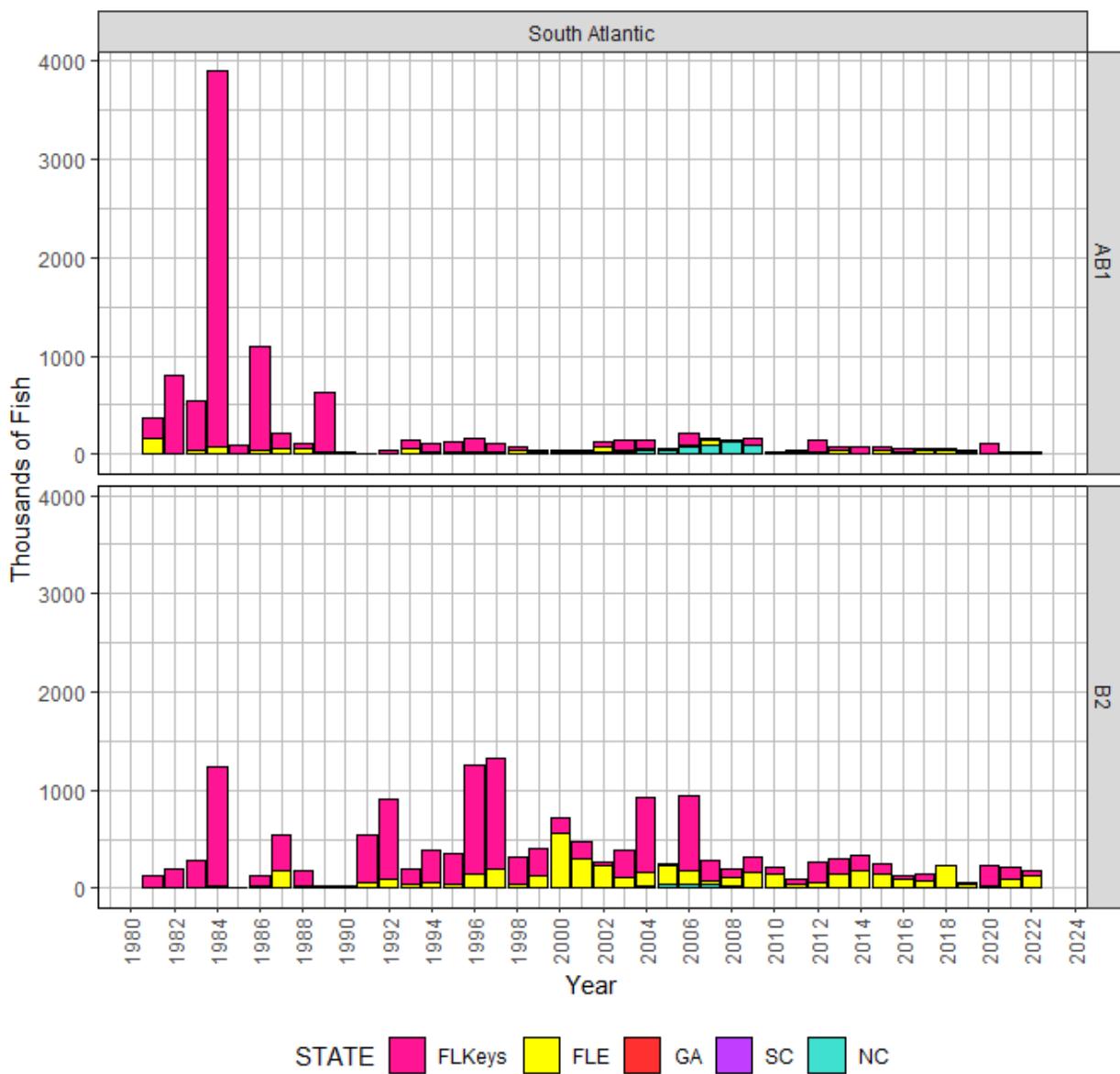


Figure 4. Annual Red Grouper landings (AB1) and discards (B2), in thousands of fish, by state from 1981 to 2022 (MRIP).

