Vermilion Snapper – Advisory Panel Information Document

November 2017

Biology

Vermilion snapper, *Rhomboplites aurorubens*, occur in the Western Atlantic, from North Carolina to Rio de Janeiro, Brazil. The species is most abundant off the southeastern United States and in the Gulf of Campeche, Mexico (Hood and Johnson 1999). Vermilion snapper are bottom-dwelling, commonly found over rock, ledges, live-bottom, gravel, or sand bottoms near the edge of the continental and island shelves (Froese and Pauly 2003). The species occurs at depths from 59 to 400 feet (18 to 122 meters), but is most abundant at depths less than 250 feet (76 meters). Individuals often form large schools.

This species spawns in aggregations (Lindeman et al. 2000). The spawning season extends from April through late September in the southeastern United States with a peak in June-August (Cuellar et al. 1996; Zhao et al. 1997; Sedberry et al. 2006; Farmer et al. 2017).

Vermilion snapper do not change sex during their lifetime. Very few immature vermilion snapper have been collected in the South Atlantic region (Cuellar et al. 1996, Zhao and McGovern 1997, SEDAR 2 2003, SEDAR 17 2008). Based on the information available, most vermilion snapper are mature by age 1 (80%) and all are mature by age 2 (SEDAR 17 2008). The size of maturity is unclear since most fish are mature when they are collected. However, the smallest mature male sampled was 5.6 inches total length and the smallest female sampled was 7.1 inches (Zhao and McGovern 2007). The maximum size of vermilion snapper is 24.2 inches (61.5 centimeters) total length (SEDAR 17 2008). Maximum reported age in the South Atlantic is 19 years (SEDAR 17 2008).

This species preys on fishes, shrimp, crabs, polychaete worms, and other bottom-dwelling invertebrates, as well as cephalopods and planktonic organisms (Allen 1985). Sedberry and Cuellar (1993) reported that small crustaceans (especially copepods), sergestid decapods, barnacle larvae, stomatopods, and decapods dominated the diets of small (< 2 inches standard length (50 millimeters)) vermilion snapper off the southeastern United States. Larger decapods, fishes, and cephalopods are more important in the diet of larger vermilion snappe

Stock Status

An update to the vermilion snapper assessment was conducted in 2012 with data through 2011 (SEDAR 17 Update 2012). Most of the data sources were simply updated with the 4 additional years of observations available since the SEDAR 17 (SEDAR 17 2008) benchmark. The SEDAR 17 Update (2012) showed that vermilion snapper are **not overfished** and **overfishing is not occurring**. The stock was very close to the biomass at maximum sustainable yield (94.3% of B_{MSY}) and the spawning stock biomass (SSB) was also very close to SSB_{MSY} (98.1% of SSB_{MSY}). Fishing mortality (F) at the time of the assessment update was well below the fishing mortality at maximum sustainable yield (76.9% of F_{MSY}) and although stock biomass shows a significant decrease over the assessment period, such a trend is expected in a fishery

being harvested at exploitation rates approaching the maximum sustainable yield level. Further, it is expected that the stock will decrease to around B_{MSY}, if exploitation stays at the desired level, slightly below F_{MSY}, at which point it will stabilize and hover around that value as long as overfishing is not occurring. Evidence in some model outputs suggests that the stock is reaching such equilibrium and that the stock is being sustainably harvested.

A vermilion snapper stock assessment is currently underway. A standard assessment was requested to allow consideration of new video index data. The terminal year will be 2016 and assessment webinars will be held in late 2017 and early 2018.

Management Overview

The Fishery Management Plan (FMP) for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP; SAFMC 1983) established a management regime for the fishery for snappers, groupers and related reef species under the area of authority of the South Atlantic Fishery Management Council and the territorial seas of the states, extending from the North Carolina/Virginia border through the Atlantic side of the Florida Keys. The FMP included a 4-inch trawl mesh size requirement to achieve a 12-inch total length (TL) size limit for vermilion snapper because there were concerns that the stock was experiencing growth overfishing and it was determined that a 4-inch trawl mesh would allow fish smaller than 12 inches to escape.

In 1992, Amendment 4 (SAFMC 1992) implemented a 10-inch TL recreational minimum size limit and a 12-inch TL commercial minimum size limit for vermilion snapper. In addition, the recreational bag limit was set at 10 fish per person per day. The recreational minimum size limit was subsequently increased to 11 inches TL in 1999 through implementation of Amendment 9 (SAFMC 1999).

A stock assessment conducted in 2003 determined that the vermilion snapper stock in the South Atlantic was undergoing overfishing (SEDAR 2 2003). The Council took action to end overfishing of vermilion snapper in Amendment 13C (SAFMC 2006) by specifying a commercial quota of 1.1 million pounds gutted weight and increasing the recreational minimum size limit to 12 inches TL. A recreational closure was later put in place from November 1 through March 31 and the recreational bag limit was reduced to 5 fish per person per day with a prohibition on possession by the captain or crew of a charter vessel or headboat (Amendment 16; SAFMC 2009). In addition, the amendment established a commercial split season and semi-annual commercial quotas. Amendment 15B (SAFMC 2008) prohibited the sale of snapper grouper species harvested or possessed in the EEZ under the bag limits and prohibited the sale of snapper grouper harvested or possessed under the bag limits by federally permitted for-hire vessels. Accountability measures were implemented in 2011 (Amendment 17B 2011a) and a 1,500-pound gutted weight trip limit was put in place later that year (Regulatory Amendment 9, SAFMC 2011b).

Through Regulatory Amendment 18 (SAFMC 2013) the Council revised commercial and recreational annual catch limits in response to a stock assessment update (SEDAR 17 Update, 2012). The amendment also reduced the commercial trip limit to 1,000 pounds gutted weight with step-downs to 500 pounds gutted weight once 75% of each season's quota was met. Lastly, the annual November-April recreational closure was removed. In 2014, the Council removed the

prohibition on retaining the vermilion snapper bag limit by captain and crew on federally-permitted for-hire vessels (Amendment 27 SAFMC 2014).

