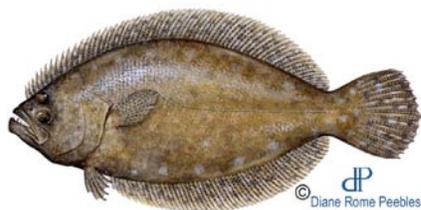
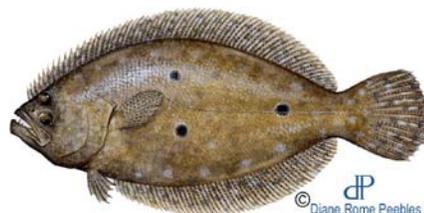


**Flounders, *Paralichthys* spp.**



**Southern flounder,  
*Paralichthys lethostigma*  
Jordan & Gilbert, 1884**



**Gulf flounder,  
*Paralichthys albigutta*  
Jordan & Gilbert, 1882**

Nearly all flounders landed by anglers in Florida are one of three species in the genus *Paralichthys*: gulf flounder *P. albigutta*; southern flounder, *P. lethostigma*; or summer flounder, *P. dentatus*. Gulf flounder are the only species to range along the entire Florida coast. Summer flounder are only a minor component of the flounder landings in northeast Florida; their center of distribution is off the U.S. Mid-Atlantic Bight. Southern flounder are generally only found north of the Loxahatchee River on the Atlantic coast and north of the Caloosahatchee River on the gulf coast. The distributions of gulf and southern flounder appear to be substrate-related. Southern flounder are found on silt and mud, and gulf flounder are found mostly on sand. Studies have shown that female southern flounder reach about 28" and 7 years of age while female gulf flounder reach only about 18" and 3 years of age (Table 1; Wenner *et al.* 1990; Stokes 1977). More recently, Fitzhugh *et al.* (1999) reported that gulf flounder attain older ages than previously thought: the oldest gulf flounder found in offshore waters off northwest Florida was age 11. While estuarine samples of southern flounder show maximum ages of about 4 years (Stunz *et al.* 2000; Fitzhugh *et al.* 1999), older fish probably occur in shelf waters. Males of both species do not get as large as females. Female southern flounder mature at age 3 or 4 (Wenner *et al.* 1990), and female gulf flounder mature at age 1 (Fitzhugh *et al.* 1999). Both species spawn in offshore waters during late fall–winter (65 ft–200 ft).

Table 1. Von Bertalanffy growth parameters and length-weight relations for flounders

| Inches TL = $L_{\infty}(1 - e^{-K(\text{age} - t_0)})$ | K    | $L_{\infty}$ (inches TL) | $t_0$ (years) | Source                        |
|--|------|--------------------------|---------------|-------------------------------|
| Male southern flounder, South Carolina                 | 0.25 | 20.4                     | -1.07         | Wenner <i>et al.</i> (1990)   |
| Female southern flounder, South Carolina               | 0.23 | 29.9                     | -0.57         | Wenner <i>et al.</i> (1990)   |
| Male gulf flounder, northwest Florida                  | 0.60 | 13.6                     | -2.4          | Fitzhugh <i>et al.</i> (1999) |
| Female gulf flounder, northwest Florida                | 0.40 | 19.4                     | -2.14         | Fitzhugh <i>et al.</i> (1999) |
| Male southern flounder, northwest Florida              | 0.32 | 13.5                     | -5.2          | Fitzhugh <i>et al.</i> (1999) |
| Female southern flounder, northwest Florida            | 1.67 | 18.0                     | -0.75         | Fitzhugh <i>et al.</i> (1999) |

| Weight in lbs = $a(\text{inches TL})^b$  | a        | b    | Source                        |
|--|----------|------|-------------------------------|
| Male southern flounder, South Carolina   | 0.000261 | 3.17 | Wenner <i>et al.</i> (1990)   |
| Female southern flounder, South Carolina | 0.000275 | 3.15 | Wenner <i>et al.</i> (1990)   |
| Male gulf flounder, northwest Florida    | 0.000579 | 2.81 | Fitzhugh <i>et al.</i> (1999) |

