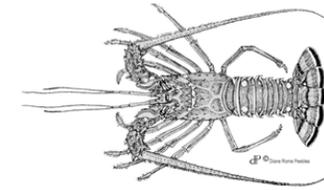
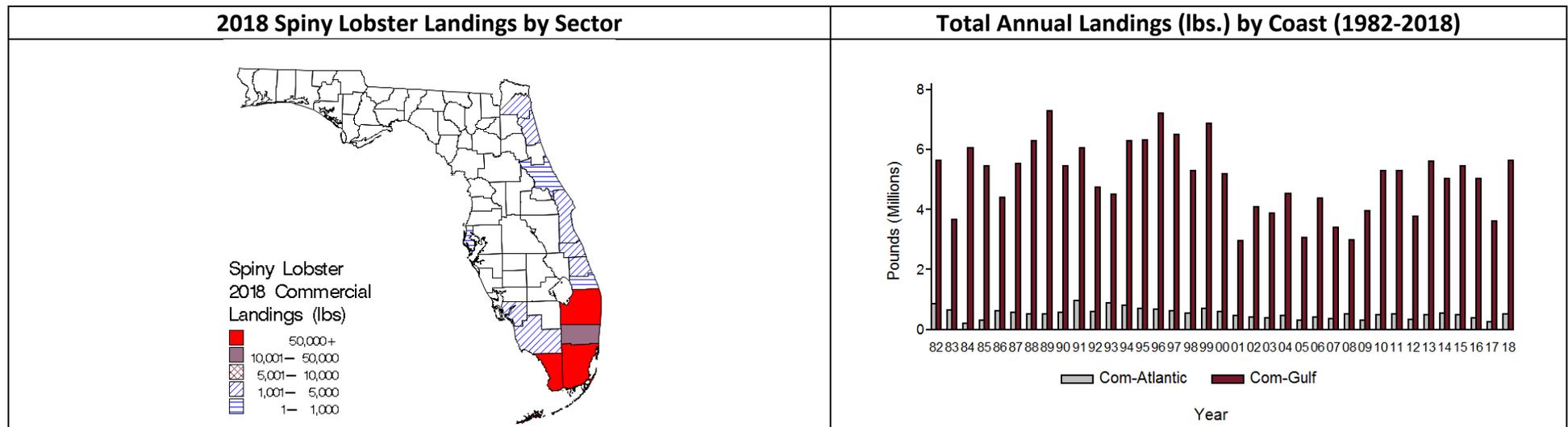


Caribbean Spiny Lobster, *Panulirus argus* (Latreille, 1804)

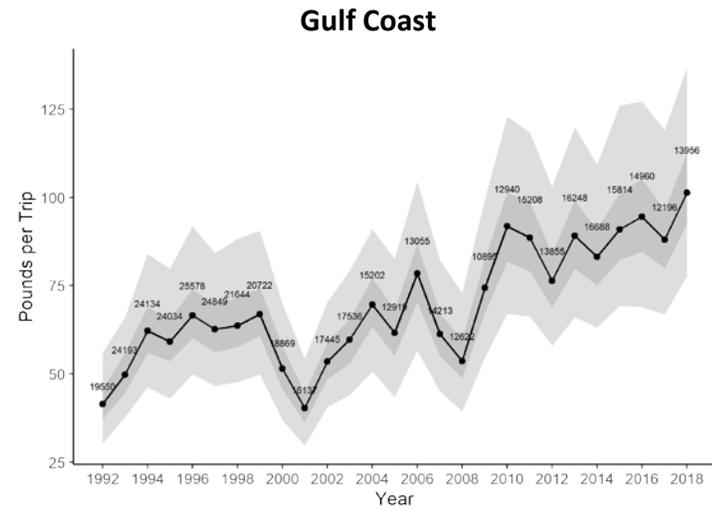
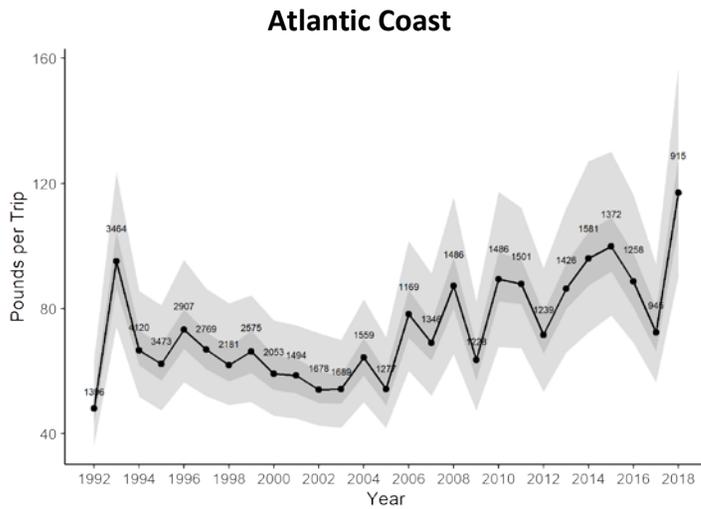


