

2013 Recreational Red Snapper Quota Closure Analysis
NOAA Fisheries Service
Southeast Regional Office
St. Petersburg, FL
December 19, 2012

Abstract

Annually NOAA Fisheries projects the length of the Gulf of Mexico recreational red snapper fishing season. Projections for the 2013 fishing season were made using historical landings data and red snapper average weights, which indicate there is a strong linear trend in catch rates and average weights since the rebuilding plan was revised in 2007. Preliminary landings for 2012 indicate 5.8 million pounds of red snapper were landed in 2012, resulting in a 1.8 million pound quota overage. Assuming the Gulf Council approves a recreational quota of 4.146 million pounds for 2013, projections indicate the season length would be 27 days (range 24-30 days). Additional analyses were also performed to evaluate the impacts of Louisiana non-compatible regulations on the federal season length. Results of this analysis are highly dependent on catch rates assumed for Louisiana waters when the federal season is closed. If state water catch rates are comparable to historical state water catch rates, then the length of the federal season would be largely unchanged (+1 day to -2 days). However, if state water catch rates are comparable to state plus federal water catch rates then the length of the federal season would be shortened by 13 days (range 7-17 days shorter).

Introduction

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires NOAA Fisheries Service to close recreational red snapper in the Gulf of Mexico when the quota is met or projected to be met. In April 2012, NOAA Fisheries Service projected the 2012 recreational quota would be met 40 days after the June 1 opening of the fishing season, and established a closure date for the recreational sector of July 11, 2012 (FB12-038). Due to adverse weather conditions during June 2012, the closure date was extended to July 17, 2012.

In November 2012, the Gulf Council's Scientific and Statistical Committee examined updated stock assessment projections and recommended an Allowable Biological Catch (ABC) for 2013 of 8.462 mp ww. The Gulf Council will consider this ABC at their February 2013 meeting. Assuming they set the red snapper 2013 total allowable catch (TAC) equal to the ABC, the recreational sector would be allocated a 4.146 mp ww quota (49% of the TAC) for 2012. This analysis summarizes preliminary landings for the 2012 fishing season and predicts when the 2013 quota will be met, given a season starting on June 1, 2012. Given the short length of the red snapper fishing season and lags in the timeliness of landings data, in-season quota monitoring of red snapper is not possible. Historical red snapper landings adjusted for increases in average weight and catch rate are used as a proxy for predicting when the 2013 quota will be met.

2012 Recreational Red Snapper Landings

Recreational red snapper 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 red snapper landings are estimated using a combination of dockside intercepts (landings data) and phone surveys (effort data). Landings are estimated in both numbers and whole weight (lbs) 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).

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 in numbers 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, red snapper average lengths by mode, wave, and area fished were converted to weights using length-weight conversion formula from SEDAR 7 (2005).

At this time, preliminary MRFSS landings are available from January 1-October 31, 2012. Preliminary 2012 headboat landings are available from January 1-July 15, 2012. Preliminary TPWD landings are available from January 1-May 15, 2012. Landings from 2011 were used in all analyses to fill gaps for the remainder of 2012.

In February 2012, the Gulf Council approved a regulatory amendment that proposes to increase the TAC to 8.08 mp ww in 2012 (FB12-038). The recreational sector was allocated 49% of the TAC, resulting in 3.959 mp ww quota for 2012. Assuming unreported landings for August-December 2012 are equivalent to 2011 levels, Gulf of Mexico recreational red snapper landings for 2012 are estimated to be 5.834 mp ww, resulting in a 1.875 mp ww recreational quota overage (47.4 percent). The majority (75%) of recreational landings originated from Alabama and Florida (**Table 1**). For-hire (charter and headboat) landings accounted for 34.4 percent of the total recreational red snapper landings in 2012 and private/rental landings accounted for 65.6 percent of the total recreational landings in 2012 (**Table 2**).

Table 1. 2012 Gulf recreational red snapper landings (lbs ww) by state and wave. Values in gray italics incorporate some 2011 data to fill gaps.

WAVE	AL	FLW	LA	MS	TX	TOTAL
1	0	0	0	0	46,547	46,547
2	81	0	0	0	43,085	43,167
3	1,225,318	1,236,613	239,000	4,309	<i>303,545</i>	<i>3,008,786</i>
4	1,008,255	899,706	441,884	152,684	<i>184,787</i>	<i>2,687,316</i>
5	<i>0</i>	<i>310</i>	<i>0</i>	<i>0</i>	<i>3,872</i>	<i>4,182</i>
6	<i>129</i>	<i>2,848</i>	<i>0</i>	<i>18,730</i>	<i>12,695</i>	<i>34,402</i>
TOTAL	2,233,783	2,139,477	680,885	175,723	594,531	5,824,400
%	38%	37%	12%	3%	10%	100%

SOURCES: SEFSC ACL Dataset (Oct 2012), Preliminary 2012 Headboat Landings

Table 2. 2012 Gulf of Mexico red snapper landings (lbs ww) by wave, source, and mode (FH: For-Hire, PV: Private).

WAVE	HBS	MRFSS (FH)	TPWD (FH)	MRFSS (PV)	TPWD (PV)	FOR-HIRE TOTAL	PRIVATE TOTAL
1	46,547	0	0	0	0	46,547	0
2	16,240	0	5,392	0	21,534	21,632	21,534
3	390,894	752,785	24,636	1,781,050	<i>59,421</i>	<i>1,168,315</i>	<i>1,840,471</i>
4	243,127	503,994	10,252	1,875,161	<i>54,782</i>	<i>757,373</i>	<i>1,929,943</i>
5	<i>0</i>	<i>310</i>	<i>0</i>	<i>0</i>	<i>3,872</i>	<i>310</i>	<i>3,872</i>
6	<i>7,291</i>	<i>0</i>	<i>3,901</i>	<i>21,578</i>	<i>1,632</i>	<i>11,192</i>	<i>23,210</i>
TOTAL	704,099	1,257,089	44,181	3,677,790	141,241	2,005,369	3,819,031
%	12%	22%	1%	63%	2%	34%	66%

