Brown, White, and Pink Shrimp Life History in the Gulf: A Primer

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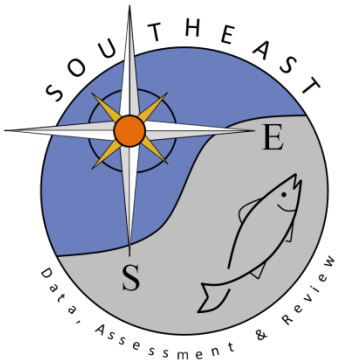

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Brown, White, and Pink Shrimp Life History and Biology (Shrimp Amendment 18)

Brown, white, and pink shrimp use a variety of habitats as they grow from planktonic larvae to spawning adults (GMFMC 1981). Brown shrimp eggs are demersal and occur offshore. Post-larvae migrate to estuaries through passes on flood tides at night from February until April; there is another minor peak in the fall. Post-larvae and juveniles are common in all U.S. estuaries from Apalachicola Bay, Florida, to the Mexican border. Brown shrimp post-larvae and juveniles are associated with shallow, vegetated, estuarine habitats, but may occur on silt, sand, and non-vegetated mud bottoms. Adult brown shrimp occur in marine waters extending from mean low tide to the edge of the continental shelf and are associated with silt, muddy sand, and sandy substrates. More detailed discussion on habitat associations of brown shrimp is provided in Nelson (1992) and Pattillo et al. (1997). Fishing for brown shrimp primarily occurs during daytime hours.

White shrimp eggs are demersal and larval stages are planktonic in nearshore marine waters. Post-larvae migrate through passes from May until November with peaks in June and September. Juveniles are common in all Gulf estuaries from Texas to the Suwannee River in Florida. Post-larvae and juveniles commonly occur on bottoms with abundant decaying organic matter or vegetative cover such as mud or peat. Juvenile migration from estuaries occurs in late August and September and is related to juvenile size and environmental conditions (e.g., sharp temperature drops in fall and winter). Adult white shrimp are demersal and inhabit nearshore Gulf waters to depths of 16 fathoms (96 feet) on soft bottoms. More detailed information on habitat associations of white shrimp is available from Nelson (1992) and Pattillo et al. (1997). Fishing for white shrimp primarily occurs during daytime hours.

Pink shrimp eggs are demersal, early larvae are planktonic, and post-larvae are demersal in marine waters. Juveniles inhabit almost every U.S. estuary in the Gulf but are most abundant in Florida. Juveniles are commonly found in estuarine areas with seagrass where they burrow into the substrate by day and emerge at night. Adults inhabit offshore marine waters, with the highest concentrations in depths of 5 to 25 fathoms (30 to 150 feet). Fishing for pink shrimp primarily occurs at night when the shrimp emerge from the substrate.

The three species of penaeid shrimp harvested by the shrimp fishery are short-lived and provide annual crops, while royal red shrimp live longer (2-5 years). The condition of each shrimp stock is monitored annually, and none has been classified as overfished or undergoing overfishing.

Status of the Brown, White, and Pink Shrimp Stock

Definitions of Maximum Sustainable Yield (MSY), Overfishing, and Overfished

In December 2015, NMFS implemented Shrimp Amendment 15, which modified the MSY, overfishing threshold, and overfished threshold. The MSY values for the penaeid shrimp stocks

are values produced by the Stock Synthesis model approved by the Gulf Council's Scientific and Statistical Committee. Species-specific MSY values will be recomputed during updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf Council. Currently, the Stock Synthesis model produces the following values:

- Brown shrimp: MSY is 146,923,100 lb of tails
- White shrimp: MSY is 89,436,907 lb of tails
- Pink shrimp: MSY is 17,345,310 lb of tails

The overfishing threshold is defined as the maximum fishing mortality threshold (MFMT). The MFMT for each penaeid shrimp stock is defined as the fishing mortality rate at MSY (F_{MSY}). Species-specific F_{MSY} will be recomputed during the updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf Council. Currently, the MFMT values are:

- Brown shrimp: F_{MSY} is 9.12
- White shrimp: F_{MSY} is 3.48
- Pink shrimp: F_{MSY} is 1.35

