

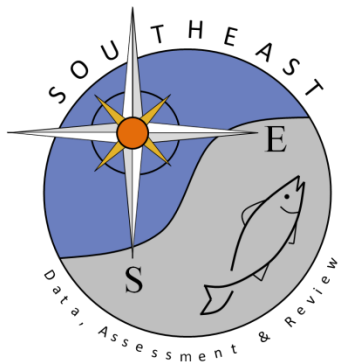
General Recreational Survey Data for Red Grouper in the Gulf of Mexico

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SEDAR88-WP-02

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of Mexico**

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Data Analysis and Assessment Support Branch
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04-05-2024

Update to the 03-07-2024 working paper

Switched weight summary tables and figures from whole weight to gutted weight

General recreational catch estimates for Red Grouper are compiled from the following separate sampling programs:

1. Marine Recreational Information Program (MRIP) (SEDAR68-DW-13)
2. Texas Parks and Wildlife Department (TPWD) (SEDAR70-WP-03)
3. Louisiana Creel survey program (LA Creel; 2014+)
 - The Louisiana Biological sampling program (LA BIO) does not prioritize sampling of Red Grouper. Size and age data from Louisiana (2014+) are not available for this assessment.

Parameters for data prepared for SEDAR 88 recreational catch data:

- Species: Red Grouper
 - Year Range: 1981 - 2022
 - Geographic Range: Gulf of Mexico states from Texas to western Florida, excluding the Florida Keys.
 - Fishing Modes: Charter, Headboat (1981-1985), Private
 - Weight Units: gutted weight, converted from whole weight using ratio of 1.048
 - 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 (AP AIS), and the For Hire Survey (FHS)
 - MRIP Data Gaps from COVID: Missing 2020 intercepts were imputed from all AP AIS 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 8-15). For SEDAR 88 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.

- 1989 landings estimate: 2,301,978 fish
- 1989 discard estimate: 6,069,081 fish
 - Strata: western Florida, sub-state region 2 (Levy to Collier county), private, wave 1, and ocean > 10 miles
 - Intercept Records: a total of 28 angler trips that resulted in a landings estimate of 272,883 fish and a discard estimate of 1,097,127 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	1.42	14
<i>Harvest not seen by interviewer</i>	0	0	0	0
<i>Released live fish</i>	0	3	6.89	50

- Strata: western Florida, sub-state region 2 (Levy to Collier county), private, wave 4, and ocean > 10 miles
- Intercept Records: a total of 41 angler trips that resulted in a landings estimate of 243,888 fish and a discard estimate of 1,095,900 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	1.31	25
<i>Harvest not seen by interviewer</i>	0	0	0.15	5
<i>Released live fish</i>	0	3	6.66	50

- Strata: western Florida, sub-state region 2 (Levy to Collier county), private, wave 5, and ocean > 10 miles
- Intercept Records: a total of 36 angler trips that resulted in a landings estimate of 652,159 fish and a discard estimate of 600,857 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	3.75	43
<i>Harvest not seen by interviewer</i>	0	0	0.17	5
<i>Released live fish</i>	0	3	4.08	15

- Strata: western Florida, sub-state region 2 (Levy to Collier county), private, wave 6, and ocean > 10 miles
- Intercept Records: a total of 7 angler trips that resulted in a landings estimate of 271,302 fish and a discard estimate of 1,324,998 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	1.75	12
<i>Harvest not seen by interviewer</i>	0	0	2.71	10
<i>Released live fish</i>	2	4	21.86	100

- 2004 landings estimate: 1,220,033 fish
- 2004 discard estimate: 7,936,491 fish
 - Strata: western Florida, sub-state region 1 (Escambia to Dixie county), private, wave 2, and ocean > 10 miles
 - Intercept Records: a total of 22 angler trips that resulted in a landings estimate of 149,600 fish and a discard estimate of 242,080 fish

<i>Catch Observation</i>	<i>Minimum</i>	<i>Median</i>	<i>Mean</i>	<i>Maximum</i>
<i>Harvest seen by interviewer</i>	0	1	1.15	5
<i>Harvest not seen by interviewer</i>	0	0	0.45	1
<i>Released live fish</i>	0	2	2.59	10

- Strata: western Florida, sub-state region 2 (Levy to Collier county), private, wave 2, and ocean > 10 miles
- Intercept Records: a total of 85 angler trips that resulted in a landings estimate of 236,542 fish and a discard estimate of 1,599,704 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	0.29	13
<i>Harvest not seen by interviewer</i>	0	0	0.45	5
<i>Released live fish</i>	0	4	5.08	25

- Strata: western Florida, sub-state region 2 (levy to collier county), private, wave 3, and ocean > 10 miles
- Intercept Records: a total of 153 angler trips that resulted in a landings estimate of 150,905 fish and a discard estimate of 1,459,172 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	0.54	21
<i>Harvest not seen by interviewer</i>	0	0	0.12	3
<i>Released live fish</i>	0	4	5.37	33

Providing a bit more context for these two (annual) estimates, the 1989 and 2004 landings (AB1) and discard estimates (B2) for Red Grouper have relatively low standard errors (i.e., CVs ~ 0.23 & 0.15 respectively, Table 5), a function of adequate sample sizes that appear adequately distributed across strata. Additionally, the 1989 estimates were from a regulatory regime with no management regulations on bag limits or size restrictions, which seems to have resulted in relatively large catch estimates for this year (of both AB1 and B2). While there was no mandate to require discarding in 1989 (e.g., of undersized fish), there was an apparent increase in the discard rates of 1988 ($B2/AB1 = 1.3$) and 1989 ($B2/AB1 = 2.6$), which was still more similar to that in preceding years (1981-1987; $\text{mean}(B2/AB1) = 0.4$) than over subsequent years (1990-2007; $\text{mean}(B2/AB1) = 8.8$) (Figure 7). This was followed by the implementation of Reef Fish Amendment 1 in 1990, which included a minimum size limit of 20" and an aggregate bag limit of 5 grouper, resulting in a sustained reduction in Red Grouper landings, more discards, and an increased discard rate. With respect to the 2004 estimate, Secretarial Amendment 1 established the first bag limit that was specific to Red Grouper, of two fish per person per day. This amendment also provided a rebuilding plan for Gulf of Mexico Red Grouper, including establishing commercial and recreational quotas for Red Grouper and reducing the commercial quotas for both shallow-water grouper and deepwater groupers. Note that the discard rate in 2004 ($B2/AB1 = 6.5$) is generally similar to that in preceding (1990-2003; $\text{mean}(B2/AB1) = 9.5$) and subsequent years (2005-2007; $\text{mean}(B2/AB1) = 6.0$), suggesting angler behavior did not change in 2004 (Figure 7) and that 2004 was simply a year with relatively high catch. These trends, and their potential linkage to responses from regional fisheries management (e.g., Reef Fish Amendment 1 and Secretarial Amendment 1), suggest that the 1989 and 2004 estimates represent real dynamics in the catch timeseries for Gulf of Mexico Red Grouper.

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, LACreel 2014+, TPWD). FLW excludes the Florida Keys.

Year	TX		LA		MS		AL		FLW		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2
1981			0	0	0	0	0	0	1,014,506	408,700	1,014,506	408,700
1982			0	0	0	0	0	0	704,026	167,105	704,026	167,105
1983	0	0	0	0	0	0	0	0	1,247,569	99,231	1,247,569	99,231
1984	0	0	0	0	0	0	65	0	816,916	162,951	816,981	162,951
1985	0	0	0	0	0	0	0	0	1,402,558	99,429	1,402,558	99,429
1986	0	0	0	0	0	0	0	0	1,215,626	900,270	1,215,626	900,270
1987	0	0	0	0	0	0	0	0	821,981	740,499	821,981	740,499
1988	0	0	0	0	0	0	0	0	1,589,481	2,002,786	1,589,481	2,002,786
1989	0	0	0	0	0	0	0	0	2,301,978	6,069,081	2,301,978	6,069,081
1990	0	0	0	0	0	0	0	116	550,733	4,571,762	550,733	4,571,877
1991	0	0	594	0	0	0	0	0	585,438	5,642,799	586,032	5,642,799
1992	0	0	0	0	0	0	0	0	921,320	5,362,209	921,320	5,362,209
1993	0	0	0	0	0	0	0	0	668,898	3,244,418	668,898	3,244,418
1994	0	0	0	0	0	0	0	0	564,548	3,382,561	564,548	3,382,561
1995	0	0	0	0	0	0	5	0	539,314	4,072,396	539,319	4,072,396
1996	0	0	0	0	0	0	150	0	131,936	1,361,345	132,085	1,361,345
1997	0	0	0	0	0	0	0	0	172,411	2,142,844	172,411	2,142,844
1998	0	0	0	0	0	0	0	0	207,431	3,540,391	207,431	3,540,391
1999	0	0	0	0	0	0	74	0	484,666	5,780,273	484,739	5,780,273
2000	0	0	0	0	0	0	16	0	603,935	4,698,385	603,951	4,698,385
2001	0	0	0	0	0	0	49	69	361,429	3,774,808	361,478	3,774,877
2002	0	0	0	0	1,308	0	2,980	20,976	442,486	4,116,516	446,774	4,137,492
2003	0	0	0	0	0	147	7,161	40,331	342,232	4,055,292	349,394	4,095,770

Year	TX		LA		MS		AL		FLW		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2	AB1	B2
2004	0	0	0	0	1,516	0	15,859	16,942	1,202,658	7,919,549	1,220,033	7,936,491
2005	0	0	0	0	0	0	5,870	17,803	465,758	2,931,943	471,628	2,949,746
2006	0	0	0	0	0	0	2,708	1,706	370,098	2,341,906	372,806	2,343,612
2007	22	0	0	0	0	0	111	0	312,434	1,711,606	312,567	1,711,606
2008	11	0	0	0	0	0	0	10	253,027	6,662,596	253,038	6,662,607
2009	0	0	0	0	0	0	0	4,222	205,167	6,670,096	205,167	6,674,318
2010	0	0	0	0	0	0	1,776	10,306	331,453	5,867,637	333,229	5,877,943
2011	0	0	0	0	0	0	0	0	275,546	6,455,269	275,546	6,455,269
2012	0	0	0	0	0	0	37	120	682,954	4,856,875	682,991	4,856,996
2013	0	0	0	0	0	0	590	3,744	858,162	5,512,096	858,752	5,515,840
2014	0	0	118	0	0	0	1,126	3,441	860,886	4,725,370	862,129	4,728,812
2015	0	0	0	0	0	0	2,450	0	534,573	2,877,718	537,023	2,877,718
2016	0	0	29	0	0	0	232	0	401,680	2,486,209	401,941	2,486,209
2017	0	0	0	0	0	0	2,098	774	243,461	2,502,709	245,559	2,503,483
2018	0	0	12	0	0	0	1,769	0	277,893	3,409,071	279,673	3,409,071
2019	0	0	5	0	0	0	121	0	260,469	1,769,257	260,595	1,769,257
2020	0	0	0	0	0	0	617	0	308,896	1,721,121	309,513	1,721,121
2021	0	0	0	0	0	0	16	0	285,629	2,301,627	285,645	2,301,627
2022	0	0	8	0	0	0	299	759	384,390	2,047,145	384,697	2,047,904

Table 2. Annual landings (AB1) and discards (B2) of Red Grouper in numbers of fish by mode and year (MRIP, LACreel 2014+, TPWD). Note catch from the combined private-shore fishing mode in the LA Creel survey is added to the private mode.

Year	Cbt		Hbt		Priv		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2
1981	373,180	49,403	233,401	30,899	407,925	328,398	1,014,506	408,700
1982	68,883	5,296	43,082	3,312	592,060	158,497	704,026	167,105
1983	54,775	9,435	34,259	5,901	1,158,535	83,896	1,247,569	99,231
1984	341,951	48,761	213,869	30,497	261,162	83,694	816,981	162,951
1985	473,087	15,389	295,886	9,625	633,586	74,415	1,402,558	99,429
1986	140,113	86,363			1,075,513	813,907	1,215,626	900,270
1987	68,762	50,123			753,219	690,377	821,981	740,499
1988	57,239	70,652			1,532,243	1,932,133	1,589,481	2,002,786
1989	41,473	196,089			2,260,505	5,872,992	2,301,978	6,069,081
1990	90,888	196,883			459,845	4,374,994	550,733	4,571,877
1991	45,056	215,954			540,976	5,426,844	586,032	5,642,799
1992	64,256	204,602			857,064	5,157,606	921,320	5,362,209
1993	22,154	86,379			646,745	3,158,040	668,898	3,244,418
1994	38,510	146,510			526,039	3,236,051	564,548	3,382,561
1995	73,577	236,720			465,742	3,835,677	539,319	4,072,396
1996	25,124	114,829			106,962	1,246,516	132,085	1,361,345
1997	17,491	127,887			154,920	2,014,957	172,411	2,142,844
1998	24,350	202,585			183,081	3,337,806	207,431	3,540,391
1999	33,082	375,157			451,658	5,405,117	484,739	5,780,273
2000	97,146	471,536			506,805	4,226,849	603,951	4,698,385
2001	47,671	272,157			313,807	3,502,720	361,478	3,774,877
2002	36,215	228,016			410,559	3,909,476	446,774	4,137,492
2003	43,304	343,210			306,090	3,752,560	349,394	4,095,770
2004	86,977	423,964			1,133,056	7,512,527	1,220,033	7,936,491
2005	86,281	248,419			385,348	2,701,327	471,628	2,949,746
2006	40,257	123,352			332,549	2,220,260	372,806	2,343,612
2007	21,344	111,913			291,222	1,599,693	312,567	1,711,606
2008	44,800	367,994			208,239	6,294,612	253,038	6,662,607
2009	25,682	398,022			179,485	6,276,296	205,167	6,674,318
2010	50,596	497,987			282,634	5,379,955	333,229	5,877,943
2011	45,102	433,964			230,444	6,021,306	275,546	6,455,269
2012	94,780	464,256			588,211	4,392,740	682,991	4,856,996
2013	139,583	620,479			719,170	4,895,361	858,752	5,515,840

Year	Cbt		Hbt		Priv		Total	
	AB1	B2	AB1	B2	AB1	B2	AB1	B2
2014	101,685	435,470			760,444	4,293,342	862,129	4,728,812
2015	75,712	326,901			461,312	2,550,817	537,023	2,877,718
2016	66,549	322,165			335,392	2,164,044	401,941	2,486,209
2017	49,353	299,920			196,206	2,203,563	245,559	2,503,483
2018	45,515	261,443			234,158	3,147,628	279,673	3,409,071
2019	49,326	172,336			211,269	1,596,921	260,595	1,769,257
2020	61,059	455,762			248,453	1,265,358	309,513	1,721,121
2021	127,051	514,980			158,594	1,786,646	285,645	2,301,627
2022	84,426	404,643			300,271	1,643,261	384,697	2,047,904

