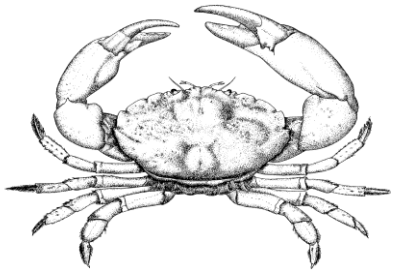
Florida stone crab,
***Menippe mercenaria* (Say, 1818),**
and
gulf stone crab,
***M. adina* (Williams and Felder, 1986)**



Stone crabs are found from North Carolina south around peninsular Florida to the Yucatan Peninsula and Belize and throughout the Bahamas and Greater Antilles. Adults are benthic and live in burrows that can be found from the shoreline out to depths of 200'. In the northern and western Gulf of Mexico (northwest Florida to Tamaulipas, Mexico), gulf stone crabs replace Florida stone crabs. In addition, there are zones of secondary contact and hybridization between species in the gulf between Cedar Key and Cape San Blas and in the Atlantic between Cape Canaveral and Charleston, South Carolina (Bert and Harrison 1988). Differences in the ecology and life history among hybrids, gulf stone crabs, and Florida stone crabs suggest the need for different management regimes for each fishery (Bert 1992). Florida stone crab growth is highly variable but growth to 0.4" carapace width (CW) can occur in as little as 6 months to as long as one year (Tweedale *et al.* 1993). Transition points in crusher-claw propodus length (PL):CW analysis indicated that 50% morphological maturity (CW_{50}) occurred at approximately 2.76" CW for males and 2.36" CW for females (Gerhart and Bert 2008). Most female Florida stone crabs spawn when they reach 2.25"–2.75" carapace width or approximately age 2. Recruitment to the commercial fishery is estimated to begin at age 3 for males and age 4 for females (Gerhart and Bert 2008). Although some spawning occurs all year, Florida stone crabs spawn principally from April through September.

The stone crab fishery is unusual in that only the claws are harvested; the crab is returned to the water alive, ostensibly to generate new claws. Approximately 20% of the claws measured in fish houses were regenerated, providing evidence that crabs survive the de-clawing process.

The operating season of the stone crab fishery is from October 15 through May 15. Since the operating season spans two calendar years, stone crab landings are reported by the calendar year in which the season begins. In calendar year 2009, commercial stone crab landings were 2,642,838 pounds of claws. There are no estimates for the size of the recreational fishery. Landings were taken almost exclusively (99% by weight) in gulf coast counties. The highest landings were reported in Monroe, Collier, Lee, Manatee, Pinellas, Hernando, Citrus, Levy, Dixie, and Wakulla Counties on the gulf coast and in Dade County on the Atlantic coast of Florida in 2009 (Fig. 1). Overall, landings of stone crab increased between 1986 and 1992 stabilized at about 2.6–3.5 million pounds each year through 2004, declined to about 2.0 million pounds in 2005, and increased to 3 million pounds in 2009 (Fig. 2). The 2009 total landings of stone crab were 4% lower than the average landings in the previous five years (2004-2008) and were 7% lower than the 1982–2009 historical average landings (Fig. 2).

The stone crab fishery is managed in the federal Exclusive Economic Zone under a fishery management plan developed by the Gulf of Mexico Fishery Management Council (Costello *et al.* 1979). Analysis of the fishery between 1981 and 1985 indicated that the resource was fully used at that time and had begun to show a decline in catch per unit effort and landings (Phares 1992). Commercial catch per trip on the Atlantic coast increased linearly from 1993-1997, landings rates stabilized at 20-30 pounds per trip between 1998-2006, increased to nearly 40 pounds/trip in 2007 and drop to less than 30 pounds/trip in 2008 (Fig. 3a). Landings rates on

the gulf coast increased steadily through 2001, declined during 2002-2003, and increased to over 100 pounds/trip in 2008 (Fig 3b).

Stone crabs captured in fishery-independent-monitoring were separated into young-of-the-year (YOY) and post-YOY based on a carapace width of 25mm. Young-of-the-year stone crabs were extremely rare in sets on the Atlantic coast but there is some evidence of a stronger year class in 2000 (Fig. 4a). The gulf coast relative abundance of YOY stone crabs has remained somewhat stable aside from extremely poor years in 1997 and 2001; strong year classes were detected in 2006 and 2007 followed by high abundances through 2009 (Fig. 4b). Post-YOY relative abundance varied without trend from 1997 to 2009 on both coasts (Figs. 4c and 4d). No stone crabs were observed with gross external abnormalities.