SOURCES: SEFSC ACL Dataset (Oct 2012), Preliminary 2012 Headboat Landings

Red Snapper Average Weights

Season length projections are heavily dependent upon estimates of average weight. Between 2007 and 2012, the reported average weight of a red snapper landed in the Gulf of Mexico increased from 3.32 to 7.07 lbs ww per fish. Between 2010 and 2012, the average weight of red snapper jumped from 5.31 to 7.07 lbs ww. Reported average weights were derived from the SEFSC ACL database (2012). For 2012, average weights are preliminary. Predicted average weights were obtained from the 2009 stock assessment (B. Linton, SEFSC, pers. comm.). The assessment projections were 4-5% higher than reported average weights in 2009 and 2010, 4% lower in 2011, and 11% lower in 2012. The assessment projects the average weight of red snapper to be 6.47 lbs ww in 2013. Given the recent trend in average weight, this seems unlikely (**Figure 1**). To account for recent trends in average weight, observed average weights from 2006-2012 were projected using a generalized linear regression implemented in SAS Proc GENMOD, and a value was forecast for 2013.

The Deepwater Horizon/BP oil spill resulted in large fishery closures in the Gulf of Mexico from April-December 2010. To avoid distortion of model predictions due to the unique fishery dynamics caused by spill-related fishery closures, 2010 data were dropped from all regression models.

Generalized linear regression model fits for red snapper average weights (LR $\chi^2=23.32$, $p<0.0001$, $R^2 = 0.98$) indicated a rapidly increasing linear trend of approximately 0.67 lbs ww per year (Figure 2). Projected average weight for 2013 was 7.70 lbs ww per fish, with 95% confidence limits between 7.34-8.06 lbs ww per fish.

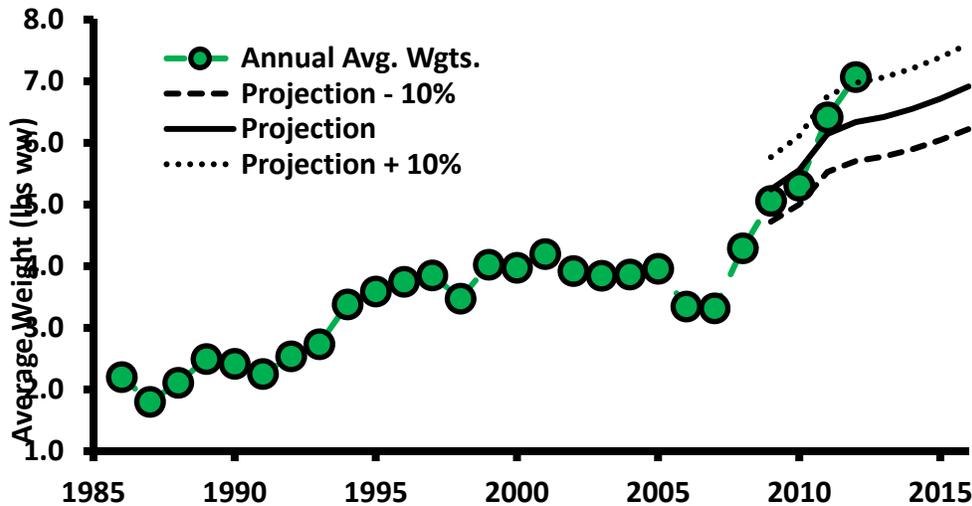


Figure 1. Reported and predicted average weights of red snapper, 2000-2013.

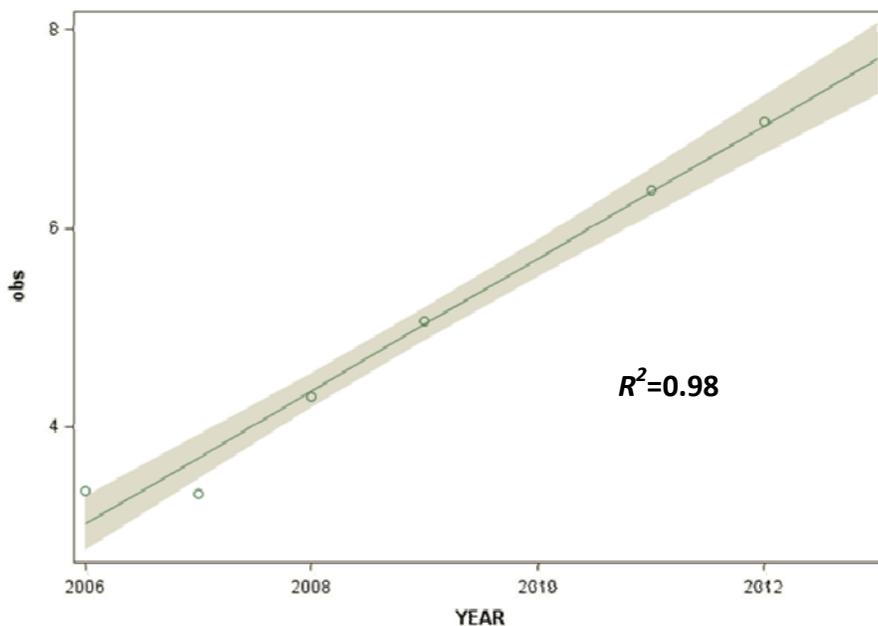


Figure 2. Observed (circles) and predicted (line) average weights of red snapper, 2006-2013. Shaded gray area denotes 95% confidence limits.

Quota Closure Projection

The start date for the federal recreational red snapper fishing season begins June 1, 2013. The federal season was estimated to be closed when projected landings reached the 4.146 mp quota. Analyses described herein assume all Gulf states, except Texas, will adopt compatible fishing seasons for recreational red snapper in 2013. All Gulf states, except Texas, implemented federally consistent fishing seasons for red snapper in 2012.

The 2013 Quota Closure Projection was based primarily upon a regression of in-season catch rates through time. Monthly catch-per-day was computed using the SEFSC ACL Recreational Dataset (Oct 2012), which includes headboat, MRFSS, and TPWD landings. MRFSS and TPWD landings are estimated on a bimonthly wave basis, while headboat landings are estimated monthly. Wave landings in numbers were distributed to months as follows:

1. If the federal fishing season was only open for one month within a wave, all landings from the wave were assigned to the federal season.
2. If the federal season was partially open within two months of a wave, landings were distributed proportional to the number of federal days open within each month of the two month wave.
3. If the federal season was not open at all during the wave, landings were distributed to months proportional to the number of days in each month.

