

# Recreational Survey Data for King Mackerel in the Atlantic and Gulf of Mexico

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## 1. INTRODUCTION

Data for king mackerel from recreational fisheries surveys in the Atlantic and Gulf of Mexico are presented, including summaries of catch estimates and sampling fractions. Recreational data for king mackerel for 1981-1999 are from previous assessments. New/updated data are presented for 2000-2007 (2007 through June only). Data are presented by calendar year and migratory group using current stock definitions. Issues addressed include the use of MRFSS charterboat methods, the lack of estimates for fish released in the Headboat Survey and TPWD, and the differences in updated data from TPWD.

## 2. OVERVIEW OF THE SURVEYS

Estimates of recreational catch for marine fish species in the Atlantic and 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

Survey	Area	Timeframe	Mode*
MRFSS	1. TX (not all modes/waves) 2. NC-LA 3. NC-LA 4. ME-VA 5. USVI 6. PR	1. 1981-1985 2. 1981-1985 (except 1981, wave 1) 3. 1986-present 4. 1981-present (except 1981, wave 1) 5. 2000 6. 2000-present	1. SH, HB/CH, PR 2. SH, HB/CH, PR 3. SH, CH, PR 4. SH, HB/CH, PR 5. SH, CH, PR 6. SH, CH, PR
Headboat	1. NC-FLE (incl. Keys) 2. FLW-TX	1. 1981- present (overlap w/MRFSS HBT 81-85) 2. 1986-present	1. HB 2. HB

TPWD	TX	1983-present	CH, PR
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\*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.

## 2.1 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 being included in order to avoid duplication with the Headboat Survey.) 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 in more detail in section 4.1 of this paper. 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.

## 2.2 Headboat Survey (HBS)

The Headboat Survey covers the South Atlantic coast headboats starting in 1981 and the Gulf of Mexico headboats starting in 1986. Since MRFSS produced headboat estimates from 1981-1985 in their combined charter+headboat mode, estimates from the Headboat Survey are not used until 1986 for all areas (S. Atlantic and Gulf of Mexico) in order to prevent duplication. In 1986 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 2002-2006. 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. In 2006 there were no trip reports for LA and no substitutes were used. Some fish were sampled. Effort estimates were generated but no catch estimates.

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

The TPWD Sport-boat Angling Survey samples fishing trips made by sport-boat anglers fishing in Texas marine waters. All sampling takes place at recreational boat access sites. The raw data includes information on catch, effort and length composition of the catch for sampled boat-trips. These data are used by TPWD to generate recreational catch and effort estimates. Data and estimates for finfish from this survey are sent to the Southeast Fisheries Science Center (SEFSC) for use by the National Marine Fisheries Service (NMFS).

The survey is designed to estimate landings and effort by high-use and low-use seasons (May 15-November 20 and November 21-May 14). Estimates by wave are also calculated for NMFS so that they are compatible with MRFSS. Shore mode and headboat mode are not included in the survey.

Files for all years were replaced by TPWD in November 2005 to incorporate revisions to the calculation of estimates and numerous data corrections and revisions to the raw data. However, as mentioned earlier, data prior to 2000 have not been replaced for this assessment at this time. Whether data prior to 2000 will be replaced for any survey for all years will invariably be decided at this Data Workshop.

## **3. CATCH ESTIMATES and SAMPLING PROPORTIONS**

The MRFSS king mackerel catch data presented here are from the traditional MRFSS or “old charterboat” method of producing estimates for all years in order to maintain consistency with previous years and assessments (see section 4.1 for further details).

MRFSS estimates are made at the state level (by coast for Florida). Atlantic migratory group includes data from MA to GA year-round. Gulf of Mexico migratory group includes data from LA to FLW year-round. MRFSS includes the Florida Keys/Monroe county in FLW thus the Keys are included in the Gulf migratory group year-round. Landings from FLE (from Nassau county to Miami-Dade county) switch seasonally. Data from waves 1 and 6 (winter) are included in the Gulf migratory group and data from waves 3, 4, and 5 (summer) are included in the Atlantic migratory group. Wave 2 estimates (March-April) for FLE are split and half put into March (thus the Gulf migratory group) and the other half into April (thus the Atlantic migratory group).

Headboat Survey data were available through 2006. 2007 data presented for January through June are taken from 2006 data for the same time period. As mentioned before there are no catch estimates made for LA from 2004-2006. Headboat Survey personnel recommend using the average landings for LA from 1999-2001 in order to estimate the missing years.