Despite the three-fold increase in the number of traps used in the fishery since 1989-90 the level of landings has remained fairly stable over time. Muller *et al.* (2006) found that the recent (through 2004-2005) landings levels are probably all that can be harvested under current environmental conditions, regulations, and fishery practices. Overfishing was clearly occurring because of the excessive number of traps used in the fishery. Recruitment does not show any decline over the time series (1986/87 through 2004/05). Muller *et al.* (2006) suggested that stone crabs were resilient to continued overfishing because most female stone crabs spawn one or more times before their claws reach legal size, because some crabs survive declawing, and because the fishing season is closed during the principal spawning season. The fishery continues to have too many traps in the water as evidenced by the low catch-per-trap level over a very wide range of recent numbers of deployed traps.

a. Commercial landings (pounds)

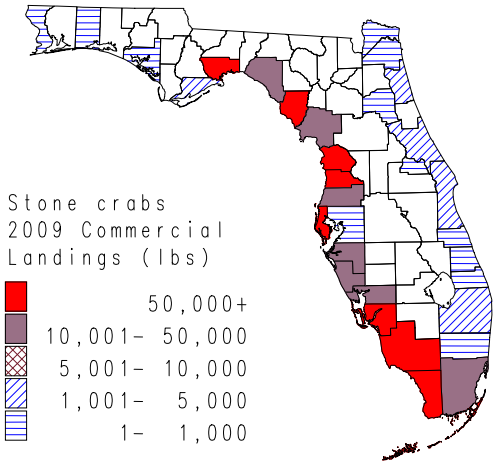


Figure 1. Geographic distribution of the commercial landings (pounds) of stone crab claws during 2009.

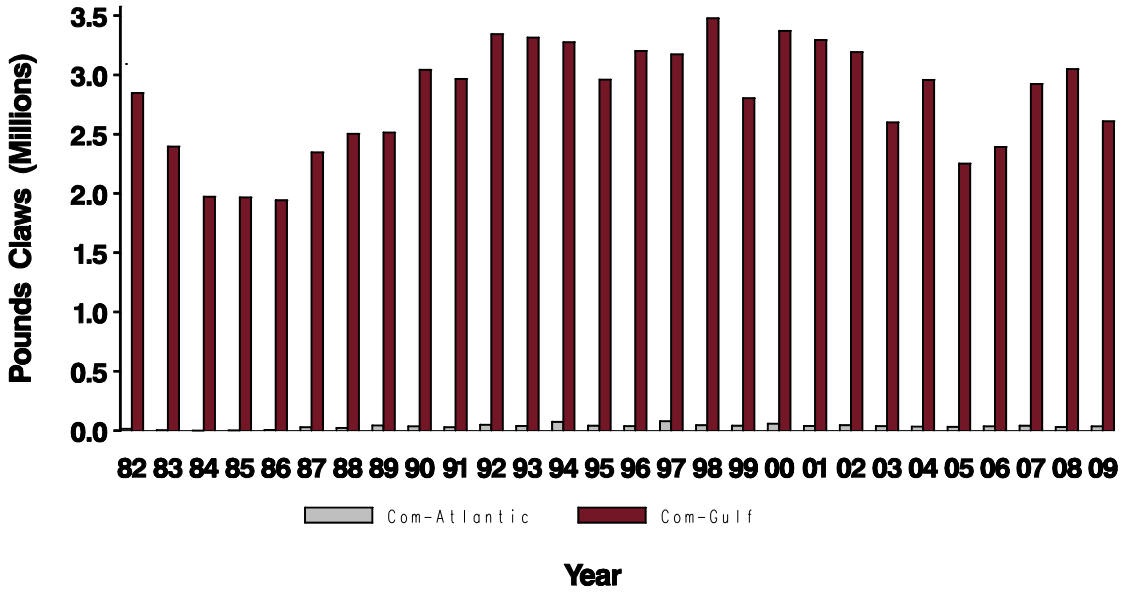
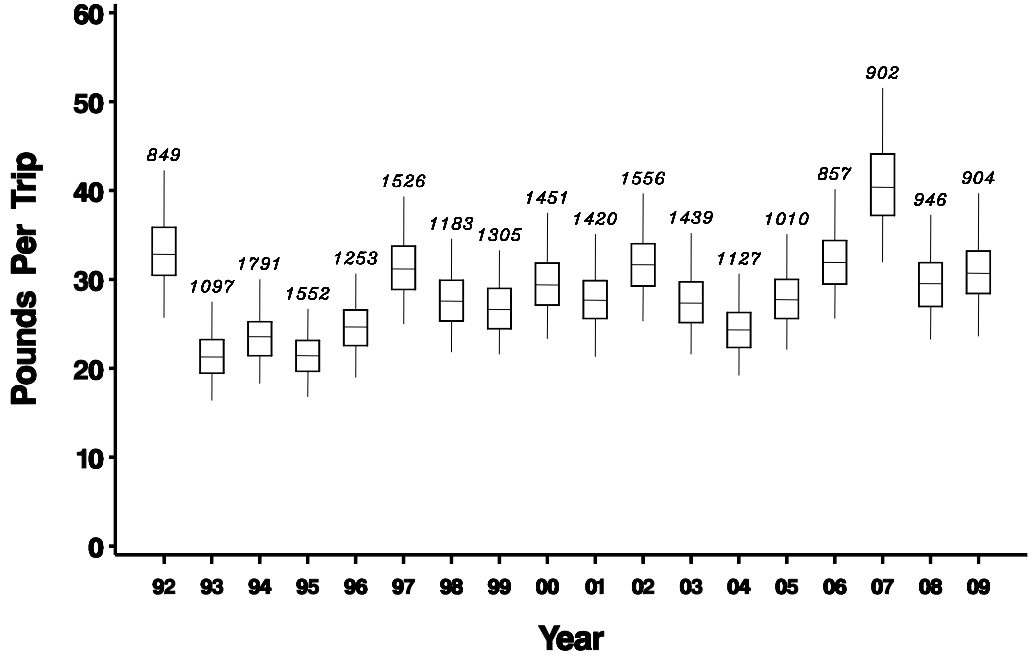


