Three commercially important species of penaeoid shrimp occur on both coasts of Florida. The distribution of white shrimp, *Litopenaeus setiferus*, and brown shrimp, *Farfantepenaeus aztecus*, is intermittent in Florida waters. White shrimp do not occur from about St. Lucie Inlet on the Atlantic coast around the southern tip of Florida north to about the mouth of the Ochlockonee River. Brown shrimp do not occur on the gulf coast between Sanibel Island and Apalachicola Bay. All three shrimp species occur in nearshore waters and estuaries and use the estuaries as nursery areas. At various juvenile stages, penaeoid shrimp usually inhabit seagrass beds and algal mats within estuaries. Stable isotope studies show young pink shrimp that recruited to the southeastern Gulf of Mexico offshore fisheries are mostly migrants from seagrass meadows (Fry et al. 1999). Adult pink shrimp, *F. duorarum*, are most abundant at depths between 35' and 120'. White shrimp are most abundant in waters shallower than 90', and brown shrimp are most abundant in waters less than 180'. White shrimp are typically distributed in areas of low salinity over organic-rich, mud bottoms. Brown shrimp are found on similar bottoms but in higher salinities. Pink shrimp occur on more coarse sediments and in a wide variety of salinities (Steele unpublished ms.). White shrimp grow rapidly until about 6.3 inches total length (TL). Peak growth rates are 0.8 inches/month during summer. Brown shrimp can grow at peak rates of 1.8 inches/month during spring; pink shrimp peak growth rates have been reported to exceed 2.0 inches/month.

All three species mature during their first year. Sizes at maturity are about 5.5 inches TL for white and brown shrimp and about 3.3 inches TL for pink shrimp. Spawning occurs in relatively deep water for brown shrimp (49'–360') and pink shrimp (13'–160'), and in nearshore waters (20'–80') for white shrimp. White shrimp spawn during April–October. Pink and brown shrimp can spawn year-round, especially in deeper or more southern waters. Peak spawning occurs during February and March for brown shrimp and during spring, summer, and fall for pink shrimp.

Reported commercial penaeid shrimp landings totaled 14,522,026 pounds in Florida during 2015. The majority of statewide landings (64%) were made on the Gulf coast. The geographic distribution of landings for each species was different. The greatest landings of brown shrimp were reported in the Florida Panhandle region and in Hillsborough and Lee County on the Gulf coast, and in Nassau, Duval, St. Johns, and Brevard Counties on the Atlantic coast (Fig. 1a). Pink shrimp were landed mostly in Gulf, Franklin, Hernando, Pinellas, Hillsborough, Lee, and Monroe Counties on the Gulf coast and Duval and Dade Counties on the Atlantic coast (Fig. 1b). White shrimp were landed mostly in the northeast region of Florida, and Franklin and Gulf Counties in the panhandle region of the Gulf in areas adjacent to extensive seagrass beds and algal mats.
saltwater marshes and high freshwater run-off (Fig. 1c).

The 2015 total landings of brown shrimp were 22% lower than the average landings in the previous five years (2010–2014), while landings of pink and white shrimp were closer to five year averages (5% higher and 4% lower, respectively). Compared to the 1986–2014 historical average landings, brown and pink shrimp landings were 6% and 18% below average, respectively, and white shrimp were 31% above the long term average (Fig. 2). Commercial landings of penaeid shrimp increased on the Atlantic coast from a low of about 2.5 million pounds in 1984 to a peak of about 8 million pounds in 2011. Landings declined in 2013 but have since slowly increased (Fig. 2). Gulf coast landings increased dramatically, from about 10.6 million pounds in 1992 to 24.6 million pounds in 1996, and then dropped to an average of 13.4 million pounds during the period 1999-2006, and declined to an average of around 9 million pounds from 2007-2015. Competition from foreign imports and increased fuel and operating costs contributed significantly to the declines in penaeid shrimp landings by commercial shrimpers over the last 15 years.

