Biological Review of the 2018 Texas Closure

Report to the Gulf of Mexico Fisheries Management Council

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Introduction

In 1981, the Gulf of Mexico Shrimp Fishery Management Plan (FMP) was implemented with the primary objective to increase the yield of brown shrimp (*Farfantepenaeus aztecus*) harvested from Texas offshore waters. Since then, various aspects of the Texas closure management measure have been analyzed and reported on by scientists at the Southeast Fisheries Science Center (SEFSC). This report contains an overview of selected effects of the 2018 Texas closure and will be presented by the SEFSC to the Gulf of Mexico Fishery Management Council (GMFMC) at the April 2019 meeting.

Background

The Shrimp FMP regulates fishing for brown shrimp in the Exclusive Economic Zone (EEZ) off the coast of Texas. Provisions in the Shrimp FMP prohibited brown shrimp fishing from the coast line to 200-miles off Texas during the periods: May 22-July 15, 1981; May 26-July 14, 1982; May 27-July 15, 1983; May 16-July 6, 1984; and May 20-July 8, 1985. In 1986, 1987, and 1988 only the portion of the EEZ from 9 to 15-miles was closed to fishing. In 1986, the area was closed May 10-July 2, while in both 1987 and 1988, Texas offshore waters were closed from June 1-July 15. In 1989, the 200-mile closure again went into effect and has remained in effect each year since that time. Closure periods were: June 1-July 15, 1989; May 15-July 8; 1990; May 17-July 6, 1991; May 15-July 6, 1992; May 15-July 6, 1993; May 13-July 7; 1994; May 15-July 15; 1995; June 1-July 15; 1996; May 15-July 15, 1997; May 15-July 8, 1998; May 15-July 15, 1999; May 11-July 5, 2000; May 15-July 8, 2001; May 15-July 15, 2002, May 15-July 15, 2003, May 15-July 15, 2004, May 15-July 15, 2005, May 15-July 10, 2006, May 15-July 15, 2007, May 15-July 15, 2008, May 15-July 15, 2009, May 15-July 15, 2010, May 15-July 15, 2011, May 15-July 15, 2012, May 23-July 15, 2013, and May 15-July 15 for 2014-2018. State of Texas regulations, implemented in 1960, prohibited shrimp fishing in the territorial sea off Texas during these same periods, with the exception of allowing white shrimp fishing from the beach out to 4 fathoms. In 1990, however, state law prohibited all shrimping activities including the 4-fathom daytime fishery. This closure has been in effect during each of the subsequent closures (1991 through 2018).

The management objectives of the Texas closure regulation (as specified in the Shrimp FMP) are to increase the yield of brown shrimp and eliminate the waste of the resource caused by discarding undersized shrimp caught during a period in their life cycle when they are growing rapidly. The objective of the 1960 through 1980 Texas territorial sea closures was to ensure that a substantial portion (>50%) of the shrimp in Gulf waters had reached 65 tails/pound or 112 mm in length by the season's opening. Thus, this temporary closure of the offshore fishery from mid-May to mid-July each year results in larger shrimp to the fishery and subsequently a higher market value.

National Marine Fisheries Service (NMFS) port agents, as well as state trip ticket systems in Louisiana, Mississippi, Alabama, and Florida, collect shrimp statistics on the catch, effort, and fishing location of shrimp vessels operating in the Gulf of Mexico. These data provide information on the species, size and location of capture, as well as information on the catch rates and fishing effort of the vessels in the fleet. In addition, the electronic

logbook program collects detailed data on fishing location and effort for the offshore fishing fleet (Gallaway, et al., 2003).

Recruitment

Postlarval brown shrimp begin entering estuaries in Texas and western Louisiana in mid-February and continue through July, depending on environmental conditions. Several "waves" of postlarve may enter the estuaries throughout the spring however, peak recruitment usually occurs from February through early April. A wide array of environmental and biological factors affects the fate of these young shrimp. Research has identified salinity, temperature, and water height as important primary environmental factors affecting the survival, growth and abundance levels of subsequent offshore shrimp populations. The amount of usable nursery area for juvenile and subadult brown shrimp appears to be related to the distribution of favorable salinities (≥10 ppt) as well as to the tidal water height in interior marshes. Bay water temperatures exceeding 60° F in April and May are also favorable for above average shrimp production, with optimal growth occurring after 68° F.