Fishery-Independent Trends

Abundance of vermilion snapper in the South Atlantic region is tracked independent of landings by the Southeast Reef Fish Survey (SERFS). The survey has been operating in the region since 1978. **Figure 1** shows the relative catch per unit effort (CPUE) of vermilion snapper since 1990 in surveys conducted through the Marine Resources Monitoring, Assessment and Prediction (MARMAP) program, the Southeast Area Monitoring and Assessment Program (SEAMAP) and the Southeast Fishery Independent Survey (SEFIS). Sampling for these surveys is conducted at various stations in the South Atlantic using an array of gear (i.e., chevron traps, rod and reel, bottom longlines) and video cameras. Survey data indicate that abundance of vermilion snapper has increased since 2013 (**Figure 1**).

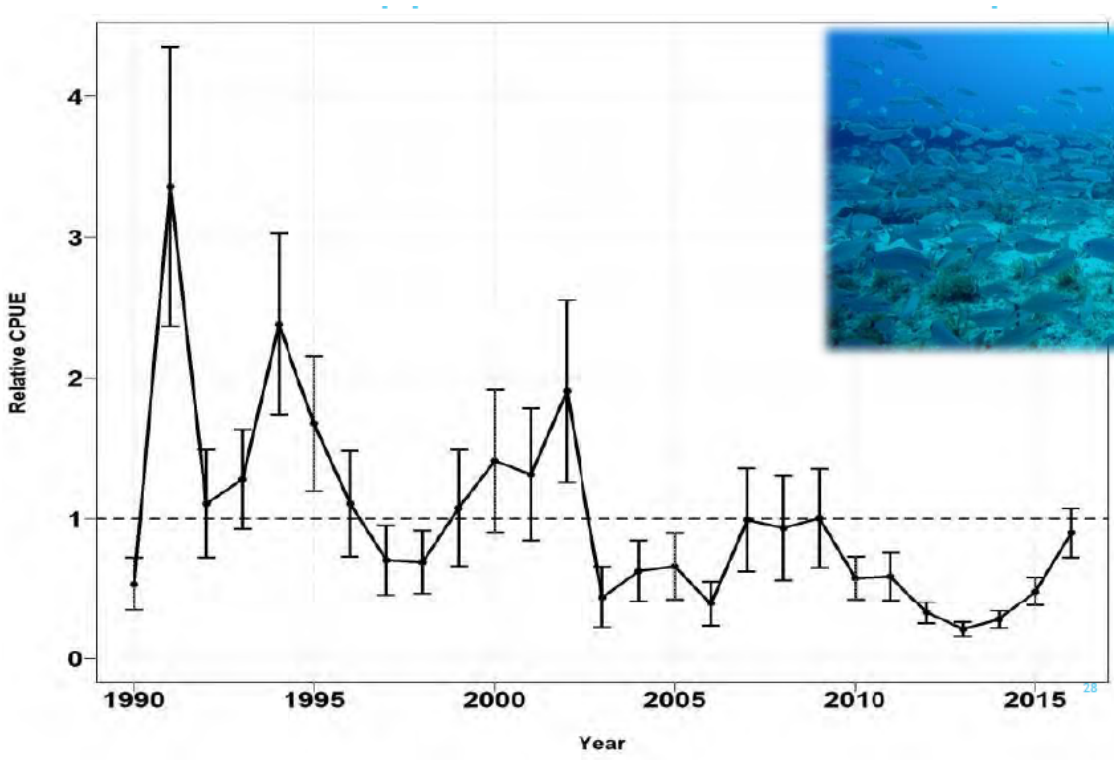

Figure 1. Relative catch per unit effort of vermilion snapper in fishery-independent surveys in the South Atlantic region, 1990-2016.

Fishery Performance

The following summary of vermilion snapper landings was prepared using various data sources as detailed below:

ALS: The Accumulated Landings System (ALS) is the system used by the Southeast Fisheries Science Center (SEFSC) to track commercial landings in the South Atlantic. It is comprised of commercial dealer reports. These data are provided to the Council each year.

SEFSC: The SEFSC provides recreational data, which are a combination of the Marine Recreational Information Program survey data and the Southeast Region Headboat Survey (SRHS) data. The MRIP data are provided to the SEFSC in numbers and are subsequently converted to weight using a method unique to the Southeast Region. These data are transmitted to the Council each year.

ACCSP: In addition to submitting reports to the SEFSC, commercial dealers and fishermen submit reports to the Atlantic Coastal Cooperative Statistics Program (ACCSP). The commercial landings and value information for 2016 presented here were obtained from ACCSP.

MRIP: These are the recreational data collected directly by the Marine Recreational Information Program (MRIP). Landings are estimated from intercepted trips and a separate phone survey for effort. The SEFSC uses a different methodology to convert the recreational catch in numbers to weight than MRIP does. Headboat landings are not collected through MRIP but through the SRHS mentioned above.

Commercial Landings

Commercial landings in pounds whole weight (lbs ww) from 2000 through 2016 by state are presented in **Table 1**. Landings by state are presented graphically in **Figure 2** and total landings relative to recreational quotas/ACLs are shown in **Figure 3**.

Table 1. South Atlantic vermilion snapper total commercial landings (lbs ww) and quota/ACL (where applicable) from 2000 through 2016, by state. Data for Georgia and South Carolina were aggregated due to confidentiality concerns.

