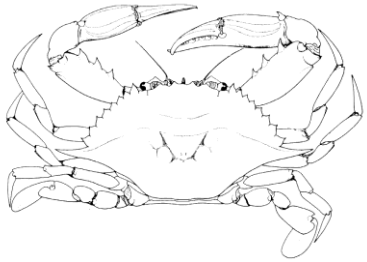
Blue crab,
Callinectes sapidus
Rathbun, 1896



In the western Atlantic, blue crabs are distributed from Nova Scotia south to northern Argentina, including Bermuda and the Antilles. Blue crabs are an important link in the food chain, feeding on fish, aquatic vegetation, mollusks, crustaceans, and annelids while they serve as prey to mammals, birds, and fishes. The high level of genetic patchiness and gene flow found among blue crabs inhabiting gulf and Atlantic estuaries suggests that little population substructuring occurs; although, latitudinal clines in allele frequencies may be maintained by selective forces operating over broad geographic scales (McMillen-Jackson *et al.* 1994). Blue crabs grow to adult size, 3.9"–9.4" carapace width, after 18 to 20 molts (Van Engel 1958). In the St. Johns River, where some blue crabs survive to four years of age, adult size is reached after one year (Tagatz 1968). Female blue crabs mate once in their lifetimes during the period March–December following their terminal molt. Size at maturity varies between about 2.0" and 7.0" carapace width (Steele 1979). After mating in the upper reaches of estuaries, females move to the mouth of the estuary or nearshore coastal waters to spawn. On the gulf coast of Florida, females leave the estuary and move northward toward the Florida Panhandle region before spawning (Steele 1991).

Reported commercial landings of blue crab were 10,370,336 pounds during the calendar year 2007. Landings were greater on the gulf coast, where about 59% of the statewide landings were made in 2007. More than 1,000 pounds of blue crab were landed in most coastal counties of Florida during 2007 (Fig. 1). The 2007 total landings were 2% lower than the average landings in the previous five years (2002–2006) and were 23% lower than the 1982–2007 historical average landings (Fig. 2). There are no precise estimates of the size of the recreational fishery, but it may be substantial (Steele unpublished ms).

On the Atlantic coast, 2004-2007 landings rates of blue crabs returned to near the long-term average of 200-220 pounds per trip after being below 180 pounds per trip during the period 2001-2003 (Fig. 3a). On the gulf coast, after falling to a low in 2001, landings rates have trended upwards from 2001-2006 to near historic levels of about 275 pounds per trip, but have fallen in 2007 to near the long-term average (Fig. 3b) of just over 200 pounds per trip.

Indices of abundance for young-of-the-year (YOY) blue crab followed a cyclical pattern on both coasts, with peaks in 1998 and 2005 on the Atlantic coast and in 1998 and 2004 on the gulf coast (Figs. 4a and 4b). Abundance of post-YOY blue crab on the Atlantic coast varied followed similar patterns as observed in the YOY index with highs in 1998 and 2005 (Fig. 4c). The post-YOY abundance index on the gulf coast followed similar patterns as the YOY index with highs in 1996, 1998 and 2006 (Fig. 4d).

On the Atlantic coast, the incidence of blue crabs captured during monitoring trips with gross external abnormalities was extremely low except for in 2004 (Fig. 5a). On the gulf coast the incidence of individuals with gross external abnormalities was high in 2001 and has remained high from 2005 to 2007 (Fig. 5b). On the Atlantic coast all gross external abnormalities were unclassified or "other" while on the gulf coast the majority of abnormalities were due to parasitic

infestation (Figs. 5c and 5d).