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, LACreel 2014+, TPWD). 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	Hbt				Cbt				Priv			
	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp
1981	233,401	0.81	76 (14)	610 (35)	373,180	0.81	76 (14)	610 (35)	407,925	0.38	221 (8)	1,780 (14)
1982	43,082	0.88	76 (5)	597 (6)	68,883	0.88	76 (5)	597 (6)	592,060	0.35	467 (18)	3,773 (36)
1983	34,259	0.44	123 (19)	1,357 (71)	54,775	0.44	232 (19)	1,560 (71)	1,158,535	0.46	739 (13)	7,100 (21)
1984	213,869	0.42	116 (25)	1,518 (63)	341,951	0.42	190 (25)	1,668 (63)	261,162	0.39	752 (8)	5,588 (11)
1985	295,886	0.83	89 (20)	1,260 (84)	473,087	0.83	196 (20)	1,476 (84)	633,586	0.51	902 (11)	7,611 (26)
1986					140,113	0.25	426 (55)	2,672 (134)	1,075,513	0.31	1,754 (45)	14,258 (86)
1987					68,762	0.29	397 (31)	2,475 (51)	753,219	0.26	1,773 (55)	15,007 (93)
1988					57,239	0.42	389 (27)	2,012 (42)	1,532,243	0.20	1,865 (75)	15,264 (117)
1989					41,473	0.35	353 (15)	1,671 (24)	2,260,505	0.23	1,395 (52)	11,106 (87)
1990					90,888	0.71	251 (6)	1,219 (13)	459,845	0.25	1,167 (27)	8,598 (37)
1991					45,056	0.67	338 (4)	1,791 (4)	540,976	0.25	1,246 (33)	10,364 (50)
1992					64,256	0.37	523 (13)	3,283 (30)	857,064	0.19	1,906 (81)	19,736 (127)
1993					22,154	0.50	345 (10)	1,831 (15)	646,745	0.24	1,572 (61)	16,403 (91)
1994					38,510	0.48	390 (10)	1,970 (13)	526,039	0.22	1,640 (56)	19,134 (114)
1995					73,577	0.43	370 (11)	1,811 (20)	465,742	0.30	1,501 (41)	17,396 (99)
1996					25,124	0.77	445 (4)	2,012 (7)	106,962	0.23	1,808 (38)	19,576 (66)

Year	Hbt				Cbt				Priv			
	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp
1997					17,491	0.61	603 (19)	2,793 (23)	154,920	0.33	1,731 (26)	19,990 (35)
1998					24,350	0.24	879 (65)	4,983 (75)	183,081	0.20	1,897 (44)	22,440 (68)
1999					33,082	0.21	1,157 (99)	7,919 (123)	451,658	0.19	2,442 (83)	28,056 (124)
2000					97,146	0.40	1,183 (98)	9,761 (171)	506,805	0.20	2,233 (69)	24,056 (108)
2001					47,671	0.23	1,035 (102)	8,268 (147)	313,807	0.20	2,093 (57)	24,695 (90)
2002					36,215	0.18	1,034 (139)	8,664 (228)	410,559	0.22	2,165 (70)	25,906 (115)
2003					43,304	0.11	1,156 (222)	9,498 (348)	306,090	0.20	2,328 (73)	25,573 (102)
2004					86,977	0.10	1,151 (312)	10,429 (587)	1,133,056	0.21	2,130 (104)	24,695 (185)
2005					86,281	0.12	958 (241)	8,372 (476)	385,348	0.27	1,992 (49)	22,721 (69)
2006					40,257	0.18	907 (149)	7,193 (223)	332,549	0.35	2,295 (38)	25,207 (52)
2007					21,344	0.15	934 (113)	7,302 (163)	291,222	0.22	2,245 (62)	24,782 (84)
2008					44,800	0.19	844 (81)	5,811 (103)	208,239	0.19	2,392 (48)	25,619 (57)
2009					25,682	0.21	825 (62)	5,603 (81)	179,485	0.23	2,428 (39)	26,727 (50)
2010					50,596	0.36	801 (74)	5,316 (96)	282,634	0.26	2,385 (43)	24,592 (52)
2011					45,102	0.22	970 (116)	7,101 (176)	230,444	0.19	2,530 (50)	26,143 (67)
2012					94,780	0.34	1,048 (126)	8,231 (198)	588,211	0.19	2,685 (65)	26,630 (106)
2013					139,583	0.23	689 (69)	3,725 (113)	719,170	0.19	2,357 (83)	23,384 (165)
2014					101,685	0.23	1,277 (78)	6,924 (176)	760,444	0.25	3,464 (83)	31,639 (163)
2015					75,712	0.22	1,405 (76)	7,527 (143)	461,312	0.21	3,613 (87)	31,347 (157)

Year	Hbt				Cbt				Priv			
	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp	AB1	CV	PSU	Trp
2016					66,549	0.20	1,476 (102)	7,130 (185)	335,392	0.28	3,783 (69)	32,416 (105)
2017					49,353	0.26	1,416 (56)	7,266 (90)	196,206	0.29	3,447 (42)	30,176 (70)
2018					45,515	0.37	1,444 (40)	7,803 (61)	234,158	0.29	3,364 (31)	26,387 (42)
2019					49,326	0.30	1,524 (47)	7,652 (71)	211,269	0.30	3,377 (35)	26,983 (61)
2020					61,059	0.27	1,450 (35)	7,356 (41)	248,453	0.35	3,469 (33)	30,352 (50)
2021					127,051	0.30	1,658 (54)	9,838 (94)	158,594	0.35	3,316 (16)	23,236 (26)
2022					84,426	0.26	1,510 (46)	8,175 (66)	300,271	0.38	3,289 (23)	20,410 (26)

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, LACreel 2014+, TPWD). 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	Hbt				Cbt				Priv			
	B2	CV	PSU	Trp	B2	CV	PSU	Trp	B2	CV	PSU	Trp
1981	30,899	0.48	76 (10)	610 (21)	49,403	0.48	76 (10)	610 (21)	328,398	0.78	221 (3)	1,780 (6)
1982	3,312	1.00	76 (1)	597 (1)	5,296	1.00	76 (1)	597 (1)	158,497	0.45	467 (10)	3,773 (14)
1983	5,901	0.63	123 (5)	1,357 (15)	9,435	0.63	232 (5)	1,560 (15)	83,896	0.72	739 (2)	7,100 (3)
1984	30,497	0.48	116 (14)	1,518 (35)	48,761	0.48	190 (14)	1,668 (35)	83,694	0.60	752 (5)	5,588 (6)
1985	9,625	0.39	89 (13)	1,260 (46)	15,389	0.39	196 (13)	1,476 (46)	74,415	0.69	902 (3)	7,611 (6)

Year	Hbt				Cbt				Priv			
	B2	CV	PSU	Trp	B2	CV	PSU	Trp	B2	CV	PSU	Trp
1986					86,363	0.27	426 (38)	2,672 (85)	813,907	0.39	1,754 (29)	14,258 (58)
1987					50,123	0.37	397 (20)	2,475 (40)	690,377	0.22	1,773 (46)	15,007 (89)
1988					70,652	0.48	389 (16)	2,012 (41)	1,932,133	0.21	1,865 (62)	15,264 (134)
1989					196,089	0.39	353 (13)	1,671 (67)	5,872,992	0.26	1,395 (62)	11,106 (207)
1990					196,883	0.65	251 (6)	1,219 (70)	4,374,994	0.26	1,167 (58)	8,598 (151)
1991					215,954	0.91	338 (3)	1,791 (6)	5,426,844	0.20	1,246 (66)	10,364 (209)
1992					204,602	0.36	523 (11)	3,283 (91)	5,157,606	0.17	1,906 (125)	19,736 (481)
1993					86,379	0.62	345 (6)	1,831 (33)	3,158,040	0.20	1,572 (93)	16,403 (343)
1994					146,510	0.69	390 (6)	1,970 (44)	3,236,051	0.22	1,640 (112)	19,134 (369)
1995					236,720	0.44	370 (10)	1,811 (77)	3,835,677	0.23	1,501 (90)	17,396 (314)
1996					114,829	0.64	445 (6)	2,012 (27)	1,246,516	0.19	1,808 (106)	19,576 (269)
1997					127,887	0.33	603 (26)	2,793 (93)	2,014,957	0.24	1,731 (75)	19,990 (175)
1998					202,585	0.23	879 (63)	4,983 (255)	3,337,806	0.15	1,897 (139)	22,440 (422)
1999					375,157	0.22	1,157 (95)	7,919 (493)	5,405,117	0.13	2,442 (217)	28,056 (689)
2000					471,536	0.41	1,183 (78)	9,761 (328)	4,226,849	0.15	2,233 (154)	24,056 (413)
2001					272,157	0.34	1,035 (62)	8,268 (384)	3,502,720	0.13	2,093 (159)	24,695 (544)
2002					228,016	0.20	1,034 (112)	8,664 (638)	3,909,476	0.13	2,165 (177)	25,906 (571)
2003					343,210	0.15	1,156 (279)	9,498 (1,333)	3,752,560	0.13	2,328 (195)	25,573 (537)
2004					423,964	0.15	1,151 (312)	10,429 (1,627)	7,512,527	0.14	2,130 (199)	24,695 (757)

Year	Hbt				Cbt				Priv			
	B2	CV	PSU	Trp	B2	CV	PSU	Trp	B2	CV	PSU	Trp
2005					248,419	0.14	958 (232)	8,372 (1,141)	2,701,327	0.15	1,992 (137)	22,721 (394)
2006					123,352	0.24	907 (109)	7,193 (373)	2,220,260	0.32	2,295 (83)	25,207 (215)
2007					111,913	0.25	934 (70)	7,302 (244)	1,599,693	0.22	2,245 (105)	24,782 (259)
2008					367,994	0.21	844 (94)	5,811 (417)	6,294,612	0.13	2,392 (185)	25,619 (672)
2009					398,022	0.22	825 (105)	5,603 (440)	6,276,296	0.14	2,428 (221)	26,727 (763)
2010					497,987	0.26	801 (79)	5,316 (413)	5,379,955	0.17	2,385 (152)	24,592 (483)
2011					433,964	0.22	970 (100)	7,101 (442)	6,021,306	0.18	2,530 (145)	26,143 (483)
2012					464,256	0.17	1,048 (112)	8,231 (666)	4,392,740	0.16	2,685 (124)	26,630 (476)
2013					620,479	0.23	689 (60)	3,725 (383)	4,895,361	0.17	2,357 (147)	23,384 (550)
2014					435,470	0.19	1,277 (112)	6,924 (839)	4,293,342	0.13	3,464 (188)	31,639 (775)
2015					326,901	0.21	1,405 (104)	7,527 (656)	2,550,817	0.14	3,613 (164)	31,347 (590)
2016					322,165	0.19	1,476 (129)	7,130 (752)	2,164,044	0.21	3,783 (154)	32,416 (486)
2017					299,920	0.20	1,416 (88)	7,266 (509)	2,203,563	0.21	3,447 (126)	30,176 (429)
2018					261,443	0.24	1,444 (72)	7,803 (322)	3,147,628	0.21	3,364 (105)	26,387 (350)
2019					172,336	0.24	1,524 (61)	7,652 (255)	1,596,921	0.25	3,377 (87)	26,983 (301)
2020					455,762	0.33	1,450 (67)	7,356 (250)	1,265,358	0.21	3,469 (98)	30,352 (269)
2021					514,980	0.22	1,658 (105)	9,838 (643)	1,786,646	0.29	3,316 (66)	23,236 (159)
2022					404,643	0.24	1,510 (65)	8,175 (361)	1,643,261	0.22	3,289 (68)	20,410 (172)

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, LACreel 2014+, TPWD). 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	1,014,506	0.47	297 (22)	2,390 (49)	408,700	0.67	297 (13)	2,390 (27)
1982	704,026	0.32	543 (23)	4,370 (42)	167,105	0.41	543 (11)	4,370 (15)
1983	1,247,569	0.42	870 (32)	8,660 (92)	99,231	0.62	870 (7)	8,660 (18)
1984	816,981	0.31	876 (33)	7,256 (74)	162,951	0.38	876 (19)	7,256 (41)
1985	1,402,558	0.51	998 (31)	9,087 (110)	99,429	0.52	998 (16)	9,087 (52)
1986	1,215,626	0.27	2,068 (100)	16,930 (220)	900,270	0.35	2,068 (67)	16,930 (143)
1987	821,981	0.24	2,044 (86)	17,482 (144)	740,499	0.20	2,044 (66)	17,482 (129)
1988	1,589,481	0.18	2,127 (102)	17,276 (159)	2,002,786	0.20	2,127 (78)	17,276 (175)
1989	2,301,978	0.22	1,609 (67)	12,777 (111)	6,069,081	0.24	1,609 (75)	12,777 (274)
1990	550,733	0.23	1,313 (33)	9,817 (50)	4,571,877	0.25	1,313 (64)	9,817 (221)
1991	586,032	0.23	1,439 (37)	12,155 (54)	5,642,799	0.19	1,439 (69)	12,155 (215)
1992	921,320	0.17	2,269 (94)	23,019 (157)	5,362,209	0.15	2,269 (136)	23,019 (572)
1993	668,898	0.23	1,762 (71)	18,234 (106)	3,244,418	0.20	1,762 (99)	18,234 (376)
1994	564,548	0.20	1,841 (66)	21,104 (127)	3,382,561	0.21	1,841 (118)	21,104 (413)
1995	539,319	0.26	1,687 (52)	19,207 (119)	4,072,396	0.22	1,687 (100)	19,207 (391)
1996	132,085	0.23	2,034 (42)	21,588 (73)	1,361,345	0.18	2,034 (112)	21,588 (296)
1997	172,411	0.31	2,111 (45)	22,783 (58)	2,142,844	0.22	2,111 (101)	22,783 (268)
1998	207,431	0.18	2,538 (109)	27,423 (143)	3,540,391	0.13	2,538 (202)	27,423 (677)
1999	484,739	0.17	3,310 (182)	35,975 (247)	5,780,273	0.12	3,310 (312)	35,975 (1,182)
2000	603,951	0.18	3,125 (167)	33,810 (279)	4,698,385	0.13	3,125 (232)	33,810 (741)
2001	361,478	0.17	2,836 (159)	32,963 (237)	3,774,877	0.11	2,836 (221)	32,963 (928)
2002	446,774	0.20	2,933 (209)	34,570 (343)	4,137,492	0.12	2,933 (289)	34,570 (1,209)
2003	349,394	0.17	3,207 (295)	35,071 (450)	4,095,770	0.11	3,207 (474)	35,071 (1,870)
2004	1,220,033	0.18	2,986 (416)	35,124 (772)	7,936,491	0.13	2,986 (511)	35,124 (2,384)
2005	471,628	0.22	2,659 (290)	31,093 (545)	2,949,746	0.13	2,659 (369)	31,093 (1,535)
2006	372,806	0.31	2,868 (187)	32,400 (275)	2,343,612	0.30	2,868 (192)	32,400 (588)
2007	312,567	0.20	2,859 (175)	32,084 (247)	1,711,606	0.20	2,859 (175)	32,084 (503)
2008	253,038	0.15	2,927 (129)	31,430 (160)	6,662,607	0.12	2,927 (279)	31,430 (1,089)
2009	205,167	0.20	2,953 (101)	32,330 (131)	6,674,318	0.13	2,953 (326)	32,330 (1,203)
2010	333,229	0.22	2,876 (117)	29,908 (148)	5,877,943	0.15	2,876 (231)	29,908 (896)