Total landings in-season (i.e., from months during which the federal season was open) were summed across data sources for the Eastern and Western Gulf of Mexico by year. In-season catch-per-day was computed for the Eastern and Western Gulf of Mexico as in-season landings divided by days in the federal season, by year. For 2012, three days were subtracted from the federal season for the Eastern Gulf of Mexico to account for Tropical Storm Debby which eliminated fishing pressure for at least three days (SERO-LAPP 2012-03). Annual catch per day for the entire Gulf of Mexico was computed as the sum of annual catch-per-day from the Eastern and Western Gulf of Mexico.

Because the red snapper population is in a rebuilding plan, population abundance is expected to grow, which might lead to higher catch rates. Abundance at age was obtained from the most recent red snapper stock assessment (B. Linton, SEFSC, pers. comm.) and converted to exploitable abundance using the selectivity at age for the recreational sector (**Figure 3**; SEDAR-7 2011). Exploitable abundance, scaled to 2011 values, was investigated as a predictor variable in the generalized linear regression on in-season catch rate versus year for the years 2006-2012, to correspond with the beginning of the rebuilding plan (SEDAR-7 2005). The regression analysis was implemented in SAS Proc GENMOD.

Generalized linear regression model fit for red snapper catch-per-day indicated a strong positive linear trend (LR $\chi^2=22.17$, $p<0.0001$, $R^2 = 0.98$) in catch rates over time. Catch rates were estimated to increase by approximately 1,860 fish per day per year (**Figure 4**). Exploitable population abundance was not included in the final model as its parameter estimate was insignificant as determined by log-likelihood ($p=0.54$). Assuming an average weight of 7.70 lbs

ww per fish (95% CI range 7.34-8.06 lbs ww per fish), an in-season catch rate of 18,922 fish per day (95% CI range 17,811-20,032 fish per day), and an out-of-season catch rate of 73.6 fish per day (based on 2012 data when available, 2011 data when 2012 unavailable), the recreational Gulf of Mexico red snapper quota is projected to be met in late June 2013 (**Table 3**). Additional sensitivity analyses were performed using lower and upper confidence limits for catch rates and average weights. Season length estimates ranged from 24-30 days. These projections assume all Gulf States except Texas adopt fishing seasons consistent with the federal fishing season; if other Gulf States do not adopt consistent fishing seasons, then the federal fishing season is expected to be substantially shorter than predicted herein.

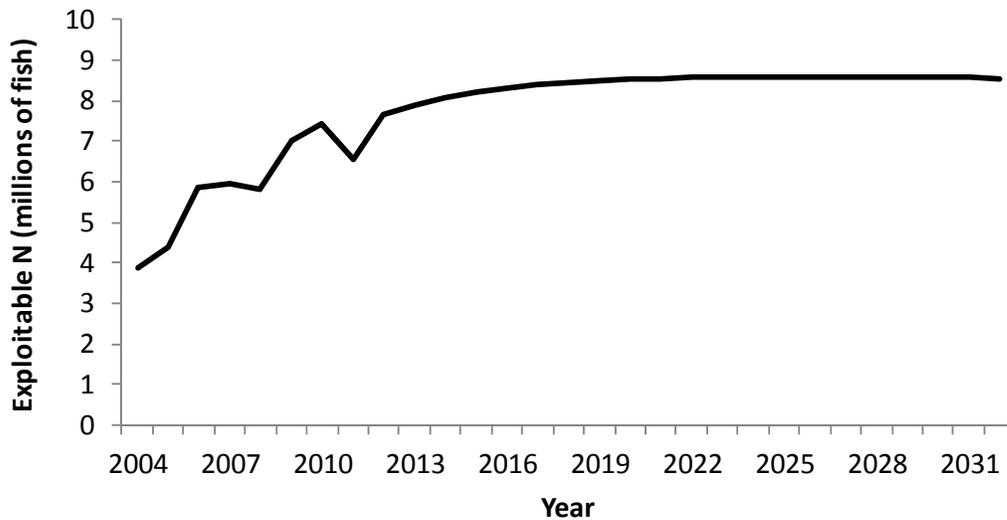


Figure 3. Projected change in abundance of recreationally exploitable Gulf red snapper (SEDAR-7 2009; B. Linton, pers. comm., Dec 2012).

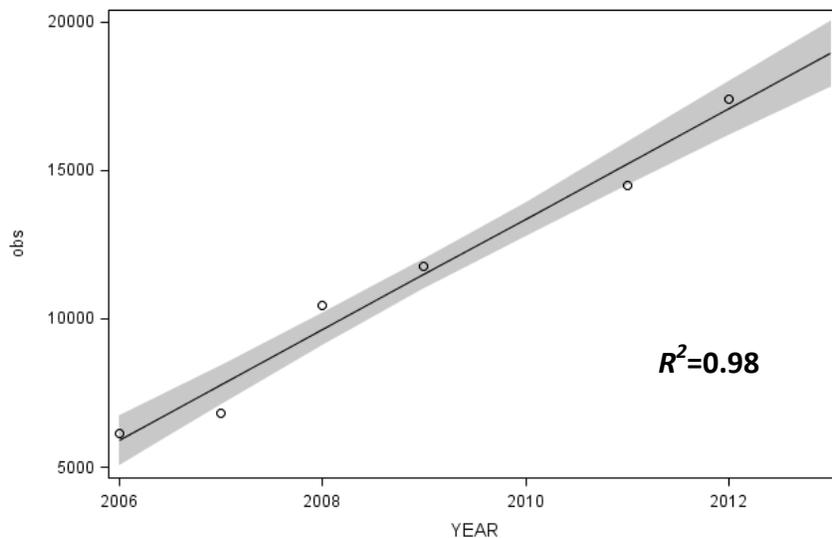


Figure 4. Observed (circles) and predicted (line) in-season catch rates (numbers of fish per open day) for Gulf recreational red snapper, 2006-2013. Shaded gray area denotes 95% confidence limits.

