

## **Projected 2010 Quota Closure Date for Gulf of Mexico Recreational Greater Amberjack**

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Southeast Regional Office  
St. Petersburg, Florida

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### **Introduction**

Gulf of Mexico greater amberjack are managed under regulations and quotas established by the Gulf of Mexico Fisheries Management Council (Gulf Council) and the National Marine Fisheries Service (NMFS). Amendment 30A to the Reef Fish Fishery Management Plan established annual catch limits and accountability measures for greater amberjack, modified the rebuilding plan, increased the recreational minimum size limit from 28 to 30 inches fork length, set a zero bag limit for captain and crew of for-hire vessels, and set commercial and recreational quotas. The quota for 2009 was set at 1.368 million pounds whole weight (mp ww). On October 24, 2009, NMFS closed the recreational sector after landings data from the Marine Recreational Fisheries Statistics Survey (MRFSS) indicated this quota had been exceeded in-season. Total recreational landings of greater amberjack in 2009 are estimated to have exceeded the quota by 9% despite the quota closure. The accountability measures for the recreational greater amberjack sector include a payback provision where the next year's quota is reduced by the prior year's quota overage. This analysis computes when the quota for 2010 will be met using prior year's landings and preliminary landings estimates from Wave 1, 2010.

### **Methods and Results**

#### ***Landings in 2009***

Recreational greater amberjack landings were obtained from three data sources:

1. Marine Recreational Fisheries Statistics Survey (MRFSS), including the For-hire charter survey;
2. Southeast Fisheries Science Center Headboat survey (HBS); and,
3. Texas Parks and Wildlife Department (TPWD) charter and private/rental creel survey.

MRFSS and For-hire greater amberjack landings are estimated using a combination of dockside intercepts (landings data) and phone surveys (effort data). Landings in pounds whole weight (lbs ww) are estimated annually by two-month wave (e.g., Wave 1 = Jan/Feb, ... Wave 6 = Nov/Dec), area fished (inland, state, and federal waters), mode of fishing (charter, private/rental, shore), and state (west Florida, Alabama, Mississippi, and Louisiana). MRFSS landings of greater amberjack in the Gulf of Mexico are post-

stratified for West Florida, with landings from the Florida Keys removed (Table 1). Headboat landings are collected through logbooks completed by headboat operators. Landings (lbs ww) are reported by vessel, day/month, and statistical reporting area (i.e., area 18 = Dry Tortugas off west coast of Florida, ..., area 27 = Southeast Texas). The TPWD creel survey generates estimates of landings for private/rental boats and charter vessels fishing off Texas. Landings are reported in numbers by high (May 15-November 20) and low-use time periods (November 21-May 14), area fished (state vs. federal waters), and mode of fishing (private vs. charter). To convert TPWD landings in numbers to landings in pounds, greater amberjack average lengths by mode, wave, and area fished were converted to weights using a standard length-weight conversion formula from SEDAR 9 SAR2 (2006). Final landings estimates for 2009 totaled 1.493 mp ww, exceeding the quota by 124,817 lbs; a 9% overage (Table 2).

**Table 1.** MRFSS post-stratified landings (lbs ww) for West Florida for 2009, all modes.

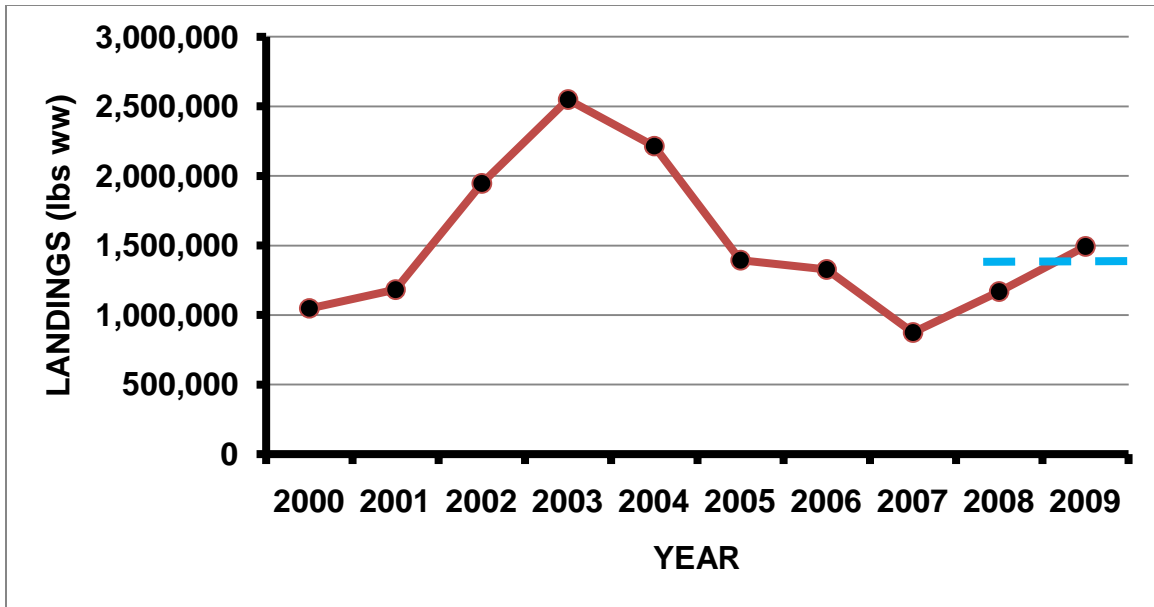
WAVE	WEST FLORIDA (excluding Keys)		FLORIDA KEYS	
	POUNDS	PSE	POUNDS	PSE
1	81,559	31.0	9,656	37.3
2	23,345	28.7	17,314	36.1
3	567,098	20.4	7,502	51.1
4	264,892	16.8	1,819	52.3
5	52,549	18.8	1,464	53.7
6 (closed)	0	.	0	.
<b>TOTAL</b>	<b>989,443</b>		<b>37,755</b>	