Life History

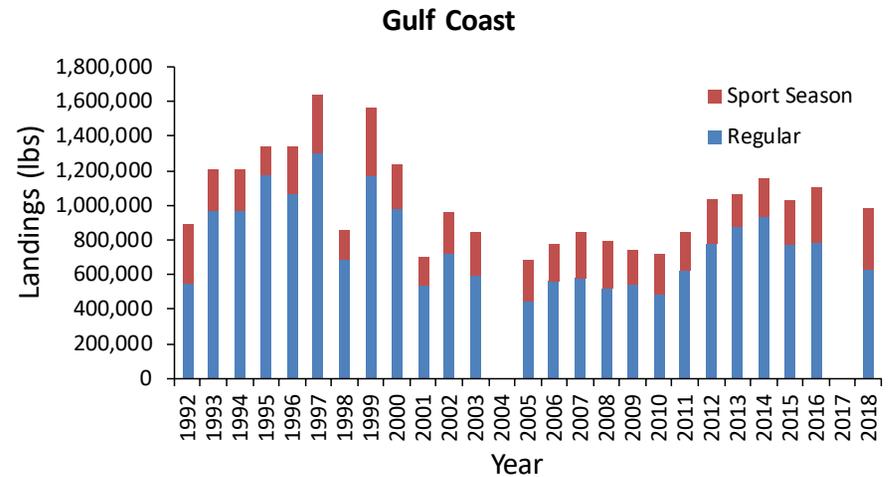
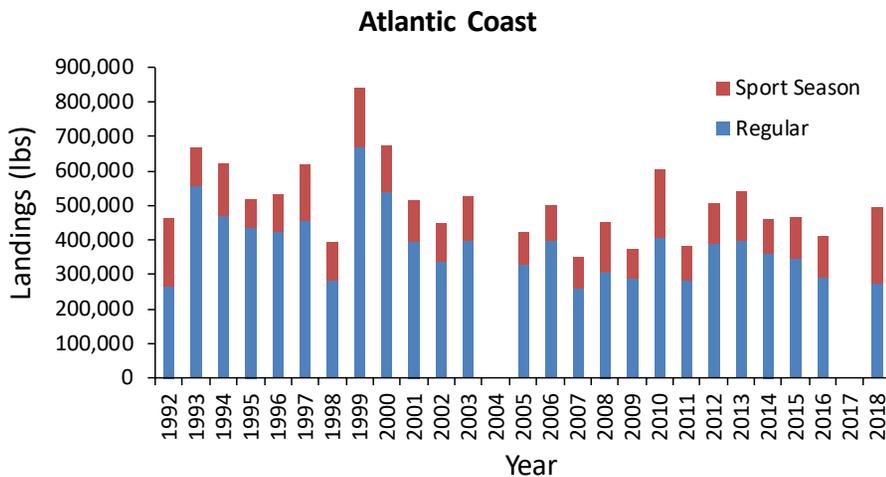
Caribbean Spiny Lobster supports important fisheries throughout most of its range, Bermuda to Brazil. In south Florida, spawning occurs from April through October when water temperatures exceed 23 °C. Settlement of pueruli, the free-swimming phase linking planktonic and benthic life stages, occurs year-round with a peak in settlement usually occurring during the spring and sometimes during other seasons (Marx 1986). The origin of Caribbean Spiny Lobsters inhabiting Florida is not known (Lyons 1986). Competing theories suggest that recruits originate from the West Indies (Sims and Ingle 1967), from the Gulf of Mexico (Lewis 1951), or from local areas (Menzies and Kerrigan 1979). Tringali (pers. comm.) has examined the specimens of Spiny Lobster from throughout the Caribbean using 24 micro-satellite loci and cannot link genetic patterns with source location. Kough *et al.* (2013) used a hydrodynamic model to track larvae launched from 261 sites in 39 counties in the Caribbean and the model had Florida receiving settlement from throughout the Caribbean as well as some local production. Young juvenile lobsters, about 1 inch in carapace length, can grow 0.01–0.05 inches carapace length per week (Forcucci *et al.* 1994). This growth rate would allow some Spiny Lobsters to reach 3 inches in about 1.5 years after settlement. Sharp *et al.* (2000) tagged juvenile lobsters with coded wire tags and got 157 recaptures and found that juvenile lobsters at large for 52 weeks old would be on average 42 mm CL. In general, although male lobsters grow faster than females, most Caribbean Spiny Lobster in Florida attain about 3.4–3.5 inches carapace length when they are more than three years old (Muller *et al.* 1997a). Adult Caribbean Spiny Lobsters feed mainly on gastropods, chitons, and bivalves (Cox *et al.* 1997). Arthropods inhabiting rubble fields were also found in their diets.



