

**Recreational Survey Data for Red Grouper in the Gulf of Mexico**  
by Vivian M. Matter

NOAA Fisheries  
Southeast Fisheries Science Center  
Sustainable Fisheries Division  
75 Virginia Beach Drive  
Miami FL 33149

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### INTRODUCTION

Data for red grouper from recreational fisheries surveys in the Gulf of Mexico are presented, including summaries of catch estimates and sampling fractions. Length distributions will be presented in a separate document entitled "Length Frequency Analysis of the Gulf of Mexico Recreational Red Grouper Fishery" by Steve Saul (SEDAR 12-DW-12). Issues addressed include the lack of estimates for fish released in the Headboat Survey and placement of the Keys landings into the Gulf of Mexico or Atlantic Ocean.

### OVERVIEW OF THE SURVEYS

Estimates of recreational catch for marine fish species in the Gulf of Mexico beginning in 1981 are obtained by a combination of results from three surveys:

- the Marine Recreational Fishery Statistics Survey (MRFSS) conducted by the NOAA Fisheries (NMFS).
- the Texas Marine Sport-Harvest Monitoring Program by the Texas Parks and Wildlife Department (TPWD).
- the Headboat Survey (HBS) conducted by NMFS, Southeast Fisheries Science Center, Beaufort, NC.

These three surveys together provide estimates of catch in numbers (and sometimes weight), estimates of effort, length and weight samples, and catch-effort observations for shore-based and boat fishing. The combined coverage is continuous beginning in 1981 with only minor gaps (see table below).

Recreational Surveys available for Gulf and Atlantic: MRFSS, Headboat, and TPWD

<b>Survey</b>	<b>Area</b>	<b>Timeframe</b>	<b>Mode*</b>
MRFSS	1. TX (not all modes/waves) 2. ME-VA 3. NC-LA 4. USVI 5. PR	1. 1981-1985 2. 1981-present (except 1981, wave 1) 3. 1981-present (except 1981, wave 1) 4. 2000 5. 2000-present	1. SH, HB/CH, PR 2. SH, HB/CH, PR 3. SH, CH, PR 4. SH, CH, PR 5. SH, CH, PR
Headboat	1. NC-FLE (incl. Keys) 2. FLW-TX	1. 1972- present 2. 1986-present	1. HB 2. HB
TPWD	TX	1983-present	CH, PR

\*mode abbreviations (SH=shore, HB=headboat, CH=charterboat, PR=private/rental)

The MRFSS and the TPWD survey are both sampling-based, while the Headboat Survey strives to be a census of headboats

using logbooks. The strata, data gathered and quantities estimated also differ. Strata for estimates of catch from the three surveys can be made comparable by summing (e.g., summing Headboat Survey estimates into bi-monthly "waves" to match MRFSS and TPWD). Other differences, such as the lack of estimate of released fish in the Headboat Survey and different measures of effort, must also be addressed.

## **MRFSS**

The MRFSS provides information on participation, effort, and species-specific catch. Data are collected to provide catch and effort estimates in two-month periods ("waves") for each recreational fishing mode (shore fishing, private/rental boat, charterboat, or headboat/charterboat combined) and area of fishing (inshore, state Territorial Seas, U.S. Exclusive Economic Zone) in each state, except TX. MRFSS was conducted in TX through only 1985 and did not include all modes in all years. Starting in 1986, MRFSS has not covered Headboats in the Gulf of Mexico and South Atlantic. Before 1986, charterboats and headboats were combined as one mode. No survey was conducted in wave 1 of 1981. Survey data for TX in 1981-1985, Wave 4, are no longer available. (Note: the MRFSS is in the process of re-incorporating headboats in some states, but headboat estimates are not yet being provided.) Catch estimates are made for strata used in the intercepts: fish landed whole and observed by the samplers ("Type A"), fish reported as killed by the fishers ("Type B1") and fish reported as released alive by the fishers ("Type B2").

Two surveys within MRFSS provide the information described above: the "traditional" MRFSS and the For-Hire Survey (FHS), or "new charterboat method," discussed below. The traditional MRFSS design is based on an intercept survey of anglers and telephone survey of coastal households and has been used since the inception of the MRFSS. It applies to all fishing modes included in the survey. For 1981-1985 in TX to ME and for all years in VA to ME, the traditional MRFSS covered charterboats and headboats as a combined mode.

In 1998, the FHS began providing estimates for charterboats in some states. The traditional MRFSS and FHS operate concurrently, but the FHS estimates have been phased in as the "official" charterboat estimates starting with LA through FL West Coast in 2000. (This was expanded to the FL East Coast in 2003 and to GA through ME starting in wave 2 of 2005.) This new method was needed because of the low number of charterboat anglers contacted in the traditional telephone survey of coastal households.

### **For Hire Survey and calibration of old method estimates with the new method.**

In the FHS, directories of charterboats are developed for each state and are continuously updated. Each week, a sample of 10% of the listed charterboats are surveyed by telephone to ask about their fishing effort during the previous week, including the number of vessel trips, the number of anglers, areas fished and other information. Validation surveys by field samplers directly observe some charterboat effort on the docks to allow correction of over and under-reporting of trips in the telephone survey.

The MRFSS intercept survey of anglers at boat access sites is conducted as usual, encountering some charterboats. This allows calculation of a correction factor for charterboat trips on unlisted boats (not in the charterboat directory): (total intercepted cbt angler trips) / (intercepted cbt angler trips on listed boats).

Thus the estimate of total charterboat angler trips for an area of fishing is:

Estimated total charterboat angler trips =  
(total charterboat angler trips in on listed boats) \* (correction factor for trips on unlisted boats) where the total charterboat angler trips on listed boats is based on the 10% sample in the telephone survey and corrected for over/under reporting by the validation survey.