The Gulf States Marine Fisheries Commission developed a fishery management plan for blue crab (Steele and Perry 1990) and updated it in 1999 (Guillory *et al*. 2001). In the most recent plan recommended management actions included: minimum outside wall mesh sizes of 1.5" (corner to corner) hexagonal or 1.75" square mesh for hard crab traps, a 5" minimum size limit (except peeler crabs held for shedding), prohibition of the sale of egg-bearing females, a trap identification system, and the use of 2 3/8" escape rings. Guillory *et al.* (2001) concluded that there was no evidence of a decline in blue crab abundance in Florida, it was believed that the average historical landings might be a better estimate of maximum sustainable yield than that estimated by a simple surplus-production model. None of the "stock stress" indicators were detected using Florida data where, excluding 1998 data, no increase in total mortality and no decrease in relative abundance, mean carapace width or landings were observed. Population models provide evidence that blue crab in Chesapeake Bay were growth overfished (Tang 1983, Rugolo *et al*. 1997). While blue crab abundance was at average long-term levels in the Chesapeake, the expended effort needed to make the current landings there is too high, resulting in a less economically viable fishery (Rugolo *et al*. 1997). Murphy *et al.* (2001) developed a stock assessment for blue crabs in Florida during 1989-2000 including preliminary data from 2000. Whether blue crabs were judged as overfished in Florida depended on the actual life span of blue crabs in Florida and the overfished criterion. The estimated fishing mortality rate was near $F_{0.1}$ during 2000 if blue crabs were assumed to live only three years, but if they live much longer, blue crabs were judged as overfished using the $F_{0.1}$ criterion, with fishing mortality rate much higher than the natural mortality rate. An updated assessment of blue crabs in Florida through 2005 (Murphy et al. 2007) presented highly uncertain results that indicated that blue crab had probably not been in an overfished state (low biomass) or undergoing overfishing (high fishing mortality rate) during the period 2002-2005. A common feature in all of Murphy et al.'s (2007) analyses is the finding that blue crabs in Florida appear to be very resilient to high fishing rates.

a. Commercial landings (pounds)

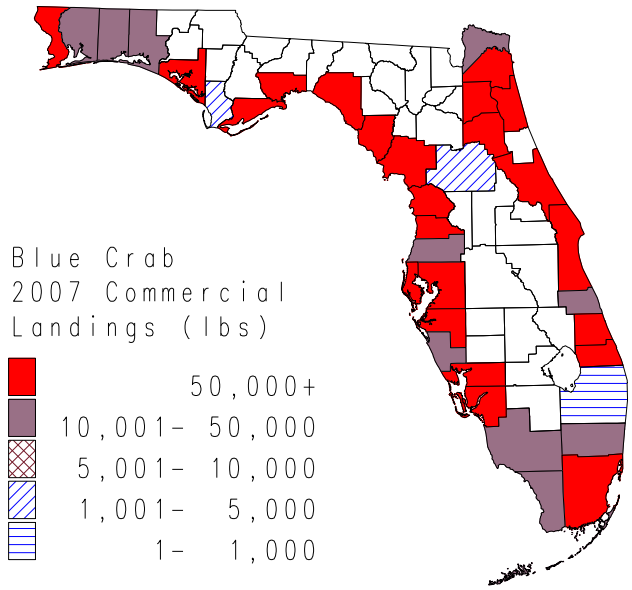


Figure 1. Geographic distribution of blue crab commercial landings by county during 2007.