Year	AB1				B2			
	Total	CV	PSU	Trp	Total	CV	PSU	Trp
2011	275,546	0.16	3,165 (166)	33,244 (243)	6,455,269	0.16	3,165 (245)	33,244 (925)
2012	682,991	0.17	3,388 (191)	34,861 (304)	4,856,996	0.14	3,388 (236)	34,861 (1,142)
2013	858,752	0.16	2,732 (152)	27,109 (278)	5,515,840	0.15	2,732 (207)	27,109 (933)
2014	862,129	0.22	4,042 (161)	38,563 (339)	4,728,812	0.11	4,042 (300)	38,563 (1,614)
2015	537,023	0.18	4,277 (163)	38,874 (300)	2,877,718	0.12	4,277 (268)	38,874 (1,246)
2016	401,941	0.24	4,509 (171)	39,546 (290)	2,486,209	0.18	4,509 (283)	39,546 (1,238)
2017	245,559	0.24	4,105 (98)	37,442 (160)	2,503,483	0.18	4,105 (214)	37,442 (938)
2018	279,673	0.25	4,012 (71)	34,190 (103)	3,409,071	0.19	4,012 (177)	34,190 (672)
2019	260,595	0.25	4,050 (82)	34,635 (132)	1,769,257	0.22	4,050 (148)	34,635 (556)
2020	309,513	0.29	4,156 (68)	37,708 (91)	1,721,121	0.17	4,156 (165)	37,708 (519)
2021	285,645	0.23	4,146 (70)	33,074 (120)	2,301,627	0.23	4,146 (171)	33,074 (802)
2022	384,697	0.29	4,012 (69)	28,585 (92)	2,047,904	0.18	4,012 (133)	28,585 (533)

Table 6. Estimated landings of Red Grouper in pounds gutted weight by state and year (MRIP, LACreel 2014+, TPWD). Average weight estimates are calculated in whole weight 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). Whole weight estimates for Red Grouper were converted to gutted weight using a WWT:GWT ratio of 1.048. FLW excludes the Florida Keys.

Year	TX	LA	MS	AL	FLW	Total
1981		0	0	0	4,212,615	4,212,615
1982		0	0	0	2,961,866	2,961,866
1983	0	0	0	0	5,347,940	5,347,940
1984	0	0	0	292	3,844,167	3,844,459
1985	0	0	0	0	6,195,211	6,195,211
1986	0	0	0	0	3,235,987	3,235,987
1987	0	0	0	0	2,410,761	2,410,761
1988	0	0	0	0	4,553,697	4,553,697
1989	0	0	0	0	7,503,941	7,503,941
1990	0	0	0	0	3,478,000	3,478,000
1991	0	3,735	0	0	3,693,886	3,697,621
1992	0	0	0	0	5,996,738	5,996,738
1993	0	0	0	0	3,985,301	3,985,301
1994	0	0	0	0	3,774,451	3,774,451
1995	0	0	0	33	3,406,617	3,406,649
1996	0	0	0	948	828,861	829,809
1997	0	0	0	0	1,119,000	1,119,000
1998	0	0	0	0	1,491,621	1,491,621
1999	0	0	0	520	3,382,222	3,382,743
2000	0	0	0	116	4,193,398	4,193,514
2001	0	0	0	339	2,404,936	2,405,275
2002	0	0	9,384	26,655	3,112,801	3,148,840
2003	0	0	0	53,501	2,109,506	2,163,007
2004	0	0	9,178	78,721	7,830,195	7,918,094
2005	0	0	0	32,034	2,974,936	3,006,970
2006	0	0	0	18,487	2,611,098	2,629,585
2007	150	0	0	754	2,006,290	2,007,193
2008	72	0	0	0	1,566,722	1,566,795
2009	0	0	0	0	1,570,480	1,570,480
2010	0	0	0	10,539	1,927,159	1,937,698
2011	0	0	0	0	1,497,416	1,497,416

Year	TX	LA	MS	AL	FLW	Total
2012	0	0	0	204	4,048,194	4,048,398
2013	0	0	0	3,299	4,909,470	4,912,769
2014	0	710	0	6,774	5,316,033	5,323,517
2015	0	0	0	16,276	3,723,716	3,739,992
2016	0	177	0	1,420	2,574,478	2,576,076
2017	0	0	0	14,217	1,656,874	1,671,090
2018	0	90	0	13,320	2,017,816	2,031,226
2019	0	31	0	759	1,618,749	1,619,539
2020	0	0	0	4,289	2,051,898	2,056,187
2021	0	0	0	110	2,277,836	2,277,946
2022	0	57	0	2,132	2,771,296	2,773,485

Table 7. Red Grouper landings in pounds gutted weight (LBS) with associated coefficients of variation (CV; Approach 2 described in Nuttall and Dettloff 2022) by year and mode (MRIP, LACreel 2014+, TPWD). Whole weight estimates for Red Grouper were converted to gutted weight using a WWT:GWT ratio of 1.048.

Year	Cbt		Hbt		Priv		Total	
	LBS	CV	LBS	CV	LBS	CV	LBS	CV
1981	1,960,209	0.83	868,625	0.81	1,383,782	0.43	4,212,615	0.48
1982	271,623	0.91	169,883	0.91	2,520,361	0.41	2,961,866	0.37
1983	564,914	0.44	280,749	0.45	4,502,278	0.51	5,347,940	0.43
1984	2,184,783	0.46	778,495	0.43	881,181	0.44	3,844,459	0.32
1985	2,278,444	0.84	2,064,253	0.83	1,852,513	0.51	6,195,211	0.51
1986	374,575	0.25			2,861,412	0.32	3,235,987	0.27
1987	261,727	0.31			2,149,034	0.27	2,410,761	0.25
1988	239,044	0.44			4,314,653	0.22	4,553,697	0.20
1989	202,714	0.36			7,301,228	0.24	7,503,941	0.23
1990	476,060	0.71			3,001,940	0.26	3,478,000	0.24
1991	260,110	0.67			3,437,511	0.25	3,697,621	0.23
1992	601,752	0.38			5,394,986	0.19	5,996,738	0.17
1993	144,971	0.50			3,840,329	0.24	3,985,301	0.23
1994	311,687	0.48			3,462,764	0.22	3,774,451	0.20
1995	535,778	0.43			2,870,871	0.30	3,406,649	0.26
1996	173,462	0.77			656,347	0.23	829,809	0.23
1997	149,619	0.61			969,382	0.33	1,119,000	0.32
1998	197,342	0.24			1,294,279	0.21	1,491,621	0.18
1999	242,867	0.22			3,139,875	0.19	3,382,743	0.17
2000	809,903	0.40			3,383,611	0.20	4,193,514	0.18
2001	334,963	0.23			2,070,312	0.20	2,405,275	0.17
2002	268,079	0.18			2,880,760	0.22	3,148,840	0.20
2003	269,853	0.11			1,893,154	0.20	2,163,007	0.17
2004	519,621	0.10			7,398,473	0.21	7,918,094	0.18
2005	513,070	0.12			2,493,900	0.27	3,006,970	0.22
2006	262,350	0.18			2,367,236	0.35	2,629,585	0.31
2007	145,391	0.15			1,861,802	0.22	2,007,193	0.20
2008	293,645	0.19			1,273,149	0.19	1,566,795	0.15
2009	193,864	0.21			1,376,617	0.24	1,570,480	0.20
2010	326,603	0.36			1,611,095	0.26	1,937,698	0.22
2011	244,092	0.22			1,253,324	0.19	1,497,416	0.16
2012	575,589	0.34			3,472,809	0.19	4,048,398	0.17

Year	Cbt		Hbt		Priv		Total	
	LBS	CV	LBS	CV	LBS	CV	LBS	CV
2013	796,929	0.23			4,115,840	0.19	4,912,769	0.16
2014	586,348	0.23			4,737,169	0.25	5,323,517	0.22
2015	500,068	0.22			3,239,924	0.21	3,739,992	0.18
2016	406,258	0.20			2,169,818	0.28	2,576,076	0.24
2017	343,159	0.26			1,327,932	0.29	1,671,090	0.24
2018	362,111	0.37			1,669,115	0.30	2,031,226	0.25
2019	304,516	0.31			1,315,023	0.30	1,619,539	0.25
2020	418,147	0.28			1,638,040	0.36	2,056,187	0.29
2021	878,597	0.30			1,399,349	0.36	2,277,946	0.23
2022	612,766	0.26			2,160,719	0.39	2,773,485	0.29

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. FLW excludes the Florida Keys. LA lengths are available from MRIP only through 2013.

Year	LA					MS					AL					FLW				
	N	Min	Avg	SD	Max	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	0	0	0 (0)	0	0	0	0	130 (49)	160	475	137	880
1982	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	150 (42)	200	443	134	875
1983	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	161 (92)	285	536	182	990
1984	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	650	650	0	650	217 (73)	250	502	143	880
1985	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	221 (110)	192	517	126	870
1986	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	535 (220)	290	412	76	591
1987	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	332 (144)	240	416	104	800
1988	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	562 (159)	280	432	97	735
1989	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	381 (111)	262	433	83	675
1990	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	106 (50)	250	538	84	717
1991	2 (2)	438	459	30	480	0 (0)	0	0	0	0	0 (0)	0	0	0	0	149 (52)	439	539	56	824
1992	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	512 (157)	207	547	63	826
1993	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	285 (106)	332	536	67	741
1994	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	361 (127)	457	560	64	740
1995	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	346	346	0	346	324 (118)	410	561	71	818
1996	0 (0)	0	0	0	0	0 (0)	0	0	0	0	4 (1)	299	480	140	638	136 (72)	458	567	63	761
1997	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	122 (58)	430	558	54	812
1998	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	281 (143)	340	549	74	863
1999	0 (0)	0	0	0	0	0 (0)	0	0	0	0	3 (3)	378	544	179	734	600 (244)	273	561	68	755
2000	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	454	454	0	454	773 (278)	320	555	84	826
2001	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	640	640	0	640	698 (236)	451	552	68	823

Year	LA					MS					AL					FLW				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2002	0 (0)	0	0	0	0	1 (1)	494	494	0	494	29 (18)	415	519	47	680	904 (324)	442	565	70	829
2003	0 (0)	0	0	0	0	0 (0)	0	0	0	0	60 (38)	275	503	59	637	1,112 (412)	375	539	68	855
2004	0 (0)	0	0	0	0	1 (1)	490	490	0	490	137 (50)	423	521	49	718	2,372 (721)	342	549	66	876
2005	0 (0)	0	0	0	0	0 (0)	0	0	0	0	86 (31)	368	517	78	695	1,755 (514)	455	554	60	850
2006	0 (0)	0	0	0	0	0 (0)	0	0	0	0	44 (18)	430	574	59	691	713 (257)	408	567	67	850
2007	0 (0)	0	0	0	0	0 (0)	0	0	0	0	2 (1)	522	540	26	559	538 (245)	350	570	70	920
2008	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	416 (159)	445	563	69	777
2009	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	304 (131)	456	576	75	770
2010	0 (0)	0	0	0	0	0 (0)	0	0	0	0	7 (5)	497	566	86	725	323 (143)	447	542	58	711
2011	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0	571 (243)	417	533	56	745
2012	0 (0)	0	0	0	0	0 (0)	0	0	0	0	1 (1)	625	625	0	625	1,016 (303)	275	537	67	816
2013	0 (0)	0	0	0	0	0 (0)	0	0	0	0	6 (5)	590	632	68	765	1,145 (273)	242	537	56	796
2014						0 (0)	0	0	0	0	3 (2)	500	629	118	731	1,581 (335)	285	550	55	775
2015						0 (0)	0	0	0	0	4 (3)	500	589	95	720	1,181 (297)	454	564	63	810
2016						0 (0)	0	0	0	0	1 (1)	702	702	0	702	899 (286)	342	553	63	820
2017						0 (0)	0	0	0	0	4 (3)	539	668	87	727	451 (157)	399	571	69	755
2018						0 (0)	0	0	0	0	2 (2)	520	630	156	740	319 (96)	466	590	76	785
2019						0 (0)	0	0	0	0	2 (2)	748	749	1	750	406 (121)	350	558	71	797
2020						0 (0)	0	0	0	0	3 (2)	629	703	65	750	253 (80)	350	572	76	785
2021						0 (0)	0	0	0	0	2 (1)	272	283	16	294	555 (119)	450	580	69	803
2022						0 (0)	0	0	0	0	1 (1)	700	700	0	700	306 (89)	457	586	71	800

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. FLW excludes the Florida Keys. LA weights are available from MRIP only through 2013.