In 2016, high rainfall amounts subsequently led to large freshwater discharges into the estuaries. This unprecedented flooding in Texas, and to a lesser degree in Louisiana, most likely concentrated juvenile shrimp at the mouth of bays and out of the nursery habitats required for optimal growth and survival. These high levels of precipitation did not occur in 2018, providing juvenile shrimp with an opportunity for optimal growth in 2018 compared to the conditions seen in 2016.

This is reflected in the 2018 Galveston Bay, Texas, postlarval and juvenile brown shrimp indices of abundance, the bait index-model (Berry and Baxter, 1969). This model predicted that the brown shrimp season, from July 2018 through June 2019, would yield approximately 22.2 million pounds off the Texas coast. This value is below the historical average of 23.6 million pounds for 1990-2017. Our environmental model did not support this below average yield prediction, instead predicting an average production level for Texas offshore waters (compared to historical production; 1981-2017). The model uses Galveston air temperature during mid-April (the key component), rainfall during early March, and bay water height during late April and early May. These components are additive in the model, thus higher values indicate higher catch. The greatest contributing factor and key component, temperature during mid-April, was slightly below average this year (68.6º F). Rainfall recorded during early March was relatively low at 0.18 inches, less than the historical average of 0.6 inches. Relatively high tidal heights during late April and early May were recorded at approximately 5.4 feet. Using these environmental parameters, our model suggests an average production of brown shrimp from Texas waters, as related to environmental conditions conducive for optimal shrimp growth and survival.

Catch information from Louisiana inshore and offshore fisheries in May is used to estimate total production for the biological year from May through April. Using 2018 May catch data in our Louisiana Model, we predict a harvest of 27 million pounds for

Louisiana west of the Mississippi River for the 2018-2019 season. This is below the historical average of 30.7 million pounds.

In summary, the 2018 abundance indices point to a below average year of brown shrimp production in offshore waters of the western Gulf of Mexico. The Galveston Bay bait index forecasts a slightly below average year at 22.2 million pounds from offshore Texas waters. However, the 2018 Environmental Model predicts average production for Texas offshore waters. Louisiana indices also indicate a below average brown shrimp yield of 27 million pounds this season from west of the Mississippi River to the Texas-Louisiana border. Overall, the western Gulf of Mexico should expect an annual brown shrimp production of approximately 49.2 million pounds during the 2018-2019 season. This is above the 1960-2017 long-term historical average of 43.2 million pounds for the two-state area.

Texas Fishing Trends

In Texas bays, from May through August 2018, 0.21 million pounds of brown shrimp were landed. This represents a below average value relative to the historical inshore catches for this period (1981-2017 average was 4.2 million pounds). Monthly catches in 2018 were not equally distributed across each of the four months. Between May and August of 2018, most of the Texas inshore catch of brown shrimp occurred in May (51 %).

Offshore production of brown shrimp during May through August 2018 was 10.8 million pounds, with 10.2 million pounds (>95%) of the catch produced in the July through August period. The total catch for this period represents a below average level when compared to historical catch values for the EEZ closures (1981-2017 average was 13.0 million pounds). During the July through August 2018 period only about 1.1% of the brown landed shrimp were in the >67 count size category (Figure 1).