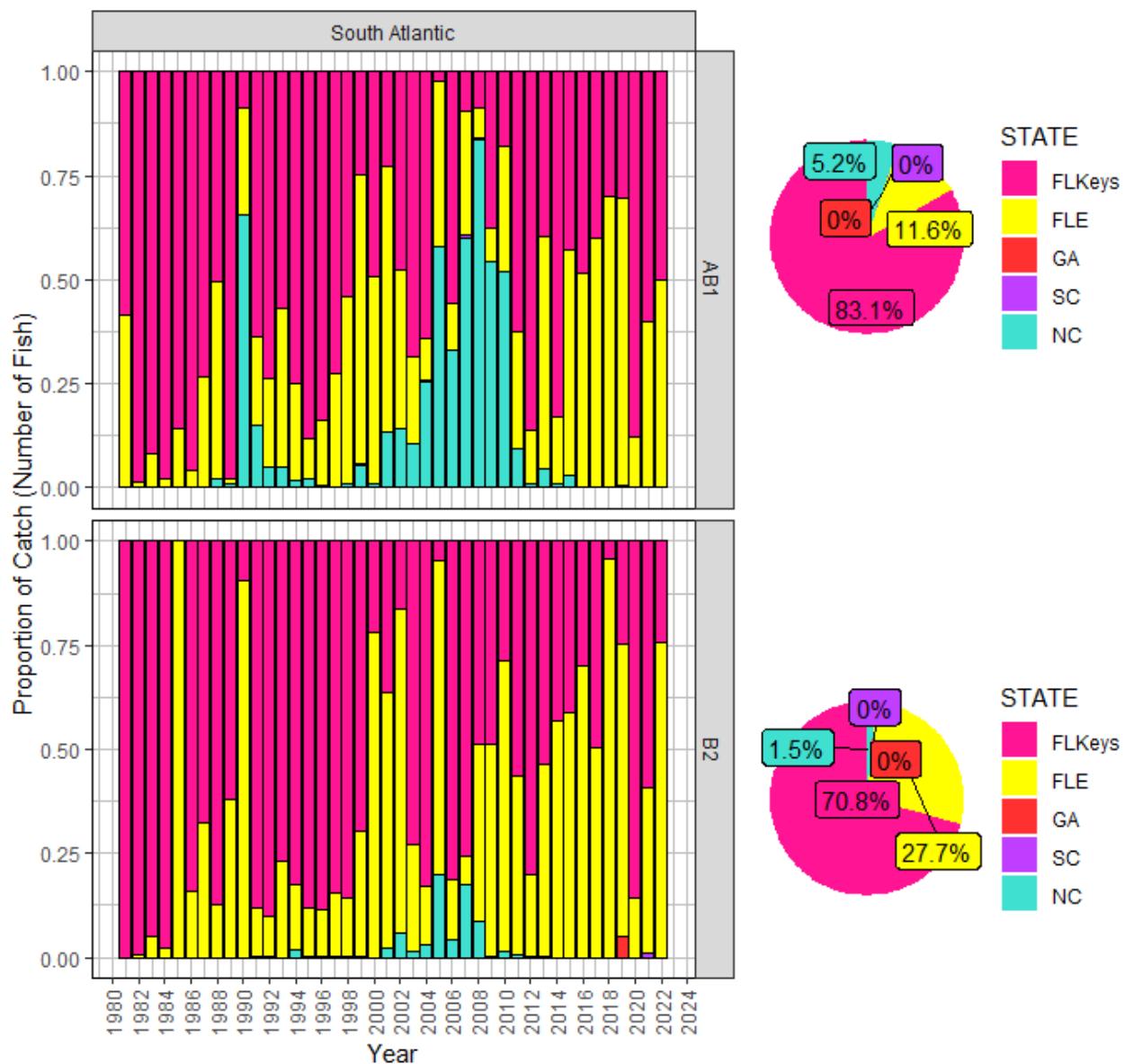


Figure 4a. Proportion of Red Grouper landings (AB1) and discards (B2), in numbers of fish, from each state by year (bar graph) and overall (pie chart) between 1981 and 2022 (MRIP).