Table 1.(continued) Von Bertalanffy growth parameters and length-weight relations for flounders

| Weight in lbs = a (inches TL) <sup>b</sup>  | a        | b      | Source                        |
|---|----------|--------|-------------------------------|
| Female gulf flounder, northwest Florida     | 0.000220 | 3.2183 | Fitzhugh <i>et al.</i> (1999) |
| Male southern flounder, northwest Florida   | 0.000906 | 2.5723 | Fitzhugh <i>et al.</i> (1999) |
| Female southern flounder, northwest Florida | 0.000200 | 3.314  | Fitzhugh <i>et al.</i> (1999) |

Gulf flounders are benthic carnivores. Large juveniles feed primarily on small fish and crustaceans (shrimp and crabs). Adults feed on schooling fish such as menhaden, bay anchovy, pinfish, grunts, pigfish, Atlantic croaker, and mullets (Springer and Woodburn 1960; Topp and Hoff 1972; Benson 1982).

Total landings of flounders in Florida during 2007 were 991,324 pounds, the majority of which (74%) were landed by the recreational fishery. Landings were greater on the Atlantic coast, where about 67% of the statewide landings were made in 2007. In 2007, commercial landings on the Atlantic coast were highest in Volusia County (Fig. 1a). On the gulf coast, commercial landings were greatest in Franklin, Bay and Escambia Counties. Estimated recreational landings of flounders in Florida were highest in the northeast subregion along the Atlantic coast; they were highest in the northwest subregion (Fig. 1b).

The 2007 total landings of flounders were 18% higher than the average landings in the previous five years (2002–2006) and were 3% lower than the historical average landings (1982–2007). In 1995, Atlantic coast recreational landings were almost exclusively southern flounder, while gulf coast recreational landings were mostly gulf flounder. Based on limited commercial sampling, the species composition of the commercial landings appears to be similar to that of the recreational landings (Murphy *et al.* 1994).

Annual standardized commercial landings rates for mixed flounder species have been steady over the period 1992-2003 and increased somewhat in 2004-2007 on the Atlantic coast, and have increased steadily since 1992 on the gulf coast (Figs. 3a-b). Recreational total catch rates for gulf flounder are much lower on the Atlantic coast than on the gulf coast (Figs. 3c-d). Standardized recreational total catch rates for gulf flounder exhibited a discrete increasing trend during 1994-1999 and then varied without trend on the gulf coast, but held almost steady from 1991-2005 on the Atlantic coast with some modest increases in 2006-2007. With the exception of high levels in 1997 on the Atlantic coast and 1991 on the gulf coast, standardized recreational total catch rates for southern flounder have been relatively stable over the period 1998-2007 on the Atlantic coast (Fig. 3e) and trending slightly upward from 2005-2007 on the Gulf coast (Fig. 3f).

Indices of abundance for young-of-the-year (YOY) gulf flounder were consistently low on the Atlantic coast and varied without trend on the gulf coast, in spite of two exceptional peaks observed in 1998 and 2003 (Figs. 4a and 4b). Abundances of post-YOY gulf flounder on the Atlantic coast were low in 1999 and have been slightly higher since 2003; on the gulf coast, post-YOY gulf flounder varied without trend except for highs in 1998, 1999, 2004 and 2005 (Figs. 4c and 4d).

On the Atlantic coast, no gulf flounder were collected with gross external abnormalities, while abnormalities in gulf flounder on the gulf coast were high in 2001 and 2006 (Fig. 5a). No single specific type of gross external abnormality was most frequent among gulf flounder on the gulf coast (Fig. 5b).

Murphy *et al.* (1994) found that adequate information was not available to assess the

condition of southern or gulf flounder stocks in Florida. A rough characterization of gulf flounder's population dynamics suggested it was unlikely that they were being fished at a maximum level of yield-per-recruit. Summer and southern flounder populations, which mature at a larger size and older age, are possibly more sensitive to fishing than gulf flounder. New life history information (Fitzhugh *et al.* 1999) needs to be considered in future assessments of gulf or southern flounder.