Texas Ports Shrimp Landings

The distribution of shrimp landings in Texas ports was examined to determine if changes in shrimp landings at the various ports had occurred since the initial closure in 1981. May through August Gulf-wide shrimp catch was summarized by port of landing. Figure 2 shows landings of the five upper Texas coast ports, Figure 3 shows the landings of the five middle Texas coast ports, and Figure 4 shows the landings of the four lower Texas coast ports. The five upper Texas coast ports (with long term mean landing percentage) include Jefferson (17.30%), Chambers (0.37%), Galveston (4.77%), Harris (1.79%), and Kemah (11.26%). The five middle Texas coast ports (with overall mean landing percentage) include Port Lavaca (2.50%), Brazoria (6.41%), Matagorda 0.54%), Palacios (14.55%), and Seadrift (1.73%). The four lower Texas coast ports (with overall mean landing percentage) include Aransas (9.80%), Nueces (2.01%), Port Isabel (10.61%), and Brownsville (15.95%).

Two of the upper Texas coast ports, Chambers and Galveston, experienced a slight increase in landings relative to the other ports during 2018. The other upper Texas ports;

Jefferson, Harris, and Kemah experienced decreased landings relative to the other ports. However, Jefferson County had the highest percentage of landings for all ports in Texas again this year. For the middle Texas coast ports, landings at Brazoria, Matagorda, Seadrift, Palacios, and Port Lavaca were all lower this year compared to 2017. For the Lower Texas coast ports, Brownsville and Port Isabel had decreased landings, Aransas had increased landings, and Nueces had no change (with no reported landings) compared to the 2017 landings.

White Shrimp Catch off Texas

For the twenty-ninth consecutive year, the 0-4 fathom white shrimp (*Litopenaeus setiferus*) fishery off Texas has been closed in conjunction with the Texas closure. Following the 2018 closure, most of the white shrimp landed in offshore waters of Texas in July were in the 15-20 and smaller count size range with a below average (286,106 lbs < 449,704 lbs) level of production (Figure 5). White shrimp production in August, 2018 (371,266 lbs) was less than the previous year (500,675 lbs) (Figure 6), and was in large and in the 15-20 count size range.

References

Berry, R. and K. Baxter. 1969. Predicting brown shrimp abundance in the northwestern Gulf of Mexico. FAO Fish. Rep. 57(3): 775-798.

Gallaway, B. J., J. G. Cole, L. R. Martin, J. M. Nance, and M. Longnecker. 2003. Description of a simple electronic logbook designed to measure effort in the Gulf of Mexico shrimp fishery. North American Journal of Fishery Management: 23: 581-589.

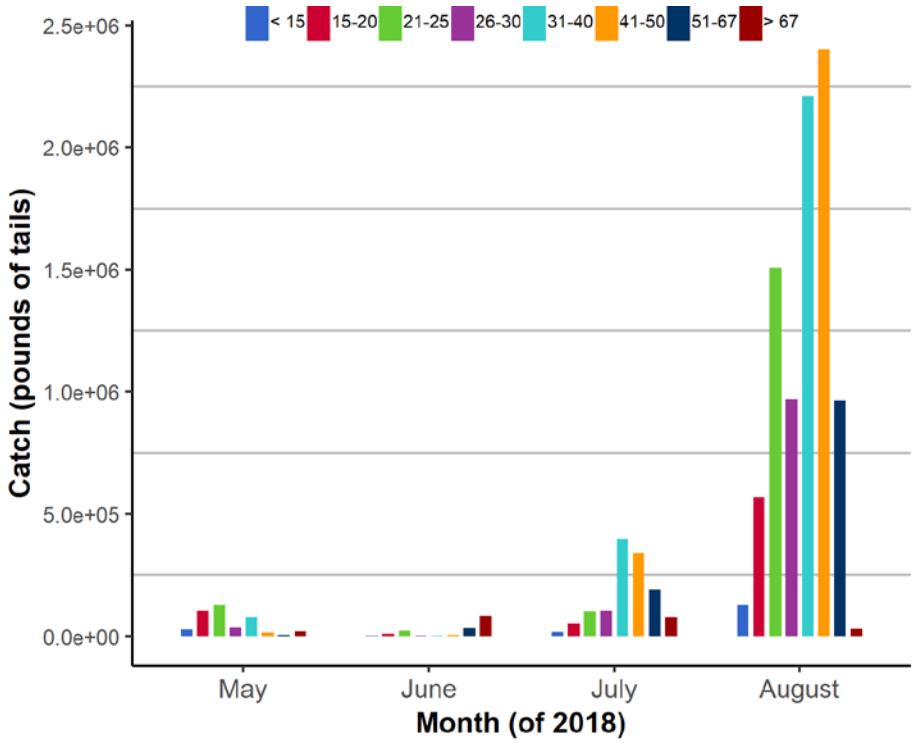

Figure 1. Size composition of brown shrimp catch from offshore Texas, May to August 2018