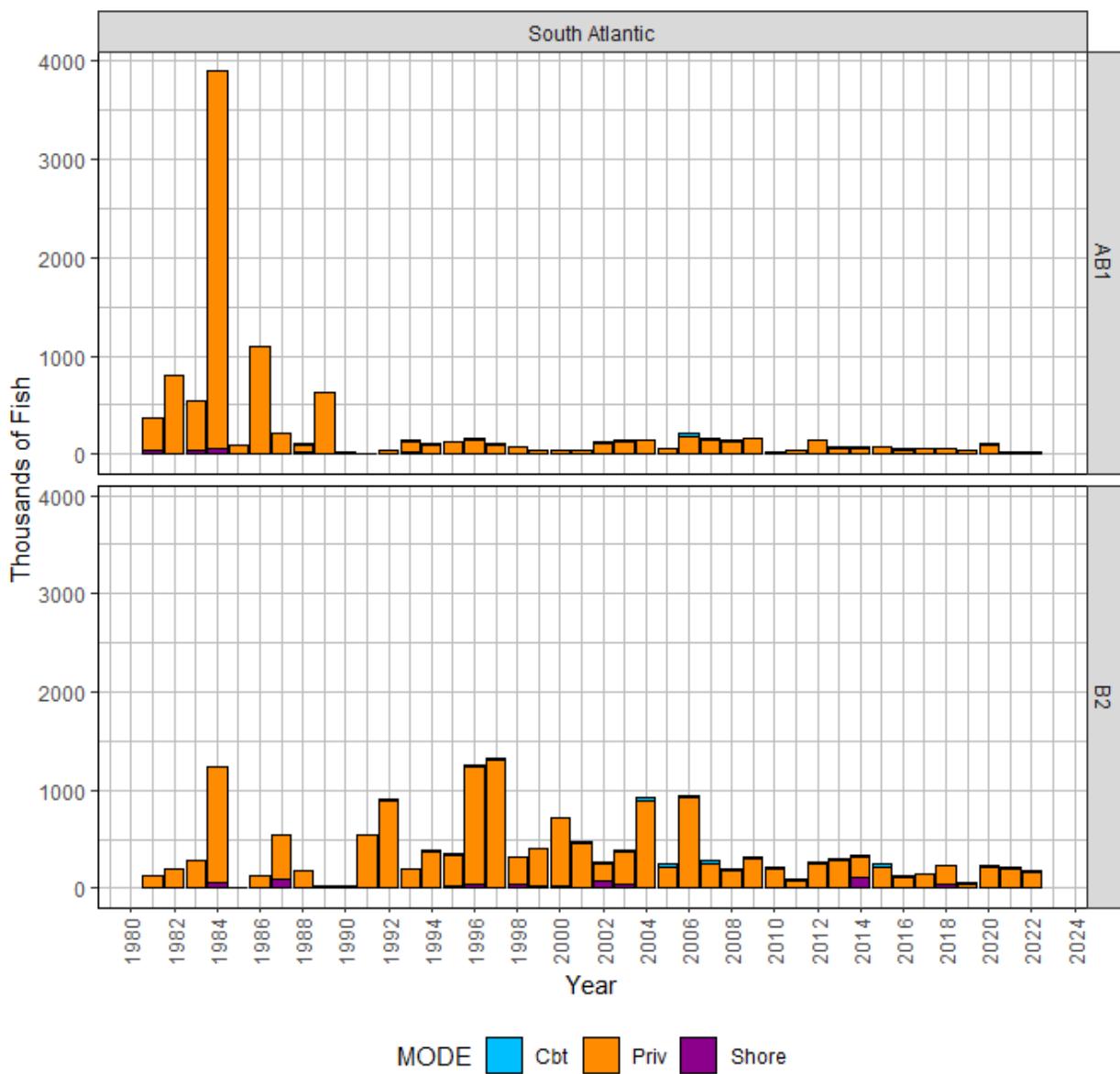


Figure 5. Annual Red Grouper landings (AB1) and discards (B2), in thousands of fish, by mode from 1981 to 2022 (MRIP).