Table 3. Projected 2013 recreational red snapper in-season and out-of-season catch rates with 95% upper and lower confidence limits (UCL and LCL). Intersection of mean estimates in bold.

Catch Rate (fish/day)	Average Weight (lbs ww/fish)		
	7.70 (Mean)	7.34 (95% LCL)	8.06 (95% UCL)
18,922 (Mean)	27	29	26
17,811 (95% LCL)	29	30	27
20,032 (95% UCL)	26	27	24

Discussion

If current trends in catch rates and average weights continue into 2013, a federal season of 27 days is expected to constrain the Gulf of Mexico recreational red snapper harvest at or below the 4.146 mp ww quota. This season projection method assumes that derby-fishery conditions in the Gulf of Mexico recreational red snapper fishery will continue, and that historical trends of in-season catch rate are valid predictors of future fishery trends. This model implicitly captures year-to-year variability in effort and stock abundance. The input data for the projection are truncated to the time period of the rebuilding plan to better capture current conditions. If 2013 effort is lower than projected, then a longer season than those presented in this report might be required to catch the entire recreational quota. If 2013 effort or stock abundance are higher than projected, then a shorter recreational season would be required to avoid a quota overage.

Setting the season length based on shorter season estimates will reduce the risk of a quota overage, but increases the likelihood that the quota may not be harvested. Increases in the recreational quota are contingent on the annual catch limit not being exceeded in the prior fishing year. If the annual catch limit is exceeded, then the quota would not be increased, unless the best scientific information available indicates otherwise. Additionally, if the fixed summer season results in an underage in quota harvested, the NOAA Fisheries Assistant Administrator has authority to reopen the recreational red snapper season to harvest any remaining quota (50 CFR 622.42).

References

- FB12-38. 2012. Final Rule - Gulf of Mexico Red Snapper Quota Increases and Recreational Season. Fishery Bulletin, NOAA Fisheries Service Southeast Regional Office. May 2012.
- FB12-48. 2012. NOAA Fisheries Service Announces an Extension to the Gulf of Mexico Recreational Red Snapper Season. Fishery Bulletin, NOAA Fisheries Service Southeast Regional Office. June 2012.
- SEDAR-7. 2005. Stock assessment report of SEDAR 7 Gulf of Mexico red snapper. SEDAR (<http://www.sefsc.noaa.gov/sedar/>), Charleston, South Carolina. 480 p.

SEDAR-7. 2009. Stock assessment of red snapper in the Gulf of Mexico: Report of the update assessment workshop, Miami, Florida. 224 p.

SERO. 2012. Extension of the Gulf of Mexico recreational red snapper fishing season. SERO-LAPP-2012-03. NMFS, Southeast Regional Office, St. Petersburg, Florida. 13 p.

Appendix: Louisiana Incompatible Season

Introduction

The state of Louisiana has proposed opening red snapper harvest in state waters for three-day weekends in 2013, beginning the Saturday prior to Palm Sunday until September 30, including Memorial Day and Labor Day. This 88-day season would be incompatible with the proposed federal season for 2013, described above. The state of Louisiana is also proposing to increase their bag limit from the current federal limit of 2 fish per angler to 3 fish per angler. The intent of this analysis is to evaluate the harvest likely to occur under these incompatible regulations, as well as the impact upon the length of the federal fishing season.

Methods and Results

The quota closure projection for the federal season assuming compatible regulations for all states except Texas was considered the baseline for evaluating the impacts of Louisiana incompatibility. To evaluate the impacts of potential state incompatibility, the proportion of landings from the Eastern (i.e., Florida, Alabama, Mississippi) and Western (i.e., Louisiana, Texas) Gulf of Mexico between 2001-2011 were evaluated (**Figure A1**). Partitioning between the Eastern and Western Gulf of Mexico was consistent with SEDAR-7 (2009).

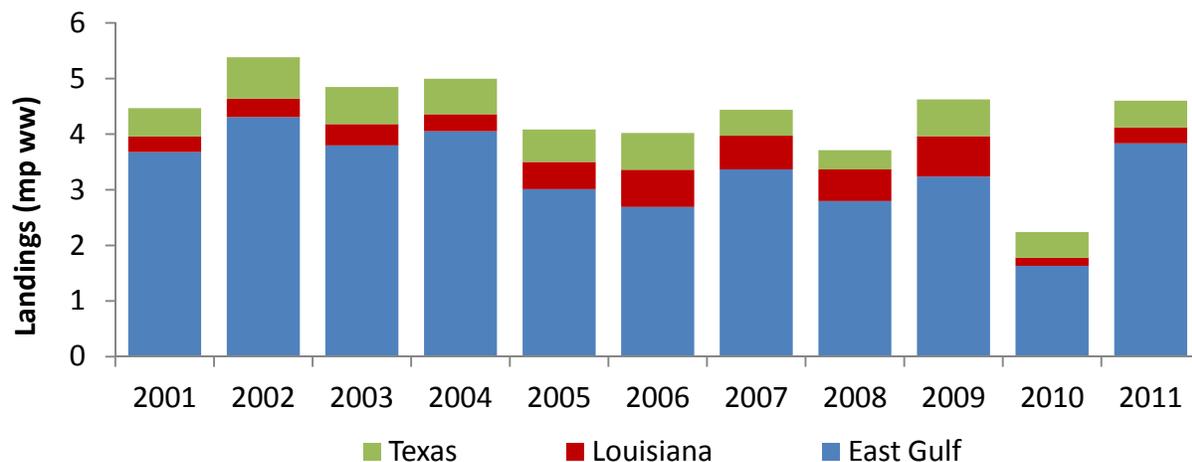


Figure A1. Recreational landings in the Western (i.e., Texas and Louisiana) and Eastern (i.e., Florida, Alabama, and Mississippi) Gulf of Mexico, 2001-2011.

Average Weight

As discussed under the baseline scenario, average weights of recreationally-landed red snapper in the Gulf of Mexico have been increasing since the revision of the rebuilding plan in 2007 (**Figure A2**).