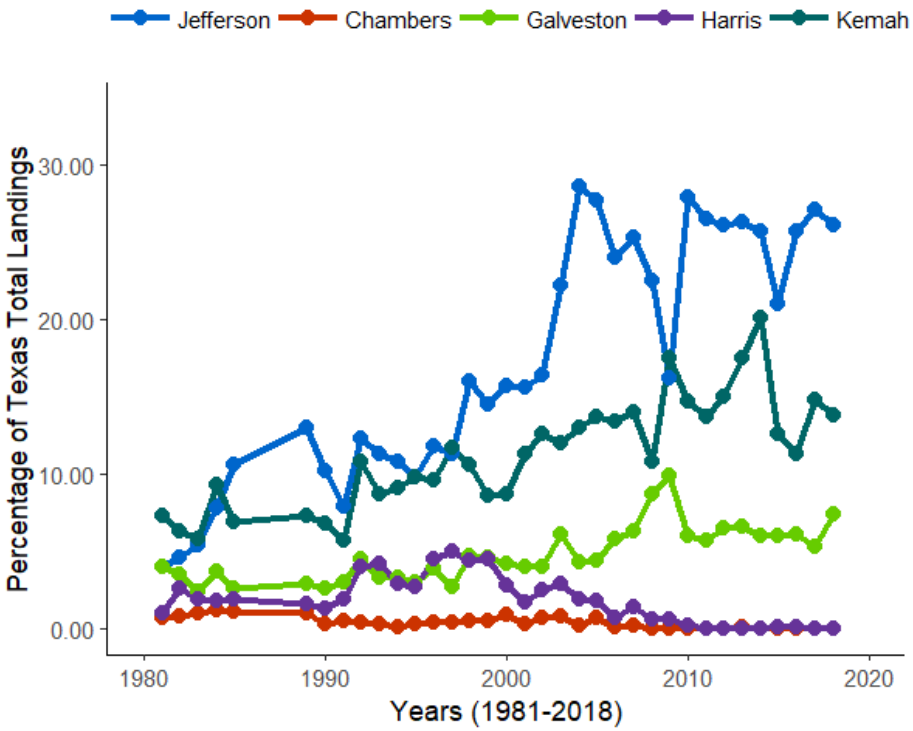

Figure 2. Distribution of landings by upper Texas coast ports, May to August 2018