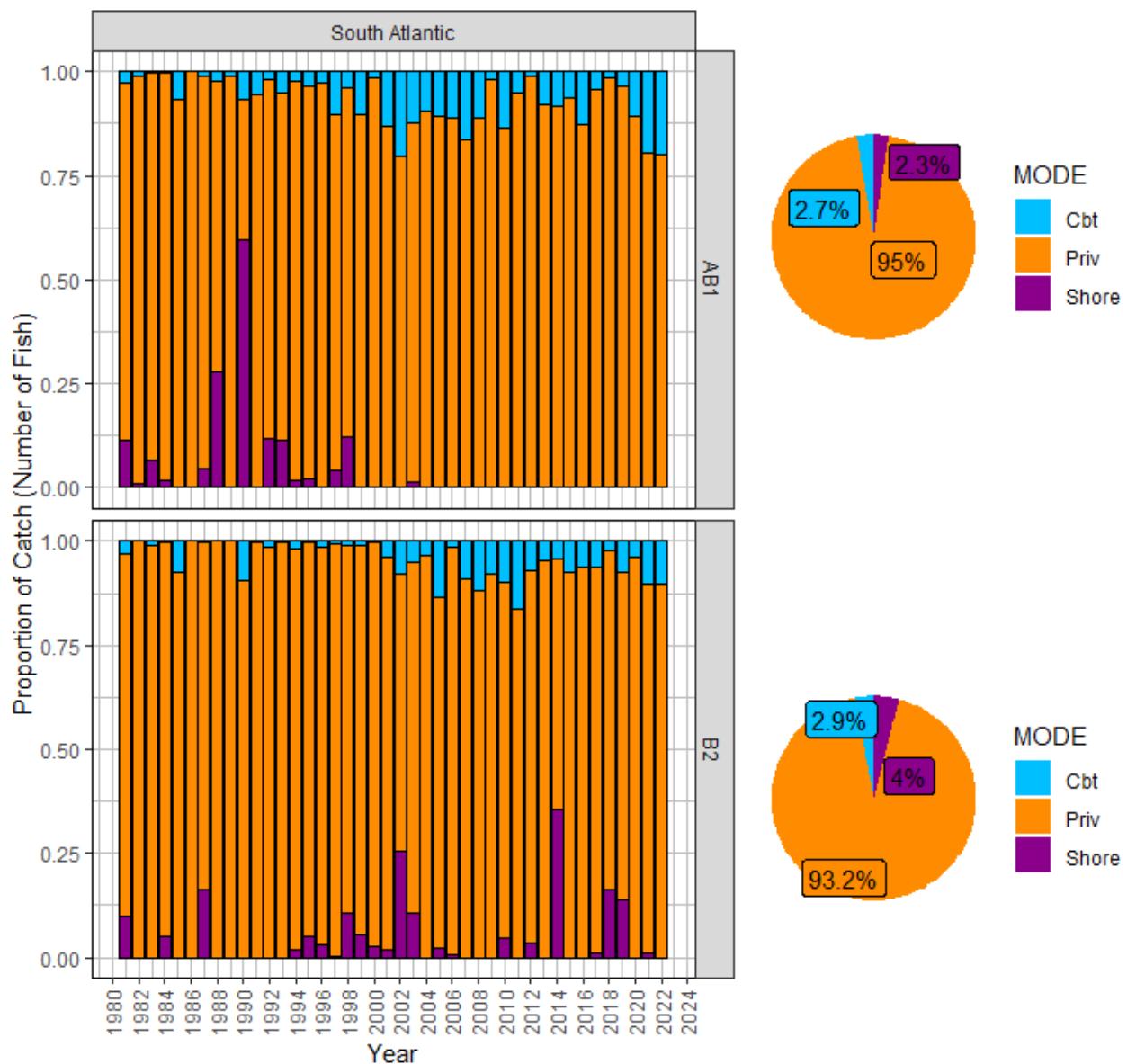


Figure 5a. Proportion of Red Grouper landings (AB1) and discards (B2), in numbers of fish, from each mode by year (bar graph) and overall (pie chart) between 1981 and 2022 (MRIP).