For the Headboat Survey data, Atlantic migratory group includes data from NC through NE FL (HBT areas 1-7, 9, and 10) year-round. Gulf migratory group includes data from TX through SW FL (HBT areas 20-27) year-round. Data from East-Central FL through the Dry Tortugas (HBT areas 8, 11, 12, 17, and 18) is included in the Atlantic migratory group in the summer (Apr-Oct) and in the Gulf migratory group in the winter (Nov-Mar).

TPWD data were available through 2006. 2007 data presented for January through June are taken from 2006 data for the same time period. All data belongs to the Gulf migratory group.

Tables 1-8 show the total recreational catch estimates by migratory group, mode, and data source, as well as the sampling proportions by migratory group. The estimates include substitutions for missing estimates and all but 2000+ are from past assessments and do not reflect updates made more recently. In the tables, estimated A+B1 is the catch that was killed and B2 is the catch that was released alive. Recreational length data was obtained from the following sources (not necessarily for all years): MRFSS, HBS, TPWD, TIP, GulfFIN, Panama City lab, and Alabama charterboat study.

Table 1. Total estimated recreational A+B1 catch (number of fish killed) and B2 catch (number released alive) by migratory group and calendar year for king mackerel.

Table 2. Atlantic migratory group estimated recreational A+B1 catch (number of fish killed) and B2 catch (number released alive) by data source and calendar year for king mackerel.

Table 3. Gulf of Mexico migratory group estimated recreational A+B1 catch (number of fish killed) and B2 catch (number released alive) by data source and calendar year for king mackerel.

Table 4. Atlantic migratory group estimated recreational A+B1 catch (number of fish killed) by mode and calendar year for king mackerel.

Table 5. Gulf of Mexico migratory group estimated recreational A+B1 catch (number of fish killed) by mode and calendar year for king mackerel.

Table 6. Atlantic migratory group estimated recreational B2 catch (number released alive) by mode and calendar year for king mackerel.

Table 7. Gulf of Mexico migratory group estimated recreational B2 catch (number released alive) by mode and calendar year for king mackerel.

Table 8. Percent of total estimated recreational A+B1 catch that was measured by migratory group and calendar year for king mackerel.

## **4. TOPICS FOR DISCUSSION**

### **4.1 Use of new charterboat method vs. old charterboat method estimates**

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.

Prior to the Data Workshop there were no conversion factors available for the Atlantic coast. As a result, the king mackerel catch data presented here are from the traditional MRFSS or “old charterboat” method of producing estimates for all years in order to maintain consistency with previous years and assessments. See document entitled “Estimated conversion factors for calibrating MRFSS charterboat landings and effort estimates from the Southeastern US (North Carolina to Florida-east coast) in 1981-2003 with For-Hire Survey estimates with application to King Mackerel landings” by Tom Sminkey (SEDAR16-DW-15) for new Atlantic calibration factors.

Table 9 shows the difference between MRFSS king mackerel landings estimated using the old charterboat method and the new charterboat method where calibration factors are available (Gulf of Mexico).

#### 4.2 Estimation of the number of fish released in the Headboat Survey and TPWD survey.

Currently, there are no release estimates for either the Headboat Survey or the TPWD survey.

The HBS has been collecting release data on their logbooks since 2004. Estimates of releases have been calculated for these years but these estimates were not available prior to the Data Workshop. Please see Estimates of released king mackerel in the South Atlantic and Gulf of Mexico Headboat fishery, 2004-2006 (SEDAR16-DW-25) by Kenneth Brennen for these estimates. Tables 10 and 11 show the ratio of b2 to ab1 estimates from the MRFSS survey for charterboat. These ratios could possibly be used as a proxy to estimate release for the HBS.

Table 10. Ratios of **fish released alive** (B2) to **fish killed** (AB1) from MRFSS charterboat catch estimates by state and wave for the Gulf of Mexico migratory group.

Table 11. Ratios of **fish released alive** (B2) to **fish killed** (AB1) from MRFSS charterboat catch estimates by state and wave for the Atlantic migratory group.

Releases for TPWD could possibly be estimated by using the MRFSS b2 to ab1 for LA.

#### **4.3 TPWD updated data**

In November 2005 TPWD provided updated catch estimates to the SEFSC for all years dating back to 1983. As mentioned earlier, this data update incorporated revisions to the calculation of estimates and numerous data corrections and revisions to the raw data. Catch data prepared for this Data Workshop includes new/updated data from all sources from 2000-2007. Final recreational catch estimates from previous king mackerel assessments are used for 1981-1999. Table 12 shows the differences between the original TPWD data used in prior king mackerel assessments and the updated data TPWD for the years 1983-1999.