The FHS estimates of catch then follow in the same manner as for the traditional MRFSS, with the mean catch per trip coming from the MRFSS intercept survey. The pilot study of new charterboat methods in the Gulf of Mexico found that the annual effort at the state and Gulf level were not significantly different between the pilot study and the traditional MRFSS. However, the effort from the new charterboat methods differed from the traditional MRFSS in the distributions of effort by area and season.

Conversion factors were estimated by Diaz and Phares to calibrate the traditional MRFSS charterboat estimates for 1981-1997 with the FHS in the Gulf of Mexico (Diaz and Phares, 2004). In addition to the official FHS estimates for 2000-2003,

estimates were also made for 1998-1999 using the FHS methodology. Thus the relationship between the old charterboat method estimates of trips and the FHS for 1998-2003 was used to estimate the conversion factors. The following are the conversion factors and standard errors (in parentheses):

Apply to 1986 – 1997 charterboat mode in AL, LA, and MS

	WAVE					
Area	1	2	3	4	5	6
Inshore	1.26 (1.31)	1.54 (1.27)	3.82 (1.26)	4.67 (1.26)	3.28 (1.27)	1.48 (1.28)
< 3 miles	0.74 (1.37)	0.75 (1.26)	1.49 (1.25)	2.28 (1.24)	0.64 (1.28)	0.52 (1.40)
> 3 miles	0.44 (1.28)	0.63 (1.24)	2.23 (1.23)	1.87 (1.24)	1.26 (1.23)	0.53 (1.28)

Apply to 1986- 1997 charterboat mode in FLW

	WAVE					
Area	1	2	3	4	5	6
Inshore	3.17 (0.16)	5.31 (0.16)	5.71 (0.16)	5.33 (0.16)	3.49 (0.16)	3.70 (0.16)
< 10 miles	0.95 (0.16)	1.10 (0.16)	1.78 (0.16)	0.70 (0.16)	0.48 (0.16)	0.98 (0.16)
> 10 miles	0.38 (0.16)	0.58 (0.16)	0.77 (0.16)	0.73 (0.16)	0.59 (0.16)	0.55 (0.16)

Apply to 1981-1985 combined Charterboat+Headboat mode in LA, MS, AL, and FLW

Wave					
1	2	3	4	5	6
1.45 (1.10)	1.31 (1.10)	1.63 (1.10)	1.34 (1.10)	2.67 (1.10)	1.58 (1.10)

Reference:

*Estimated Conversion Factors for Calibrating MRFSS Charterboat Landings and Effort Estimates for the Gulf of Mexico in 1981-1997 with the For Hire Survey Estimates with Application to Red Snapper Landings.* Guillermo A. Diaz and Patty Phares. National Marine Fisheries Service, Southeast Fisheries Science Center, Sustainable Fisheries Division, August, 2004. Sustainable Fisheries Division Contribution No. SFD-2004-036.

### Headboat Survey (HBS)

The Headboat Survey covers the Gulf of Mexico headboats starting in 1986. (At the same time, the MRFSS combined charter+headboat mode estimates changed to charterboat only for the Gulf and South Atlantic states.)

Total catch per trip is reported in logbooks provided to all headboats in TX through NC. Agents collect these logbook trip reports and sample some trips to gather size data. Although reporting via the logbooks is mandatory, compliance is low in some areas for recent years, especially South Florida. The HBS creates substitutes for the missing reports based on data for similar vessels or time periods, thus providing estimates of total catch by month (or groups of months) and area. Each vessel is assigned to one of 26 Gulf of Mexico and South Atlantic areas, based on the port from which the vessel operates and the general fishing area. (There are areas that are not used anymore, including a few very general geographic areas and one for the Bahamas).

The survey was inconsistent in LA in 2002-2005. There were no trip reports collected in LA in 2002. 2001 trip reports were used (by the HBS) as a substitute to generate estimates numbers caught (though there are some minor differences between the resulting estimates for the two years). In 2003, there were only a few trip reports but they were still used to

generate the estimates. In 2004 and 2005 there were no trip reports or fish sampled, and no substitutes were used, so there are no estimates or samples for 2004 and 2005.

### **TX Parks and Wildlife Survey (TPWD)**

There were no red grouper estimates in the TPWD survey from 1983-2005.

## **CATCH ESTIMATES and SAMPLING PROPORTIONS**

### **MRFSS**

Tables 1-7 show the MRFSS catch estimates and CVs by mode and by state, sampling proportions by mode. Sampling proportions use the number observed (tspclaim = type A catch sampled) and number measured for length (tsp\_lex) contained on the catch estimates records. There may be minor differences between these and the same quantities calculated directly from the intercept files. Sampled catch (observed or measured) may occur in cells where there is no catch estimate. This occasionally happens when the intercept survey encounters fishers in a state-wave-mode cell but there is no corresponding estimate of trips, usually in the traditional MRFSS in a charterboat cell with low effort. Sampled fish with no corresponding estimate were kept in calculating the proportions but this does not greatly affect the proportions.

In the tables, estimated A+B1 is the catch that was killed and B2 is the catch that was released alive. In the intercepts, Type A is the catch that was seen and identified by the interviewer, thus is the "observed catch" in the sampling proportions. Type A estimates are the expansion of the observed catch.

Tabulated estimates use the new charterboat method (FHS) for 1998-2004. Except as noted, the charterboat estimates for 1986-1997 and charter+headboat estimates for 1981-1985 are calibrated to the new method using the conversion factors estimated in Diaz and Phares. CVs for the calibrated charterboat and charter+headboat in 1981-1997 do not include the variance associated with the calibration factor.

*\*Final 2005 estimates were provided at the Data Workshop by Tom Sminkey.*

Table 1. Estimated MRFSS A+B1 catch (fish killed) and coefficients of variations (CV) by mode for red grouper in the Gulf of Mexico. Charterboat and cbt/hbt estimates use the new method or are calibrated to the new method.