South Atlantic Vermilion Snapper Commercial Landings (lbs ww)						
Year	Source	FL	GA + SC	NC	Total Comm	Comm Quota/ ACL
2000	ALS	159,422	727,104	500,345	1,386,871	
2001	ALS	196,346	745,669	501,523	1,443,538	
2002	ALS	182,873	515,548	465,584	1,164,005	
2003	ALS	121,238	289,978	253,016	664,232	
2004	ALS	174,706	619,434	325,905	1,120,045	
2005	ALS	151,680	558,356	421,955	1,131,991	
2006	ALS	170,215	343,390	336,141	849,746	1,221,000
2007	ALS	222,905	315,423	541,178	1,079,506	1,221,000
2008	ALS	287,199	344,825	591,422	1,223,446	1,221,000
2009	ALS	283,612	273,543	361,921	919,076	1,221,000

South Atlantic Vermilion Snapper Commercial Landings (lbs ww)						
Year	**Source**	**FL**	**GA + SC**	**NC**	**Total Comm**	**Comm Quota/ ACL**
2010	ALS	261,770	394,798	316,781	973,349	733,040
2011	ALS	317,515	375,568	323,392	1,016,475	733,040
2012	ALS	288,933	431,360	276,171	996,464	733,040
2013	ALS	365,332	295,188	267,259	927,779	932,960
2014	ALS	412,115	261,652	242,261	916,028	892,160
2015	ALS	362,070	114,997	225,481	702,548	876,520
2016	*ACCSP*[1]	*256,966*	*320,283*	*266,150*	*843,398*	*862,920*

[1] 2016 data are from the ACCSP data warehouse. This differs from previous years, which present landings in the SEFSC's Accumulated Landings System (ALS). It is unknown how comparable these two data sources are, therefore caution should be used when consulting these data.

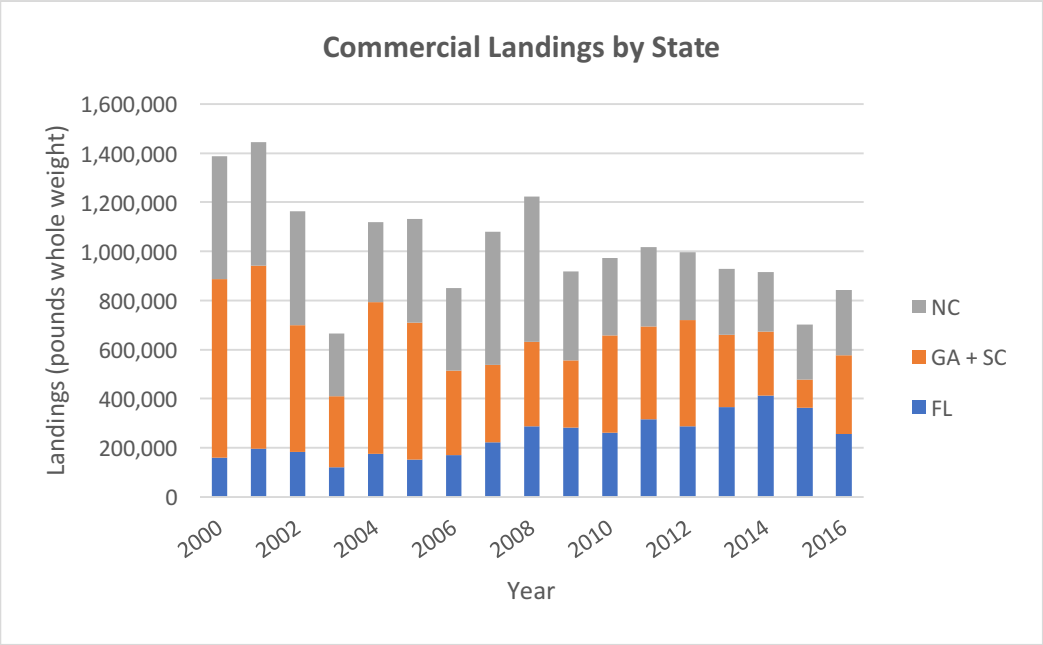

Figure 2. Commercial landings (pounds whole weight) of vermilion snapper in the South Atlantic region from 2000 through 2016 by state. Data for Georgia and South Carolina were aggregated due to confidentiality concerns.

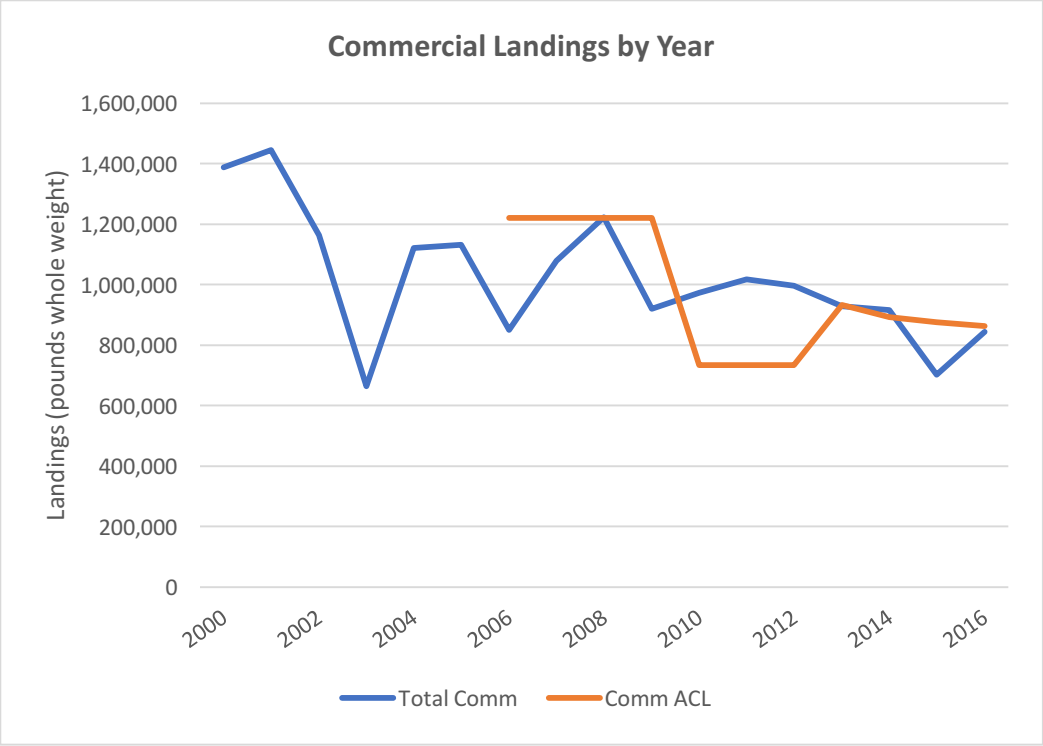

Figure 3. Commercial landings (pounds whole weight) of vermilion snapper in the South Atlantic region from 2000 through 2016 (blue line). Quotas/commercial ACLs are shown since 2007, when first implemented (orange line).