**Table 2.** Final 2009 recreational landings estimates (lbs ww) for Gulf greater amberjack.

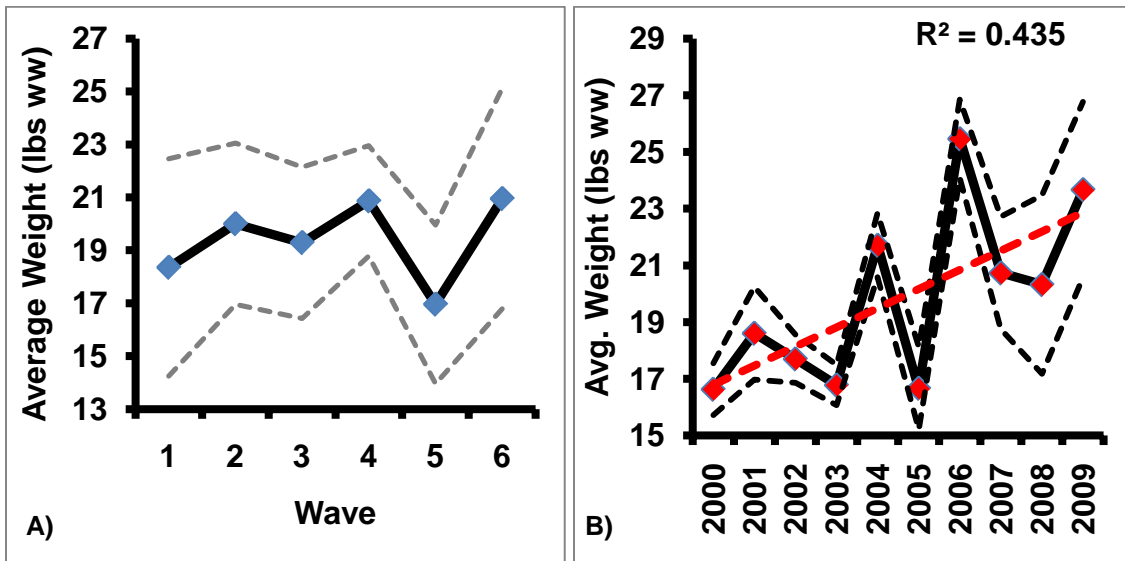
DATA SOURCE	LANDINGS (lbs ww)
HBS	103,192
MRFSS	1,385,990
TPWD	3,634
<b>Grand Total</b>	<b>1,492,816</b>

***Projected Landings in 2010***

The recreational quota for greater amberjack in 2010 would remain at 1.368 mp ww if the 2009 quota had not been exceeded. However, due to the overage of 124,817 lbs in 2009, the 2010 quota will be reduced to 1,243,184 lbs ww in compliance with accountability measures specified at 50 CFR 622.49(a)(1)(ii). Historical (2000-2008) HBS, MRFSS, and TPWD greater amberjack landings data were obtained from the NMFS Southeast Fisheries Science Center (SEFSC) ACL Recreational Landings Dataset (received January 2010). These data were used in combination with the 2009 landings estimates to examine annual landings trends in the greater amberjack recreational sector (Figure 1). Recreational landings of greater amberjack between 2000-2009 reached a peak in 2003, then declined to a low in 2007 (Figure 1). Figure 1 indicates a linear trend of increasing landings between 2007-2009.



**Figure 1.** Recreational landings (lbs ww) of greater amberjack in the Gulf of Mexico. Blue line denotes recreational quota of 1.368 mp ww implemented by Amendment 30A in August 2008.