Table 1. Total estimated recreational A+B1 catch (number of fish killed) and B2 catch (number released alive) by migratory group and calendar year for king mackerel.

year	Atlantic		Gulf		Total A+B1	Total B2
	A+B1	B2	A+B1	B2		
1981	416,459	2,182	667,664	8,619	1,084,123	10,801
1982	609,745	1,172	911,746	17,310	1,521,491	18,482
1983	669,517	240	324,294	179	993,811	419
1984	614,122	1,083	400,733	925	1,014,855	2,008
1985	806,111	10,550	196,363	16,657	1,002,474	27,207
1986	684,097	13,850	221,584	19,755	905,681	33,605
1987	567,387	42,646	547,034	32,704	1,114,421	75,350
1988	546,264	32,635	475,170	42,899	1,021,434	75,534
1989	368,758	22,579	364,519	157,327	733,277	179,906
1990	464,310	13,874	563,052	118,152	1,027,362	132,026
1991	590,412	50,732	727,904	166,282	1,318,316	217,014
1992	715,843	26,406	492,463	162,502	1,208,306	188,908
1993	358,048	32,170	694,934	68,731	1,052,982	100,901
1994	397,824	19,088	654,230	155,129	1,052,054	174,217
1995	464,347	41,267	654,994	160,402	1,119,341	201,669
1996	364,967	47,430	733,161	186,781	1,098,128	234,211
1997	529,465	82,923	741,014	140,384	1,270,479	223,307
1998	449,264	75,711	623,136	105,970	1,072,400	181,681
1999	359,696	90,467	533,734	105,259	893,430	195,726
2000	550,128	79,403	539,497	153,086	1,089,625	232,489
2001	339,992	84,642	527,276	309,018	867,268	393,660
2002	278,192	69,962	568,635	201,479	846,827	271,441
2003	445,607	123,835	579,326	271,576	1,024,933	395,411
2004	348,935	120,067	452,026	215,668	800,961	335,735
2005	398,772	165,744	431,396	207,317	830,168	373,061
2006	447,418	142,773	775,108	587,901	1,222,526	730,674
2007	306,636	95,721	336,471	70,057	643,107	165,778

Table 2. **Atlantic migratory group** estimated recreational A+B1 catch (number of fish killed) and B2 catch (number released alive) by data source and calendar year for king mackerel.

year	HBS		MRFSS		Total A+B1	Total B2
	A+B1	B2	A+B1	B2		
1981			416,459	2,182	416,459	2,182
1982			609,745	1,172	609,745	1,172
1983			669,517	240	669,517	240
1984			614,122	1,083	614,122	1,083
1985			806,111	10,550	806,111	10,550
1986	28,187		655,910	13,850	684,097	13,850
1987	29,428		537,959	42,646	567,387	42,646
1988	22,072		524,192	32,635	546,264	32,635
1989	24,022		344,736	22,579	368,758	22,579
1990	27,865		436,445	13,874	464,310	13,874
1991	41,296		549,116	50,732	590,412	50,732
1992	23,175		692,668	26,406	715,843	26,406
1993	21,657		336,391	32,170	358,048	32,170
1994	25,090		372,734	19,088	397,824	19,088
1995	18,708		445,639	41,267	464,347	41,267
1996	31,607		333,360	47,430	364,967	47,430
1997	18,708		510,757	82,923	529,465	82,923
1998	16,355		432,909	75,711	449,264	75,711
1999	20,022		339,674	90,467	359,696	90,467
2000	20,037		530,091	79,403	550,128	79,403
2001	12,554		327,438	84,642	339,992	84,642
2002	11,670		266,522	69,962	278,192	69,962
2003	9,099		436,508	123,835	445,607	123,835
2004	13,632		335,303	120,067	348,935	120,067
2005	21,688		377,084	165,744	398,772	165,744
2006	17,445		429,973	142,773	447,418	142,773
2007	5,903		300,733	95,721	306,636	95,721



Table 3. **Gulf of Mexico migratory group** estimated recreational A+B1 catch (number of fish killed) and B2 catch (number released alive) by data source and calendar year for king mackerel.