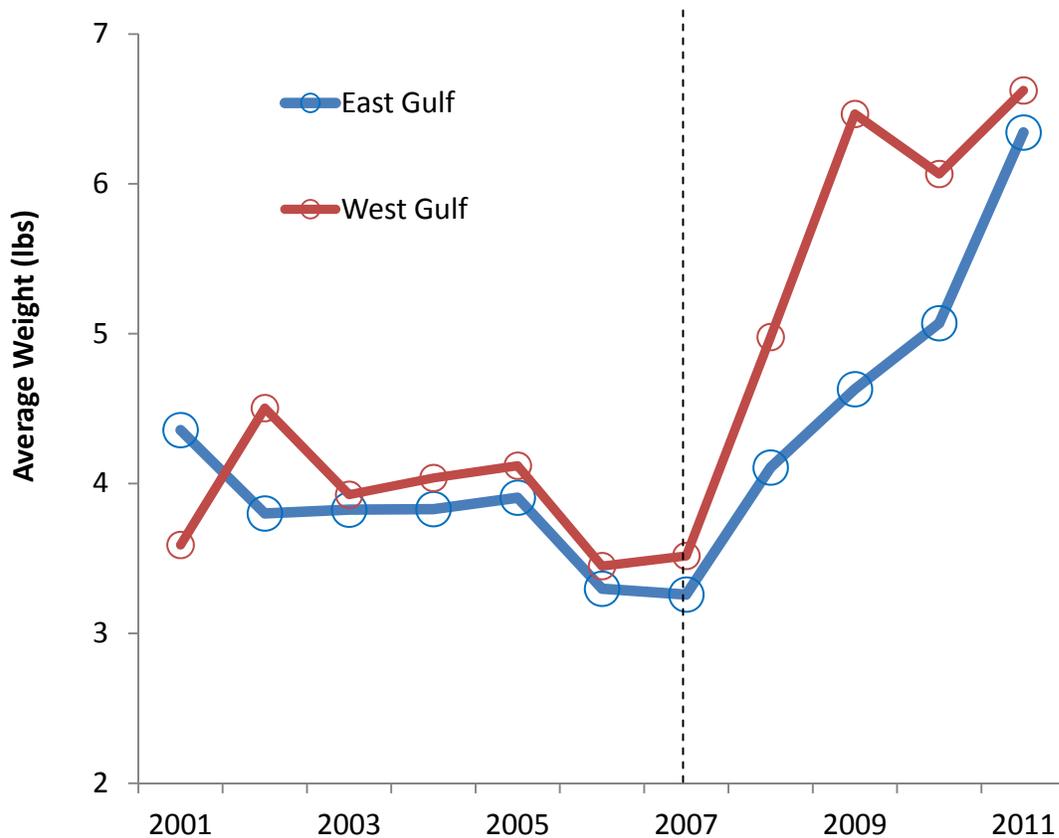


Figure A2. Observed average weights of recreationally-landed red snapper in the Gulf of Mexico, 2001-2011. Dashed line indicates revision of rebuilding plan following SEDAR-7 (2005).

Because differences in average weight between regions may be important when considering state incompatibility, average weights for 2013 were projected using generalized linear regression methods for the Eastern and Western Gulf of Mexico. Projections were run in SAS using Proc GENMOD, and projected average weight from SEDAR-7 (2009) was evaluated as a predictor variable (B. Linton, SEFSC, pers. comm.). SEDAR-7 (2009) projected average weight was not a significant predictor variable for the Eastern Gulf of Mexico ($p > 0.05$), but it was for the Western Gulf of Mexico ($p < 0.0001$).

Model fits for both regions were excellent (Eastern: $F_{1,4}=187.6$, $R^2=0.98$, $p<0.0001$; Western: $F_{1,2}=43.0$, $R^2=0.96$, $p<0.0001$) and indicated rapidly increasing trends in average weight (**Figure A3a,b**; Eastern $\beta_1=0.75$, Western $\beta_1=0.82$). Projected 2013 average weights were 7.69 lbs ww per fish for the Eastern Gulf of Mexico (95% CI: 7.35-8.03) and 8.27 lbs ww per fish for the Western Gulf of Mexico (95% CI: 7.91-8.63).