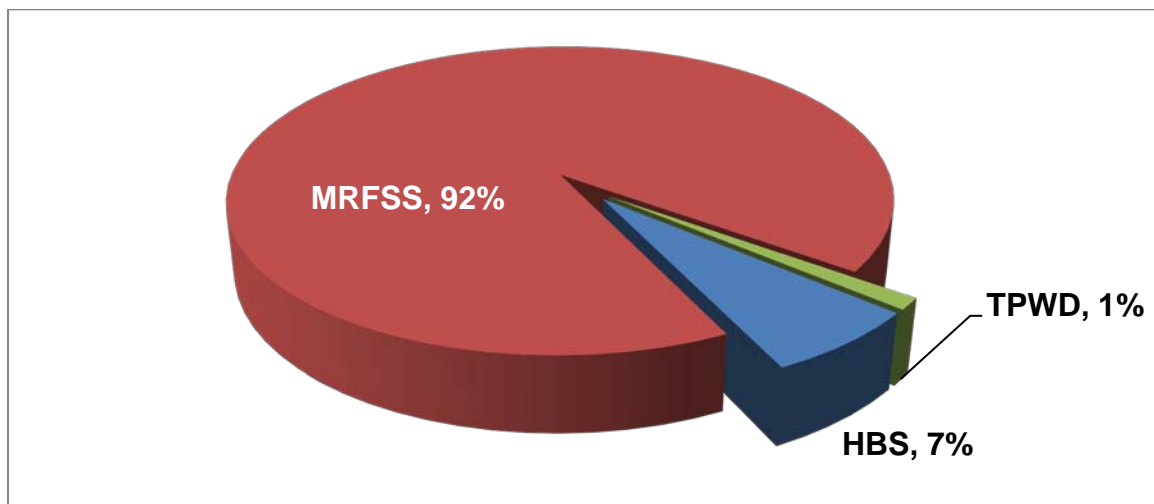
**Figure 2.** Average recreational landed weight (lbs ww) of Gulf greater amberjack, all data sources, 2000-2009, A) by wave with 95% confidence intervals and B) by year, 2000-2009, with linear trendline.

No significant trends were apparent in greater amberjack average landed weight by wave (Figure 2A). Although the greater amberjack stock is rebuilding, between 2000-2009, there was a significant trend ( $F_{1,8}=6.16, p<0.05$ ) in average weight of landed greater amberjack (Figure 2B), with average weight increasing by approximately 2/3 lb per year. However, there was no significant trend ( $p=0.4$ ) in the most recent years (2006-2009), although the minimum size limit was increased by 2 inches in mid-2008. Landed greater amberjack averaged 19.4 lbs/fish from 2000-2008, as compared to 23.7 lbs/fish in 2009;

however, average weights in 2006 were higher than this 2009 average. No assumptions of increases average weight of landed fish were explored in this modeling effort.

Between 2000-2009, the majority (92%  $\pm$  1%) of recreational greater amberjack landings in the Gulf of Mexico were reported to MRFSS (Figure 3). The majority of landings occur during waves 3 and 4 (Figure 4).