Assessments of the status of summer flounder in North Carolina northward found that the stock abundance in 1993–1994 was at the lowest average level since the 1960s. Although data indicated that 1993 year-class was very poor, some stock rebuilding had occurred due to good recruitment in 1991 and 1992. The Atlantic States Marine Fisheries Commission (1982) developed a Fishery Management Plan for summer flounder for the stock north of North Carolina.

a. Commercial landings (pounds)

b. Recreational landings (numbers)

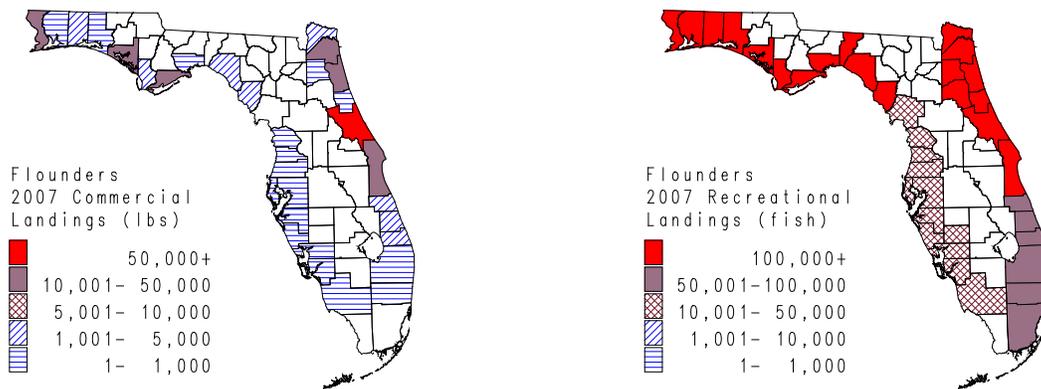


Figure 1 (a)-(b). Geographic distribution of flounders landed during 2007. (a) Commercial landings (pounds) by county; (b) Recreational landings (numbers of fish) by region.

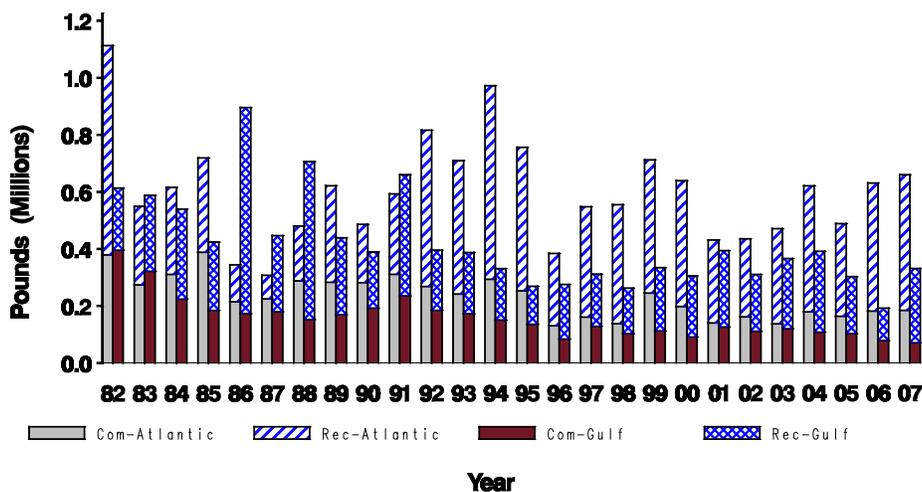


Figure 2. Total annual landings (pounds) of flounders on the Atlantic and gulf coasts of Florida, 1982–2007.