Table 2. Estimated MRFSS B2 catch (released alive) and coefficients of variations (CV) by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

Table 3. Estimated MRFSS A+B1 (fish killed) and B2 catch (released alive) by state for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

Table 4. Comparison of MRFSS old charterboat method estimates to recalibrated charterboat estimates (using conversion factors from Diaz and Phares) for red grouper in the Gulf of Mexico.

Table 5. Percent of MRFSS **Type A catch estimate that was measured** by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

Table 6. Percent of MRFSS **observed Type A catch that was measured** by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

Table 7. Percent of MRFSS **Type A catch estimate that was observed** by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

The MRFSS includes the Keys in FLW. However, separating the Keys into a separate "state" can be considered. The MRFSS post-stratified estimates which treat the Keys separately are shown in Table 8. *\*Final 2005 estimates were*

*provided at the Data Workshop by Tom Sminkey.*

Table 8. Estimated MRFSS A+B1 catch (fish killed) and coefficients of variations (CV) by **Florida region** for red grouper in the Gulf of Mexico. Charterboat and cbt/hbt estimates use the new method or are calibrated to the new method.

### **Headboat Survey**

Tables 8 - 10 show the Headboat Survey catch estimates and sampling proportions by year and area group. Sampling proportions use the estimated number of fish and number of fish measured by the samplers. Occasional trip reports may have observed catch that does not correspond to an estimate (by area and month) or observed catch with weight but no number reported. Occasional length samples may not match any estimate or trip report. These are retained in calculations of total catch and sampling proportions but they do not greatly affect the results.

Table 9. Headboat Survey **estimated catch** by area groups for Gulf of Mexico red grouper. (Estimated catch includes only kept fish.)

Table 10. Percent of Headboat Survey **estimated catch that was measured** by area groups for Gulf of Mexico red grouper.

Table 11. Percent of Headboat Survey **estimated catch that was reported in logbooks** by area groups for Gulf of Mexico red grouper.

Headboat Survey Gulf and Keys area codes for reference in reviewing the tables:

12=Fl. Keys, Atlantic-based vessels

17=Dry Tortugas (Atlantic/Keys-based vessels)

18=Dry Tortugas (Gulf vessels)

20=SW FL (1/2 and 3/4-day trips) - [may be out of use?]. (Naples to Crystal River)

21=SW FL - full day trips (Naples to Crystal River)

22=Fl. Middle Grounds trips

23=NW FL and AL (Carrabelle to Pensacola, including Panama City and Destin)

24=LA

25=NE TX (Sabine Pass-Freeport)

26=Port Aransas, TX

27=Port Isabel, TX

In this report, Headboat Survey areas 12 and 17, which are considered "Atlantic" by the Headboat Survey, are included in the Gulf to make the Headboat areas included comparable to the MRFSS.

## **ADJUSTMENTS TO ESTIMATES**

### **Estimation of the number of fish released in the Headboat Survey.**

In 2004 the Headboat Survey logbook trip reports started collecting information on fish released alive and returned dead but estimates of the total fish released were not generated. However, the sample data (trip reports) for 2004 and 2005 can be used to suggest the use of the ratio of charterboat estimates for B2 / (A+B1) from the MRFSS to estimate the releases in the Headboat Survey.

Examination of the 2004 and 2005 headboat release data by vessel indicate that some vessels may not have been reporting released fish (or at least not on some trips). Since it was not clear which trips were reporting zero released fish and which were simply not reporting, only trips with some release data for any species were selected. Of those trips reporting releases, trips with red grouper (kept or released) were further selected. Of these, the quality of data may have varied. For instance, the reports for certain vessels often contained identical entries for the number of fish released as the number of

fish kept, a prominent difference from other vessels.

Tables 12 and 13 show the ratios for fish released alive to fish killed (kept + released dead) calculated using Headboat Survey 2004 and 2005 trip reports and MRFSS charterboat catch estimates for 2004 and 2005. For the Headboat Survey, the ratios are calculated as  $r_{hbt} = \text{live} / (\text{num} + \text{dead})$ , where live = fish released alive, num = fish kept, and dead = fish released dead. For the MRFSS, ratios are  $r_{mrf} = B2 / (A + B1)$ . In practice, the ratio  $r_{mrf}$  would be applied to the headboat catch estimate which corresponds to "num" only, since there is no estimate of fish released dead in the Headboat Survey. The MRFSS includes fish released dead in the B1 catch, and while the fish released dead can not be separated from other kinds of B1 catch in the estimates, this quantity is small in the sample data relative to the total B1 samples. Tables 14 shows data from headboat observer programs conducted by Florida and Alabama. Alabama data is available from 2004, wave 2 and Florida data is available in 2005. Table 15 shows ratios from MRFSS private catch estimates in 2004 and 2005.

Table 12. Ratios of **fish released alive to fish killed (kept + released dead)** from the Headboat Survey trip report data for red grouper in 2004 and 2005. Number of fish reported in logbooks as kept, released dead, released alive by area group and wave in the Gulf of Mexico. Only trips that reported discards for any species were used in this table.

Table 13. Ratios of **fish released alive (B2) to fish killed (AB1)** from MRFSS charterboat catch estimates in 2004 and 2005 by state and wave in the Gulf of Mexico.

Table 14. Ratio of fish **released alive (B2) to fish killed (AB1)** from headboat observer programs in Florida (2005+) and Alabama (2004+).

Table 15. Ratio of fish **released alive (B2) to fish killed (AB1)** from MRFSS private mode estimates in 2004 and 2005 by state and wave in the Gulf of Mexico.

This adjustment using MRFSS estimates might also be calculated using the post-stratified MRFSS which estimate the Keys separately from FLW (Table 8).