The overfished threshold is defined as the minimum stock size threshold (MSST). The MSST for each penaeid shrimp stock is the minimum spawning stock biomass at MSY (SSB_{MSY}). SSB_{MSY} values for the penaeid shrimp stocks are values produced by the Stock Synthesis model. Species-specific SSB_{MSY} values will be recomputed during the updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf Council. Currently, the MSST values are:

- Brown shrimp: SSB_{MSY} is 6,098,824 lb of tails
- White shrimp: SSB_{MSY} is 365,715,146 lb of tails
- Pink shrimp: SSB_{MSY} is 23,686,906 lb of tails

Description of the Fishery – Permits and Effort

In 2001, the Council established a federal commercial permit for all vessels harvesting shrimp from federal waters of the Gulf through Amendment 11 (GMFMC 2001). Approximately 2,951 vessels had been issued these permits by 2006. After the establishment of the permit, the shrimp fishery experienced economic losses, primarily because of high fuel costs and reduced shrimp prices caused by competition from imports. These economic losses resulted in the exodus of vessels from the fishery, and consequently, reduction of effort. The Council determined that the number of vessels in the offshore shrimp fleet would likely decline to a point where the fishery again became profitable for the remaining participants, and new vessels might want to enter the fishery. That additional effort could negate, or at least lessen, profitability for the fleet as a whole. Consequently, the Council established a 10-year moratorium on the issuance of new federal commercial shrimp vessel permits through Amendment 13 (GMFMC 2005). The final rule implementing the moratorium was effective October 26, 2006; permits became effective in March 2007. The Council then reviewed the 10-year moratorium from Amendment 13 (GMFMC 2005) and established a 10-year continuation of the moratorium through Amendment

17A (GMFMC 2016). The final rule implementing the continuation of the 10-year moratorium was effective August 22, 2016, and extended the moratorium such that it would expire on October 26, 2026. In 2025, the Council began work on another amendment to consider extending the moratorium past 2026. The number of permits following implementation of the moratorium is displayed in Table 1 and has continued to decline. Figure 1 displays catch, effort, and catch-per-unit-effort (CPUE) for the industry.

Table 1. Number of valid or renewable Gulf commercial shrimp permits as of December 31 each year since implementation of the moratorium. Valid permits are those that were fishable at least one day each year.

Year	Number of Valid or Renewable Permits Each Year	Cumulative Number of Permits Lost from the Fishery	Number of Active Vessels*	% of Active Permits*
2008	1,933	N/A		
2009	1,907	26		
2010	1,723	184		
2011	1,632	91		
2012	1,582	50		
2013	1,534	48		
2014	1,501	33		
2015	1,471	30		
2016	1,454	17	1093	75%
2017	1,442	12	1102	76%
2018	1,426	16	1078	76%
2019	1,418	8	1041	73%
2020	1,400	18	995	71%
2021	1,384	16	980	71%
2022	1,360	24	948	70%
2023	1,335	25	807	60%
2024	1,287	48		

Source: NMFS Southeast Regional Office (SERO) Permits Database

*Active means landing at least one pound of shrimp each year, and shrimp landings from trip tickets may include landings in both inshore and offshore.