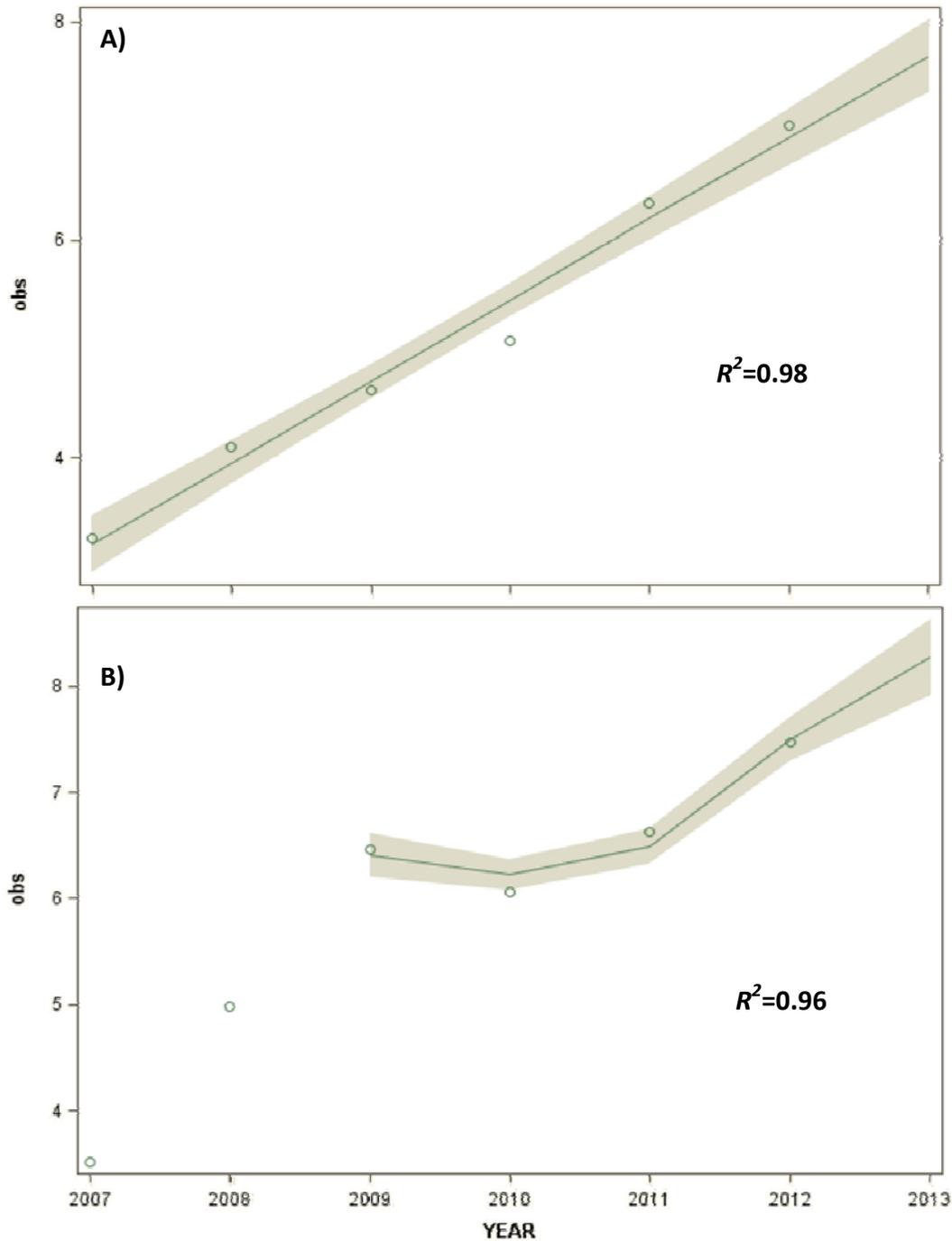


Figure A3. Generalized linear regression model fits to observed recreational red snapper average weights (open circles) for the **a)** Eastern (i.e., Florida, Alabama, Mississippi) and **b)** Western (i.e., Louisiana, Texas) Gulf of Mexico, with 95% confidence bands. Western Gulf projection incorporates SEDAR-7 (2009) assessment-projected average weight as predictor.

Louisiana Catch Rates

Amendment 30B to the Gulf of Mexico Fishery Management Council’s Reef Fish Fishery Management Plan requires federally-permitted for-hire vessels to comply with federal regulations when they are more restrictive than state regulations. Due to this regulatory constraint on for-hire harvest when Louisiana harvest would be open but federal harvest of recreational Gulf of Mexico red snapper would be closed, it was important to consider Louisiana incompatibility impacts by fishing mode and area fished (**Figure A4**). The bulk (70%) of Louisiana landings in 2011 originated from private/rental boats fishing in federal waters (**Figure A4**).

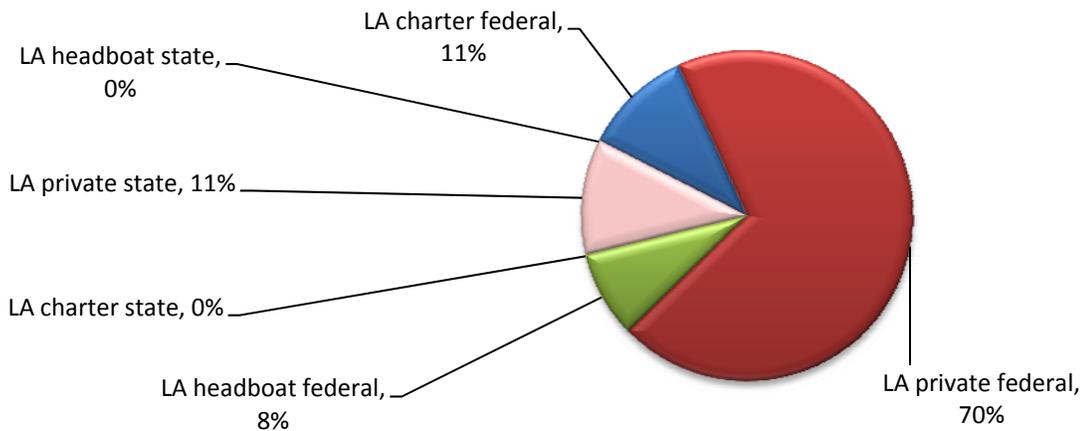


Figure A4. Percent composition of Louisiana recreational red snapper landings in pounds whole weight, by mode of fishing and area fished, in 2011.

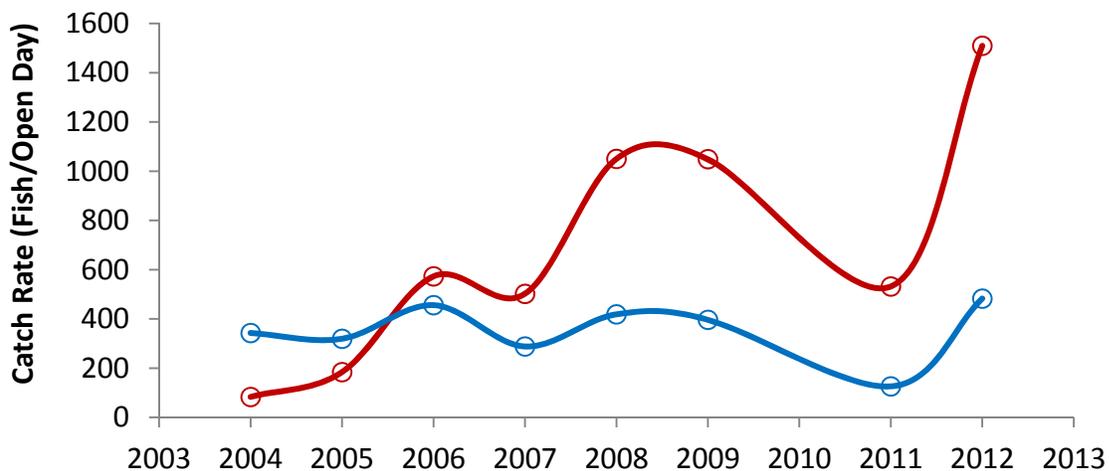


Figure A5. Recreational Gulf of Mexico in-season red snapper catch rates (number of fish harvested per day) in Louisiana state and federal waters, as reported to MRFSS, for the for-hire (blue) and private/rental boat (red) modes. Catch rates for 2012 are based on preliminary MRFSS Waves 3-4, 2012 data.