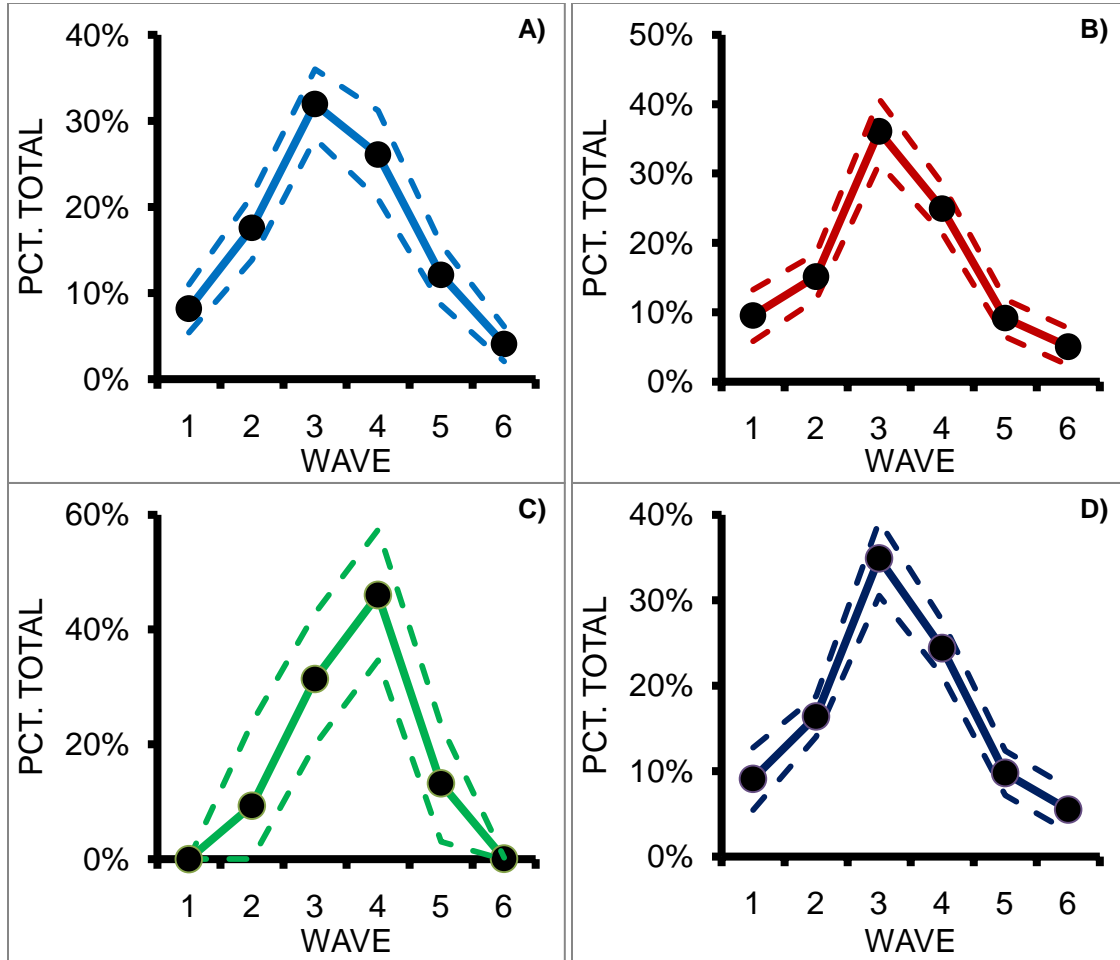
Because market forces and regulatory actions may increase the desirability of greater amberjack as a targeted species, MRFSS-reported ‘targeted’ trips for greater amberjack were evaluated for 2000-2009. MRFSS dockside intercept interviews ask anglers what the primary and secondary ‘target’ species were for their fishing trip. For the purposes of this analysis, a ‘targeted’ trip for greater amberjack was defined as any trip with a primary or secondary targeted species listed as ‘greater amberjack’, ‘jack family’, ‘jack genus’, ‘amberjack family’, ‘amberjack genus’, ‘banded rudderfish’, ‘lesser amberjack’, or ‘almaco jack.’ As with overall MRFSS landings trends, landings of greater amberjack on targeted trips peaked during Waves 3 and 4 (Figure 5A). Targeted effort (e.g., angler-trips) for greater amberjack was significantly higher during Waves 2-4 than during the winter months (Figure 5B). Interestingly, catch-per-angler-per-trip (CPAT) was significantly higher during Wave 1 as compared to other waves (Figure 5C). The simple average proportion ratio of targeted trips for greater amberjacks relative to targeted trips for other managed Gulf reef fish species steadily declined between 2003-2007, with a slightly increasing trend between 2007-2009 (Figure 5D).



**Figure 3.** Average percent recreational landings of greater amberjack in the Gulf of Mexico, 2000-2009, by data source.

Preliminary estimates of MRFSS-reported recreational greater amberjack landings of 68,536 lbs ww are available for 2010 Wave 1. Overall landings in Wave 1 were on average 14% higher than MRFSS landings between 2000-2008 and were adjusted accordingly to account for all sectors. Cumulative landings trends from 2000-2009 suggest that these preliminary landings in 2010 may put the fishery on a course similar to 2006-2008, rather than the higher landings observed in 2009 (Figure 6A). However, January and February 2010 were characterized by an unusually cold winter, which may

have severely depressed recreational fishing effort; therefore, reduced landings in Wave 1 in 2010 may not be an appropriate indicator for reduced fishing pressure over the course of the year. Historically, Wave 1 landings have represented between 5-13% of the total annual landings (Figure 6B).