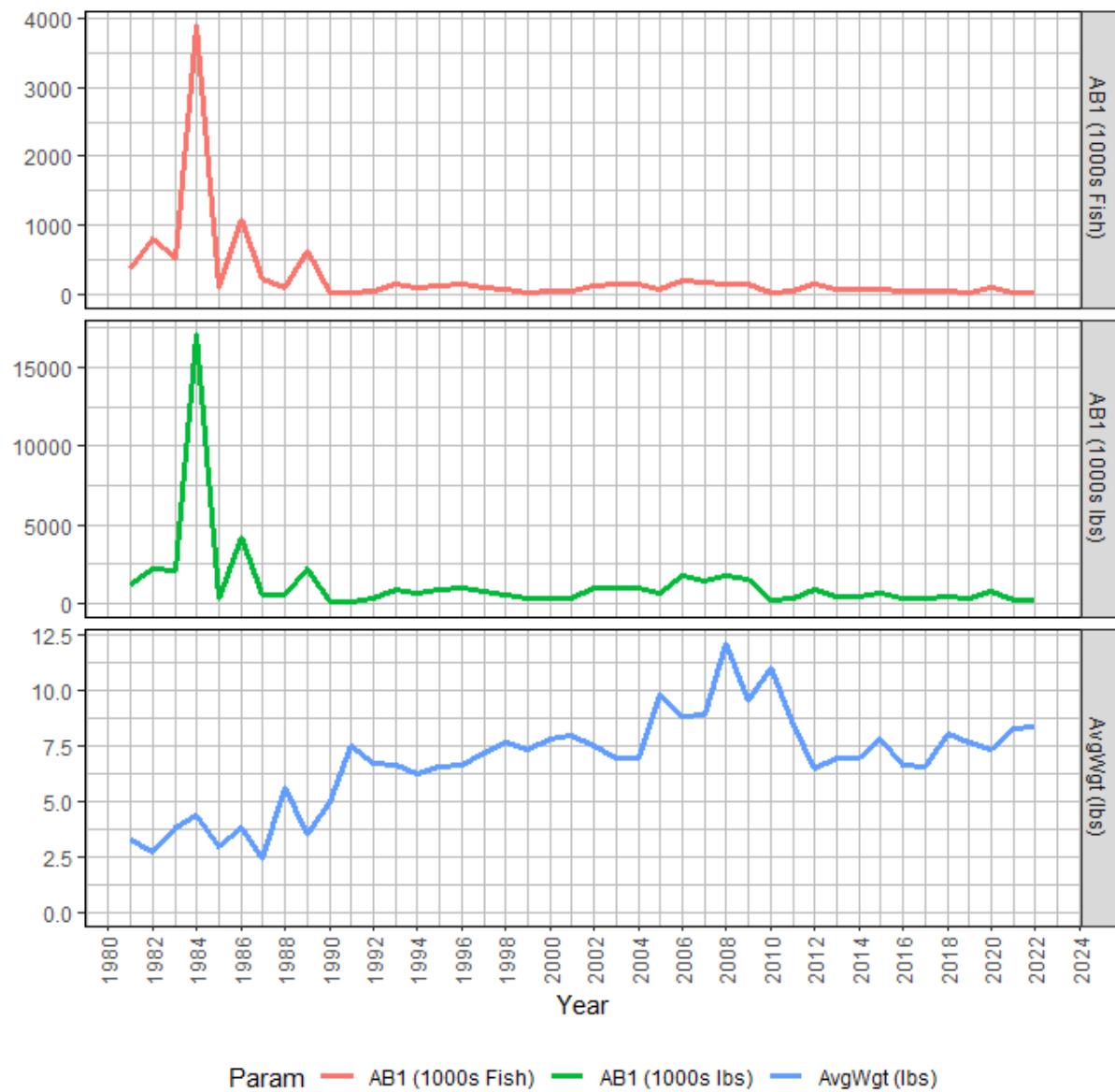


Figure 6. Estimates of annual landings for Red Grouper in the South Atlantic (MRIP): estimated landings in thousands of fish (top), estimated landings in thousands of pounds whole weight (middle), and average weight of landed fish (estimated lbs/estimated fish) (bottom). Average weight estimates are calculated by strata using the following hierarchy: species, region, year, state, mode, wave, and area (Matter and Rios 2013). The minimum number of weights used at each level of substitution is fifteen fish, except for the final species level where the minimum is one fish (Dettloff and Matter 2019b).