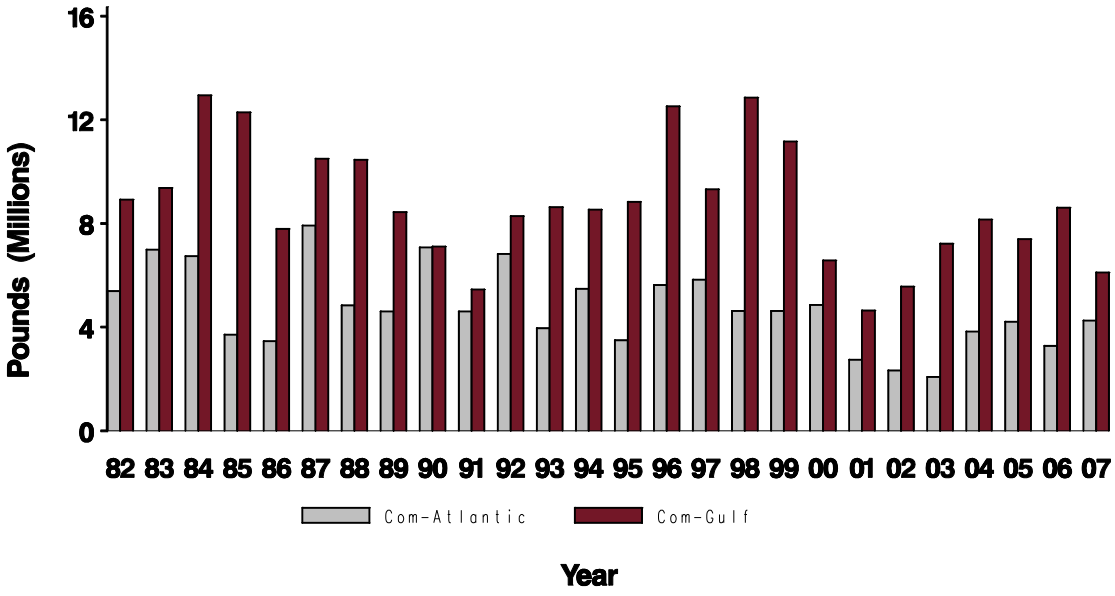
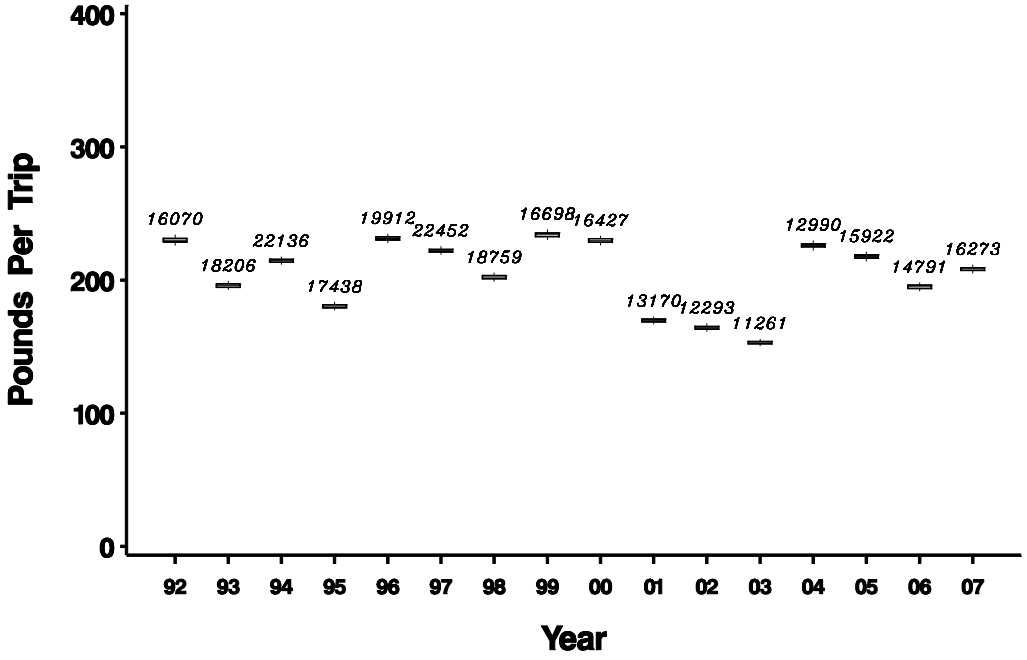


Figure 2. Total annual landings (pounds) wild harvest of hard clams on the Atlantic and gulf coasts of Florida, 1982–2007.

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



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

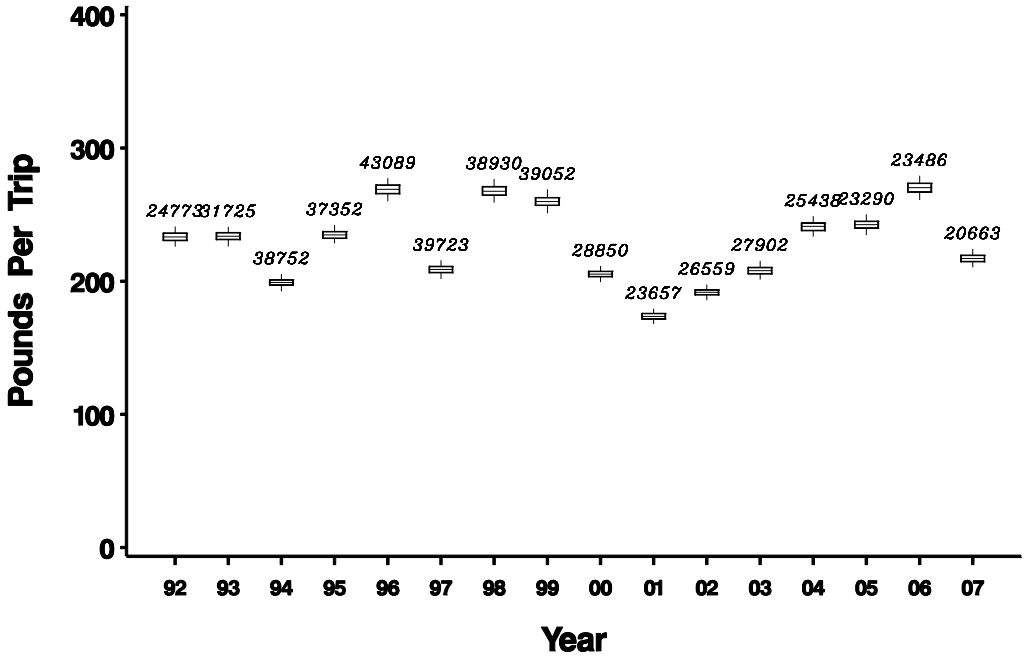


Figure 3 (a)-(b). Annual standardized catch rates for blue crabs in Florida. Commercial landings rates (pounds/trip), 1992-2007: (a) Atlantic Coast; (b) Gulf Coast