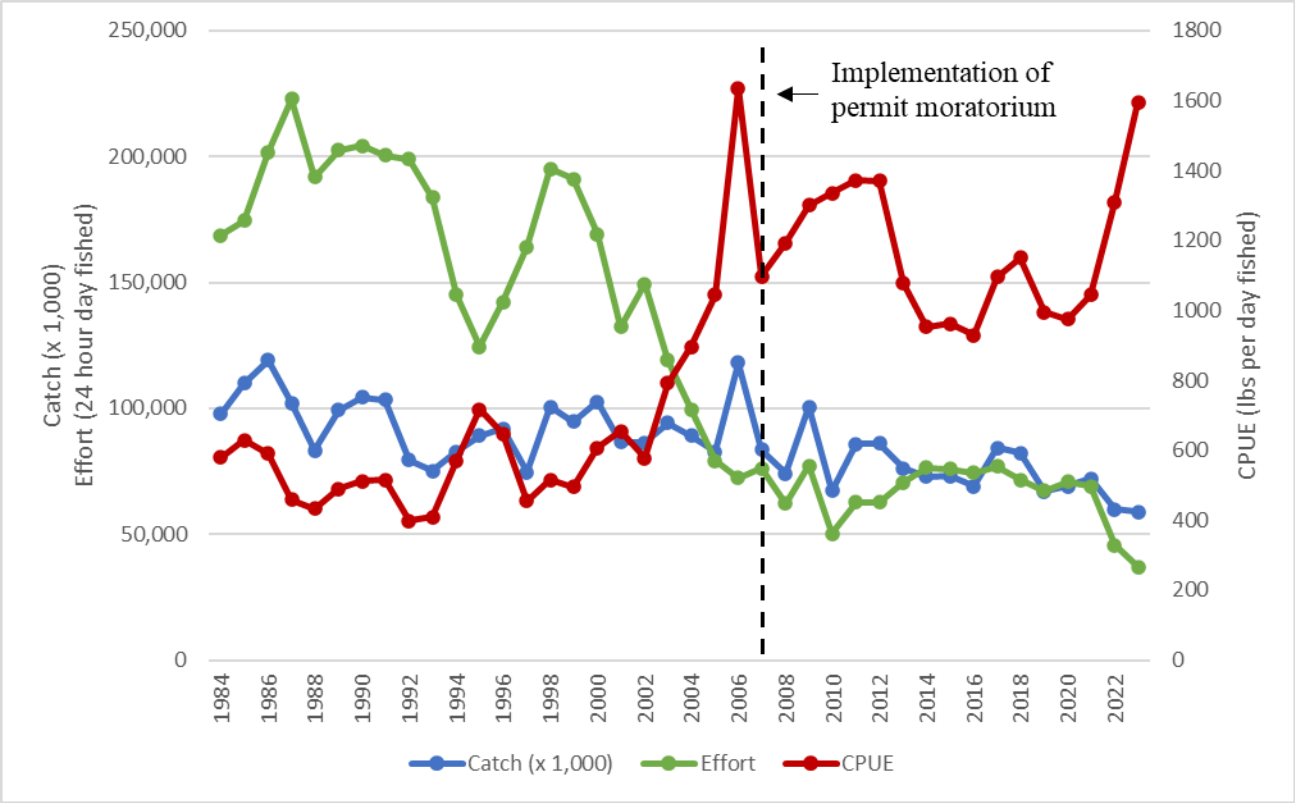

Figure 1. Catch, effort and CPUE from 1984-2023 for all shrimp caught in offshore waters[1] and landed in Gulf ports.[2]

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GMFMC. 2001. Amendment 11 to the fishery management plan for the shrimp fishery of the Gulf of Mexico, U.S. waters. Gulf of Mexico Fishery Management Council, Tampa, FL, 48 pp. https://gulf-council-media.s3.amazonaws.com/uploads/2025/03/Shrimp-Amendment-11_508Compliant.pdf

[1] Offshore waters are waters outside the COLREGS lines. The COLREGS lines are the set of demarcation lines that have been established by the Convention on the International Regulations for Preventing Collisions at Sea, 1972 (commonly called COLREGS). COLREGS define boundaries across harbor mouths and inlets for navigation purposes.

[2] Although landings information can be obtained from both the Gulf Shrimp System (GSS) and Annual Landings Form (ALF) databases, effort is not reported on the ALF, and it is not possible to determine whether the reported landings on the ALF came from offshore or inshore waters. Thus, landings estimates are based solely on GSS data, and only shrimp landed at Gulf ports are taken into account. Further, because separate permits are not required to harvest each of the penaeid species, and multiple species of shrimp may be harvested simultaneously, these estimates include all shrimp harvested from offshore waters, regardless of whether they are federally managed.

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Additional Sources of Relevant Information:

- NOAA Fisheries Species Directory
  - Brown Shrimp | NOAA Fisheries
  - Pink Shrimp | NOAA Fisheries
  - White Shrimp | NOAA Fisheries
- Gulf Data Atlas (Gulf Data Atlas; >Living Marine Resources>Invertebrates>[Select Shrimp of Choice])