Year	LA					MS					AL					FLW				
	N	Min	Avg	SD	Max	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	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	130 (49)	0.2	4.3	3.7	19.2
1982	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	150 (42)	0.2	4.8	5.7	28.2
1983	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	161 (92)	0.8	7.2	6.2	23.9
1984	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	6.2	6.2	0.0	6.2	217 (73)	0.5	5.2	4.4	24.8
1985	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	221 (110)	0.2	6.1	4.7	22.9
1986	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	535 (220)	0.9	2.8	1.6	7.6
1987	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	332 (144)	0.4	3.2	2.9	22.4
1988	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	177 (65)	0.9	3.2	2.6	16.8
1989	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	381 (111)	0.7	3.6	2.3	13.2
1990	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	106 (50)	0.6	6.4	2.7	14.1
1991	2 (2)	4.4	4.4	0.1	4.5	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	149 (52)	3.5	6.6	2.2	18.7
1992	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	464 (143)	0.3	7.4	3.5	32.7
1993	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	285 (106)	1.5	6.2	2.4	15.8
1994	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	361 (127)	3.1	7.1	2.6	16.1
1995	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	1.4	1.4	0.0	1.4	324 (118)	2.6	6.8	2.6	21.8
1996	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	4 (1)	0.8	6.5	5.1	13.0	136 (72)	3.3	6.8	2.5	15.4
1997	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	122 (58)	2.9	8.6	4.5	29.6
1998	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	281 (143)	2.1	7.6	3.8	24.9
1999	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	3 (3)	5.5	24.0	23.2	50.0	600 (244)	0.8	7.3	2.9	17.3
2000	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	5.5	5.5	0.0	5.5	773 (278)	1.4	7.5	4.1	29.2
2001	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	12.5	12.5	0.0	12.5	698 (236)	3.2	7.2	3.7	32.5

Year	LA					MS					AL					FLW				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2002	0 (0)	0.0	0.0	0.0	0.0	1 (1)	4.6	4.6	0.0	4.6	29 (18)	5.5	9.2	3.0	21.0	904 (324)	3.1	7.5	3.2	22.5
2003	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	60 (38)	1.7	7.9	3.0	20.1	1,112 (412)	2.4	6.4	2.9	23.5
2004	0 (0)	0.0	0.0	0.0	0.0	1 (1)	4.2	4.2	0.0	4.2	137 (50)	2.5	5.4	1.8	13.7	2,372 (721)	1.6	6.4	2.9	24.7
2005	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	86 (31)	1.9	5.5	2.5	12.6	1,755 (514)	2.9	6.2	2.4	22.6
2006	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	44 (18)	2.4	7.2	2.8	15.3	713 (257)	2.8	6.8	2.8	24.3
2007	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	2 (1)	5.1	5.8	1.1	6.6	538 (245)	1.3	7.0	3.2	31.4
2008	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	416 (159)	2.9	6.8	3.0	21.7
2009	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	304 (131)	3.1	7.6	3.1	17.8
2010	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	7 (5)	4.0	7.6	5.3	18.7	323 (143)	3.2	6.2	2.4	15.3
2011	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	571 (243)	2.9	5.7	2.3	18.0
2012	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	1 (1)	9.7	9.7	0.0	9.7	1,016 (303)	0.7	5.8	2.6	19.9
2013	0 (0)	0.0	0.0	0.0	0.0	0 (0)	0.0	0.0	0.0	0.0	6 (5)	7.6	10.0	4.2	18.5	1,145 (273)	0.7	5.8	2.2	23.0
2014						0 (0)	0.0	0.0	0.0	0.0	3 (2)	4.6	10.9	5.8	16.0	1,581 (335)	1.7	6.3	2.2	16.5
2015						0 (0)	0.0	0.0	0.0	0.0	4 (3)	4.6	7.6	3.6	12.8	1,181 (297)	2.6	6.9	2.6	18.4
2016						0 (0)	0.0	0.0	0.0	0.0	1 (1)	12.9	12.9	0.0	12.9	899 (286)	1.4	6.4	2.5	21.0
2017						0 (0)	0.0	0.0	0.0	0.0	4 (3)	5.8	11.9	4.8	17.0	451 (157)	2.5	7.0	2.7	16.2
2018						0 (0)	0.0	0.0	0.0	0.0	2 (2)	5.5	10.5	7.0	15.4	319 (96)	3.4	7.9	3.4	18.8
2019						0 (0)	0.0	0.0	0.0	0.0	2 (2)	19.6	20.3	0.9	20.9	406 (121)	1.2	6.5	2.9	18.3
2020						0 (0)	0.0	0.0	0.0	0.0	3 (2)	10.1	14.9	5.5	20.9	253 (80)	1.2	7.2	3.4	18.1
2021						0 (0)	0.0	0.0	0.0	0.0	2 (1)	0.8	0.8	0.1	0.9	555 (119)	3.7	7.3	3.1	20.9
2022						0 (0)	0.0	0.0	0.0	0.0	1 (1)	8.8	8.8	0.0	8.8	306 (89)	3.0	7.5	3.1	18.3

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					Hbt					Priv				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	43 (8)	330	519	130	880	43 (27)	290	435	110	760	44 (14)	160	472	157	780
1982	5 (2)	380	507	147	720	5 (4)	410	639	195	875	140 (36)	200	434	126	835
1983	18 (2)	380	649	108	800	78 (69)	300	582	172	990	65 (21)	285	451	176	845
1984	80 (13)	330	577	139	850	109 (50)	305	471	129	880	29 (11)	250	417	108	570
1985	58 (14)	355	530	157	870	107 (70)	355	563	98	870	56 (26)	192	413	66	505
1986	312 (134)	303	414	75	591						223 (86)	290	409	77	570
1987	120 (51)	255	435	119	735						212 (93)	240	405	94	800
1988	140 (42)	298	451	104	735						422 (117)	280	426	95	700
1989	81 (24)	298	450	74	675						300 (87)	262	429	85	643
1990	29 (13)	298	504	66	616						77 (37)	250	550	87	717
1991	22 (4)	438	510	43	602						129 (50)	449	543	57	824
1992	148 (30)	445	553	69	826						364 (127)	207	544	61	741
1993	41 (15)	465	523	42	598						244 (91)	332	538	70	741
1994	70 (13)	457	538	55	688						291 (114)	458	565	65	740
1995	95 (20)	346	576	79	818						230 (99)	410	554	68	762
1996	39 (7)	299	554	85	736						101 (66)	458	568	59	761
1997	57 (23)	491	560	54	733						65 (35)	430	555	55	812
1998	155 (75)	340	538	68	708						126 (68)	432	563	79	863
1999	319 (123)	273	556	67	755						284 (124)	380	565	70	727
2000	508 (171)	320	552	81	826						266 (108)	390	561	89	815
2001	478 (147)	451	550	69	823						221 (90)	474	557	67	799

Year	Cbt					Hbt					Priv				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2002	656 (228)	442	560	71	829						278 (115)	415	571	66	810
2003	968 (348)	275	538	68	855						204 (102)	417	534	67	842
2004	2,030 (587)	423	547	64	876						480 (185)	342	550	74	825
2005	1,693 (476)	368	550	60	835						148 (69)	467	570	71	850
2006	644 (223)	415	565	66	850						113 (52)	408	580	69	727
2007	386 (163)	350	570	75	920						154 (83)	473	567	58	690
2008	314 (102)	445	566	73	777						102 (57)	468	553	54	705
2009	208 (81)	456	579	78	770						96 (50)	466	570	69	744
2010	214 (96)	447	542	60	725						116 (52)	460	544	57	710
2011	443 (176)	441	533	56	745						128 (67)	417	531	53	739
2012	720 (198)	434	533	61	816						297 (106)	275	549	78	802
2013	700 (113)	242	536	59	796						451 (165)	412	540	52	697
2014	1,082 (175)	285	546	53	775						502 (162)	458	558	59	760
2015	804 (143)	454	560	60	810						381 (157)	469	574	69	734
2016	670 (183)	342	549	62	820						230 (104)	468	564	66	780
2017	337 (90)	428	572	68	734						118 (70)	399	569	73	755
2018	235 (59)	466	593	72	785						86 (39)	467	581	87	750
2019	286 (69)	384	560	72	797						122 (54)	350	556	73	763
2020	159 (34)	450	574	74	785						97 (48)	350	573	83	775
2021	500 (94)	272	575	67	760						57 (26)	474	605	96	803
2022	244 (65)	466	586	68	800						63 (25)	457	589	84	784

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					Hbt					Priv				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1981	43 (8)	1.2	5.2	4.0	19.2	43 (27)	0.9	3.3	2.7	13.7	44 (14)	0.2	4.5	4.0	15.7
1982	5 (2)	2.0	6.0	4.9	12.8	5 (4)	2.8	13.1	10.1	26.3	140 (36)	0.2	4.4	5.4	28.2
1983	18 (2)	1.8	10.8	4.7	19.6	78 (69)	0.9	8.8	6.4	23.9	65 (21)	0.8	4.3	5.0	18.7
1984	80 (13)	1.1	7.1	5.0	20.5	109 (50)	1.1	4.4	3.7	24.8	29 (11)	0.5	3.4	2.0	8.2
1985	58 (14)	1.5	7.0	6.7	22.7	107 (70)	1.6	7.4	3.6	22.9	56 (26)	0.2	2.9	1.3	5.1
1986	312 (134)	0.9	2.8	1.6	7.6						223 (86)	0.9	2.9	1.7	7.3
1987	120 (51)	0.6	3.9	3.7	22.4						212 (93)	0.4	2.8	2.3	15.6
1988	46 (21)	0.9	4.0	3.8	16.8						131 (44)	0.9	3.0	1.9	9.1
1989	81 (24)	1.2	4.8	2.7	13.2						300 (87)	0.7	3.3	2.1	10.8
1990	29 (13)	1.0	5.5	2.0	9.9						77 (37)	0.6	6.7	2.9	14.1
1991	22 (4)	3.5	6.0	1.4	9.4						129 (50)	3.5	6.7	2.3	18.7
1992	148 (30)	5.0	9.4	4.6	32.7						316 (113)	0.3	6.5	2.4	18.2
1993	41 (15)	4.0	6.9	2.1	11.5						244 (91)	1.5	6.0	2.4	15.8
1994	70 (13)	4.2	8.1	2.8	16.1						291 (114)	3.1	6.8	2.5	14.9
1995	95 (20)	1.4	7.4	3.1	21.8						230 (99)	2.6	6.5	2.4	15.7
1996	39 (7)	0.8	7.3	3.6	15.4						101 (66)	3.3	6.5	2.1	14.3
1997	57 (23)	4.9	10.8	5.5	29.6						65 (35)	2.9	6.6	1.9	15.9
1998	155 (75)	2.1	8.0	3.8	23.6						126 (68)	2.6	7.1	3.7	24.9
1999	319 (123)	0.8	7.7	3.8	50.0						284 (124)	2.0	7.1	2.9	15.8
2000	508 (171)	1.4	7.8	4.4	29.2						266 (108)	1.9	7.0	3.6	17.8
2001	478 (147)	3.2	7.3	3.9	32.5						221 (90)	3.5	6.8	3.2	19.7

Year	Cbt					Hbt					Priv				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2002	656 (228)	3.2	7.6	3.3	22.5						278 (115)	3.1	7.3	2.9	20.4
2003	968 (348)	1.7	6.5	2.9	23.5						204 (102)	2.8	6.2	2.7	19.9
2004	2,030 (587)	2.5	6.3	2.7	24.0						480 (185)	1.6	6.5	3.5	24.7
2005	1,693 (476)	1.9	6.1	2.3	17.5						148 (69)	3.6	6.9	3.1	22.6
2006	644 (223)	2.4	6.8	2.8	24.3						113 (52)	3.7	7.2	2.7	14.5
2007	386 (163)	1.3	7.1	3.4	31.4						154 (83)	3.4	6.9	2.5	14.4
2008	314 (102)	2.9	7.0	3.2	21.7						102 (57)	3.5	6.4	2.4	13.8
2009	208 (81)	3.1	7.6	3.2	17.8						96 (50)	3.2	7.7	3.0	16.2
2010	214 (96)	3.2	6.2	2.6	18.7						116 (52)	3.6	6.3	2.2	13.1
2011	443 (176)	2.9	5.7	2.4	18.0						128 (67)	2.9	5.7	2.0	14.9
2012	720 (198)	3.0	5.6	2.4	19.9						297 (106)	0.7	6.3	3.0	17.3
2013	700 (113)	0.7	5.8	2.3	23.0						451 (165)	2.4	6.0	2.0	13.1
2014	1,082 (175)	1.7	6.1	2.1	16.5						502 (162)	2.2	6.6	2.4	16.0
2015	804 (143)	3.3	6.8	2.4	18.4						381 (157)	2.6	7.3	2.8	15.0
2016	670 (183)	1.4	6.2	2.4	21.0						230 (104)	3.3	6.9	2.8	16.8
2017	337 (90)	3.2	7.1	2.7	17.0						118 (70)	2.5	7.0	2.6	15.9
2018	235 (59)	3.4	7.9	3.2	18.8						86 (39)	3.6	7.7	4.0	16.4
2019	286 (69)	2.1	6.6	3.1	20.9						122 (54)	1.2	6.6	3.0	17.9
2020	159 (34)	3.0	7.2	3.3	20.9						97 (48)	1.2	7.4	3.7	18.1
2021	500 (94)	0.8	7.2	2.8	16.4						57 (26)	3.7	8.4	4.8	20.9
2022	244 (65)	3.5	7.5	3.0	18.3						63 (25)	3.0	7.6	3.7	17.5

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	130 (49)	160	475	137	880	130 (49)	0.2	4.3	3.7	19.2
1982	150 (42)	200	443	134	875	150 (42)	0.2	4.8	5.7	28.2
1983	161 (92)	285	536	182	990	161 (92)	0.8	7.2	6.2	23.9
1984	218 (74)	250	503	143	880	218 (74)	0.5	5.2	4.3	24.8
1985	221 (110)	192	517	126	870	221 (110)	0.2	6.1	4.7	22.9
1986	535 (220)	290	412	76	591	535 (220)	0.9	2.8	1.6	7.6
1987	332 (144)	240	416	104	800	332 (144)	0.4	3.2	2.9	22.4
1988	562 (159)	280	432	97	735	177 (65)	0.9	3.2	2.6	16.8
1989	381 (111)	262	433	83	675	381 (111)	0.7	3.6	2.3	13.2
1990	106 (50)	250	538	84	717	106 (50)	0.6	6.4	2.7	14.1
1991	151 (54)	438	538	56	824	151 (54)	3.5	6.6	2.2	18.7
1992	512 (157)	207	547	63	826	464 (143)	0.3	7.4	3.5	32.7
1993	285 (106)	332	536	67	741	285 (106)	1.5	6.2	2.4	15.8
1994	361 (127)	457	560	64	740	361 (127)	3.1	7.1	2.6	16.1
1995	325 (119)	346	560	72	818	325 (119)	1.4	6.7	2.6	21.8
1996	140 (73)	299	564	67	761	140 (73)	0.8	6.8	2.6	15.4
1997	122 (58)	430	558	54	812	122 (58)	2.9	8.6	4.5	29.6
1998	281 (143)	340	549	74	863	281 (143)	2.1	7.6	3.8	24.9
1999	603 (247)	273	560	69	755	603 (247)	0.8	7.4	3.4	50.0
2000	774 (279)	320	555	84	826	774 (279)	1.4	7.5	4.1	29.2
2001	699 (237)	451	552	68	823	699 (237)	3.2	7.2	3.7	32.5
2002	934 (343)	415	563	70	829	934 (343)	3.1	7.5	3.2	22.5
2003	1,172 (450)	275	537	68	855	1,172 (450)	1.7	6.4	2.9	23.5
2004	2,510 (772)	342	548	66	876	2,510 (772)	1.6	6.3	2.9	24.7
2005	1,841 (545)	368	552	61	850	1,841 (545)	1.9	6.2	2.4	22.6
2006	757 (275)	408	567	67	850	757 (275)	2.4	6.8	2.8	24.3
2007	540 (246)	350	570	70	920	540 (246)	1.3	7.0	3.2	31.4
2008	416 (159)	445	563	69	777	416 (159)	2.9	6.8	3.0	21.7
2009	304 (131)	456	576	75	770	304 (131)	3.1	7.6	3.1	17.8
2010	330 (148)	447	543	59	725	330 (148)	3.2	6.2	2.5	18.7

Year	Length					Weight				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2011	571 (243)	417	533	56	745	571 (243)	2.9	5.7	2.3	18.0
2012	1,017 (304)	275	538	67	816	1,017 (304)	0.7	5.8	2.6	19.9
2013	1,151 (278)	242	537	56	796	1,151 (278)	0.7	5.9	2.2	23.0
2014	1,584 (337)	285	550	55	775	1,584 (337)	1.7	6.3	2.2	16.5
2015	1,185 (300)	454	565	64	810	1,185 (300)	2.6	6.9	2.6	18.4
2016	900 (287)	342	553	63	820	900 (287)	1.4	6.4	2.5	21.0
2017	455 (160)	399	571	70	755	455 (160)	2.5	7.1	2.7	17.0
2018	321 (98)	466	590	76	785	321 (98)	3.4	7.9	3.4	18.8
2019	408 (123)	350	559	72	797	408 (123)	1.2	6.6	3.1	20.9
2020	256 (82)	350	574	77	785	256 (82)	1.2	7.3	3.5	20.9
2021	557 (120)	272	579	71	803	557 (120)	0.8	7.3	3.1	20.9
2022	307 (90)	457	587	71	800	307 (90)	3.0	7.6	3.1	18.3