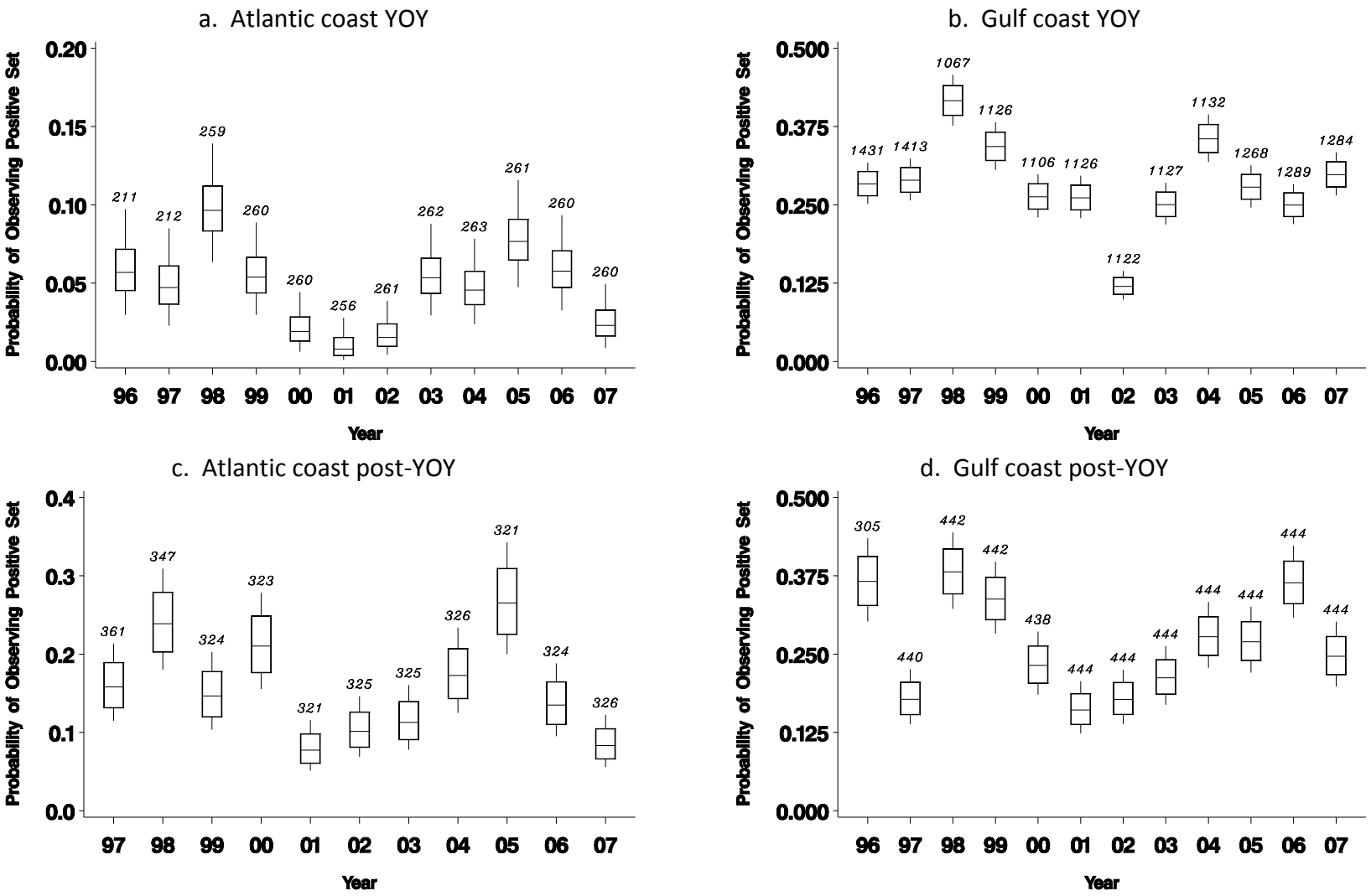


Figure 4(a)-(d). Proportion of fishery-independent-monitoring sets that captured blue crab from 1996-2007. Young-of-the-year (YOY): (a) Atlantic coast; (b) Gulf coast. Post-YOY: (c) Atlantic Coast; (d) Gulf coast.