year	HBS		MRFSS		TPWD		Total A+B1	Total B2
	A+B1	B2	A+B1	B2	A+B1	B2		
1981			667,664	8,619			667,664	8,619
1982			864,081	17,310	47,665		911,746	17,310
1983			276,629	179	47,665		324,294	179
1984			373,557	925	27,176		400,733	925
1985			164,207	16,657	32,156		196,363	16,657
1986	17,263		187,508	19,755	16,813		221,584	19,755
1987	44,248		469,626	32,704	33,160		547,034	32,704
1988	11,666		441,287	42,899	22,217		475,170	42,899
1989	20,488		325,473	157,327	18,558		364,519	157,327
1990	32,892		502,544	118,152	27,616		563,052	118,152
1991	30,675		669,526	166,282	27,703		727,904	166,282
1992	30,168		407,315	162,502	54,980		492,463	162,502
1993	34,149		586,051	68,731	74,734		694,934	68,731
1994	35,853		601,256	155,129	17,121		654,230	155,129
1995	35,080		605,553	160,402	14,361		654,994	160,402
1996	39,376		674,105	186,781	19,680		733,161	186,781
1997	41,833		665,442	140,384	33,739		741,014	140,384
1998	31,213		531,676	105,970	60,247		623,136	105,970
1999	28,604		472,227	105,259	32,903		533,734	105,259
2000	27,375		480,068	153,086	32,054		539,497	153,086
2001	20,287		489,956	309,018	17,033		527,276	309,018
2002	19,131		526,668	201,479	22,836		568,635	201,479
2003	27,418		528,051	271,576	23,857		579,326	271,576
2004	24,855		400,255	215,668	26,916		452,026	215,668
2005	35,393		376,189	207,317	19,814		431,396	207,317
2006	38,409		693,604	587,901	43,095		775,108	587,901
2007	22,783		295,426	70,057	18,262		336,471	70,057

Table 4. **Atlantic migratory group** estimated recreational **A+B1** catch (number of fish killed) by mode and calendar year for king mackerel.

year	Atlantic A+B1					All modes
	Shore	Priv	Cbt	Hbt	Cbt/Hbt	
1981	-	153,405	-	-	263,055	416,459
1982	-	401,131	-	-	208,612	609,745
1983	-	442,932	-	-	226,584	669,517
1984	2,814	403,209	-	-	208,098	614,122
1985	-	269,159	-	-	536,953	806,111
1986	23,233	441,569	189,621	28,187	1,486	684,097
1987	1,570	336,806	199,580	29,428	-	567,387
1988	8,473	307,740	207,672	22,072	304	546,264
1989	5,195	180,959	156,091	24,022	2,492	368,758
1990	17,352	266,136	152,738	27,865	221	464,310
1991	12,602	340,938	195,076	41,296	501	590,412
1992	1,622	400,033	289,253	23,175	1,755	715,843
1993	3,050	194,207	139,135	21,657	-	358,048
1994	10,420	183,707	177,772	25,090	838	397,824
1995	3,428	196,297	245,023	18,708	893	464,347
1996	1,715	166,821	163,004	31,607	1,825	364,967
1997	9,837	230,966	268,955	18,708	1,000	529,465
1998	74,058	187,737	169,144	16,355	1,966	449,264
1999	2,891	216,978	119,435	20,022	370	359,696
2000	2,409	395,360	132,317	20,037	-	550,128
2001	4,866	236,653	85,917	12,554	-	339,992
2002	17,931	195,539	53,053	11,670	-	278,192
2003	2,196	347,560	86,720	9,099	31	445,607
2004	3,670	249,169	82,301	13,632	160	348,935
2005	3,293	257,930	110,726	21,688	5,132	398,772
2006	10,474	307,867	110,873	17,445	759	447,418
2007	3,531	241,744	55,456	5,903	-	306,636

Table 5. **Gulf of Mexico migratory group** estimated recreational **A+B1** catch (number of fish killed) by mode and calendar year for king mackerel.

year	Gulf A+B1					All modes
	Shore	Priv	Cbt	Hbt	Cbt/Hbt	
1981	81,085	368,513	-	-	218,067	667,664
1982	23,102	680,171	21,479	3,220	183,773	911,746
1983	32,060	217,854	21,479	3,220	49,682	324,294
1984	828	340,465	3,864	7,562	48,015	400,733
1985	-	116,335	4,076	7,003	68,951	196,363
1986	5,863	155,085	43,373	17,263	-	221,584
1987	42,824	315,507	144,456	44,248	-	547,034
1988	23,839	268,417	171,228	11,683	-	475,170
1989	9,819	240,552	93,628	20,519	-	364,519
1990	124,220	264,816	141,087	32,926	-	563,052
1991	125,524	396,245	175,462	30,675	-	727,904
1992	54,089	244,218	163,987	30,168	-	492,463
1993	63,931	250,745	346,112	34,149	-	694,934
1994	67,516	193,921	356,943	35,853	-	654,230
1995	16,628	225,055	378,235	35,080	-	654,994
1996	7,707	177,140	508,940	39,376	-	733,161
1997	14,224	291,304	393,652	41,833	-	741,014
1998	6,505	197,721	387,694	31,213	-	623,136
1999	25,221	185,981	293,925	28,604	-	533,734
2000	32,013	237,689	242,422	27,375	-	539,497
2001	51,838	187,789	267,362	20,287	-	527,276
2002	55,910	243,964	249,630	19,131	-	568,635
2003	31,894	299,350	220,663	27,418	-	579,326
2004	21,911	227,493	177,766	24,855	-	452,026
2005	40,522	183,374	172,107	35,393	-	431,396
2006	81,476	356,116	299,112	38,409	-	775,108
2007	24,315	158,890	130,483	22,783	-	336,471