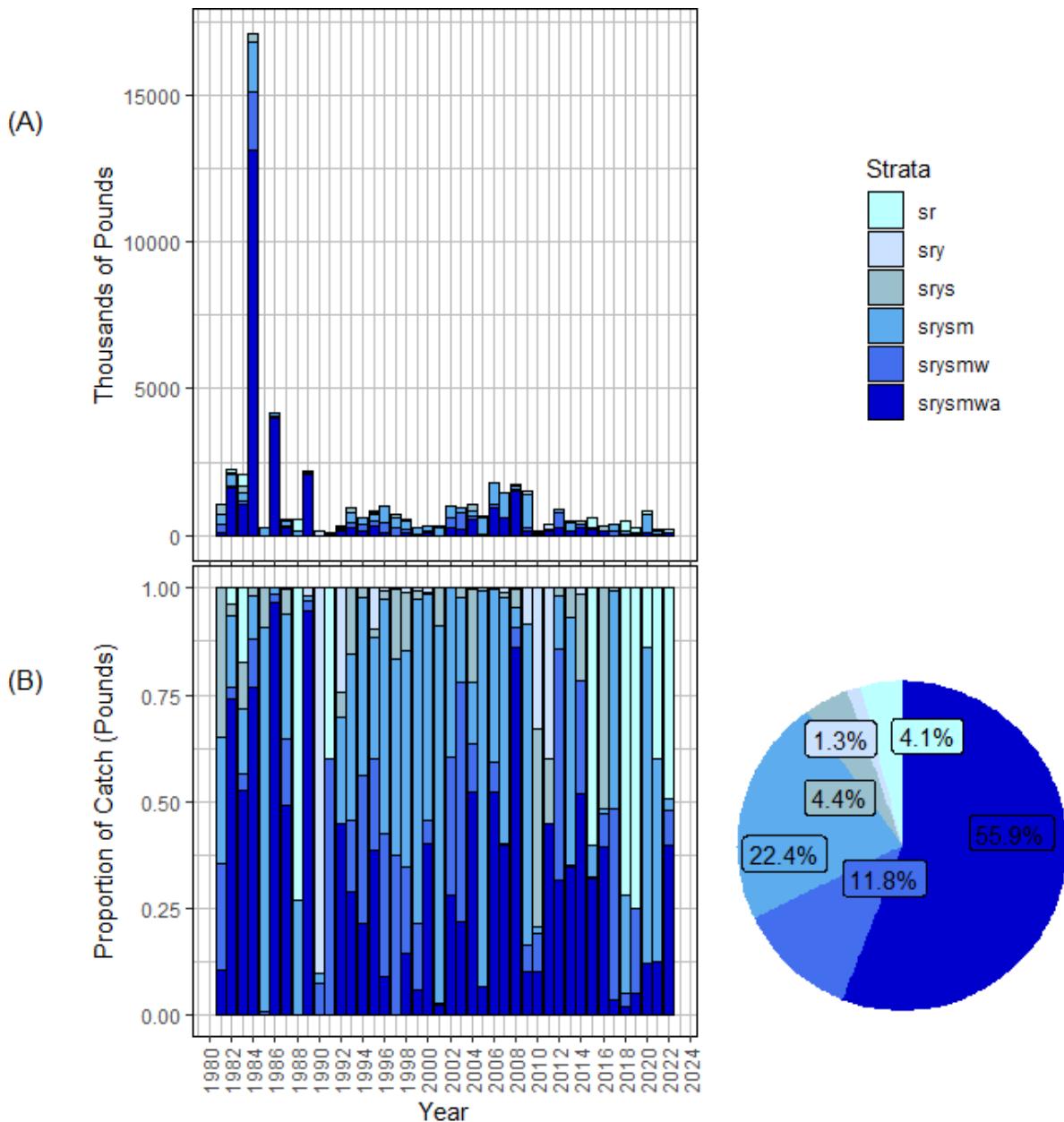


Figure 7. Annual landings estimates of South Atlantic Red Grouper in thousands of pounds whole weight by hierarchy level (MRIP), defined by species, region, year, state, mode, wave, and area. Landings are grouped by the strata at which average weights were estimated, the finest stratification being at the srysmwa level (Matter and Rios 2013). As an example, (srysmw) summarizes those landings-in-weight estimates originating from cells where average weights are specific to a particular species, region, year, state, mode, and wave (i.e., weight observations collapsed across areas). Landings are provided (A) in absolute pounds and (B) as a percentage of total landings-in-weight, which is summarized by year (stacked bar graph) and across all years (pie chart).