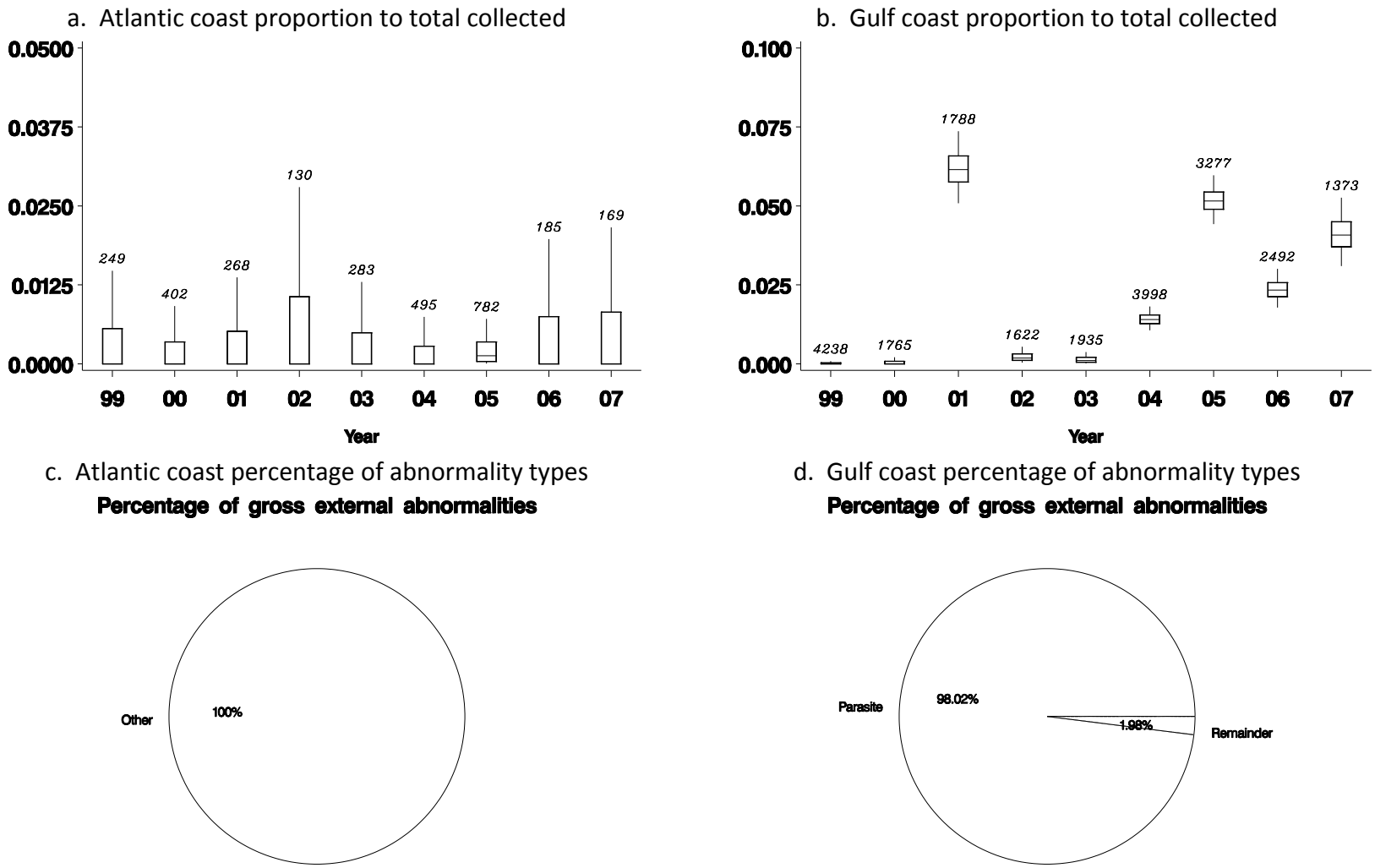


Figure 5(a)-(d). Gross external abnormalities of blue crab ≥ 75mm SL collected in fishery-independent-monitoring sets, 1999-2007. Proportion of animals with gross external abnormalities to total animals collected: (a) Atlantic coast; (b) Gulf coast. Percentage of abnormalities by type: (c) Atlantic Coast; (d) Gulf coast.