Table 13. Summary of length measurements (millimeters total length) from TPWD-intercepted Red Grouper by mode and year. Summaries include the number of fish measured by TPWD 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					Total				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
1983	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1984	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1985	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1986	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1987	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1988	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1989	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1990	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1991	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1992	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1993	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1994	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1995	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1996	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1997	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1998	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
1999	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2000	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2001	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2002	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2003	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2004	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2005	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2006	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2007	0 (0)	0	0	0	0	1 (1)	813	813	0	813	1 (1)	813	813	0	813
2008	1 (1)	740	740	0	740	0 (0)	0	0	0	0	1 (1)	740	740	0	740
2009	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2010	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2011	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2012	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2013	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0

Year	Cbt					Priv					Total				
	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max	N	Min	Avg	SD	Max
2014	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2015	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2016	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2017	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2018	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2019	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2020	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2021	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0
2022	0 (0)	0	0	0	0	0 (0)	0	0	0	0	0 (0)	0	0	0	0

Table 14. Estimated average weights of landed Red Grouper in pounds gutted weight (WGT) with associated coefficients of variation (CV; Approach 2 described in Nuttall and Dettloff 2022) by year and mode (MRIP and TPWD). Average weight estimates are calculated from annual estimates (by-mode) of landings-in-weight (gutted, 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	Hbt			Cbt			Priv			Total		
	WGT	CV	N	WGT	CV	N	WGT	CV	N	WGT	CV	N
1981	3.72	0.12	27 (43)	5.25	0.33	8 (43)	3.39	0.21	14 (44)	4.15	0.12	49 (130)
1982	3.94	0.45	4 (5)	3.94	0.46	2 (5)	4.26	0.22	36 (140)	4.21	0.20	42 (150)
1983	8.20	0.09	69 (78)	10.31	0.02	2 (18)	3.89	0.24	21 (65)	4.29	0.09	92 (161)
1984	3.64	0.10	50 (109)	6.39	0.22	13 (80)	3.37	0.22	11 (29)	4.71	0.09	74 (218)
1985	6.98	0.06	70 (107)	4.82	0.21	14 (58)	2.92	0.08	26 (56)	4.42	0.06	110 (221)
1986				2.67	0.05	134 (312)	2.66	0.06	86 (223)	2.66	0.04	220 (535)
1987				3.81	0.13	51 (120)	2.85	0.07	93 (212)	2.93	0.07	144 (332)
1988				4.18	0.14	21 (46)	2.82	0.10	44 (131)	2.86	0.08	65 (177)
1989				4.89	0.08	24 (81)	3.23	0.05	87 (300)	3.26	0.05	111 (381)
1990				5.24	0.07	13 (29)	6.53	0.06	37 (77)	6.32	0.05	50 (106)
1991				5.77	0.07	4 (22)	6.35	0.04	50 (129)	6.31	0.04	54 (151)
1992				9.36	0.10	30 (148)	6.29	0.03	113 (316)	6.51	0.04	143 (464)
1993				6.54	0.08	15 (41)	5.94	0.04	91 (244)	5.96	0.03	106 (285)
1994				8.09	0.05	13 (70)	6.58	0.03	114 (291)	6.69	0.03	127 (361)
1995				7.28	0.07	20 (95)	6.16	0.03	99 (230)	6.32	0.03	119 (325)
1996				6.90	0.13	7 (39)	6.14	0.04	66 (101)	6.28	0.04	73 (140)
1997				8.55	0.08	23 (57)	6.26	0.04	35 (65)	6.49	0.06	58 (122)
1998				8.10	0.05	75 (155)	7.07	0.05	68 (126)	7.19	0.04	143 (281)
1999				7.34	0.05	123 (319)	6.95	0.03	124 (284)	6.98	0.03	247 (603)
2000				8.34	0.04	171 (508)	6.68	0.04	108 (266)	6.94	0.03	279 (774)
2001				7.03	0.03	147 (478)	6.60	0.04	90 (221)	6.65	0.03	237 (699)
2002				7.40	0.02	228 (656)	7.02	0.03	115 (278)	7.05	0.02	343 (934)
2003				6.23	0.02	348 (968)	6.18	0.03	102 (204)	6.19	0.02	450 (1,172)
2004				5.97	0.01	587 (2,030)	6.53	0.03	185 (480)	6.49	0.01	772 (2,510)
2005				5.95	0.01	476 (1,693)	6.47	0.05	69 (148)	6.38	0.01	545 (1,841)
2006				6.52	0.02	223 (644)	7.12	0.04	52 (113)	7.05	0.02	275 (757)
2007				6.81	0.03	163 (386)	6.39	0.04	84 (155)	6.42	0.02	247 (541)
2008				6.55	0.04	103 (315)	6.11	0.04	57 (102)	6.19	0.03	160 (417)
2009				7.55	0.04	81 (208)	7.67	0.05	50 (96)	7.65	0.03	131 (304)

Year	Hbt			Cbt			Priv			Total		
	WGT	CV	N	WGT	CV	N	WGT	CV	N	WGT	CV	N
2010				6.46	0.04	96 (214)	5.70	0.04	52 (116)	5.81	0.03	148 (330)
2011				5.41	0.03	176 (443)	5.44	0.04	67 (128)	5.43	0.02	243 (571)
2012				6.07	0.03	198 (720)	5.90	0.04	106 (297)	5.93	0.02	304 (1,017)
2013				5.71	0.04	113 (700)	5.72	0.02	165 (451)	5.72	0.02	278 (1,151)
2014				5.77	0.02	175 (1,082)	6.23	0.02	162 (502)	6.17	0.02	337 (1,584)
2015				6.60	0.02	143 (804)	7.02	0.03	157 (381)	6.96	0.02	300 (1,185)
2016				6.10	0.03	183 (670)	6.47	0.03	104 (230)	6.41	0.02	287 (900)
2017				6.95	0.04	90 (337)	6.77	0.04	70 (118)	6.81	0.03	160 (455)
2018				7.96	0.05	60 (235)	7.13	0.07	42 (86)	7.26	0.04	102 (321)
2019				6.17	0.06	70 (286)	6.22	0.05	61 (122)	6.21	0.04	131 (408)
2020				6.85	0.07	41 (159)	6.59	0.06	50 (97)	6.64	0.05	91 (256)
2021				6.92	0.03	94 (500)	8.82	0.10	26 (57)	7.97	0.03	120 (557)
2022				7.26	0.04	65 (244)	7.20	0.08	25 (63)	7.21	0.04	90 (307)

Table 15. Resolution of landings-in-weight estimates (pounds gutted weight) for Gulf of Mexico Red Grouper by year and hierarchy level (MRIP, LACreel 2014+, TPWD), defined by species, region, year, state, mode, wave, and area. Average weight estimates are calculated in whole weight 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). 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). Whole weight estimates for Red Grouper were converted to gutted weight using a WWT:GWT ratio of 1.048. 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.

Year	N	AB1.lbs				
		sry	srys	srysm	srysmw	srysmwa
1981	130 (49)	0	0	190,125	56,103	3,186,958
1982	150 (42)	0	441,505	254,028	271,044	1,995,289
1983	161 (92)	0	0	3,612,031	974,716	761,193
1984	218 (74)	292	0	1,483,373	721,906	1,638,888
1985	221 (110)	0	0	2,015,804	108,783	4,070,624
1986	535 (220)	0	0	174,008	318,191	2,743,788
1987	332 (144)	0	0	22,072	251,934	2,136,754
1988	177 (65)	0	0	3,327,622	188,974	1,037,102
1989	381 (111)	0	0	52,180	293,019	7,158,743
1990	106 (50)	0	0	1,530,211	560,973	1,386,816
1991	151 (54)	3,735	0	588,963	345,264	2,759,659
1992	464 (143)	0	0	865,633	220,228	4,910,877
1993	285 (106)	0	0	94,206	1,023,894	2,867,200
1994	361 (127)	0	0	108,854	419,270	3,246,328
1995	325 (119)	33	0	659,672	99,489	2,647,456
1996	140 (73)	948	0	125,807	40,387	662,668
1997	122 (58)	0	0	157,587	703,355	258,058
1998	281 (143)	0	0	134,055	173,251	1,184,315
1999	603 (247)	520	0	7,206	313,953	3,061,063
2000	774 (279)	116	0	0	327,005	3,866,393
2001	699 (237)	339	0	349,641	55,824	1,999,470
2002	934 (343)	9,384	20,210	151,258	283,572	2,684,416
2003	1,172 (450)	0	34,278	13,293	569,265	1,546,171
2004	2,510 (772)	9,178	42,514	159,780	464,064	7,242,558
2005	1,841 (545)	0	9,074	1,939	373,548	2,622,409

Year	N	AB1.lbs				
		sry	srys	srysm	srysmw	srysmwa
2006	757 (275)	0	0	169,156	238,856	2,221,574
2007	541 (247)	903	0	19,722	396,869	1,589,699
2008	417 (160)	72	0	495,582	543,089	528,051
2009	304 (131)	0	0	243,388	174,688	1,152,404
2010	330 (148)	10,539	0	112,130	784,683	1,030,346
2011	571 (243)	0	0	123,018	480,224	894,174
2012	1,017 (304)	204	0	0	426,586	3,621,608
2013	1,151 (278)	3,299	0	177,868	227,117	4,504,485
2014	1,584 (337)	7,484	0	49,940	85,109	5,180,984
2015	1,185 (300)	16,276	0	6,524	102,202	3,614,991
2016	900 (287)	1,598	0	505,504	108,565	1,960,410
2017	455 (160)	14,217	0	136,169	22,746	1,497,959
2018	321 (98)	13,410	0	500,740	430,468	1,086,608
2019	408 (123)	790	0	57,884	47,882	1,512,983
2020	256 (82)	4,289	0	117,492	26,463	1,907,943
2021	557 (120)	110	0	407,662	0	1,870,173
2022	307 (90)	2,189	0	239,698	193,542	2,338,056

Table 16. Recreational Fishing Effort (in angler trips) for Gulf of Mexico anglers by state and year (MRIP, LACreel 2014+, TPWD). These effort estimates depict all (general) recreational fishing activity in the Gulf of Mexico and are not specific to Red Grouper. FLW excludes the Florida Keys.

Year	TX	LA	MS	AL	FLW	Total
1981	680,205	3,376,340	741,589	740,507	7,325,678	12,864,319
1982	680,205	3,534,377	730,214	555,508	7,504,151	13,004,455
1983	684,290	3,736,954	808,628	606,726	9,441,341	15,277,939
1984	624,338	3,483,682	735,160	604,616	9,320,227	14,768,023
1985	731,989	3,520,757	767,682	634,054	10,294,207	15,948,689
1986	703,321	3,368,108	720,668	656,533	9,705,765	15,154,395
1987	904,964	3,269,586	721,063	653,407	9,599,319	15,148,339
1988	858,703	3,187,868	696,849	645,931	12,128,499	17,517,850
1989	773,899	3,390,644	736,722	730,111	11,434,313	17,065,689
1990	767,396	3,622,354	784,910	714,855	12,212,237	18,101,752
1991	759,902	3,706,470	896,466	860,194	11,516,436	17,739,468
1992	871,839	3,920,391	890,818	914,374	11,745,347	18,342,769
1993	881,459	4,043,377	967,238	974,714	11,972,511	18,839,299
1994	991,431	3,988,582	990,253	1,013,123	12,362,726	19,346,115
1995	986,954	4,061,447	986,586	1,056,462	12,994,187	20,085,636
1996	1,011,137	4,259,790	1,041,652	1,123,082	12,608,881	20,044,542
1997	872,130	4,446,907	1,104,872	1,232,439	13,799,844	21,456,192
1998	928,356	4,529,530	1,126,139	1,210,971	15,166,244	22,961,240
1999	1,102,177	4,967,340	1,211,087	1,346,698	16,596,262	25,223,564
2000	1,102,614	5,418,948	1,280,132	1,410,357	15,572,709	24,784,760
2001	958,254	5,573,822	1,268,914	1,530,890	17,979,930	27,311,810
2002	924,008	5,196,030	1,256,962	1,542,848	17,625,384	26,545,232
2003	980,059	5,267,732	1,346,056	1,703,554	18,024,562	27,321,963
2004	974,086	4,969,316	1,338,192	1,836,510	21,579,600	30,697,704
2005	917,163	4,449,391	1,158,014	1,900,417	21,210,541	29,635,526
2006	994,244	4,557,397	1,398,518	1,883,001	18,841,262	27,674,422
2007	907,739	4,899,419	1,471,619	2,075,677	18,786,963	28,141,417
2008	871,855	5,388,373	1,588,234	2,316,742	20,194,355	30,359,559
2009	902,326	5,898,978	1,639,894	2,338,504	18,832,249	29,611,951
2010	885,813	6,174,336	1,569,529	2,349,701	19,522,031	30,501,410
2011	973,988	6,040,909	1,611,693	2,364,899	20,082,811	31,074,300
2012	1,029,404	5,838,749	1,654,760	2,173,049	21,860,398	32,556,360
2013	976,782	5,598,489	1,610,624	2,244,858	20,000,245	30,430,998

Year	TX	LA	MS	AL	FLW	Total
2014	956,422	2,226,868	1,503,011	2,124,707	17,207,074	24,018,082
2015	916,358	2,425,434	1,609,574	2,176,532	15,826,740	22,954,638
2016	1,070,929	2,241,734	1,757,923	2,113,993	17,183,903	24,368,482
2017	1,024,177	2,308,352	1,622,101	2,633,932	17,700,064	25,288,626
2018	1,076,630	2,275,932	1,546,008	1,928,020	16,931,674	23,758,264
2019	1,232,814	2,108,454	1,401,909	1,877,771	14,642,399	21,263,347
2020	1,200,806	2,501,305	1,458,973	2,092,932	16,633,102	23,887,118
2021	1,064,195	1,887,859	1,554,406	1,555,573	16,168,745	22,230,778
2022	1,153,512	1,609,250	1,730,781	1,987,275	17,648,946	24,129,764

Table 17. Recreational Fishing Effort (in angler trips) for Gulf of Mexico anglers by mode and year (MRIP, LACreel 2014+, TPWD). These effort estimates depict all (general) recreational fishing activity in the Gulf of Mexico and are not specific to Red Grouper. Effort from the combined private-shore fishing mode in the LA Creel survey has been added to the private mode.