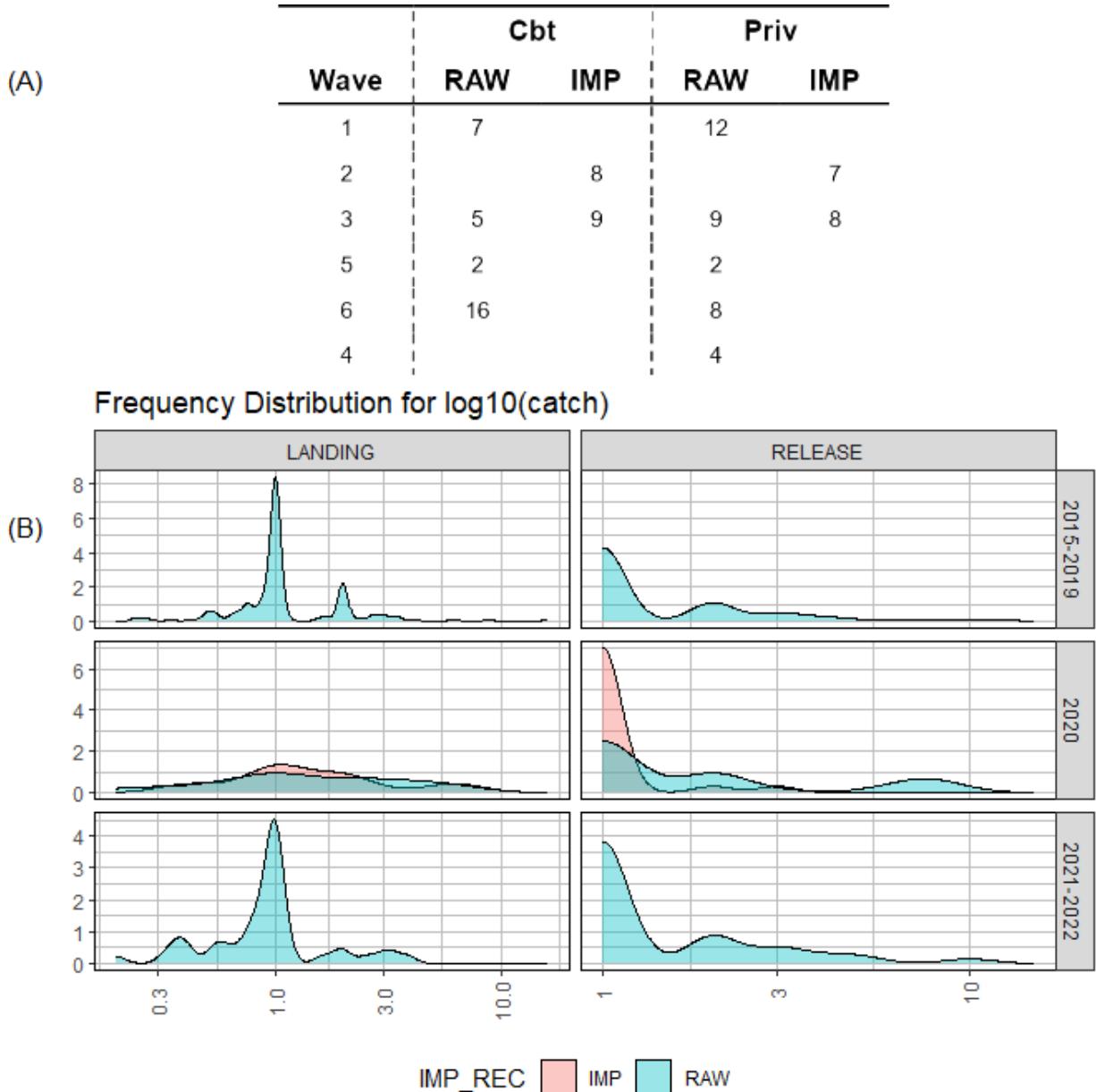


Figure 8. COVID data gaps in the MRIP APAIS and associated imputations for (positive) fishing trips that intercepted South Atlantic Red Grouper. No 2020 data were imputed for the FES or FHS. (A) Number of positive intercepts in 2020 from the APAIS (RAW) vs. those imputed from intercepts in adjacent years (IMP). (B) Distribution of APAIS catch observations in years with no imputed catch data (in 2021-2022 and 2015-2019), in raw 2020 APAIS data, and in 2020 imputations. Refer to Cody (2021) for more information on COVID data gaps in MRIP.

Appendix A

Additional Details of Survey Data and SEFSC Estimation

- MRIP Survey Methodology: Fully calibrated estimates that take into account the change in the Fishing Effort Survey (FES; 2018), the redesigned Access Point Angler Intercept Survey (APAIS; 2013), and the For Hire Survey (FHS; 2000 for all Gulf of Mexico states and eastern Florida and 2004 for all Atlantic states north of Florida).
 - Papacostas and Foster (2021) provide descriptions of the approaches used by the Office of Science and Technology to calibrate MRIP (1) effort estimates derived from the legacy Coastal Household Telephone Survey (CHTS) into FES units for the private and shore modes and (2) catch rate estimates between the original and redesigned APAIS for all modes.
 - SEFSC calibrations of catch and effort estimates between CHTS and FHS units are calculated for the For-Hire mode by year, region, state, wave, and area fished according to Dettloff and Matter (2019a). Figure 1 summarizes the resultant scaling of CHTS catch estimates under the FHS calibration ratios.
- MRIP Data Gap from COVID: Missing 2020 intercepts were imputed from all APAIS data collected in 2018 and 2019 from the same strata as the 2020 data gap, with original sample weights reduced by a factor of two to account for using two years of data (Cody 2021).