Figure 2. Total annual landings (pounds) of stone crab claws on the Atlantic and gulf coasts of Florida, 1982–2009.

a. Atlantic Coast, commercial landings rates (pounds/trip)



b. Gulf Coast, commercial landings rates (pounds/trip)

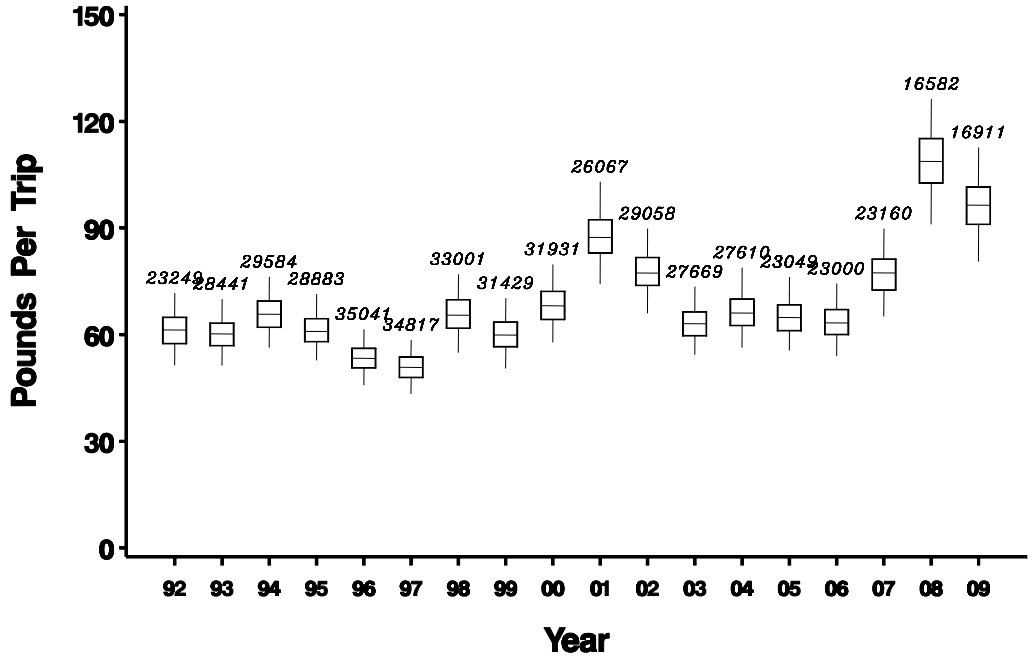


Figure 3 (a)-(b). Annual standardized catch rates for stone crabs in Florida. Commercial landings rates (pounds/trip), 1992-2009: (a) Atlantic Coast; (b) Gulf Coast.