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General overview of the recreational surveys from the following:

*Recreational Survey Data for Gag and Black Grouper in the Gulf of Mexico.* Patty Phares, Vivian Matter, and Steve Turner. National Marine Fisheries Service, Southeast Fisheries Science Center, Sustainable Fisheries Division, January, 2006. Sustainable Fisheries Division Contribution No. SFD-2006-008.

Table 1. Estimated MRFSS A+B1 catch (number of fish killed) and coefficients of variations (CV) by mode for red grouper in the Gulf of Mexico. Charterboat and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	Cbt		Cbt/Hbt		Priv		Shore		All Modes	
	A+B1	CV	A+B1	CV	A+B1	CV	A+B1	CV	A+B1	CV
1981			159,625	46%	97,868	24%	15,020	37%	272,513	28%
1982			40,128	46%	259,607	16%	4,068	67%	303,804	15%
1983			77,192	18%	540,104	19%	24,684	62%	641,980	17%
1984			240,646	22%	1,102,567	22%	76,924	52%	1,420,137	18%
1985			331,973	31%	432,956	28%			764,929	21%
1986	71,462	19%			670,984	20%	5,863	100%	748,309	18%
1987	55,612	27%			337,531	13%	10,105	95%	403,249	12%
1988	44,556	21%			631,814	13%	7,601	73%	683,972	13%
1989	38,901	24%			712,589	12%			751,490	12%
1990	45,911	70%			116,750	17%	13,506	91%	176,168	23%
1991	14,124	47%			264,147	13%	9,378	37%	287,649	13%
1992	36,082	16%			382,585	8%	24,264	30%	442,931	7%
1993	30,156	17%			315,253	13%	16,797	45%	362,205	12%
1994	25,620	16%			269,162	11%	3,770	59%	298,552	10%
1995	54,786	41%			226,334	14%	1,315	71%	282,435	14%
1996	20,447	51%			106,029	14%			126,476	14%
1997	21,474	46%			64,735	17%	1,369	100%	87,578	17%
1998	21,989	10%			81,619	14%	901	100%	104,508	11%
1999	33,278	14%			144,732	13%			178,011	11%
2000	115,826	17%			217,853	14%			333,679	11%
2001	58,136	18%			156,663	14%			214,799	11%
2002	45,538	8%			202,419	15%			247,957	12%
2003	45,062	7%			172,294	13%			217,356	10%
2004	92,146	8%			400,285	9%			492,431	8%
2005	110,636	7%			133,512	13%			244,148	8%

Table 2. Estimated MRFSS B2 catch (number released alive) and coefficients of variations (CV) by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	Cbt		Cbt/Hbt		Priv		Shore		All modes	
	B2	CV	B2	CV	B2	CV	B2	CV	B2	CV
1981			17,991	34%	49,019	44%	3,855	60%	70,866	32%
1982			6,655	100%	55,502	29%			62,157	28%
1983			24,959	36%	190,529	39%			215,488	35%
1984			47,390	24%	394,364	37%	19,163	49%	460,918	32%
1985			76,877	29%	39,262	44%	5,121	60%	121,260	23%
1986	61,526	27%			444,261	22%	5,863	100%	511,650	19%
1987	63,738	31%			403,467	15%			467,205	13%
1988	37,005	32%			817,327	15%	11,632	100%	865,964	15%
1989	91,183	24%			1,877,785	17%	1,794	100%	1,970,761	16%
1990	182,336	32%			1,358,409	13%	20,881	68%	1,561,626	12%
1991	47,116	74%			2,922,955	11%	33,429	64%	3,003,500	10%
1992	136,388	14%			2,450,741	8%	81,896	38%	2,669,025	8%
1993	109,133	23%			1,621,466	9%	7,567	54%	1,738,166	9%
1994	102,739	22%			1,546,760	7%	16,405	35%	1,665,904	7%
1995	135,386	17%			1,481,149	9%	5,099	43%	1,621,635	8%
1996	66,209	22%			994,391	8%	14,287	31%	1,074,887	8%
1997	102,748	15%			968,470	10%	8,894	42%	1,080,112	9%
1998	223,670	11%			1,293,502	7%	9,758	38%	1,526,930	6%
1999	324,000	11%			1,756,987	6%	6,049	51%	2,087,036	6%
2000	526,803	18%			1,688,318	8%	7,793	48%	2,222,914	8%
2001	230,251	13%			1,432,283	7%	3,234	100%	1,665,768	6%
2002	225,579	9%			1,723,762	7%			1,949,341	6%
2003	293,344	7%			1,786,673	7%	914	100%	2,080,930	6%
2004	339,089	8%			2,782,341	6%	3,885	51%	3,125,315	5%
2005	330,132	9%			1,380,510	8%	2,419	71%	1,713,061	6%



Table 3. Estimated MRFSS A+B1 (number of fish killed) and B2 catch (number released alive) by state for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	AL		FLW		LA		MS		All States	
	A+B1	B2	A+B1	B2	A+B1	B2	A+B1	B2	A+B1	B2
1981			272,513	70,866					272,513	70,866
1982			303,804	62,157					303,804	62,157
1983			641,980	215,488					641,980	215,488
1984	352	0	1,419,785	460,918					1,420,137	460,918
1985			764,929	121,260					764,929	121,260
1986			748,309	511,650					748,309	511,650
1987			403,249	467,205					403,249	467,205
1988			683,972	865,964					683,972	865,964
1989			751,490	1,970,761					751,490	1,970,761
1990	0	226	176,168	1,561,400					176,168	1,561,626
1991			286,914	3,003,500	735	0			287,649	3,003,500
1992			442,931	2,669,025					442,931	2,669,025
1993			362,205	1,738,166					362,205	1,738,166
1994			298,552	1,665,904					298,552	1,665,904
1995	167	0	282,268	1,621,635					282,435	1,621,635
1996	1,033	0	125,443	1,074,887					126,476	1,074,887
1997			87,578	1,080,112					87,578	1,080,112
1998			104,508	1,526,930					104,508	1,526,930
1999	37	0	177,974	2,087,036					178,011	2,087,036
2000	33	0	333,646	2,222,914					333,679	2,222,914
2001	37	66	214,762	1,665,702					214,799	1,665,768
2002	1,673	10,818	245,688	1,938,523			595	0	247,957	1,949,341
2003	4,991	28,661	212,365	2,052,078			0	191	217,356	2,080,930
2004	12,072	8,863	479,417	3,116,452			942	0	492,431	3,125,315
2005	6,715	8,549	237,433	1,704,512					244,148	1,713,061

