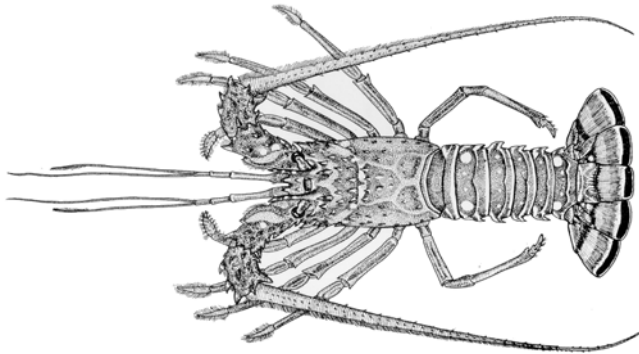


Caribbean spiny lobster, *Panulirus argus*



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. A peak in settlement usually occurs 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). 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. 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.

Since about 1992, the commercial landings of Caribbean spiny lobster in Florida have declined from a 1994-1997 average of about 5 million pounds per fishing season to a 2001-2006 average of just over 3 millions pounds. During the 2006 calendar year, the commercial fishery landed 4,775,169 pounds in Florida. Ninety-one percent of these landings were made on the gulf coast. Commercial landings were concentrated in south Florida in Monroe, Dade and Palm Beach Counties (Fig. 1). Most of the lobsters landed outside Dade and Monroe Counties were caught in the Keys and sold to wholesale dealers operating in Palm Beach County. Usually, less than a half million pounds are landed outside of the Florida Keys. Within the Keys, 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. Effort 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). The most recently available survey was conducted during 2006 when statewide recreational landings were estimated to be 947,353 pounds. This estimate was 36% lower than the average landings in the previous available five years (2000-2004) and was 37% lower than the available historic average landings (1992-2006). Adverse weather conditions made it difficult to conduct the survey in 2005, so survey data from 2005 is incomplete.

The calendar 2006 total commercial landings of spiny lobster was 16% higher than the average landings in the previous five years (2001–2005) and was 18% lower than the historical average landings (1982–2006). Atlantic coast landings peaked at nearly 1.0 million pounds in 1991, but since 2000, reported landings have averaged about 0.4 million pounds (Fig. 2). On the gulf coast, landings generally decreased between 1989 and 1993 but then increased markedly to an average of about 6.2 million pounds during the period 1994-2000. Landings dropped to a calendar-year average of 3.8 million pounds during 2001-2006 (Fig. 2). Landings were low in 1992 because of Hurricane Andrew and in 1998 because of low catch rates in August followed by Hurricane Georges in September. Standardized commercial landings rates for spiny lobster fishers on the Atlantic dropped during 1994–1995, and then remained fairly stable during 1996–1999 before slowly declining through 2003. In recent years there have been years of higher than average landings rates in 2004 and again in 2006 (Fig. 3). On the gulf coast, landings rates slowly increased from 1992 through 1999, decreased during 2000–2001, and then exhibited an increasing trend that led to historically high levels during the period 2004-2006.

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 most 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.

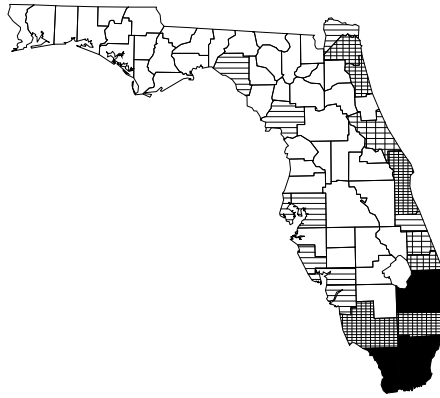


Figure 1. Geographic distribution of commercial landings of Caribbean spiny lobster during 2006

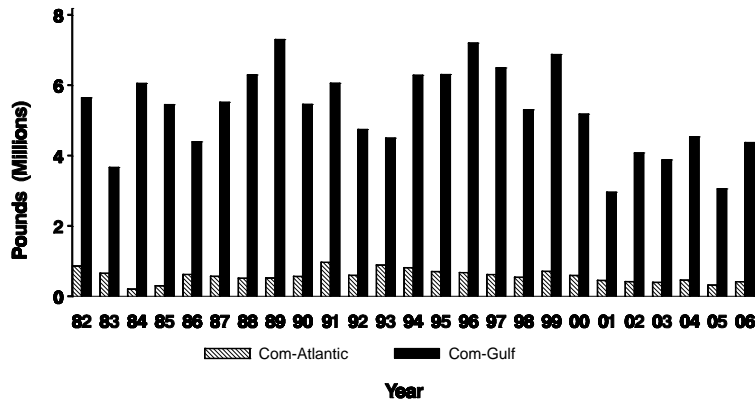


Figure 2. Total annual commercial landings of Caribbean spiny lobster on the Atlantic and gulf coasts of Florida, 1982–2006

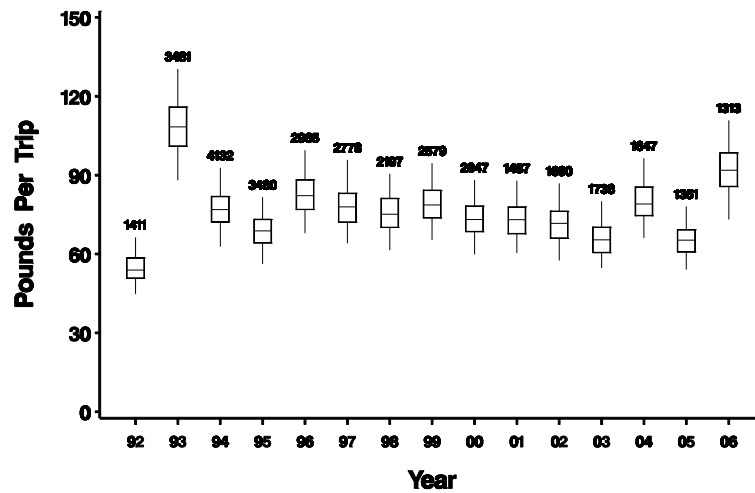


Figure 3. Annual standardized commercial catch rates (pounds) for Caribbean spiny lobster on the Atlantic coast of Florida, 1992–2006

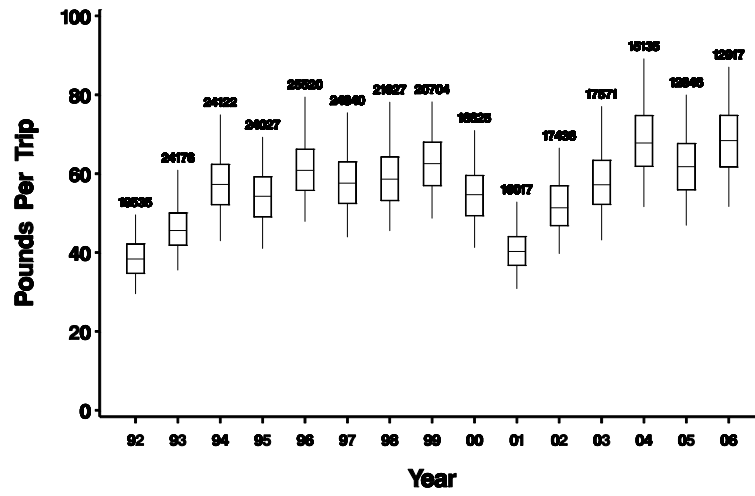


Figure 4. Annual standardized commercial catch rates (pounds) for Caribbean spiny lobster on the gulf coast of Florida, 1992–2006