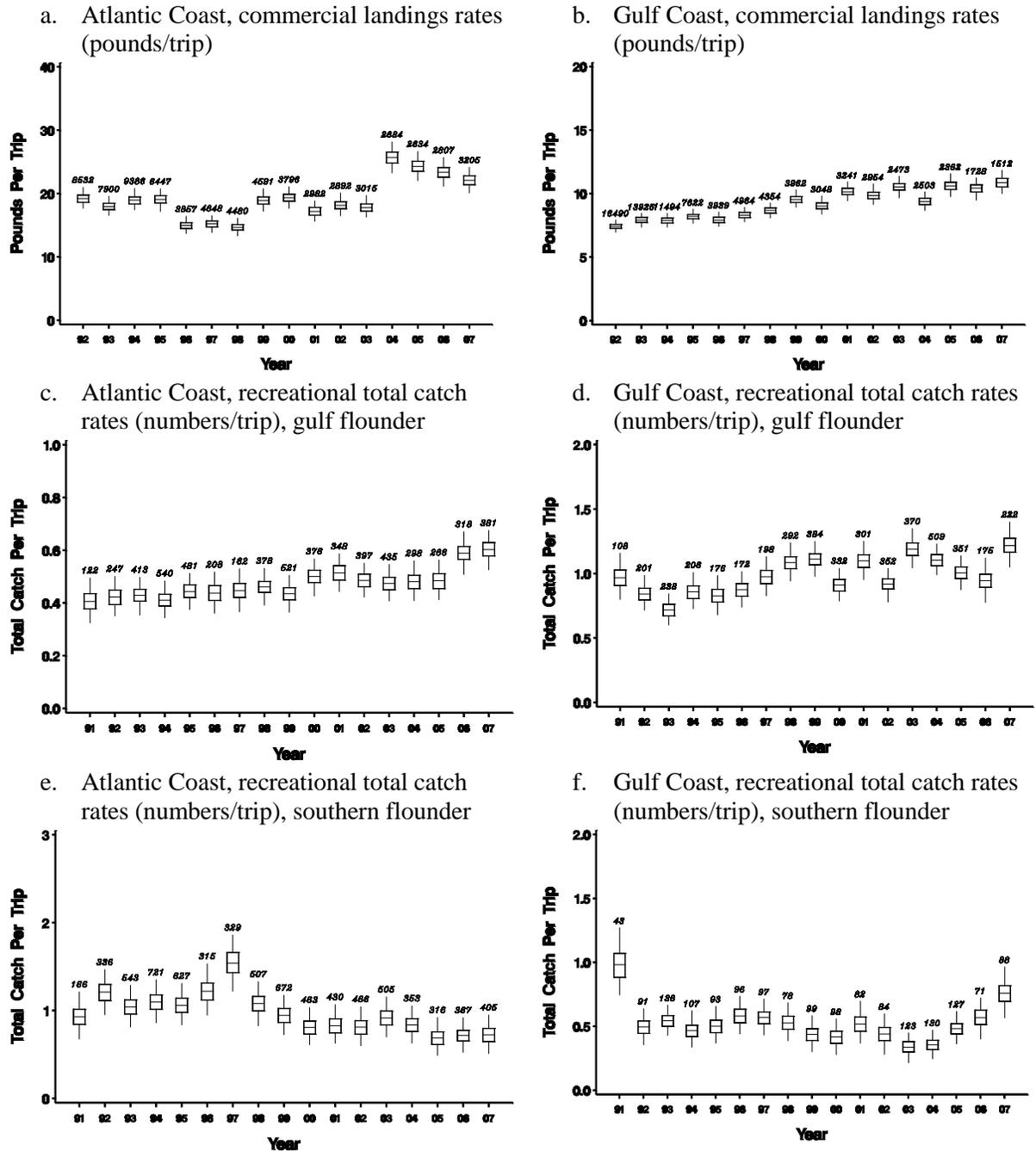


Figure 3 (a)-(f). Annual standardized catch rates for flounders in Florida. Commercial landings rates (pounds/trip), 1992-2007: (a) Atlantic Coast; (b) Gulf Coast. Recreational total catch rates (numbers/trip), gulf flounder, 1991-2007; (c) Atlantic Coast, (d) Gulf Coast. Recreational total catch rates (numbers/trip), southern flounder, 1991-2007: (e) Atlantic Coast, (f) Gulf Coast.