Table 4. Comparison of MRFSS old charterboat method estimates to recalibrated charterboat estimates (using conversion factors from Diaz and Phares) for red grouper in the Gulf of Mexico. (numbers of fish; 1981-1985 includes headboat)

<b>YEAR</b>	<b>ab1 old</b>	<b>ab1 recal</b>	<b>b2 old</b>	<b>b2 recal</b>
1981	64,177	159,625	8,735	17,991
1982	21,534	40,128	4,589	6,655
1983	43,546	77,192	16,977	24,959
1984	125,796	240,646	29,439	47,390
1985	159,638	331,973	37,389	76,877
1986	111,071	71,462	109,419	61,526
1987	68,301	55,612	86,356	63,738
1988	71,071	44,556	64,532	37,005
1989	62,766	38,901	155,246	91,183
1990	70,962	45,911	310,878	182,336
1991	12,926	14,124	56,522	47,116
1992	53,094	36,082	207,621	136,388
1993	31,021	30,156	79,105	109,133
1994	38,186	25,620	144,420	102,739
1995	86,255	54,786	226,189	135,386
1996	28,042	20,447	90,321	66,209
1997	26,557	21,474	151,706	102,748

Table 5. Percent of MRFSS **Type A catch estimate** (numbers of fish) **that was measured** by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	Cbt		Cbt/Hbt		Priv		Shore		All Modes		
	typA est.	pct. meas.	typA est.	pct. meas.	typA est.	pct. meas.	typA est.	pct. meas.	TypA est.	Pct. meas.	No. meas.
1981			65,365	0.05%	46,354	0.03%	10,431	0.12%	122,150	0.05%	61
1982			27,008	0.03%	124,611	0.08%	4,068	0.05%	155,686	0.07%	105
1983			46,233	0.11%	489,731	0.01%	19,804	0.01%	555,767	0.02%	114
1984			106,173	0.09%	196,621	0.01%	7,129	0.03%	309,923	0.04%	126
1985			107,797	0.03%	86,759	0.01%			194,557	0.02%	42
1986	8,807	0.44%			239,210	0.01%			248,017	0.03%	73
1987	6,772	0.47%			183,841	0.06%	10,105	0.01%	200,718	0.08%	151
1988	25,905	0.19%			359,826	0.05%	7,601	0.05%	393,332	0.06%	242
1989	38,901	0.15%			540,411	0.03%			579,312	0.04%	214
1990	13,650	0.10%			97,929	0.04%	1,278	0.00%	112,857	0.05%	56
1991	8,130	0.16%			238,517	0.04%	9,378	0.02%	256,024	0.04%	107
1992	36,082	0.32%			358,765	0.06%	24,264	0.05%	419,111	0.08%	354
1993	27,763	0.08%			243,269	0.05%	15,133	0.01%	286,165	0.05%	153
1994	24,881	0.23%			142,581	0.08%	3,770	0.05%	171,233	0.11%	180
1995	51,117	0.15%			153,530	0.08%	1,315	0.15%	205,962	0.10%	207
1996	20,181	0.16%			70,481	0.07%			90,663	0.09%	85
1997	21,474	0.25%			45,250	0.09%	1,369	0.07%	68,093	0.14%	96
1998	21,381	0.65%			62,549	0.14%	901	0.11%	84,830	0.26%	224
1999	33,230	0.79%			113,933	0.12%			147,163	0.27%	399
2000	114,472	0.34%			171,796	0.08%			286,268	0.19%	534
2001	58,055	0.67%			136,482	0.09%			194,537	0.26%	509
2002	44,829	1.12%			139,251	0.09%			184,080	0.34%	633
2003	43,565	1.56%			146,398	0.07%			189,963	0.41%	778
2004	84,206	1.59%			326,629	0.08%			410,836	0.39%	1,601
2005	107,429	1.04%			120,936	0.09%			228,365	0.53%	1,221

Table 6. Percent of MRFSS **observed Type A catch** (numbers of fish) **that was measured** by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	Cbt		Cbt/Hbt		Priv		Shore		All Modes		
	typA obs.	pct. meas.	typA obs.	pct. meas.	typA obs.	pct. meas.	typA obs.	pct. meas.	TypA obs.	Pct. meas.	No. meas.
1981			96	34%	34	47%	12	100%	142	43%	61
1982			8	100%	100	95%	2	100%	110	95%	105
1983			57	86%	115	55%	2	100%	174	66%	114
1984			201	49%	41	63%	2	100%	244	52%	126
1985			111	27%	13	92%			124	34%	42
1986	46	85%			230	15%			276	26%	73
1987	41	78%			150	79%	1	100%	192	79%	151
1988	125	39%			344	55%	4	100%	473	51%	242
1989	105	56%			378	41%			483	44%	214
1990	30	43%			70	61%	1	0%	101	55%	56
1991	17	76%			123	75%	2	100%	142	75%	107
1992	186	63%			454	49%	16	81%	656	54%	354
1993	50	42%			285	46%	18	11%	353	43%	153
1994	75	77%			191	63%	3	67%	269	67%	180
1995	105	72%			189	68%	2	100%	296	70%	207
1996	46	72%			100	52%			146	58%	85
1997	80	68%			65	63%	1	100%	146	66%	96
1998	234	59%			110	77%	1	100%	345	65%	224
1999	353	74%			254	54%			607	66%	399
2000	617	63%			230	63%			847	63%	534
2001	625	62%			208	58%			833	61%	509
2002	750	67%			236	55%			986	64%	633
2003	1,113	61%			208	47%			1,321	59%	778
2004	2,444	55%			508	51%			2,952	54%	1,601
2005	1,948	57%			175	61%			2,123	58%	1,221