From 2000 to 2005, vermilion snapper commercial landings were highest in Georgia and South Carolina whereas North Carolina dominated commercial catches of the species in 2007 and 2008 (**Figure 2**). Thereafter, commercial landings of vermilion snapper have been relatively evenly distributed among the South Atlantic states staying between 800,000 and 1 million pounds. However, 2015 commercial landings were the second lowest in the time series after 2003 (**Figures 2** and **3**). Landings declined precipitously from 2001 to 2003 and fluctuated with no discernible trend until 2011. Thereafter, commercial landings of vermilion snapper in the South Atlantic region have shown a declining trend (**Figure 3**). Landings exceeded the commercial quota from 2010 through 2012 and again in 2014. As noted above, 2015 landings were noticeably lower than previous years and well below the current commercial ACL (**Figure 3**).

Figure 4 and **Figure 5** show the seasonality of commercial landings. **Figure 4** displays the average monthly commercial landings from 2000 through 2010, the period prior to Amendment 17B and Regulatory Amendment 9. **Figure 5** shows landings from 2011 through 2016.

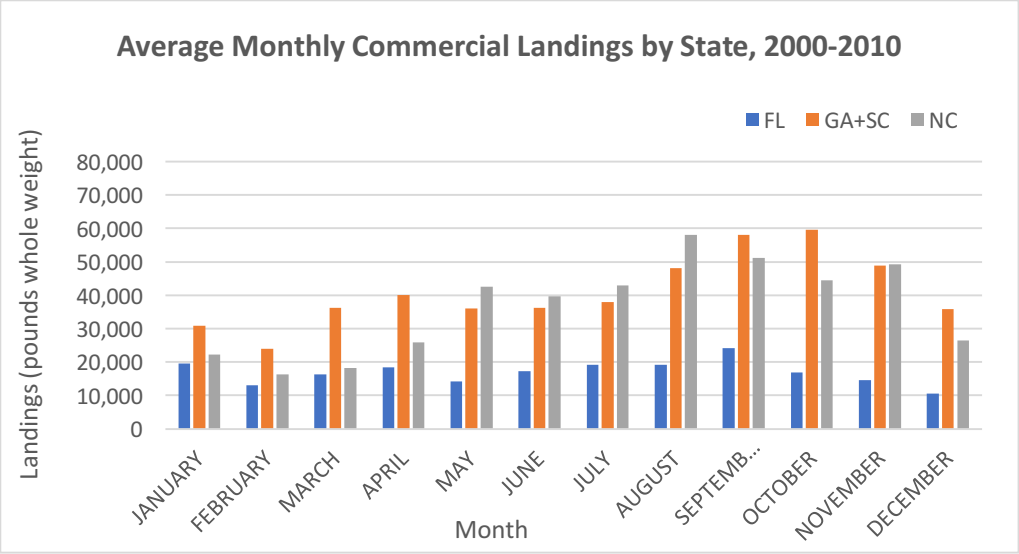

Figure 4. Average monthly commercial landings (pounds whole weight) of vermilion snapper in the South Atlantic region by state from 2000 through 2010. Data for Georgia and South Carolina were aggregated due to confidentiality concerns. Source: ACCSP.

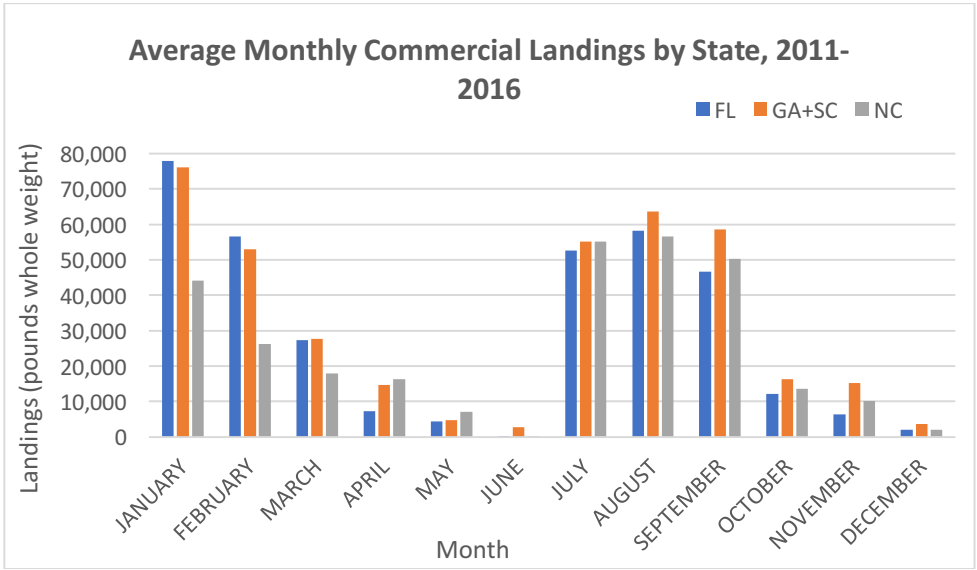

Figure 5. Average monthly commercial landings (pounds whole weight) of vermilion snapper in the South Atlantic region by state from 2011 through 2016. Data for Georgia and South Carolina were aggregated due to confidentiality concerns. Source: ACCSP.