Federal in-season catch rates for Louisiana were evaluated by mode (**Figure A5**). Louisiana catch rates, by mode, from 2012 were used as the best proxy for 2013 Louisiana catch rates, with federal headboat catch rates included in for-hire mode catch rate. Catch rates were expressed in numbers of fish harvested per open day and multiplied by the projected 2013 average weight for the Western Gulf of Mexico to get a daily harvest rate in pounds.

To provide a sensitivity run for a scenario in which the angler compliance with the boundary between Louisiana state and federal waters is 100% during time periods when Louisiana waters are open and federal waters are closed, catch rates were scaled to the maximum percentage of Louisiana MRFSS landings originating from state waters from 2007-2012 (Private: 13.97%, For-Hire: 10.06%).

In the model, if the federal season was closed and Louisiana was open, Louisiana harvest was assumed to originate only from Louisiana private anglers. For-hire vessels were assumed to comply with Amendment 30B regulations, and no increases in effort from anglers in neighboring states was modeled. If the federal season was open and Louisiana was closed, no landings were estimated for Louisiana, and the landings that would have originated from Louisiana during that time period under the fully-compatible scenario were deducted from the federal harvest. If the federal season and Louisiana were both open, Louisiana harvest was assumed to originate from both Louisiana private and for-hire anglers.

Louisiana Bag Limit Increase

Louisiana has proposed increasing their bag limit from the 2 fish per angler federal limit to 3 fish per angler. Evaluation of Louisiana angler catch rates indicated that the majority of anglers currently catch their 2 fish bag limit (**Figure A6**). Under the assumption that most anglers would be able to catch a third fish under this new regulation, the increase in Louisiana bag limit was treated as a scalar of 1.5 for the daily harvest rate in pounds.

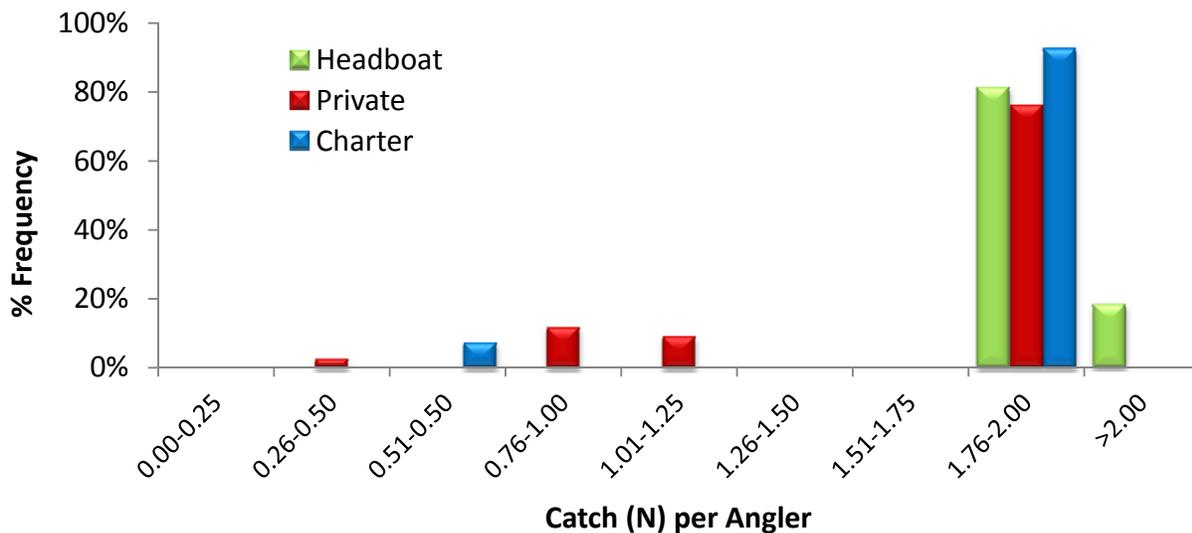


Figure A6. 2011 Louisiana recreational red snapper catch-per-angler-trip, by mode.

Louisiana 3-Day Weekends

The federal season is open continuously from June 1 to the quota closure date. By contrast, the Louisiana incompatible season would be open on 3-day weekends. The potential impacts of compression of effort into three-day weekends were evaluated using Southeast Headboat Survey data. The Headboat Survey provides daily catch records, and was used to determine the percentage of weekly catch occurring during the Friday-Sunday weekend period. The mean in-season percentage of catch on three-day weekends from 2007-2011 was 63%; this was used as a scalar to redistribute landings to the weekends-only scenario. One additional sensitivity run was conducted using the out-of-season weekend headboat catch percentage (76%).

Louisiana Allocation

When the Louisiana season is open and the federal season is closed, there will be more landings originating from Louisiana than there would be under a compliant regulatory scenario. When the Louisiana season is closed and the federal season is open, there will be less landings originating from Louisiana than there would be under a compliant regulatory scenario. Thus, to evaluate the impacts of Louisiana incompatible regulations, it is necessary to predict Louisiana's contributions to federal harvest under compatible regulations. The most straightforward way of doing this is by determining what percentage of the federal compliant season harvest originated from Louisiana in previous years. Federally-compatible harvest was determined by evaluating total harvest, in pounds whole weight, from the five Gulf states, when the federal season was open, 2000-2011 (**Figure A7**). The mean percentage of Gulf-wide harvest attributable to Louisiana from 2007-2012 was 11.5%. In 2012, this percentage was 11.7%; this amount was used to 'allocate' the recreational quota to Louisiana to determine the impact of their incompatible regulations relative to the baseline season. A 11.7% allocation would result in an equivalent Louisiana 'quota' of 485,000 pounds whole weight in 2013.