Table 7. Percent of MRFSS **Type A catch estimate** (numbers of fish) **that was observed** by mode for red grouper in the Gulf of Mexico. Charter and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	Cbt		Cbt/Hbt		Priv		Shore		All Modes		
	typA est.	pct. obs.	typA est.	pct. obs.	typA est.	pct. obs.	typA est.	pct. obs.	TypA est.	Pct. Obs.	TypA obs.
1981			65,365	0.15%	46,354	0.07%	10,431	0.12%	122,150	0.12%	142
1982			27,008	0.03%	124,611	0.08%	4,068	0.05%	155,686	0.07%	110
1983			46,233	0.12%	489,731	0.02%	19,804	0.01%	555,767	0.03%	174
1984			106,173	0.19%	196,621	0.02%	7,129	0.03%	309,923	0.08%	244
1985			107,797	0.10%	86,759	0.01%			194,557	0.06%	124
1986	8,807	0.52%			239,210	0.10%			248,017	0.11%	276
1987	6,772	0.61%			183,841	0.08%	10,105	0.01%	200,718	0.10%	192
1988	25,905	0.48%			359,826	0.10%	7,601	0.05%	393,332	0.12%	473
1989	38,901	0.27%			540,411	0.07%			579,312	0.08%	483
1990	13,650	0.22%			97,929	0.07%	1,278	0.08%	112,857	0.09%	101
1991	8,130	0.21%			238,517	0.05%	9,378	0.02%	256,024	0.06%	142
1992	36,082	0.52%			358,765	0.13%	24,264	0.07%	419,111	0.16%	656
1993	27,763	0.18%			243,269	0.12%	15,133	0.12%	286,165	0.12%	353
1994	24,881	0.30%			142,581	0.13%	3,770	0.08%	171,233	0.16%	269
1995	51,117	0.21%			153,530	0.12%	1,315	0.15%	205,962	0.14%	296
1996	20,181	0.23%			70,481	0.14%			90,663	0.16%	146
1997	21,474	0.37%			45,250	0.14%	1,369	0.07%	68,093	0.21%	146
1998	21,381	1.09%			62,549	0.18%	901	0.11%	84,830	0.41%	345
1999	33,230	1.06%			113,933	0.22%			147,163	0.41%	607
2000	114,472	0.54%			171,796	0.13%			286,268	0.30%	847
2001	58,055	1.08%			136,482	0.15%			194,537	0.43%	833
2002	44,829	1.67%			139,251	0.17%			184,080	0.54%	986
2003	43,565	2.55%			146,398	0.14%			189,963	0.70%	1,321
2004	84,206	2.90%			326,629	0.16%			410,836	0.72%	2,952
2005	107,429	1.81%			120,936	0.14%			228,365	0.93%	2,123

Table 8. Estimated MRFSS A+B1 catch (number of fish killed) and coefficients of variations (CV) by Florida region for red grouper in the Gulf of Mexico. Charterboat and cbt/hbt estimates use the new method or are calibrated to the new method.

YEAR	Panhandle		West Peninsula		Florida Keys	
	A+B1	CV	A+B1	CV	A+B1	CV
1981	1,229	50%	218,625	34%	39,652	34%
1982			169,838	18%	132,788	26%
1983	57,957	69%	331,176	22%	255,932	29%
1984	3,999	55%	343,316	17%	1,070,878	26%
1985	39,884	96%	665,501	23%	49,414	74%
1986	108,136	27%	439,435	16%	205,455	58%
1987	65,773	34%	235,406	14%	12,083	22%
1988	104,064	17%	565,460	15%	12,265	31%
1989	86,115	25%	586,312	14%	83,844	39%
1990	18,200	37%	156,542	25%	2,961	52%
1991	25,619	50%	247,223	14%	3,327	71%
1992	5,553	57%	438,722	8%	13,733	27%
1993	51,079	53%	286,329	12%	24,660	20%
1994	13,130	24%	267,945	11%	20,563	21%
1995	934	58%	254,491	10%	27,755	17%
1996	3,141	46%	94,114	12%	30,120	18%
1997	2,694	38%	66,357	15%	20,267	15%
1998	11,725	32%	85,679	11%	10,562	18%
1999	3,699	18%	170,909	9%	1,737	27%
2000	42,302	15%	285,618	10%	3,496	40%
2001	58,191	15%	153,769	11%	1,986	30%
2002	49,370	12%	188,016	14%	8,550	24%
2003	87,379	10%	100,407	11%	26,408	27%
2004	184,852	8%	277,688	8%	17,451	31%
2005	114,790	8%	117,223	8%	5,439	36%

Table 9. Headboat Survey **estimated catch** (numbers of fish) by area groups for Gulf of Mexico red grouper. (Estimated catch includes only kept fish.)

<b>YEAR</b>	<b>FL. Keys 12+17</b>	<b>SW FL- Mid.gr. 18+21+22</b>	<b>NW FL- Texas 23-27</b>	<b>All Gulf areas</b>
1986	2,678	31,692	1,221	35,591
1987	4,218	24,766	963	29,947
1988	1,314	27,298	656	29,268
1989	2,206	49,472	305	51,983
1990	5,148	14,306	276	19,730
1991	1,130	9,260	249	10,639
1992	2,086	8,875	174	11,135
1993	2,963	7,626	1,176	11,765
1994	2,748	8,893	724	12,365
1995	2,871	13,775	724	17,370
1996	3,860	13,880	1,714	19,454
1997	3,722	3,509	1,167	8,398
1998	4,786	3,527	855	9,168
1999	2,317	6,298	620	9,235
2000	3,006	7,965	896	11,867
2001	2,881	3,025	2,535	8,441
2002	2,385	2,363	2,039	6,787
2003	2,278	3,784	3,737	9,799
2004	8,369	8,742	5,068	22,179
2005	6,984	8,588	5,379	20,951

Table 10. Percent of Headboat Survey **estimated catch** (numbers of fish) **that was measured** by area groups for Gulf of Mexico red grouper.