When landings are examined on a monthly basis, a shift in the seasonality of the fishery is evident: in the earlier years, landings tended to occur throughout the year, with an increase into the late summer and fall months (**Figure 4**) whereas the effects of the split seasons occurring in the fishery become evident when looking at landings in **Figure 5**. Commercial landings are highest at the beginning of the season and then taper off as the season progresses.

Recreational Landings

Recreational landings in pounds whole weight (lbs ww) from 2000 though 2016 by state are presented in **Table 2**. Landings by state are presented graphically in **Figure 6** and total landings

relative to recreational quotas/ACLs are shown in **Figure 7**. **Figure 8** shows the seasonality of recreational vermilion snapper landings by displaying average recreational harvest of vermilion snapper by 2-month wave. Directed effort, which includes recreational trips that either harvested or targeted vermilion snapper, is shown in **Figure 9** for the South Atlantic Region annually.

Table 2. South Atlantic vermilion snapper total recreational landings (lbs ww) and recreational quota/ACL (where applicable) from 2000 through 2016, by state.

South Atlantic Vermilion Snapper Recreational Landings (lbs ww)							
Year	**Source**	**FL**	**GA**	**SC**	**NC**	**Total Rec**	**Rec Quota/ACL**
2000	SEFSC	230,502	17,566	276,060	120,015	644,142	
2001	SEFSC	204,259	16,720	245,573	131,818	598,371	
2002	SEFSC	168,542	26,373	173,540	150,616	519,072	
2003	SEFSC	238,431	24,727	164,544	78,861	506,563	
2004	SEFSC	162,122	63,571	227,860	183,022	636,575	
2005	SEFSC	98,225	54,122	137,117	181,509	470,973	
2006	SEFSC	210,570	114,940	204,387	172,490	702,387	
2007	SEFSC	126,770	22,229	452,204	159,258	760,460	
2008	SEFSC	154,430	22,831	200,437	156,604	534,302	
2009	SEFSC	211,135	22,544	132,092	135,122	500,893	
2010	SEFSC	77,070	3,494	84,133	102,360	267,057	344,960
2011	SEFSC	76,356	12,097	63,606	66,039	218,097	344,960
2012	SEFSC	65,365	4,000	52,502	87,096	208,963	344,960
2013	SEFSC	94,402	16,690	53,296	57,572	221,960	439,040
2014	SEFSC	237,937	14,632	108,585	67,131	428,285	419,840
2015	SEFSC	112,128	25,136	126,736	67,570	331,570	412,480
2016	*MRIP*	*173,000*	*1,262*	*19,934*	*49,828*	*244,024*	

[1] Data from the MRIP website. They do not include headboat data and they do not use the SEFSC's weight conversion methodology, which differs from the MRIP methodology for converting numbers to weight. Caution should be used when consulting these data.

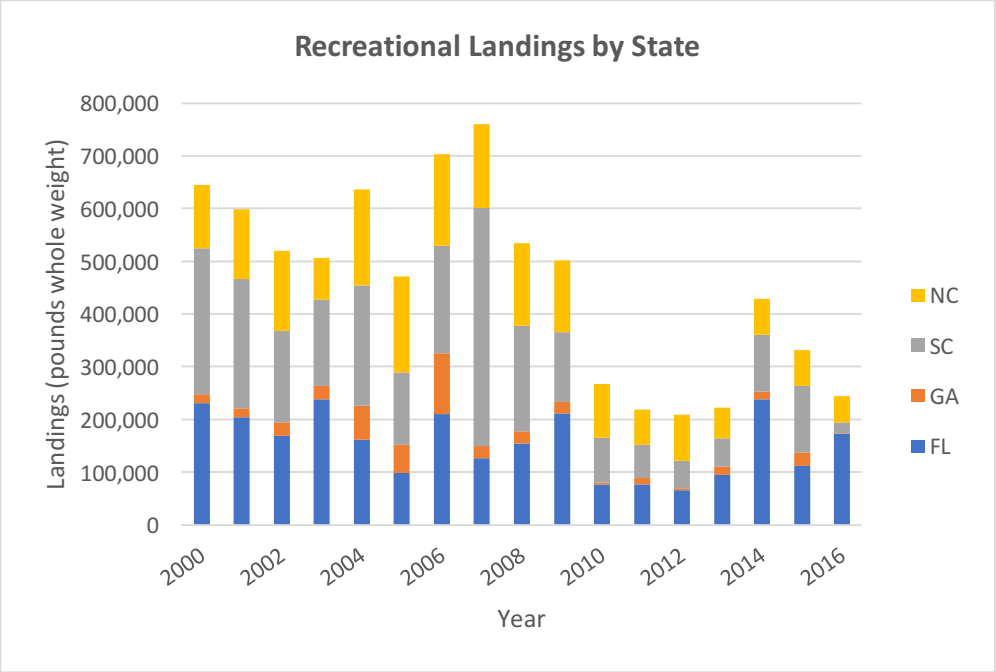

Figure 6. Recreational landings (pounds whole weight) of vermilion snapper in the South Atlantic region from 2000 through 2016 by state. Data for 2016 are from the Marine Recreational Information Program (MRIP) whereas data for prior years are from the Accumulated Landings System (ALS).