Standardized annual landings rates for all three species generally increased from 1992 to 2010-2012 on the Atlantic coast and have increased recently in 2014-2015 (Fig. 3a, 3c, and 3e). Landing rates for brown shrimp show a similar trend on the gulf coast (Fig. 3b). Landing rates for pink shrimp on the gulf coast peaked in 1996 and declined until 2000. Rates then slowly increased before stabilizing in recent years, and a similar peak, like that observed on the Atlantic coast, was observed in 2015 (Fig. 3d). Landing rates for white shrimp on the gulf coast illustrate a steep increase from 2001 to 2006 followed by a marked decrease in 2007. Rates have since been variable and increased considerably in 2015 (Fig. 3f).

The index of relative abundance of young-of-the-year (YOY) pink shrimp fluctuated without trend on the Atlantic coast from 1997 through 2004 after which abundances declined through 2010, increased in 2011 with declines through 2015 (Fig. 4a). Recruitment of gulf coast YOY pink shrimp shows a discrete declining trend since from 1999 to 2005, followed by a rebounding increasing trend through 2015 (Fig. 4b).

An assessment of the condition of U.S. gulf and South Atlantic penaeid shrimp stocks suggests that they are all harvested at or slightly in excess of the fishing mortality rates associated with maximum yield-per-recruit (Steele unpublished data). Increasing the size-at-entry to the fishery could increase the yield and value of the landings for all three shrimp species. Available data do not suggest a strong link between parent stock abundance and subsequent abundance of their progeny. Regardless, estimated spawning potential ratios were estimated to be 4%–12% for brown shrimp and 13%–39% for white shrimp during 1970–1987 (Nance et al. 1989).

Nance (1999) found that the parent stock levels for brown shrimp in the Gulf of Mexico were up in 1998 at over 300 million age-7+ month-old shrimp for November through February, well above the 125 million overfishing threshold and the highest level since 1994. For white shrimp, the parent stock number had been highly variable since the mid 1980s and the number dropped slightly in 1998 to around 800-million individuals age-7+ months for May through August. However, this level is still well above the 330 million individuals overfishing threshold. Pink shrimp parent stock numbers were up in 1999 following a slight decline in 1998 to nearly 250-million age-5+ month-old individuals for July through June and were well above the 100 million overfishing threshold.
The recent stock assessments of brown, pink, and white shrimp in the Gulf of Mexico incorporated a stock synthesis model that provided outputs for new overfished and overfishing definitions for the fisheries. The stocks have been showing increasing trends in spawning biomass and recruitment and decreasing trends in fishing mortality. Both fisheries have no indication of overfishing or being in overfished states (Hart 2012a, Hart 2012b, Hart 2012c). Both regional federal councils, the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council, have established fishery management plans for shrimp (GMFMC 1981; SAFMC 1993). The main objectives of these plans were to delay harvest of shrimps through season and area closures, reduce bycatch, and minimize gear conflicts. The SAMFC’s shrimp fishery management plan was instituted to protect the white shrimp stock from overharvest after severe winter cold-kills. This plan allows for the closure of the Exclusive Economic Zone after severe winter kills and requires permits as a first step toward possible limited entry.
Figure 1 (a)-(c). Geographic distribution of penaeid shrimp landed commercially during 2015 by species and county.

Figure 2. Total annual commercial landings (pounds) of penaeid shrimp on the Atlantic and gulf coasts of Florida, 1982–2015.
a. Atlantic Coast, commercial landings rates (pounds/trip) for brown shrimp

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

c. Atlantic Coast, commercial landings rates (pounds/trip) for pink shrimp

d. Gulf Coast, commercial landings rates (pounds/trip) for pink shrimp

e. Atlantic Coast, commercial landings rates (pounds/trip) for white shrimp

f. Gulf Coast, commercial landings rates (pounds/trip) for white shrimp

Figure 3 (a)-(f). Annual standardized catch rates for penaeid shrimp in Florida. Commercial landings rates (pounds/trip) 1992-2015: (a) Atlantic Coast brown shrimp; (b) Gulf Coast brown shrimp; (c) Atlantic Coast pink shrimp; (d) Gulf Coast pink shrimp; (e) Atlantic Coast white shrimp; (f) Gulf Coast white shrimp.
Figure 4(a)-(b). Proportion of fishery-independent-monitoring sets that captured pink shrimp from 1997-2015. Young-of-the-year (YOY): (a) Atlantic coast; (b) Gulf coast.