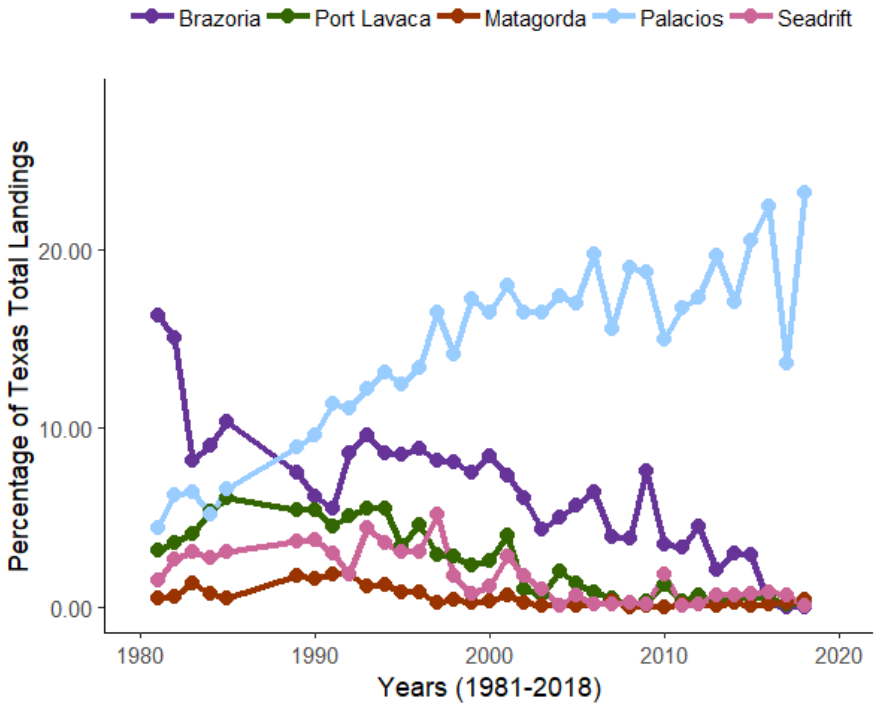

Figure 3. Distribution of landings by middle Texas coast ports, May to August 1981-2018

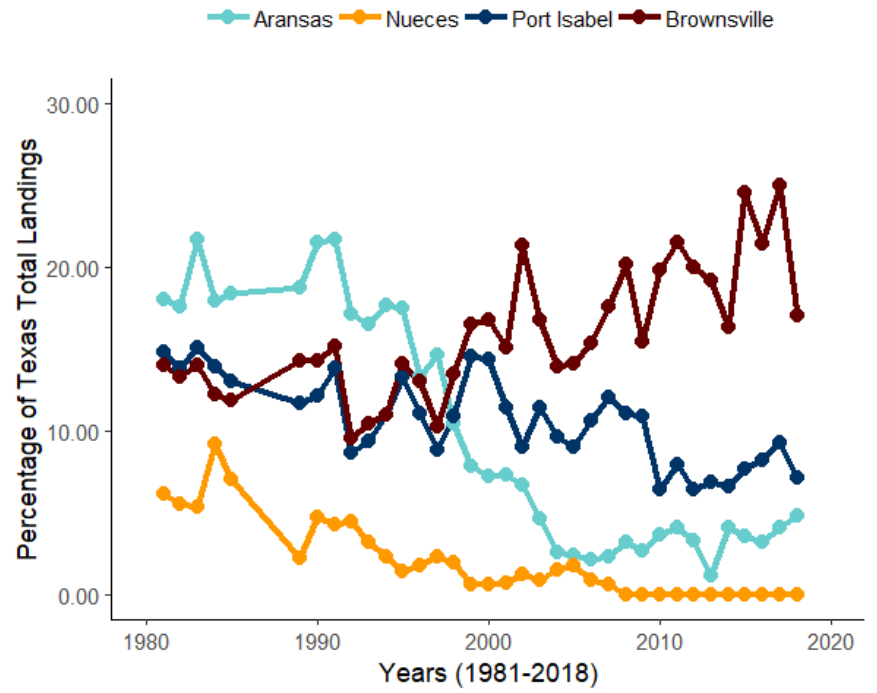

Figure 4. Distribution of landings by lower Texas coast ports, May to August 1981-2018