Fishers landed 6,129,876 pounds in 2018 which were 14.0% higher than the previous 5-year average (2013-2017). Coastwide, 91.7% of these were from the Gulf (primarily the Keys) and 8.3% were from the Atlantic. Commercial landings constituted 100% of the total landings.



Standardized Commercial Catch Rates: Atlantic coast commercial catch rates dropped after 1993 and decreased slightly through 2005 then became more variable with an overall increasing trend. Gulf coast commercial landings rates show an increasing trend with lows in 1992, 2001, and 2008. Dark grey figure lines represent first and third quartiles while the light grey lines represent the 2.5% – 97.5% quantiles.



Recreational Landings: Total landings for recreational anglers on the Atlantic coast (Nassau to Miami-Dade counties) have fluctuated without major trend. On the Gulf (Escambia to Monroe counties), landings were dome-shaped through 2005 but have been increasing again in trend through 2016.

Stock Status

Current Condition: the stock is not experiencing overfishing and it is unknown if the stock is overfished.

Management History: The fishery developed in the Key West area and expanded to the middle Keys. This development occurred around 1968, when the minimum carapace length was decreased to 3 inches. The current fishing season opens on August 6 and closes March 31. Approximately 40% of the season's landings occur in August, which is followed by a sharp decrease in landings thereafter. Fishing effort for Spiny Lobster also declines after the opening of the stone crab fishery on October 15. A Spiny Lobster trap reduction program was implemented in August 1993 to reduce excess fishing effort in the Keys lobster fishery. In 1991, the Florida Fish and Wildlife Conservation Commission began using mail surveys (Bertelsen and Hunt 1992) to estimate the recreational harvest of Spiny Lobster during the two-day sport season and during the late summer (August 6 until the first Monday in September). Adverse weather conditions in south Florida made it impossible to conduct the survey in 2004.

An early age-structured analysis of the catches-at-age (Muller *et al.* 1997) showed that fishing mortality rates during the mid 1990's were higher than commonly used benchmarks for overfishing (e.g., $F_{0.1} = 0.28$), indicating a continued need for further reduction in the number of traps used in the fishery. In fact, a later analysis found that female lobster abundance in south Florida had increased sharply after the initiation of the trap reduction program during the 1993–1994 fishing season (Muller *et al.* 1999, 2000) with transitional spawning potential ratios close to 30% during 1999–2000. In the recent stock assessment analyses (SEDAR 08 U.S. Stock Assessment Panel 2005), a variety of population assessment techniques indicated that static spawning potential ratios were likely near 30% and potentially much higher (depending on the amount of retrospective bias in the estimates of fishing mortality) during the 2003/2004 fishing year. The most recent stock assessment update (SEDAR 08 Update Stock Assessment Panel 2010) reached similar conclusions as the 2005 stock assessment, but estimating biological reference points was found to be problematic because the Florida Spiny Lobster depends on external sources to an unknown extent. Therefore, the estimation of conservation and management benchmarks for whether the stock of Spiny Lobster is overfished in southeastern US cannot be done reliably using only data from Florida alone. To assess population-wide dynamics and estimate reliable management reference points, the spawning biomass of the combined Caribbean populations must be investigated. The geometric mean for the fully selected fishing rate for the past three fishing years, 2007-08 through 2009-10, was 0.21 per year and the stock is considered to not be undergoing overfishing. However, the retrospective results from ICA model runs with various configurations call for cautions and prudent management options because fishing mortality rates were probably underestimated in recent years (SEDAR 08 Update Stock Assessment Panel 2010).

A U.S. Caribbean Spiny Lobster stock assessment was completed in 2019 (SEDAR 57), which evaluated the spiny lobster stocks in Puerto Rico, St. Croix, and St. Thomas/St. John in the US. Virgin Islands (USVI). The stocks were determined to be not overfished (i.e. current spawning output is above MSST) nor undergoing overfishing (i.e. current fishing mortality is below MFMT). Although the stock in St. Thomas/St. John and in Puerto Rico are close to the overfishing status as $F/MFMT$ is near 1.0.