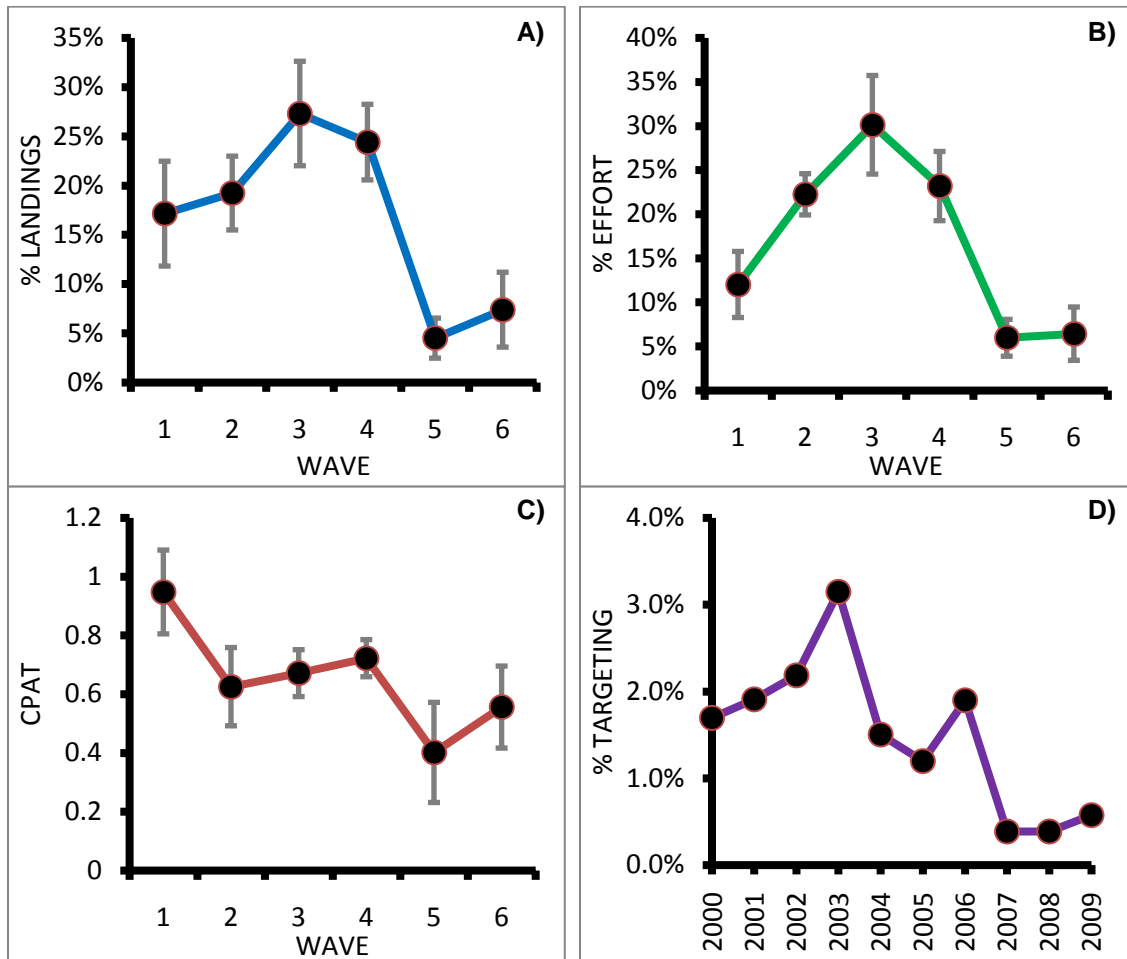


**Figure 4.** Landings by wave, with 95% confidence limits, for A) HBS 2000-2009, B) MRFSS 2000-2009, C) TPWD 2000-2008, and D) All sectors 2000-2008. In (C) and (D), averaging is done through 2008 because TPWD 2009 landings were not provided by wave.