Table 6. **Atlantic migratory group** estimated recreational **B2** catch (number released alive) by mode and calendar year for king mackerel.

year	Atlantic B2					All modes
	Shore	Priv	Cbt	Hbt	Cbt/Hbt	
1981	0	2,182	0	0	0	2,182
1982	0	0	0	0	1,172	1,172
1983	0	0	0	0	240	240
1984	0	0	0	0	1,083	1,083
1985	0	10,550	0	0	0	10,550
1986	0	13,728	122	0	0	13,850
1987	0	11,527	31,119	0	0	42,646
1988	0	23,857	8,778	0	0	32,635
1989	1,489	16,986	4,071	0	34	22,579
1990	0	11,412	2,462	0	0	13,874
1991	461	48,403	1,868	0	0	50,732
1992	586	24,149	1,671	0	0	26,406
1993	1,953	26,263	3,954	0	0	32,170
1994	1,656	16,833	598	0	0	19,088
1995	0	30,018	11,249	0	0	41,267
1996	1,109	41,680	4,641	0	0	47,430
1997	12,017	56,658	14,245	0	0	82,923
1998	2,237	60,759	12,573	0	143	75,711
1999	10,274	65,325	14,869	0	0	90,467
2000	0	65,601	13,802	0	0	79,403
2001	3,502	78,475	2,667	0	0	84,642
2002	13,349	53,667	2,948	0	0	69,962
2003	0	118,854	4,981	0	0	123,835
2004	9,049	103,119	7,898	0	0	120,067
2005	8,155	147,833	9,757	0	0	165,744
2006	13,798	121,182	7,795	0	0	142,773
2007	1,031	89,738	4,953	0	0	95,721

Table 7. **Gulf of Mexico migratory group** estimated recreational **B2** catch (number released alive) by mode and calendar year for king mackerel.

year	Gulf B2					All modes
	Shore	Priv	Cbt	Hbt	Cbt/Hbt	
1981	0	8,619	0	0	0	8,619
1982	324	15,814	0	0	1,172	17,310
1983	0	0	0	0	179	179
1984	0	0	0	0	925	925
1985	2,117	14,540	0	0	0	16,657
1986	5,863	12,851	1,041	0	0	19,755
1987	6,421	18,568	7,716	0	0	32,704
1988	0	33,010	9,889	0	0	42,899
1989	95,855	55,907	5,566	0	0	157,327
1990	71,667	20,407	26,079	0	0	118,152
1991	8,547	100,919	56,817	0	0	166,282
1992	15,939	95,018	51,546	0	0	162,502
1993	9,609	50,381	8,741	0	0	68,731
1994	2,597	93,852	58,680	0	0	155,129
1995	4,641	141,026	14,735	0	0	160,402
1996	2,245	129,119	55,420	0	0	186,781
1997	21,916	73,256	45,212	0	0	140,384
1998	2,415	62,046	41,511	0	0	105,970
1999	12,676	73,031	19,550	0	0	105,259
2000	25,589	100,648	26,849	0	0	153,086
2001	181,322	96,617	31,076	0	0	309,018
2002	65,069	109,330	27,078	0	0	201,479
2003	29,852	200,829	40,895	0	0	271,576
2004	49,432	140,574	25,661	0	0	215,668
2005	35,450	139,978	31,888	0	0	207,317
2006	294,601	242,390	50,910	0	0	587,901
2007	1,160	53,591	15,305	0	0	70,057

Table 8. **Percent of total** estimated recreational **A+B1 catch that was measured** by migratory group and calendar year for king mackerel.