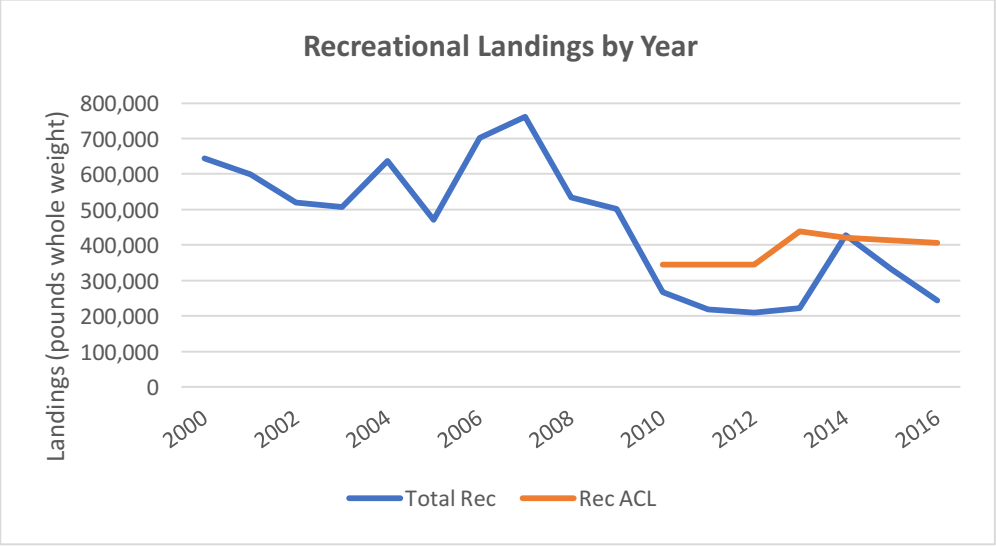

Figure 7. Recreational landings (pounds whole weight) of vermilion snapper in the South Atlantic region from 2000 through 2016 (blue line). Quotas/recreational ACLs are shown since 2010 when first implemented (orange line).

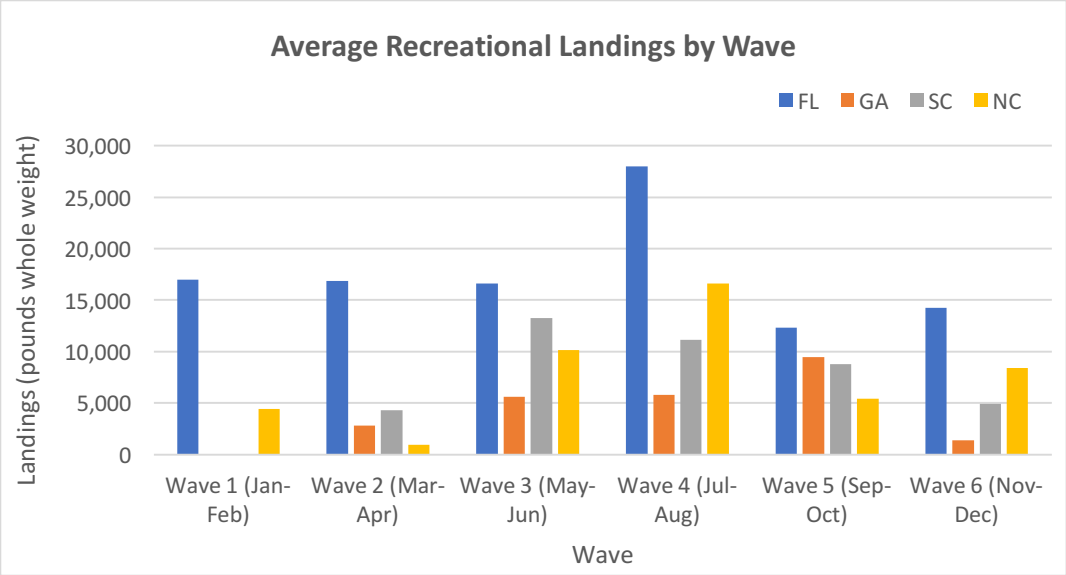

Figure 8. Average recreational landings of vermilion snapper in the South Atlantic region by wave and by state from 2000 through 2016. Source: ACCSP.

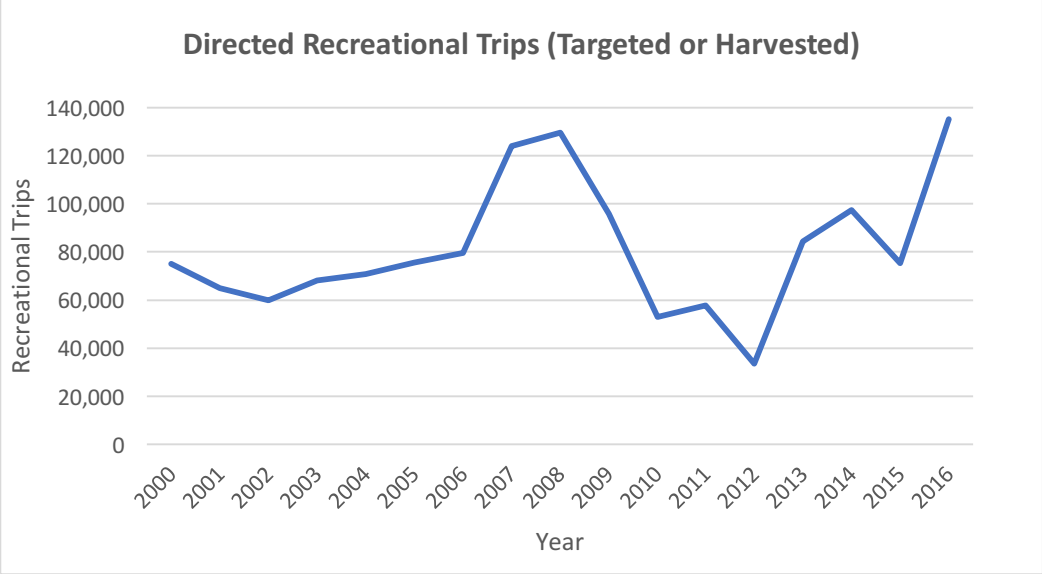

Figure 9. Directed recreational trips (targeted or harvested) for vermilion snapper in the South Atlantic region from 2000 through 2016. Source: ACCSP.