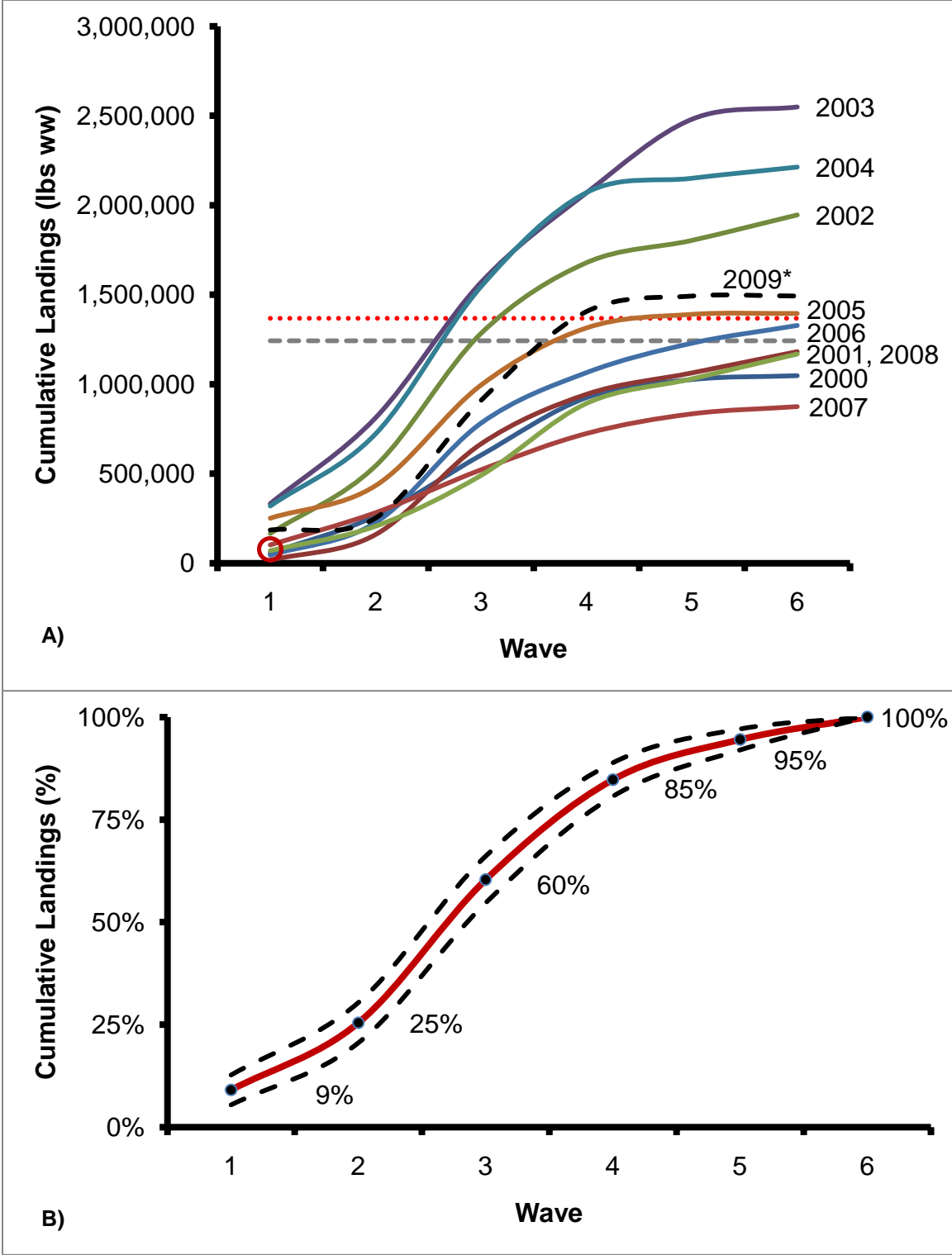
Due to the lack of clear temporal trends in landings and effort, we assumed landings in 2010 will proceed on pace with 2009 landings, as 2009 landings were the nearest temporal proxy. The recreational quota closure was implemented 53 days into the 61 day MRFSS Wave 5 in 2009. Assuming a uniform distribution of landings in Wave 5, Wave 5 landings would have been ~13% higher, and were expanded for the 2010 projection following this logic. Projecting 2010 landings based on 2009 trends also required the extrapolation of historical MRFSS 2000-2008 landings trends to predict what landings would have been during MRFSS Wave 6 of 2009, since the recreational sector was closed. A linear regression of MRFSS Wave 1-5 landings to Wave 6 landings from 2000-2008 showed an extremely poor statistical relationship ( $F_{1,7}=0.01, p=0.93$ ). Over this time period, MRFSS Waves 1-5 accounted for  $94.4\% \pm 1.4\%$  of total landings

(Figure 6B). Based on these trends, had Waves 5 and 6 in 2009 been completely open to fishing, cumulative MRFSS-reported landings might have been 1,473,384 lbs ww.

Upper and lower 80% confidence limits for MRFSS landings for 2000-2009 were generated using MRFSS percent standard error (PSE) estimates applied to post-stratified Gulf recreational landings by state, wave, and mode of fishing. Because 2009 Wave 6 was closed, an estimate of uncertainty for 2009 MRFSS Wave 6 landings was generated based on cumulative landings trends between 2000-2008, which suggested Wave 6 typically comprises  $5.6 \pm 1.4\%$  of the cumulative annual MRFSS-reported landings. Therefore, MRFSS 2009 Wave 6 landings were expanded as 4.2% of the cumulative lower confidence limit landings for MRFSS 2009 Waves 1-5 (Wave 5 adjusted). Similarly, MRFSS 2009 Wave 6 landings were expanded as 7.0% of the cumulative upper confidence limit landings for MRFSS 2009 Waves 1-5 (Wave 5 adjusted). No estimates of uncertainty were available for HBS, or TPWD data; as such, confidence limits may slightly underestimate the overall uncertainty in the data.



**Figure 5.** Evaluation of MRFSS trip intercepts in Gulf of Mexico (2000-2009) with amberjacks listed as target species, illustrating: A) Percentage of landings of greater amberjack on targeted trips by wave, B) Percentage of targeted trips for amberjacks by wave, C) Catch per angler per trip for greater amberjack by wave, and D) Percentage of targeted trips for amberjacks relative to targeted trips for any managed species in Gulf, by year.



**Figure 6.** Cumulative recreational landings of Gulf greater amberjack by wave, A) by year, 2000-2010, and B) as an average 2000-2008 with 95% confidence intervals. Note that preliminary 2010 MRFSS Wave 1 landings estimates were expanded to all sectors by scaling up 14% per historic averages (red circle in A).