<b>year</b>	<b>Atlantic No. meas.</b>	<b>Atlantic Pct. meas.</b>	<b>Gulf No. meas.</b>	<b>Gulf Pct. Meas.</b>	<b>Total No. Meas.</b>	<b>Total A+B1 Catch Est.</b>	<b>Total Pct. Meas.</b>
1981	619	0.15%	425	0.06%	1,044	1,084,123	0.10%
1982	577	0.14%	492	0.07%	1,069	1,521,491	0.07%
1983	877	0.21%	1,211	0.18%	2,088	993,811	0.21%
1984	1,372	0.33%	2,320	0.35%	3,692	1,014,855	0.36%
1985	2,918	0.70%	3,845	0.58%	6,763	1,002,474	0.67%
1986	3,664	0.88%	3,644	0.55%	7,308	905,681	0.81%
1987	6,168	1.48%	5,601	0.84%	11,769	1,114,421	1.06%
1988	2,500	0.60%	3,035	0.45%	5,535	1,021,434	0.54%
1989	2,131	0.51%	2,944	0.44%	5,075	733,277	0.69%
1990	2,055	0.49%	2,445	0.37%	4,500	1,027,362	0.44%
1991	1,959	0.47%	4,332	0.65%	6,291	1,318,316	0.48%
1992	2,631	0.63%	4,183	0.63%	6,814	1,208,306	0.56%
1993	1,511	0.36%	2,576	0.39%	4,087	1,052,982	0.39%
1994	1,415	0.34%	2,991	0.45%	4,406	1,052,054	0.42%
1995	1,583	0.38%	2,432	0.36%	4,015	1,119,341	0.36%
1996	954	0.23%	2,726	0.41%	3,680	1,098,128	0.34%
1997	2,662	0.64%	3,863	0.58%	6,525	1,270,479	0.51%
1998	1,930	0.46%	3,846	0.58%	5,776	1,072,400	0.54%
1999	1,463	0.35%	3,842	0.58%	5,305	893,430	0.59%
2000	2,142	0.51%	4,033	0.60%	6,175	1,089,625	0.57%
2001	1,777	0.43%	3,216	0.48%	4,993	867,268	0.58%
2002	1,379	0.33%	3,358	0.50%	4,737	846,827	0.56%
2003	1,928	0.46%	3,617	0.54%	5,545	1,024,933	0.54%
2004	1,600	0.38%	3,045	0.46%	4,645	800,961	0.58%
2005	1,541	0.37%	2,793	0.42%	4,334	830,168	0.52%
2006	2,128	0.51%	4,287	0.64%	6,415	1,222,526	0.52%
2007	769	0.18%	1,225	0.18%	1,994	643,107	0.31%

Table 9. Difference between old charterboat method A+B1 estimates and the new charterboat method A+B1 estimates for the Gulf of Mexico (LA-FLW) using calibration factors for 1981-1997.

YEAR	Cbt		Cbt/Hbt	
	Old A+B1	New/recalib A+B1	Old A+B1	New/recalib A+B1
1981			35,759	57,786
1982			58,989	88,373
1983			45,808	70,800
1984			37,492	56,500
1985			60,578	93,036
1986	37,795	36,318		
1987	108,446	78,941		
1988	103,427	81,598		
1989	73,647	59,382		
1990	99,688	85,826		
1991	164,650	142,199		
1992	133,327	107,324		
1993	230,469	186,002		
1994	319,977	245,624		
1995	328,130	324,293		
1996	426,692	339,905		
1997	332,823	266,829		
1998	317,726	173,231		
1999	197,735	106,727		
2000	209,940	129,859		
2001	228,240	101,819		
2002	222,498	118,913		
2003	159,175	82,741		
2004	146,080	86,872		
2005	132,832	68,415		
2006	259,481	130,403		

Table 10. Ratios of **fish released alive (B2) to fish killed (AB1)** from MRFSS charterboat catch estimates by state and for king mackerel for the Gulf migratory group.