Year	Cbt	Hbt	Priv	Total
1981	447,831	199,301	12,217,189	12,864,321
1982	553,144	260,912	12,190,401	13,004,457
1983	579,938	256,493	14,441,508	15,277,939
1984	538,563	242,211	13,987,249	14,768,023
1985	590,410	277,516	15,080,763	15,948,689
1986	566,657		14,587,739	15,154,396
1987	583,981		14,564,357	15,148,338
1988	513,682		17,004,167	17,517,849
1989	595,914		16,469,775	17,065,689
1990	582,368		17,519,384	18,101,752
1991	537,518		17,201,949	17,739,467
1992	562,458		17,780,312	18,342,770
1993	631,551		18,207,749	18,839,300
1994	673,526		18,672,590	19,346,116
1995	767,210		19,318,427	20,085,637
1996	726,006		19,318,537	20,044,543
1997	769,710		20,686,482	21,456,192
1998	765,060		22,196,180	22,961,240
1999	779,206		24,444,359	25,223,565
2000	760,488		24,024,272	24,784,760
2001	763,788		26,548,022	27,311,810
2002	742,415		25,802,816	26,545,231
2003	699,720		26,622,242	27,321,962
2004	780,766		29,916,938	30,697,704
2005	685,755		28,949,771	29,635,526
2006	817,416		26,857,005	27,674,421
2007	861,722		27,279,696	28,141,418
2008	810,000		29,549,560	30,359,560
2009	774,246		28,837,705	29,611,951
2010	595,284		29,906,126	30,501,410
2011	756,691		30,317,609	31,074,300
2012	939,221		31,617,139	32,556,360

Year	Cbt	Hbt	Priv	Total
2013	874,771		29,556,226	30,430,997
2014	861,546		23,156,536	24,018,082
2015	991,258		21,963,379	22,954,637
2016	1,054,084		23,314,398	24,368,482
2017	1,086,377		24,202,249	25,288,626
2018	1,221,177		22,537,087	23,758,264
2019	1,293,471		19,969,876	21,263,347
2020	1,181,632		22,705,487	23,887,119
2021	1,348,910		20,881,868	22,230,778
2022	1,406,930		22,722,834	24,129,764

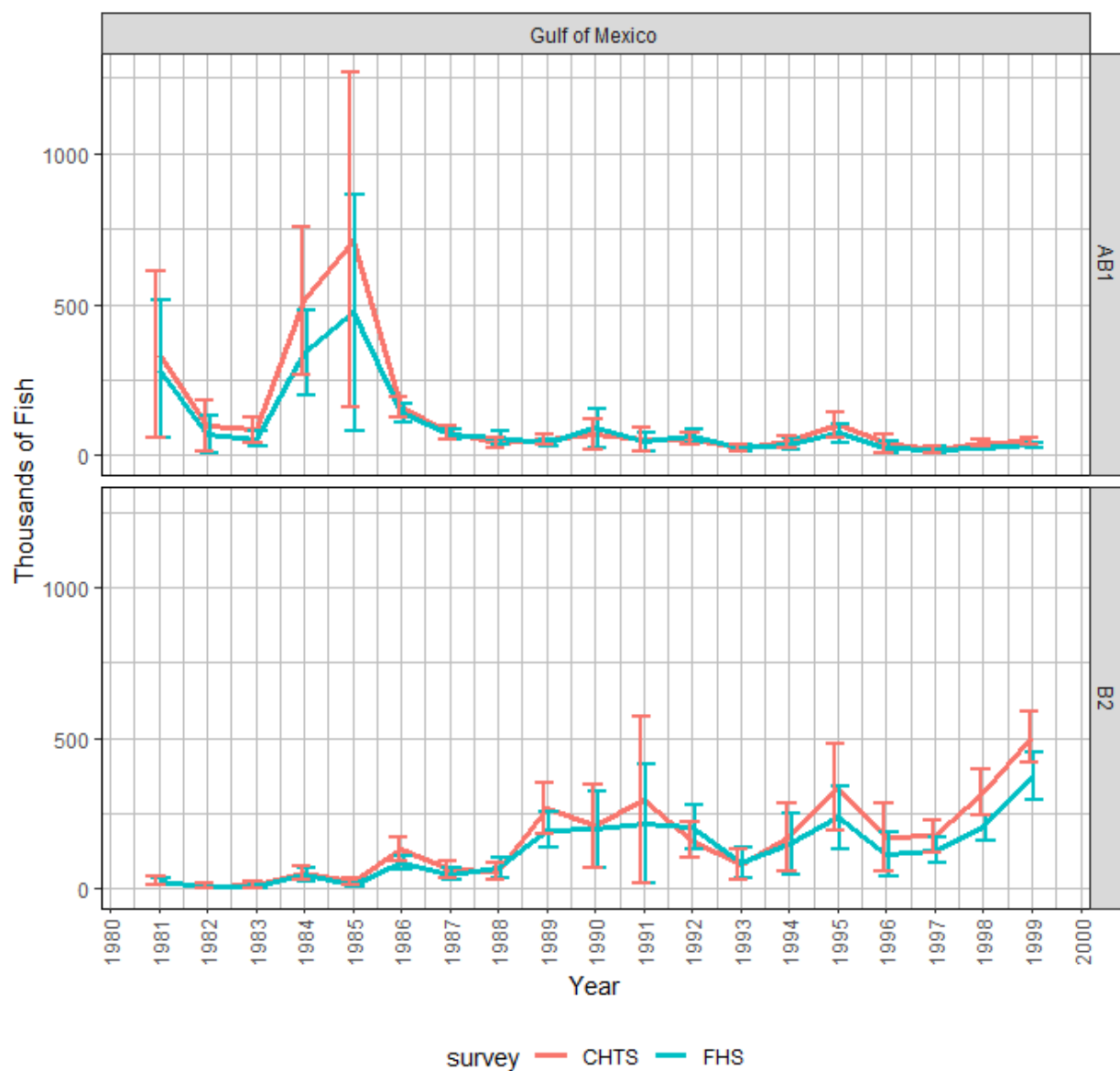


Figure 1. Comparison of Charterboat landings (AB1) and discard (B2) estimates (with standard error intervals shown) for Red Grouper from the Coastal Household Telephone Survey (CHTS) and For-Hire Survey (FHS) from the Gulf of Mexico between 1981 and 1999 (MRIP). The Charterboat calibration approach is discussed in Dettloff and Matter (2019a).

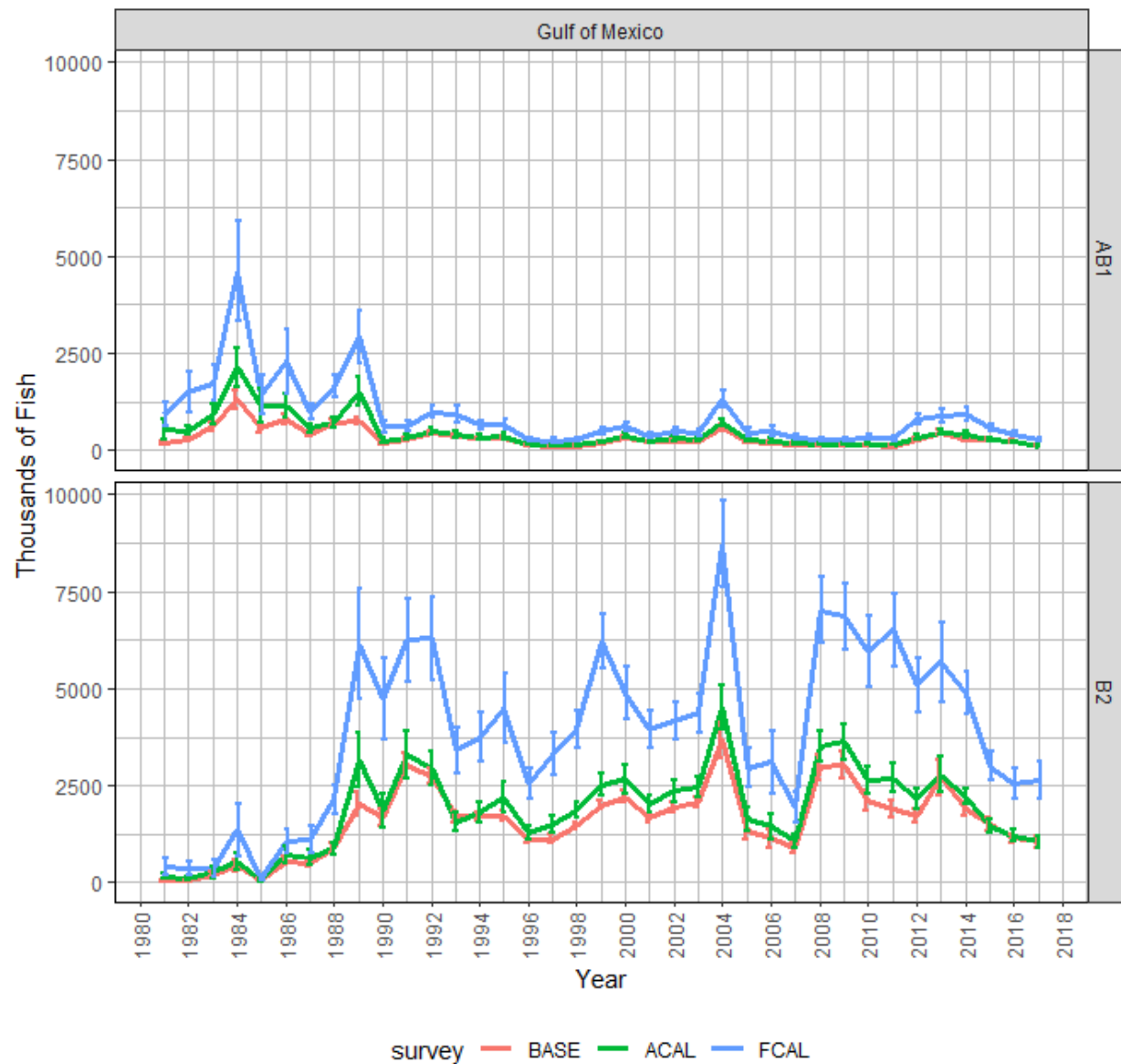


Figure 2. MRIP Base (BASE), APAIS Calibrated (ACAL), and Fully Calibrated APAIS and FES (FCAL) catch estimates for Red Grouper in the Gulf of Mexico between 1981 and 2017. Landings (AB1) and discard (B2) estimates are in thousands of fish. Estimates in this figure include the Florida Keys as that domain is not separable from those used by the MRIP online comparison tool for the Gulf of Mexico (NMFS pers comm). The Shore 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 Gulf of Mexico Red Grouper between SEDAR 88 and SEDAR 61, the terminal years of which are 2022 and 2017 respectively. Catch estimates are in thousands of fish.

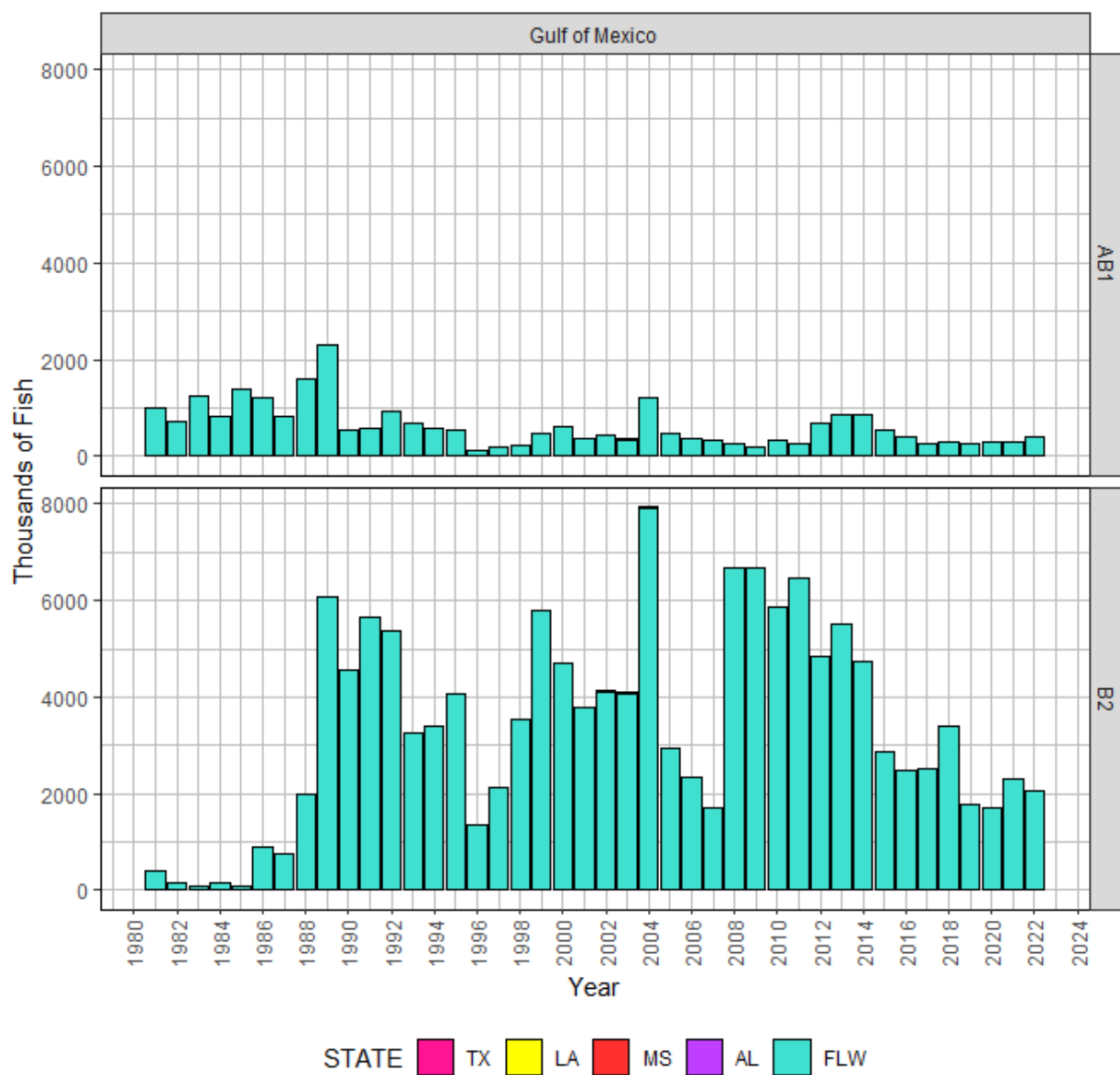


Figure 4. Annual Red Grouper landings (AB1) and discards (B2), in thousands of fish, by state from 1981 to 2022 (MRIP, LACreel 2014+, TPWD). FLW excludes the Florida Keys.