**Table 3.** Projected landings (lbs ww) per day in 2010, by month, assuming landings are uniformly distributed within waves (MRFSS, TPWD) and months (HBS).

<b>MONTH</b>	<b>80% LCL</b>	<b>MEAN</b>	<b>80% UCL</b>
<b>January*</b>	525	<b>1,327</b>	2,129
<b>February*</b>	525	<b>1,327</b>	2,129
<b>March</b>	371	<b>1,024</b>	1,677
<b>April</b>	528	<b>1,181</b>	1,834
<b>May</b>	6,516	<b>10,611</b>	14,705
<b>June</b>	6,840	<b>10,934</b>	15,029
<b>July</b>	3,936	<b>8,102</b>	12,269
<b>August</b>	3,758	<b>7,924</b>	12,091
<b>September</b>	975	<b>1,665</b>	2,355
<b>October</b>	785	<b>1,475</b>	2,165
<b>November</b>	457	<b>1,285</b>	2,448
<b>December</b>	463	<b>1,290</b>	2,453

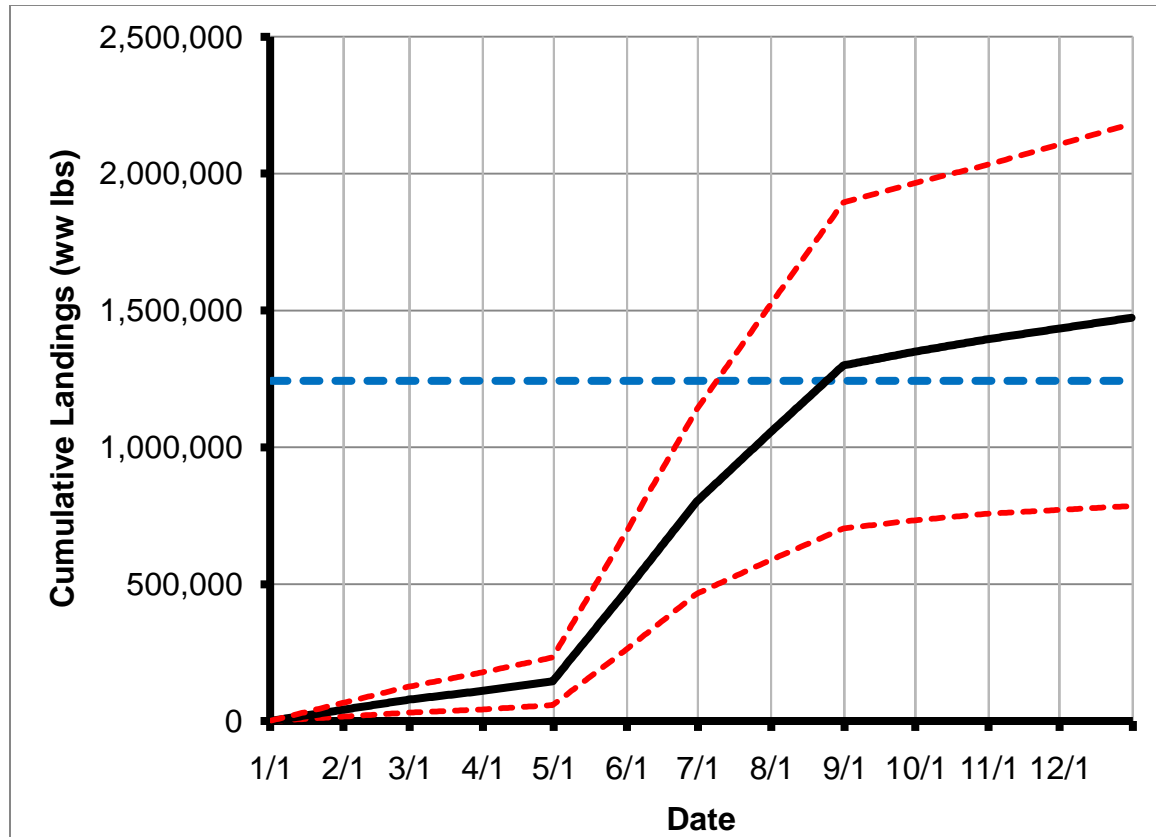
\*Based upon 2010 preliminary MRFSS Wave 1 landings, expanded to all sectors. All other computations based upon 2009 landings, expanded for Wave 5 and 6 as discussed in text.

HBS data from 2000-2009 were distributed by month as reported via headboat logbooks. TPWD data from 2000-2008 were available by wave from the SEFSC ACL dataset. TPWD landings for 2009 were distributed by two-month wave using the average percent annual landings by wave observed in 2000-2008. MRFSS and TPWD landings were assumed distributed uniformly within waves and were assigned by month based on the ratio of days between the two months within each wave.