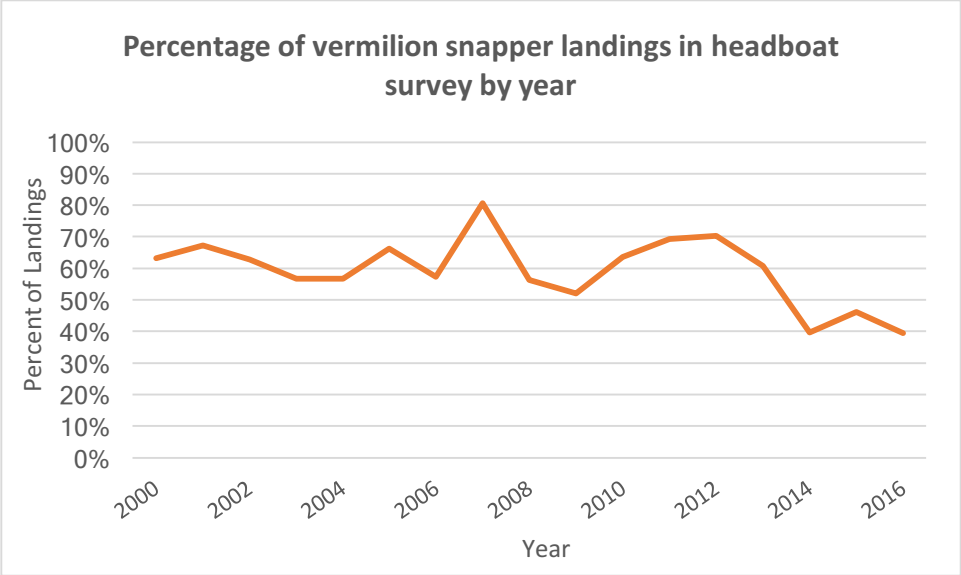

Figure 10. Percentage of vermilion snapper landings in Southeast Headboat Survey by year, 2000-2016.

There is no clear geographical trend in recreational landings of vermilion snapper in the South Atlantic region since 2000. However, South Carolina reported the highest landings observed in the time series in 2007 (**Table 2**, **Figure 5**). Overall recreational landings peaked at just over 760,000 pounds that year, followed by a sharp decline. Landings subsequently stabilized at their lowest levels from 2010-2013 and increased again to just above the recreational ACL in 2014 (**Figures 5** and **6**). Overall, recreational landings have remained below recreational quotas/ACLs, except in 2014, and have declined since (**Figure 6**). In general, recreational landings of vermilion snapper have peaked during the summer months (**Figure 8**). Overall, directed effort for vermillion snapper has generally increased since 2012 (**Figure 9**). Vermilion snapper landings in the headboat sector have averaged 59% of the total recreational landings in the South Atlantic region from 2000 through 2016 (**Figure 10**.).

Discards

Numbers of vermilion snapper discarded in the commercial and recreational components of the fishery are presented in **Figure 11** for 2000 through 2016. The commercial sector has seen a general decline in the number of discards since a peak in 2002. The headboat sector shows no discernible trend overall, although discards were highest for this component of the recreational fishery from 2007 through 2009. The private recreation and charter components show the highest level of vermilion snapper discards in 2008 followed by a steep decline from 2011 through 2013 and a subsequent steep increase through the end of the time series (**Figure 11**). Release mortality for vermilion snapper is 41% for the commercial sector and 38% for the recreational sector (SEDAR 17 Update 2012).

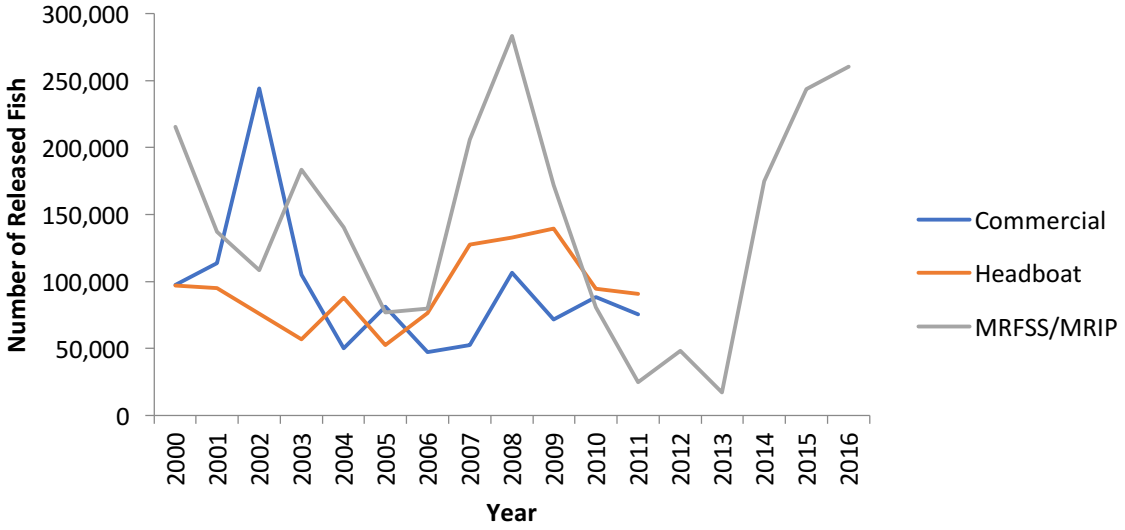

Figure 11. Number of vermilion snapper by component of the snapper grouper fishery. Number of fish released from the commercial and headboat component were pulled from SEDAR 17 Update (2012) well as 2000 to 2003 for MRFSS/MRIP, which used the MRFSS estimation method to calculate number of released fish. MRFSS/MRIP from 2004 to 2016 used the MRIP estimation method to calculate number of released fish, and data were pulled from the MRIP website for vermilion snapper caught south in the South Atlantic region.