<b>YEAR</b>	<b>FL. Keys 12+17</b>	<b>SW FL- Mid.gr. 18+21+22</b>	<b>NW FL- Texas 23-27</b>	<b>All Gulf areas Pct.meas.</b>	<b>All Gulf areas Lengths</b>	<b>All Gulf areas Catch Est.</b>
1986	10%	1%	2%	2%	640	35,591
1987	5%	2%	4%	3%	765	29,947
1988	9%	1%	6%	2%	476	29,268
1989	8%	1%	13%	2%	888	51,983
1990	2%	2%	7%	2%	359	19,730
1991	2%	1%	10%	1%	125	10,639
1992	2%	1%	6%	1%	92	11,135
1993	3%	0%	2%	1%	109	11,765
1994	3%	0%	4%	1%	134	12,365
1995	3%	0%	2%	1%	151	17,370
1996	4%	0%	2%	1%	224	19,454
1997	4%	1%	2%	2%	203	8,398
1998	4%	1%	1%	2%	224	9,168
1999	6%	2%	2%	3%	243	9,235
2000	4%	1%	2%	2%	186	11,867
2001	3%	1%	1%	2%	132	8,441
2002	5%	3%	3%	4%	261	6,787
2003	3%	3%	3%	3%	289	9,799
2004	1%	1%	2%	1%	220	22,179
2005	1%	0%	1%	1%	109	20,951



Table 11. Percent of Headboat Survey **estimated catch** (numbers of fish) **that was reported in logbooks** by area groups for Gulf of Mexico red grouper.

<b>YEAR</b>	<b>FL. Keys 12+17</b>	<b>SW FL- Mid.gr. 18+21+22</b>	<b>NW FL- Texas 23-27</b>	<b>All Gulf areas Pct.meas.</b>	<b>All Gulf areas Observed</b>	<b>All Gulf areas Catch Est.</b>
1986	78%	58%	11%	58%	20,574	35,591
1987	60%	56%	46%	56%	16,729	29,947
1988	38%	51%	91%	51%	15,014	29,268
1989	41%	31%	85%	32%	16,645	51,983
1990	13%	78%	92%	62%	12,143	19,730
1991	37%	93%	87%	87%	9,266	10,639
1992	64%	95%	91%	89%	9,908	11,135
1993	73%	89%	97%	86%	10,062	11,765
1994	74%	68%	94%	71%	8,787	12,365
1995	73%	57%	98%	61%	10,673	17,370
1996	72%	33%	99%	46%	9,040	19,454
1997	79%	81%	97%	82%	6,912	8,398
1998	56%	95%	98%	75%	6,855	9,168
1999	51%	48%	91%	52%	4,764	9,235
2000	58%	54%	98%	58%	6,938	11,867
2001	65%	59%	99%	73%	6,182	8,441
2002	41%	65%	81%	61%	4,148	6,787
2003	47%	59%	74%	62%	6,080	9,799
2004	39%	62%	72%	55%	12,309	22,179
2005	46%	95%	86%	77%	16,034	20,951

Table 12. Ratios of numbers of **fish released alive to** number of **fish killed (kept + released dead)** from the Headboat Survey trip report data for red grouper in 2004 and 2005. Number of fish reported in logbooks as kept, released dead, released alive by area group and wave in the Gulf of Mexico. Only trips that reported discards for any species were used in this table.

		FL. Keys 12+17				SW FL- Mid.gr. 18+21+22				NW FL-Texas 23-27				All areas			
year	wave	kept	dead	live	ratio	kept	dead	live	ratio	kept	dead	live	ratio	kept	dead	live	ratio
2004	1	587	0	548	0.93	465	25	2,703	5.52	7	0	22	3.14	1,059	25	3,273	3.02
	2	524	0	509	0.97	593	13	4,962	8.19	309	2	146	0.47	1,426	15	5,617	3.90
	3	549	0	539	0.98	1,006	24	4,725	4.59	311	0	33	0.11	1,866	24	5,297	2.80
	4	517	1	572	1.10	1,096	26	3,761	3.35	259	0	14	0.05	1,872	27	4,347	2.29
	5	355	0	399	1.12	406	2	1,131	2.77	57	0	0	0.00	818	2	1,530	1.87
	6	507	1	584	1.15	629	2	967	1.53	2	0	0	0.00	1,138	3	1,551	1.36
<b>2004 Total</b>		<b>3,039</b>	<b>2</b>	<b>3,151</b>	<b>1.04</b>	<b>4,195</b>	<b>92</b>	<b>18,249</b>	<b>4.26</b>	<b>945</b>	<b>2</b>	<b>215</b>	<b>0.23</b>	<b>8,179</b>	<b>96</b>	<b>21,615</b>	<b>2.61</b>
2005	1	819	26	1,014	1.20	1,240	10	1,845	1.48	334	0	0	0.00	2,393	36	2,859	1.18
	2	513	8	611	1.17	2,429	17	2,702	1.10	740	0	0	0.00	3,682	25	3,313	0.89
	3	507	14	718	1.38	1,228	3	2,551	2.07	897	3	50	0.06	2,632	20	3,319	1.25
	4	516	12	577	1.09	950	6	1,888	1.97	347	0	18	0.05	1,813	18	2,483	1.36
	5	180	0	232	1.29	332	21	662	1.88	183	0	4	0.02	695	21	898	1.25
	6	271	19	432	1.49	1	3	973	243.25	10	0	0	0.00	282	22	1,405	4.62
<b>2005 Total</b>		<b>2,806</b>	<b>79</b>	<b>3,584</b>	<b>1.24</b>	<b>6,180</b>	<b>60</b>	<b>10,621</b>	<b>1.70</b>	<b>2,511</b>	<b>3</b>	<b>72</b>	<b>0.03</b>	<b>11,497</b>	<b>142</b>	<b>14,277</b>	<b>1.23</b>

Table 13. Ratios of numbers of **fish released alive** (B2) to numbers of **fish killed** (AB1) from MRFSS charterboat catch estimates in 2004 and 2005 by state and wave in the Gulf of Mexico.