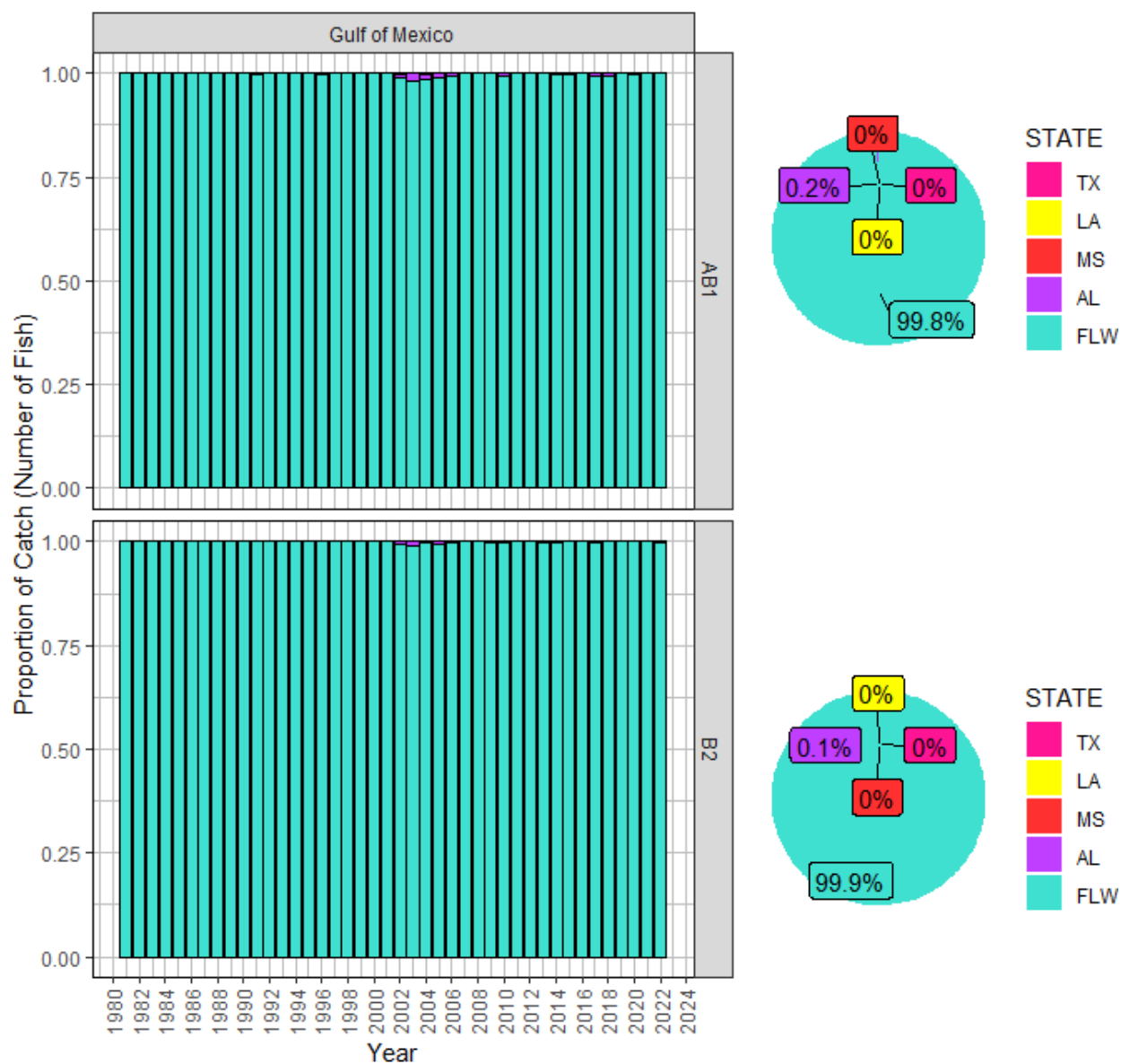


Figure 4a. Proportion of Red Grouper landings (AB1) and discards (B2), in numbers of fish, from each state by year (bar graph) and overall (pie chart) between 1981 and 2022 (MRIP, LACreel 2014+, TPWD). FLW excludes the Florida Keys.

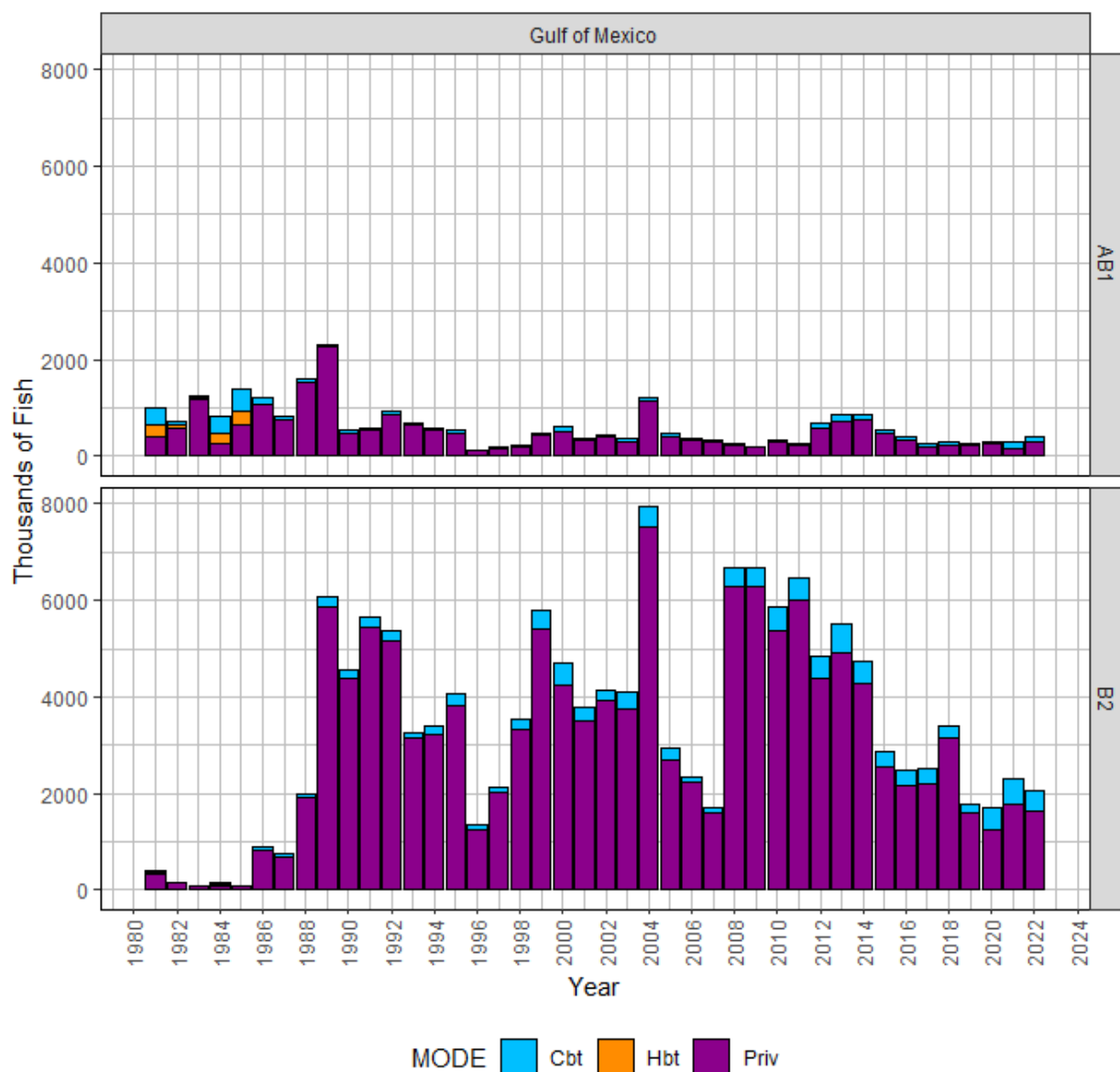


Figure 5. Annual Red Grouper landings (AB1) and discards (B2), in thousands of fish, by mode from 1981 to 2022 (MRIP, LACreel 2014+, TPWD). Note that catch from the combined Private-Shore fishing mode in the LA Creel survey has been added to the Private mode.

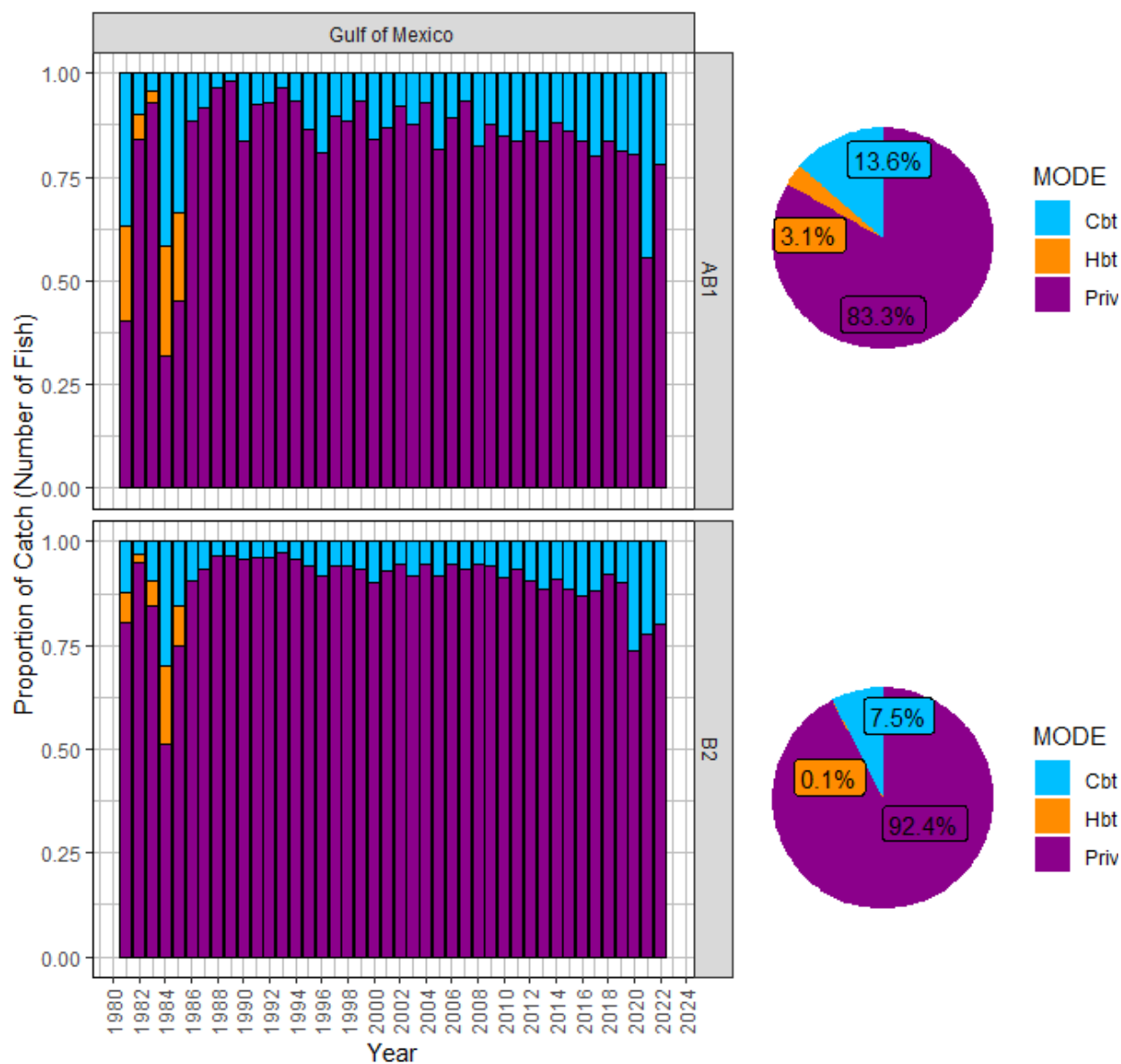


Figure 5a. Proportion of Red Grouper landings (AB1) and discards (B2), in numbers of fish, from each mode by year (bar graph) and overall (pie chart) between 1981 and 2022 (MRIP, LACreel 2014+, TPWD). Note that catch from the combined Private-Shore fishing mode in the LA Creel survey has been added to the Private mode.

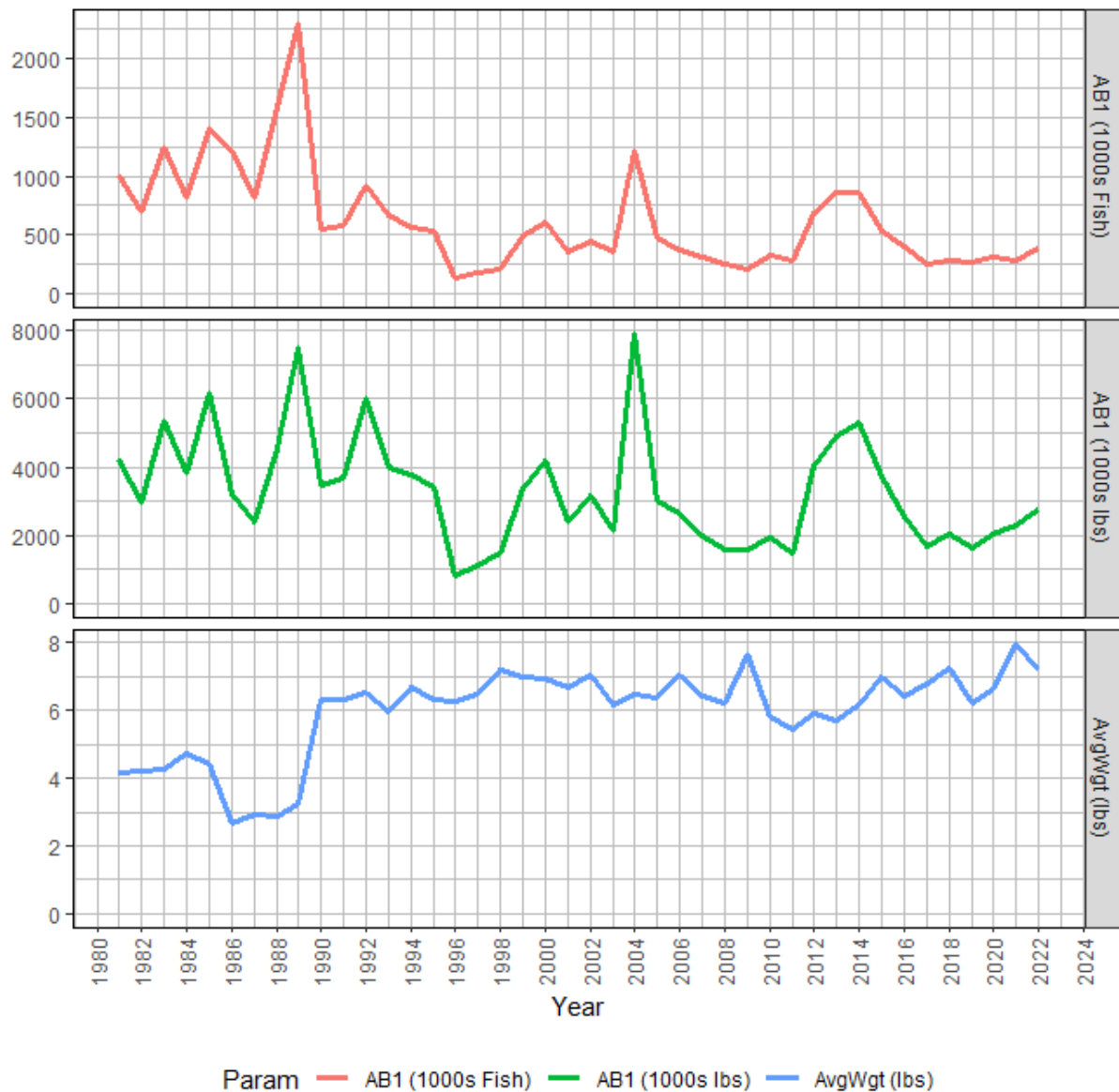


Figure 6. Estimates of annual landings for Red Grouper in the Gulf of Mexico (MRIP, LACreel 2014+, TPWD): estimated landings in thousands of fish (top), estimated landings in thousands of pounds gutted weight (middle), and average weight of landed fish (estimated lbs/estimated fish) (bottom). Average weight estimates are calculated in whole weight 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). Whole weight estimates for Red Grouper were converted to gutted weight using a WWT:GWT ratio of 1.048.