Economic Performance

Metrics that are often readily available to evaluate economic trends for the commercial sector on a species by species basis (such as price per pound or ex-vessel value) are not available for the recreational sector. Nevertheless, trends in harvest and effort are often linked to economic trends in a recreational fishery, with harvest often being associated with economic value and effort (the number of fishing trips) being associated with both value and economic impacts (i.e. jobs, income, business sales). As such, trends in harvest and effort can be used to broadly evaluate likely trends in the economic performance of a recreational fishery. Using the estimated recreational harvest (**Figure 7)** or effort (**Figure 9**) as a proxy for the economic performance of the fishery, the economic performance of the recreational vermilion snapper fishery has fluctuated over time with a peak in the mid 2000s. In recent years, recreational harvest has generally decreased while effort has increased towards and surpassing previously observed heights. This leads to conflicting trends in how the economic performance may be interpreted for the recreational fishery, with the economic value likely remaining relatively low but steady with harvest and the economic impacts of directed trips for vermillion snapper increasing with effort.

Changing focus to the commercial sector, **Figure 12** shows the average inflation adjusted price per pound (in 2016 dollars) for vermilion snapper regionally and state by state from 2000 through 2016. Total ex-vessel value for vermilion snapper in the South Atlantic Region is presented in **Figure 13** in both nominal and inflation adjusted figures. Over the timeframe, the price per pound for vermilion snapper has generally increased. The overall ex-vessel value fluctuated earlier in the time series but remained fairly steady in more recent years. The peak in the inflation adjusted ex-vessel value was observed in 2000 at $4.49 million (in 2016 dollars).

Although landings are preliminary at this time, commercial vermilion snapper landings in 2016 were $2.97 million based on currently available data.

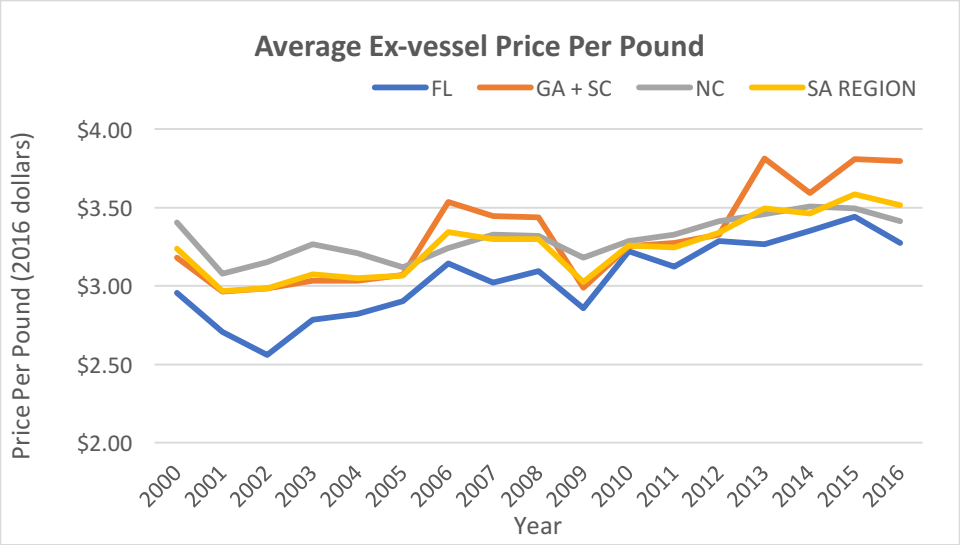

Figure 12. Average ex-vessel price per pound (2016 dollars) by state for commercial vermilion snapper landings in the South Atlantic Region from 2000 through 2016. Data for Georgia and South Carolina were aggregated due to confidentiality concerns. Inflation adjustments use the U.S. GDP deflator. Sources: U.S. Bureau of Economic Analysis and ACCSP.

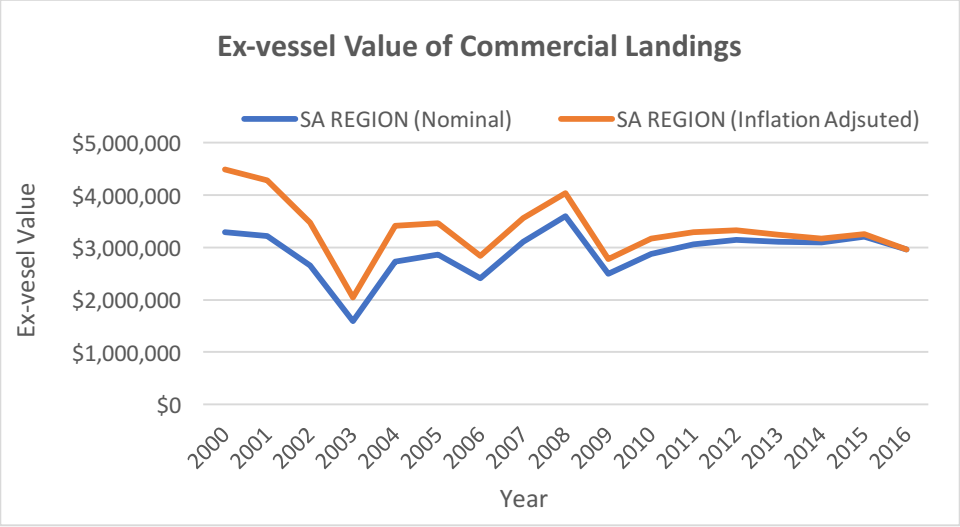

Figure 13. Nominal and inflation adjusted (2016 dollars) ex-vessel value of commercial vermilion snapper landings in the South Atlantic Region from 2000 through 2016. Inflation adjustments use the U.S. GDP deflator. Sources: U.S. Bureau of Economic Analysis and ACCSP.

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