- SEFSC Weight Estimation: Average (fish) weight estimates are calculated by strata using the following hierarchy: species, region, year, state, mode, wave, and area (Matter and Rios 2013). The minimum number of weights used at each level of substitution is fifteen fish, except for the final species level where the minimum is one fish (Dettloff and Matter 2019b). Size records above an allowable (max size) threshold are excluded from weight estimation and the summary tables included in this working paper (Tables 8-12). For SEDAR 86 Red Grouper, this includes any weights heavier than 53.235 pounds.
- SEFSC Estimates derived using SEDAR best practices (SEDAR-PW-07):
 - The MRFSS survey began in wave2 of 1981. To fill-in this (1981 wave1) MRIP data gap, the proportion of wave1 catch to that from other waves (2-6) in years 1982-1984 (by fishing mode and area) was multiplied by the total catch from waves 2-6 in 1981. MRIP sampling is not conducted in wave1 north of Florida because fishing effort is generally very low. Wave1 catch in 1981 is therefore assumed negligible in these states and was not imputed.
 - To ensure sampling can support MRIP estimates at finer stratifications than for which the survey was designed, (sub-state) domain estimates are only generated for established geographic domains. For Florida, this includes the sub-state domains of Florida in the FHS (3 = Florida Keys, Monroe; 4 = southeastern Florida, Miami-Dade to Indian River; 5 = northeastern Florida,

Brevard to Nassau). For North Carolina, this includes domains north and south of Cape Hatteras.

- Between 1981 and 1985 in the Gulf of Mexico and South Atlantic, MRIP charter and headboat modes were combined into a single (for-hire) mode for estimation purposes. Since the NMFS Southeast Region Headboat Survey (SRHS) began in 1986 in the Gulf and 1981 in the South Atlantic, the MRIP combined for-hire mode must be split in these early years (1981-1985) to provide headboat landings estimates in the Gulf and to avoid double counting of headboat landings in the South Atlantic. Estimates for the MRIP for-hire mode (1981-1985) were split using a ratio of SRHS headboat angler trip estimates to MRIP charterboat angler trip estimates for 1986-1990, calculated by state (or state equivalent to match SRHS areas to MRIP states).