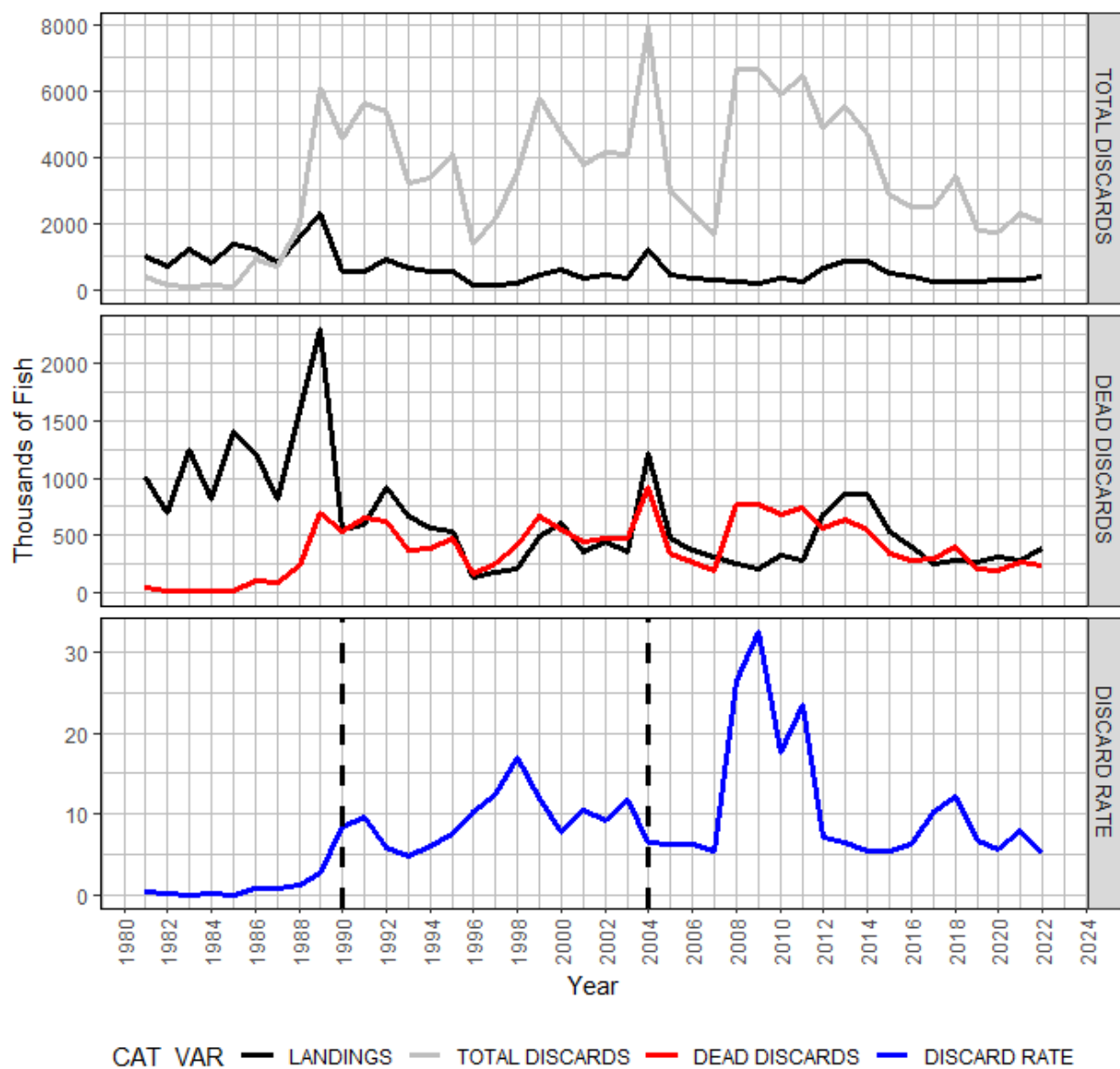


Figure 7. Timeseries of general recreational landings, discards (top panel), and the associated discard rate (bottom panel) for Gulf of Mexico Red Grouper (MRIP, LACreel 2014+, TPWD) in thousands of fish. Years where (select) management actions were implemented are identified by a dashed black line (1990 - Reef Fish Amendment 1; 2004 - Secretarial Amendment 1). Dead discards (middle panel) were calculated by applying an assumed discard mortality rate of 11.6% from the previous assessment.

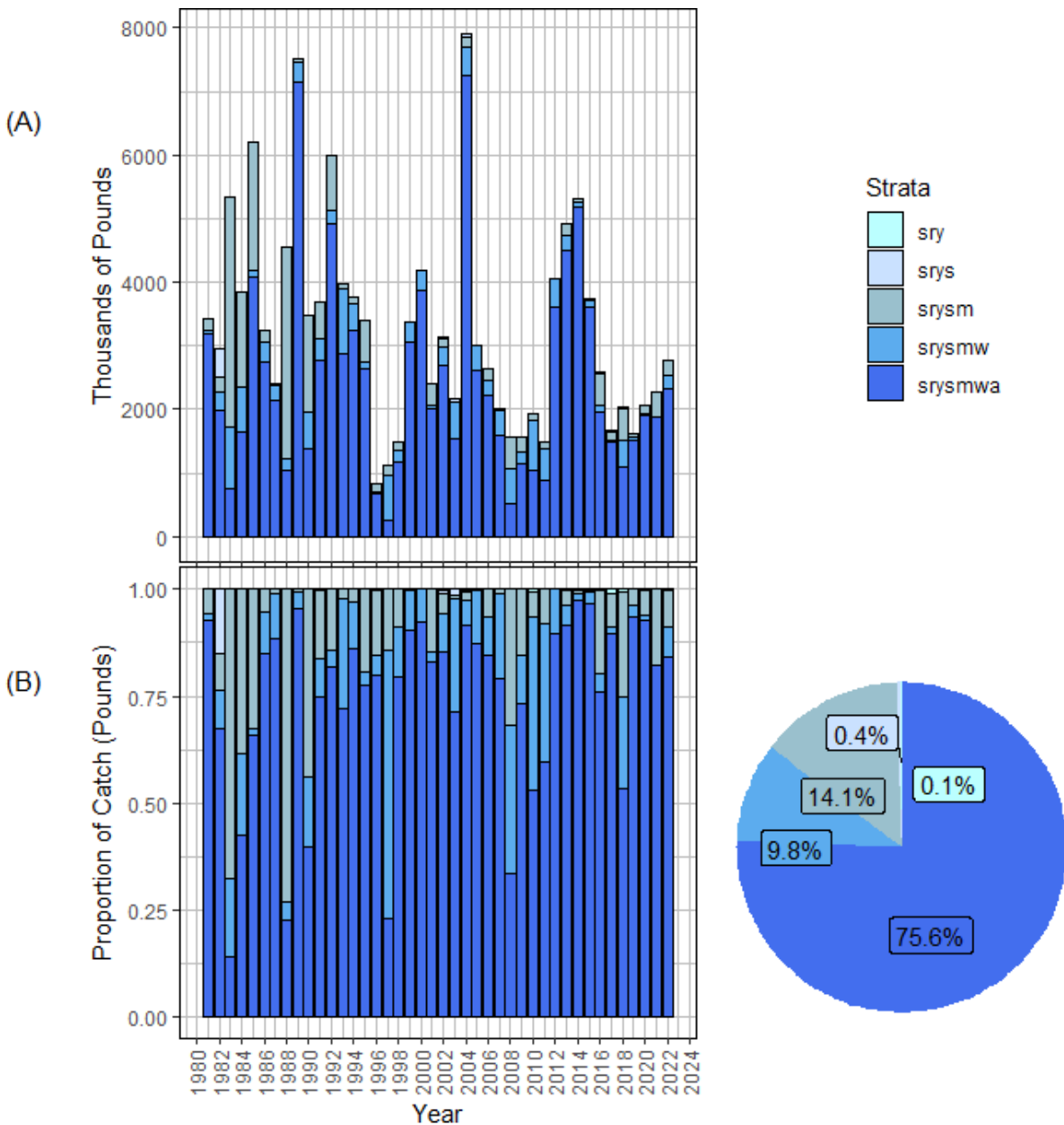


Figure 8. Annual landings estimates of Gulf of Mexico Red Grouper in thousands of pounds gutted weight by hierarchy level (MRIP, LACreel 2014+, TPWD), defined by *species*, *region*, *year*, *state*, *mode*, *wave*, and *area*. Landings are grouped by the strata at which average weights were estimated, 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). Whole weight estimates for Red Grouper were converted to gutted weight using a WWT:GWT ratio of 1.048. 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).

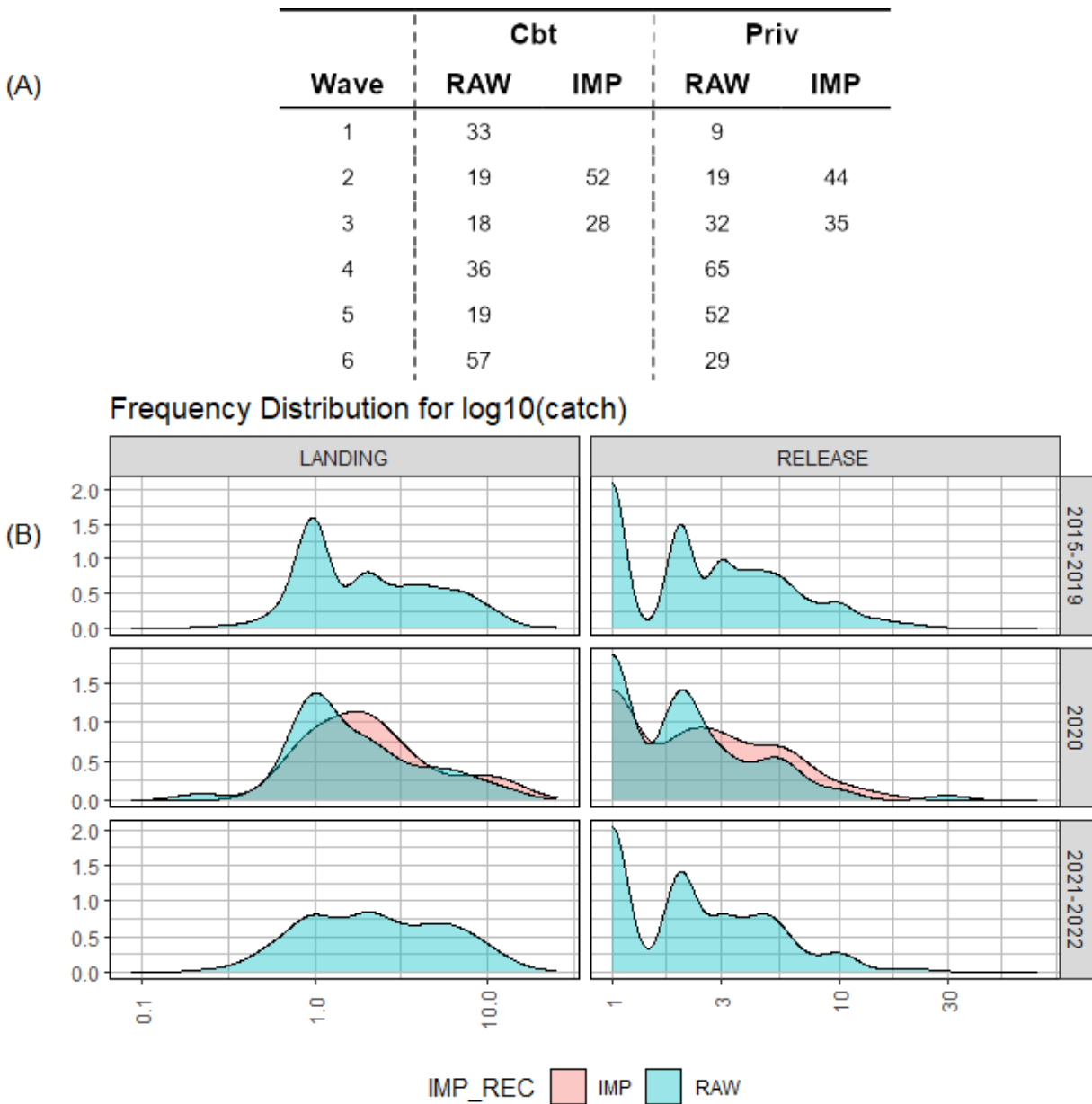


Figure 9. COVID data gaps in the MRIP APAIS and associated imputations for (positive) fishing trips that intercepted Gulf of Mexico Red Grouper. No 2020 data were imputed for the FES or FHS. (A) Number of positive intercepts in 2020 from the APAIS (RAW) vs. those imputed from intercepts in adjacent years (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.

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).
 - 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 in whole weight 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). For SEDAR 88, whole weight estimates for Red Grouper were converted to gutted weight using a WWT:GWT ratio of 1.048. Size records above an allowable (max size) threshold are excluded from weight estimation and the summary tables included in this working paper (Tables 8-15). For SEDAR 88 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. The preferred method was applied to fill-in this (1981 wave1) MRIP data gap, by which the proportion of the wave1 estimate to that from other waves (2-6) in years 1982-1984 (by fishing mode and area) was multiplied by the total estimate from waves 2-6 in 1981. This approach was used to impute both the catch and effort estimates for this strata.
 - Estimates from the TPWD survey are available starting in May (wave3) 1983. The average effort (by mode and wave) from waves 1-2 in 1984-1985 and from waves 3-6 in years 1983-1985 were used to fill-in these (1981-1983)

data gaps in Texas recreational effort. Catch was assumed negligible for these strata and 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 (1 = Florida panhandle, Escambia to Dixie; 2 = western Florida, Levy to Collier).
- Between 1981 and 1985 in the Gulf of Mexico, 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, the MRIP combined for-hire mode must be split to provide estimates of headboat landings in these early years. 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).