As previously discussed, preliminary post-stratified landings estimates were available for MRFSS 2010 Wave 1. Between 2000-2008, MRFSS-reported Wave 1 landings averaged 86% of overall Wave 1 landings. As such, MRFSS 2010 Wave 1 landings were scaled up by 14% to represent all sectors, then distributed between January and February 2010 as previously described. Cumulative landings through time were computed assuming landings were uniformly distributed among days in a month, with landings-per-day ratios across sectors unique to each month (Table 3).

Based upon these analyses, the adjusted quota for 2010 is projected to be exceeded on August 24, 2010 (Figure 7). This quota may be exceeded as early July 9, 2010 based upon the 80% upper confidence limit of the projection. The upper 80% confidence limit estimate of 2,181,791 lbs ww is well below the highest mean landings estimate for 2000-2009 of 2,548,281 lbs ww in 2003. The lower 80% confidence limit estimate of 785,672 lbs ww would not exceed the adjusted quota, and is slightly below the lowest mean landings estimate for 2000-2009; which was 874,799 lbs ww in 2007. The 95% confidence limits for 2009 Gulf-wide MRFSS landings estimates, which include the Florida Keys but exclude MRFSS Wave 6, all TPWD, and all HBS landings, range from 730,250 – 2,237,754 lbs ww, encompassing the 2010 projected ‘all-sector’ 80% confidence limits. Thus, the range of uncertainty expressed by these projections appears reasonable.





**Figure 7.** Projected cumulative recreational landings of Gulf greater amberjack in 2010, assuming landings proceed similar to 2009, with 80% confidence limits (red). Note that 2010 Wave 1 landings are based upon expanded preliminary post-stratified MRFSS landings. Dashed blue line shows quota in 2010 as adjusted for 2009 overage.

## Discussion

These projections suggest landings in 2010 may exceed the recreational quota as reduced by the 2009 overage between July and August (see Figure 7). As with any modeling approach, the projections presented by this analysis are sensitive to the input data and assumptions. The primary data source driving the outcomes of these analyses is MRFSS, which suffers from low sampling relative to the total number of recreational trips, and high levels of uncertainty with estimated average weights. The error associated with this lack of precision is captured by the PSE estimates.

In addition to the uncertainty surrounding the MRFSS weight estimation procedure, there is uncertainty associated with changes in angler behavior, which are notoriously difficult to predict. Environmental (e.g., hurricanes, rough winters) and economic (e.g., increased fuel prices, reduced market demand) events may result in unpredictable and pronounced changes in angler behavior. For example, January and February of 2010 were unseasonably cold in the Gulf of Mexico, which may account for the ~60% decline in MRFSS-reported greater amberjack landings in Wave 1 of 2010 relative to 2000-2009 averages in Wave 1. This model operates under the assumption that angler behavior in

2009 is a reasonable proxy for behavior in 2010, although it does account for the lower landings observed in Wave 1 of 2010 due to an unseasonably cold winter. The model does not assume that anglers will compensate for reduced fishing during Wave 1 with increased effort and associated landings in subsequent waves. If fishermen do increase their effort relative to historic levels, the fishery may reach the adjusted quota sooner. Additionally, if average weight of fish landed increases as the population recovers, the fishery may reach the adjusted quota sooner (see Figure 2B). As fishing for greater amberjack requires relatively specialized gears and angling techniques, if targeting of greater amberjack increases due to increased desirability or reduced opportunities to fish for other species, the fishery may reach its quota sooner (see Figure 5D). If the fishery proceeds at rates more similar to those observed in 2007 and 2008, it may not exceed the adjusted quota (see Figure 6A). If the Deepwater Horizon oil spill on April 20, 2010 reduces effort throughout the Gulf of Mexico, this may result in lower landings relative to the 2009 assumption. It should be noted that although the effects of this environmental catastrophe are as yet unquantified, it may have negative impacts upon stock status and the regional economy.

The imprecision associated with landings estimates (in lbs) derived from MRFSS is responsible for the extremely broad confidence limits in Figure 7. These confidence limits may slightly underestimate the uncertainty in the projections, as no uncertainty around the HBS and TPWD landings estimates was provided. However, the importance of these fisheries to the total landings (~8%) is minimal relative to MRFSS; therefore, a large percentage of the uncertainty in the estimates for 2010 projected landings is probably captured by this modeling approach. If the quota has not been achieved by the projected closure date of August 24, the Regional Administrator may “readjust the reduced fishing season to ensure recreational harvest achieves but does not exceed the intended harvest level” (50 CFR §622.49(a)(1)(ii)).

## **Citations**

SEDAR 9 SAR-2. 2006. Gulf of Mexico Greater Amberjack. SEDAR, Charleston, SC, 178 p.