YEAR	WAVE	FLW			AL			All states		
		ab1	b2	ratio	ab1	b2	ratio	ab1	b2	ratio
2004	1	5,428	46,377	8.54	55	95	1.73	5,483	46,472	8.48
	2	8,083	48,061	5.95	2,095	2,280	1.09	10,178	50,341	4.95
	3	27,590	108,379	3.93	2,728	1,222	0.45	30,318	109,601	3.62
	4	20,919	78,871	3.77	1,143	1,071	0.94	22,061	79,941	3.62
	5	19,058	30,567	1.60	676	64	0.09	19,734	30,631	1.55
	6	4,285	22,085	5.15	87	18	0.21	4,371	22,103	5.06
<b>2004 Total</b>		<b>85,363</b>	<b>334,339</b>	<b>3.92</b>	<b>6,783</b>	<b>4,750</b>	<b>0.70</b>	<b>92,146</b>	<b>339,089</b>	<b>3.68</b>
2005	1	379	892	2.35	13	4	0.28	393	896	2.28
	2	14,804	47,000	3.17	405	185	0.46	15,209	47,185	3.10
	3	44,867	115,992	2.59	1,773	1,237	0.70	46,641	117,228	2.51
	4	23,007	77,298	3.36	1,300	0	0.00	24,306	77,298	3.18
	5	8,682	34,402	3.96	1,578	1,527	0.97	10,260	35,929	3.50
	6	638	22,706	35.57				638	22,706	35.57
<b>2005 Total</b>		<b>92,378</b>	<b>298,290</b>	<b>3.23</b>	<b>5,069</b>	<b>2,953</b>	<b>0.58</b>	<b>97,447</b>	<b>301,243</b>	<b>3.09</b>

Table 14. Ratio of numbers of fish **released alive** (B2) to numbers of **fish killed** (AB1) from headboat observer programs in Florida (2005+) and Alabama (2004+).

YEAR	WAVE	FLW			AL			All states		
		ab1	b2	ratio	ab1	b2	ratio	ab1	b2	ratio
2004	2				0	16	0.00	0	16	0.00
	3				11	49	4.45	11	49	4.45
	4				8	38	4.75	8	38	4.75
	6				2	6	3.00	2	6	3.00
<b>2004 Total</b>					<b>21</b>	<b>109</b>	<b>5.19</b>	<b>21</b>	<b>109</b>	<b>5.19</b>
2005	1	2	65	32.50				2	65	32.50
	2	50	219	4.38	7	5	0.71	57	224	3.93
	3	38	448	11.79	3	5	1.67	41	453	11.05
	4	24	284	11.83	1	3	3.00	25	287	11.48
	5	50	471	9.42				50	471	9.42
	6	24	196	8.17				24	196	8.17
<b>2005 Total</b>		<b>188</b>	<b>1,683</b>	<b>8.95</b>	<b>11</b>	<b>13</b>	<b>1.18</b>	<b>199</b>	<b>1,696</b>	<b>8.52</b>

Table. 15 Ratio of numbers of fish **released alive** (B2) to numbers of **fish killed** (AB1) from MRFSS private mode estimates in 2004 and 2005 by state and wave in the Gulf of Mexico.

		FLW			AL			MS			All states		
YEAR	WAVE	ab1	b2	ratio	ab1	b2	ratio	ab1	b2	ratio	ab1	b2	ratio
<b>2004</b>	1	20,276	199,658	9.85			0.00				20,276	199,658	9.85
	2	71,741	455,164	6.34	1,368	0	0.00				73,109	455,164	6.23
	3	103,074	839,102	8.14	1,340	0	0.00	942	0	0.00	105,356	839,102	7.96
	4	133,162	857,175	6.44			0.00				133,162	857,175	6.44
	5	38,252	182,951	4.78	2,581	3,375	1.31				40,833	186,326	4.56
	6	27,548	244,178	8.86	0	738	0.00				27,548	244,916	8.89
<b>2004 Total</b>		<b>394,054</b>	<b>2,778,228</b>	<b>7.05</b>	<b>5,289</b>	<b>4,113</b>	<b>0.78</b>	<b>942</b>	<b>0</b>	<b>0.00</b>	<b>400,285</b>	<b>2,782,341</b>	<b>6.95</b>
<b>2005</b>	1	11,737	86,607	7.38	1,038	819	0.79				12,776	87,425	6.84
	2	33,327	192,491	5.78			0.00				33,327	192,491	5.78
	3	45,165	459,650	10.18	0	2,198	0.00				45,165	461,847	10.23
	4	27,220	461,442	16.95			0.00				27,220	461,442	16.95
	5	15,025	91,708	6.10	0	1,743	0.00				15,025	93,451	6.22
	6	0	83,244	0.00	0	609	0.00				0	83,853	0.00
<b>2005 Total</b>		<b>132,473</b>	<b>1,375,142</b>	<b>10.38</b>	<b>1,038</b>	<b>5,368</b>	<b>5.17</b>				<b>133,512</b>	<b>1,380,510</b>	<b>10.34</b>