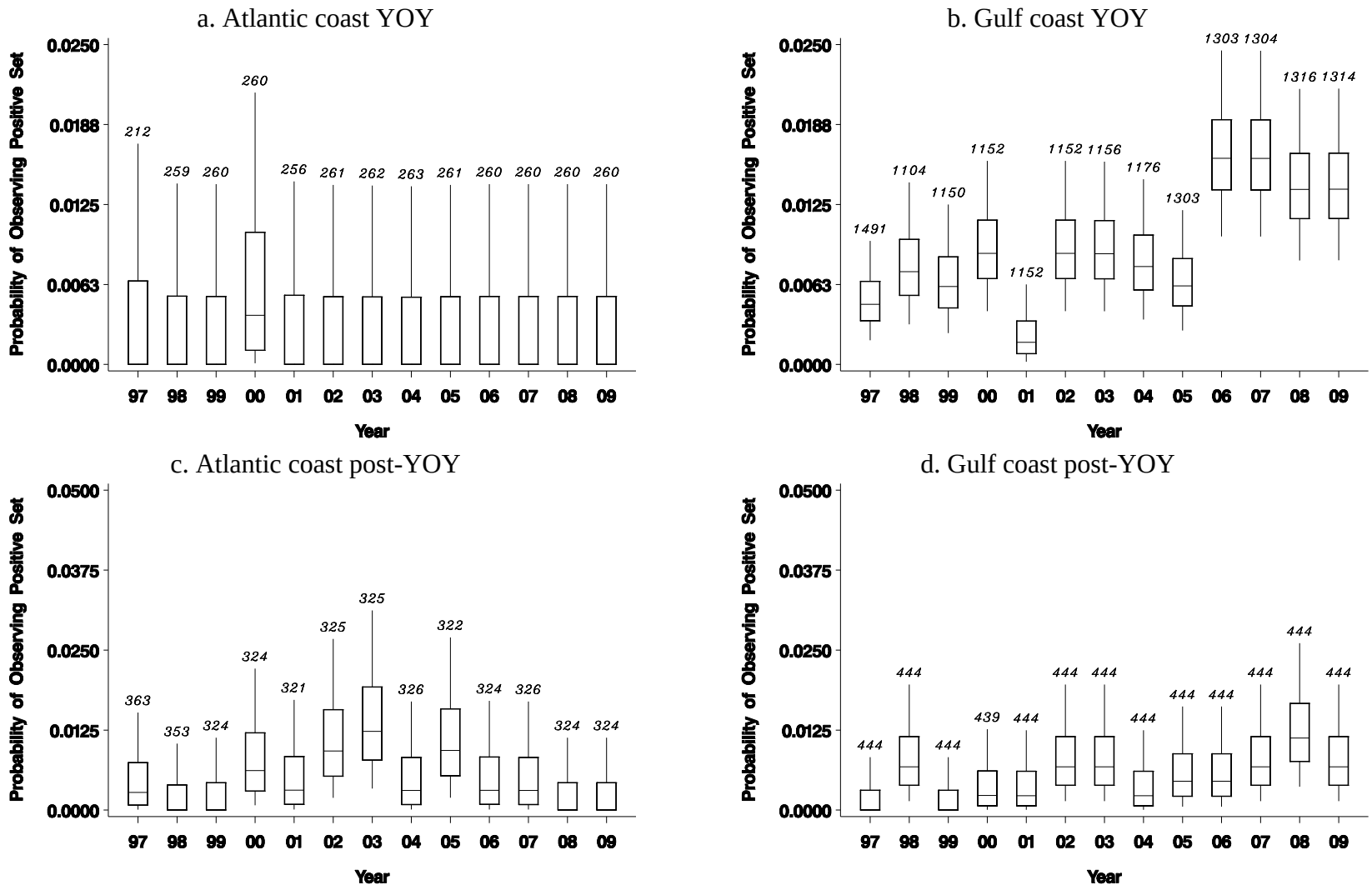


Figure 4(a)-(d). Proportion of fishery-independent-monitoring sets that captured stone crab from 1997-2009. Young-of-the-year (YOY): (a) Atlantic coast; (b) Gulf coast. Post-YOY: (c) Atlantic coast; (d) Gulf coast.