Gulf migratory group- Charter Mode																				
year	First month	Last month	FLE			FLW			AL			MS			LA			Total		
			A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1
2004	1	2	5,500	777	14%	41,152	3,719	9%						776	0	0%	47,428	4,496	9%	
	3	3	4,135	588	14%												4,135	588	14%	
		4				11,392	3,246	28%	209	0	0%			0	42		11,601	3,288	28%	
	5	6				16,429	1,598	10%	5,691	1,724	30%	101	0	0%	600	0	0%	22,821	3,322	15%
	7	8				38,325	5,671	15%	2,108	497	24%	57	0	0%	256	85	33%	40,746	6,253	15%
	9	10				12,113	1,983	16%	1,637	246	15%	261	0	0%	69	0	0%	14,080	2,229	16%
	11	12	10,025	878	9%	13,936	4,607	33%	968	0	0%						24,929	5,485	22%	
2004 Total			19,660	2,243	11%	133,347	20,824	16%	10,613	2,467	23%	419	0	0%	1,701	127	7%	165,740	25,661	15%
2005	1	2	13,491	3,757	28%	27,137	5,249	19%						0	132		40,628	9,138	22%	
	3	3	11,025	3,051	28%												11,025	3,051	28%	
		4				18,659	6,053	32%	0	0		42	0	0%	94	0	0%	18,795	6,053	32%
	5	6				26,698	5,222	20%	2,774	0	0%	0	0		102	119	117%	29,574	5,341	18%
	7	8				21,916	3,784	17%	8,171	256	3%	63	0	0%	217	0	0%	30,367	4,040	13%
	9	10				7,840	388	5%	1,921	242	13%						9,761	630	6%	
	11	12	11,872	2,322	20%	17,200	1,313	8%									29,072	3,635	13%	
2005 Total			36,388	9,130	25%	119,450	22,009	18%	12,866	498	4%	105	0	0%	413	251	61%	169,222	31,888	19%
2006	1	2	9,837	373	4%	55,113	4,431	8%						294	1,984	675%	65,244	6,788	10%	
	3	3	5,043	3,252	64%												5,043	3,252	64%	
		4				15,221	5,266	35%	80	0	0%			46	0	0%	15,347	5,266	34%	
	5	6				36,774	3,469	9%	2,718	0	0%			2,692	328	12%	42,184	3,797	9%	
	7	8				89,330	14,476	16%	8,418	1,236	15%	280	140	50%	1,570	0	0%	99,598	15,852	16%
	9	10				28,998	11,504	40%	1,653	0	0%	1,425	0	0%	859	1,263	147%	32,935	12,767	39%
	11	12	16,020	594	4%	13,741	2,594	19%	272	0	0%						30,033	3,188	11%	
2006 Total			30,900	4,219	14%	239,177	41,740	17%	13,141	1,236	9%	1,705	140	8%	5,461	3,575	65%	290,384	50,910	18%



Table 11. Ratios of **fish released alive (B2) to fish killed (AB1)** from MRFSS charterboat catch estimates by state and for king mackerel for the Atlantic migratory group.

Atlantic migratory group- Charter mode																	
year	First month	Last month	NC			SC			GA			FLE			Total		
			A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1	A+B1	B2	b2/ab1
2004	1	2	22	0	0%									22	0	0%	
	3	3	502	0	0%	45	0	0%						547	0	0%	
	4	4	502	0	0%	45	0	0%				4,135	588	14%	4,682	588	13%
	5	6	10,320	352	3%	2,140	128	6%	143	0	0%	30,181	4,804	16%	42,784	5,284	12%
	7	8	3,504	1,431	41%	3,235	0	0%	22	0	0%	13,256	491	4%	20,017	1,922	10%
	9	10	5,546	0	0%	1,031	84	8%	53	0	0%	4,929	0	0%	11,559	84	1%
	11	12	2,181	20	1%	509	0	0%						2,690	20	1%	
<b>2004 Total</b>			<b>22,577</b>	<b>1,803</b>	<b>8%</b>	<b>7,005</b>	<b>212</b>	<b>3%</b>	<b>218</b>	<b>0</b>	<b>0%</b>	<b>52,501</b>	<b>5,883</b>	<b>11%</b>	<b>82,301</b>	<b>7,898</b>	<b>10%</b>
2005	3	3	156	0	0%									156	0	0%	
	4	4	156	0	0%							11,025	3,051	28%	11,181	3,051	27%
	5	6	3,271	98	3%	3,233	517	16%				25,465	1,166	5%	31,969	1,781	6%
	7	8	17,384	650	4%	4,721	1,436	30%	128	0	0%	22,047	1,401	6%	44,280	3,487	8%
	9	10	813	496	61%	1,348	437	32%	86	0	0%	12,242	160	1%	14,489	1,093	8%
	11	12	2,228	42	2%	6,223	272	4%	200	31	16%			8,651	345	4%	
<b>2005 Total</b>			<b>24,008</b>	<b>1,286</b>	<b>5%</b>	<b>15,525</b>	<b>2,662</b>	<b>17%</b>	<b>414</b>	<b>31</b>	<b>7%</b>	<b>70,779</b>	<b>5,778</b>	<b>8%</b>	<b>110,726</b>	<b>9,757</b>	<b>9%</b>
2006	1	2	247	33	13%									247	33	13%	
	3	3	3,323	101	3%									3,323	101	3%	
	4	4	3,323	101	3%							5,043	3,252	64%	8,366	3,353	40%
	5	6	17,138	131	1%	5,063	0	0%	1,097	56	5%	26,442	1,844	7%	49,740	2,031	4%
	7	8	4,477	0	0%	4,391	248	6%	30	0	0%	27,360	1,372	5%	36,258	1,620	4%
	9	10	1,672	172	10%	887	128	14%	39	0	0%	5,200	177	3%	7,798	477	6%
	11	12	5,141	180	4%									5,141	180	4%	
<b>2006 Total</b>			<b>35,321</b>	<b>718</b>	<b>2%</b>	<b>10,341</b>	<b>376</b>	<b>4%</b>	<b>1,166</b>	<b>56</b>	<b>5%</b>	<b>64,045</b>	<b>6,645</b>	<b>10%</b>	<b>110,873</b>	<b>7,795</b>	<b>7%</b>