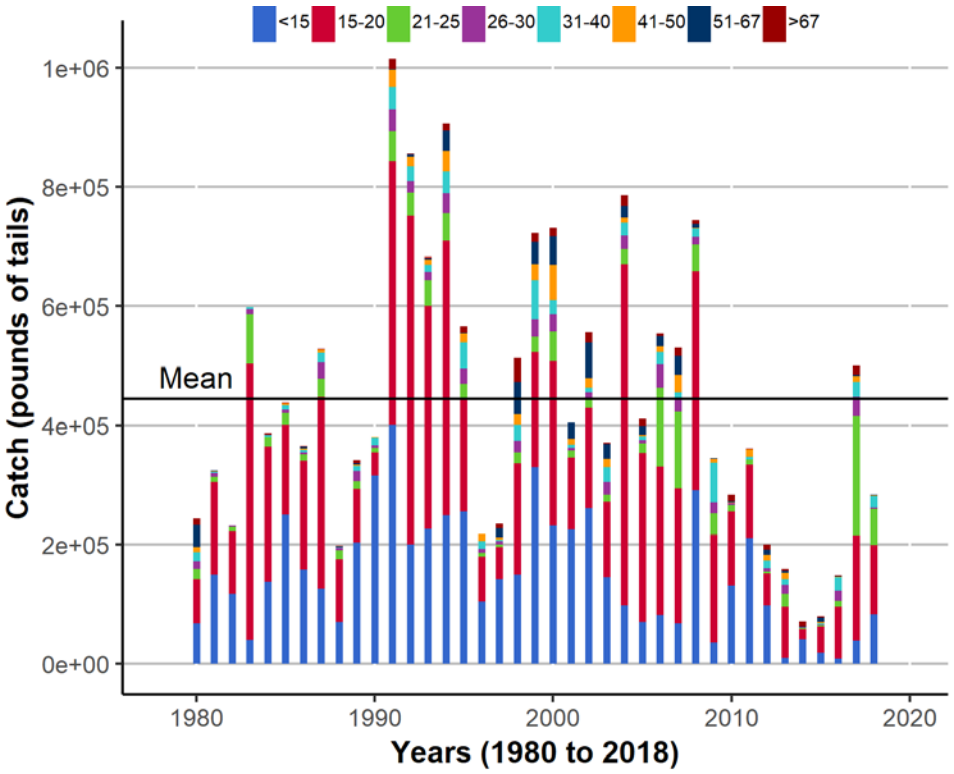

Figure 5. Size composition of Texas July offshore white shrimp catch, 1981-2018

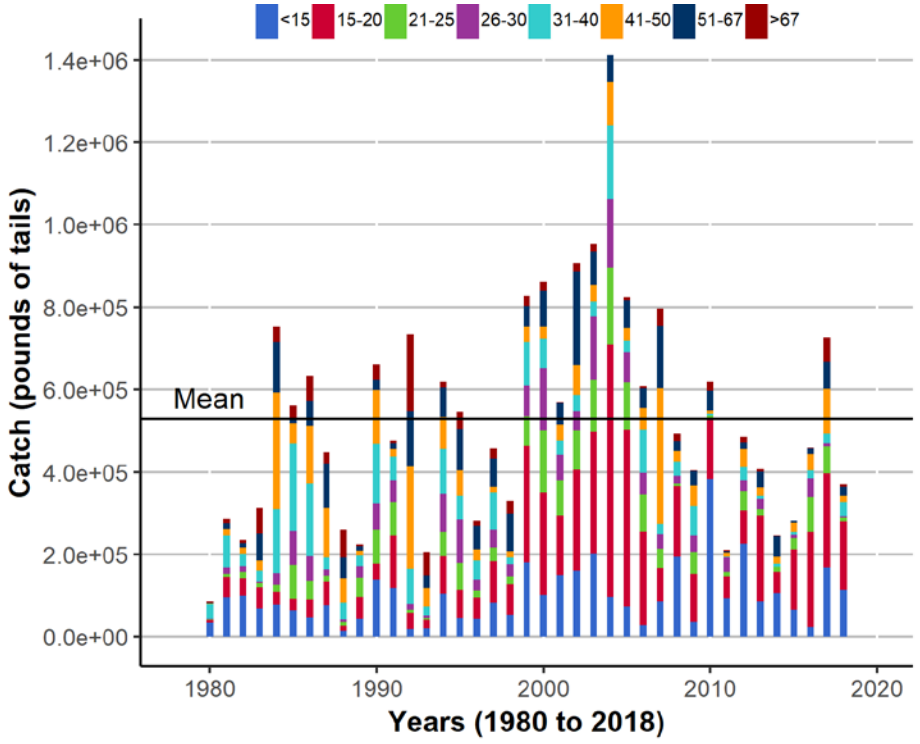

Figure 6. Size composition of Texas August offshore white shrimp catch, 1981-2018