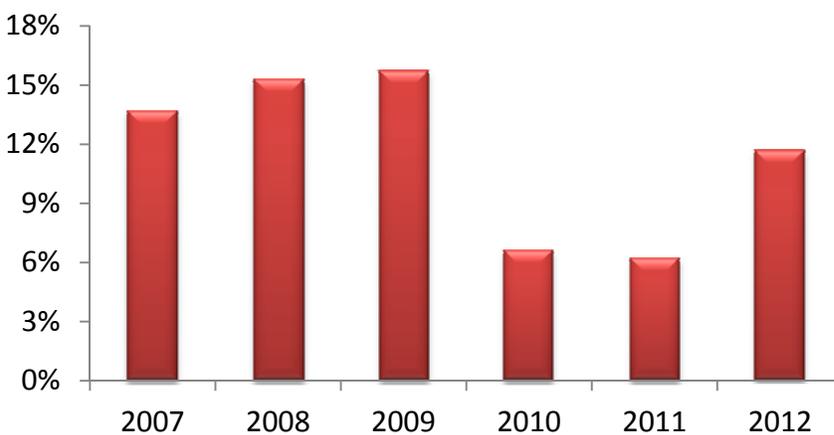


Figure A7. Percentage of federal in-season harvest originating from the state of Louisiana, 2007-2012. Note that 2012 data are preliminary estimates.

Impacts of Incompatible Regulations

The impacts of Louisiana adopting regulations that are inconsistent with the federal season described above (e.g., ‘baseline’) were evaluated in a multitude of sensitivity runs, indicated in parentheses. Input parameters included projected average weights (Eastern Gulf: 7.69 lbs (sensitivity runs: 7.35-8.03), Western Gulf: 8.27 lbs (sensitivity runs: 7.91-8.63)), Louisiana landings source (state waters only: Private: 13.97%, For-Hire: 10.06%; state and federal waters: 100% Private and 100% For-Hire), impact of increased bag limit (scalar 1.5X (sensitivity run: 1X)), redistribution of landings to three-day weekends (63% (sensitivity run: 76%)), and Louisiana allocation of baseline landings (11.7%). **Table A1** indicates that under most scenarios the length of the federal season for the entire Gulf would have to be reduced significantly to account for Louisiana incompatibility. **Table A1** also indicates that if only federal waters off Louisiana are closed to account for incompatibility, there are many scenarios for which a Louisiana-only closure would not adequately prevent a Gulf-wide quota overage.

Table A1. Input parameters and predicted change in federal season length assuming Louisiana adopts incompatible harvest regulations for recreational Gulf of Mexico red snapper. Change in federal season length assumes season length for the whole Gulf of Mexico federal season is reduced. All scenarios assume Texas season remains incompatible with federal season, and recreational quota is 4.146 million pounds (mp) whole weight.

AVERAGE WEIGHT		LA BAG LIMIT SCALAR	LA WEEKEND REDISTRIBUTION	LA Catch Rate	LA LANDINGS (MP)	% LA Overage	CHANGE IN SEASON (days)
Eastern GOM	Western GOM						All Gulf
7.69	8.27	1.5	63%	State + Federal	2.34	381%	-13
7.35	7.91	1.5	63%	State + Federal	2.25	362%	-13
8.03	8.63	1.5	63%	State + Federal	2.43	400%	-13
7.69	8.27	1.0	63%	State + Federal	1.50	209%	-7
7.69	8.27	1.5	76%	State + Federal	2.92	501%	-17
7.69	8.27	1.5	63%	State Only	0.55	13%	0
7.35	7.91	1.5	63%	State Only	0.56	15%	0
8.03	8.63	1.5	63%	State Only	0.54	11%	-1
7.69	8.27	1.0	63%	State Only	0.31	-36%	+1
7.69	8.27	1.5	76%	State Only	0.76	57%	-2

Discussion

Modeling the impacts of Louisiana adopting incompatible regulations is extremely challenging for a myriad of factors. In addition to the assumptions described previously for the baseline model, many other elements must be estimated based upon limited historical information. No sensitivity runs were performed on seasonality of catch rates or effort shifting, but their impacts are obvious. It is difficult to predict whether there will be a seasonal impact on catch rates, as Louisiana is proposing opening during time periods which have not been open for many years. This could drive the season length longer or shorter, depending on the seasonal impacts on catch rate. It is likely that if Louisiana is open and the federal season is closed, anglers from neighboring states may increase Louisiana harvest rates above the historical level (2012 catch rate) used in our model runs. This would lead to shorter seasons.

Uncertainty in average weight did not have a large impact upon model results. Regression fits to average weights were very tight. Assuming Louisiana anglers are able to take advantage of an increased bag limit leads to a predictably higher catch rate and shorter fishing season. The more weekly effort Louisiana anglers are able to redistribute into the three-day weekend openings, the shorter the federal season will need to be to compensate. **Table A1** clearly demonstrates that if Louisiana catch rates are close to those from federal and state waters combined in 2012, they will catch between 209-501% of their allotted quota (assumed to be 11.7% of 4.146 mp for purposes of this analysis). Under these scenarios, Louisiana incompatible regulations will lead to a reduction in the Gulfwide federal season of 7-17 days (26-63% reduction from baseline).

If Louisiana anglers catch rates during the Louisiana season (non-federal days) are similar to the landings reported in state waters over the 2007-2011 time period, the federal season could be extended by 1 day or reduced by up to 2 days. This is an unlikely scenario unless voluntary or enforced compliance with the state / federal boundary is extremely high and no effort shifting occurs. Additionally, Louisiana has proposed extending their state boundary into what was previously considered federal waters. If enforcement is primarily dockside, there is a distinct possibility that Louisiana catch rates during the three-day weekend openings will be at least as high as those modeled for state and federal waters combined in 2012. Discounting catch rates in 2010 and 2011 in **Figure A5** as impacts of the BP/Deepwater Horizon oil spill, the private mode catch rate in Louisiana appears to be on a linear incline. Couple that with the likely influx of interested anglers from neighboring states, and it is quite possible that the 2012 Louisiana catch rates will be even higher in 2013. Significant reductions to the federal season length may be necessary unless Louisiana and the Gulf Council can agree on a percent allocation of the recreational quota, and Louisiana can sufficiently monitor and enforce this quota allocation to prevent their allocated quota from being exceeded.