Table 12. The differences between the original TPWD data submitted to SFD and used in prior king mackerel assessments and the updated data TPWD sent in November 2005 can be seen for the years 1983-1999. For the Assessment, the years 2000-2006 were new/updated data, so that is why both columns match. 1982 and 2007 TPWD data in the assessment column correspond to data substitutions done by SFD for the assessment.

year	Assessment Data				Updated Data		
	Priv	Cbt	Hbt	Total	Priv	Cbt	Total
1982	22,966	21,479	3,220	47,665			
<b>1983</b>	<b>22,966</b>	<b>21,479</b>	<b>3,220</b>	<b>47,665</b>	<b>170,662</b>	<b>119,774</b>	<b>290,436</b>
<b>1984</b>	<b>15,750</b>	<b>3,864</b>	<b>7,562</b>	<b>27,176</b>	<b>148,670</b>	<b>97,087</b>	<b>245,757</b>
<b>1985</b>	<b>21,077</b>	<b>4,076</b>	<b>7,003</b>	<b>32,156</b>	<b>80,149</b>	<b>9,518</b>	<b>89,667</b>
<b>1986</b>	<b>12,560</b>	<b>4,253</b>	-	<b>16,813</b>	<b>29,559</b>	<b>23,745</b>	<b>53,304</b>
<b>1987</b>	<b>24,031</b>	<b>9,129</b>	-	<b>33,160</b>	<b>34,180</b>	<b>22,829</b>	<b>57,009</b>
<b>1988</b>	<b>18,524</b>	<b>3,676</b>	<b>17</b>	<b>22,217</b>	<b>104,168</b>	<b>31,298</b>	<b>135,466</b>
<b>1989</b>	<b>15,191</b>	<b>3,336</b>	<b>31</b>	<b>18,558</b>	<b>34,331</b>	<b>1,256</b>	<b>35,587</b>
<b>1990</b>	<b>23,612</b>	<b>3,970</b>	<b>34</b>	<b>27,616</b>	<b>29,383</b>	<b>10,501</b>	<b>39,884</b>
<b>1991</b>	<b>24,640</b>	<b>3,063</b>	-	<b>27,703</b>	<b>72,246</b>	<b>1,990</b>	<b>74,236</b>
<b>1992</b>	<b>50,631</b>	<b>4,349</b>	-	<b>54,980</b>	<b>42,849</b>	<b>81,844</b>	<b>124,693</b>
<b>1993</b>	<b>40,524</b>	<b>34,210</b>	-	<b>74,734</b>	<b>33,758</b>	<b>20,948</b>	<b>54,706</b>
<b>1994</b>	<b>13,697</b>	<b>3,424</b>	-	<b>17,121</b>	<b>21,497</b>	<b>8,420</b>	<b>29,917</b>
<b>1995</b>	<b>13,766</b>	<b>595</b>	-	<b>14,361</b>	<b>40,522</b>	<b>2,220</b>	<b>42,742</b>
<b>1996</b>	<b>16,537</b>	<b>3,143</b>	-	<b>19,680</b>	<b>42,848</b>	<b>26,748</b>	<b>69,596</b>
<b>1997</b>	<b>29,052</b>	<b>4,687</b>	-	<b>33,739</b>	<b>53,513</b>	<b>32,211</b>	<b>85,724</b>
<b>1998</b>	<b>34,641</b>	<b>25,606</b>	-	<b>60,247</b>	<b>18,391</b>	<b>21,241</b>	<b>39,632</b>
<b>1999</b>	<b>21,755</b>	<b>11,148</b>	-	<b>32,903</b>	<b>25,462</b>	<b>12,004</b>	<b>37,466</b>
2000	25,641	6,413	-	32,054	25,641	6,413	32,054
2001	11,501	5,532	-	17,033	11,501	5,532	17,033
2002	15,498	7,338	-	22,836	15,498	7,338	22,836
2003	14,042	9,815	-	23,857	14,042	9,815	23,857
2004	14,890	12,026	-	26,916	14,890	12,026	26,916
2005	16,929	2,885	-	19,814	16,929	2,885	19,814
2006	34,367	8,728	-	43,095	34,367	8,728	43,095
2007	15,974	2,288	-	18,262			