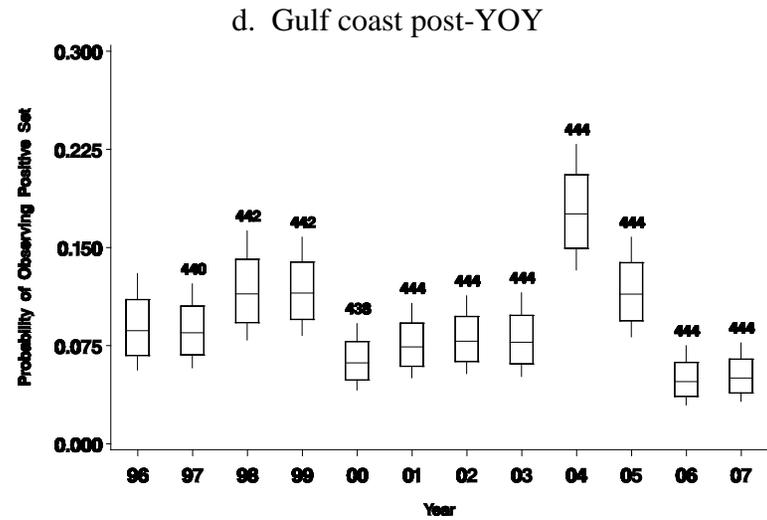
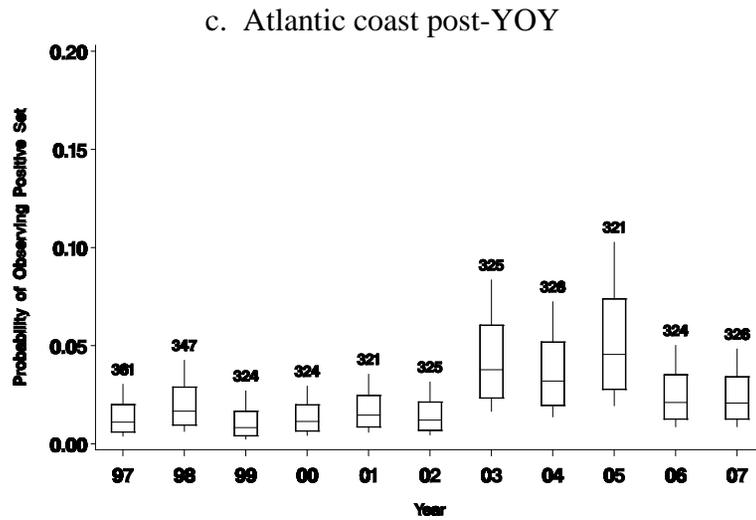
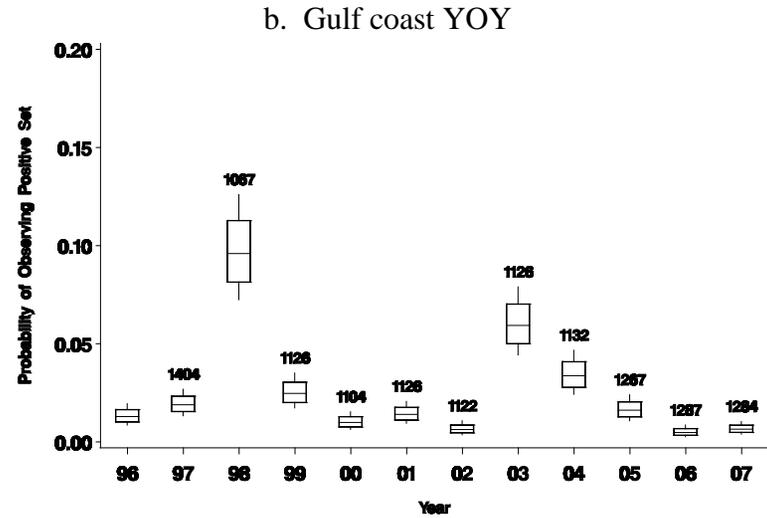
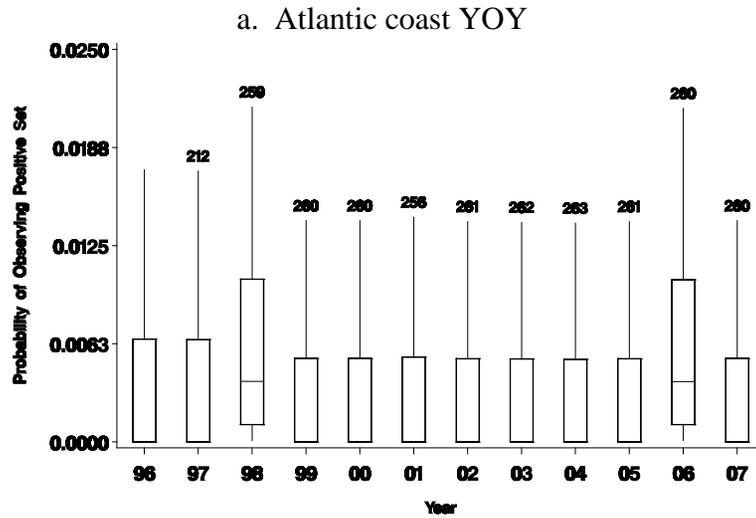
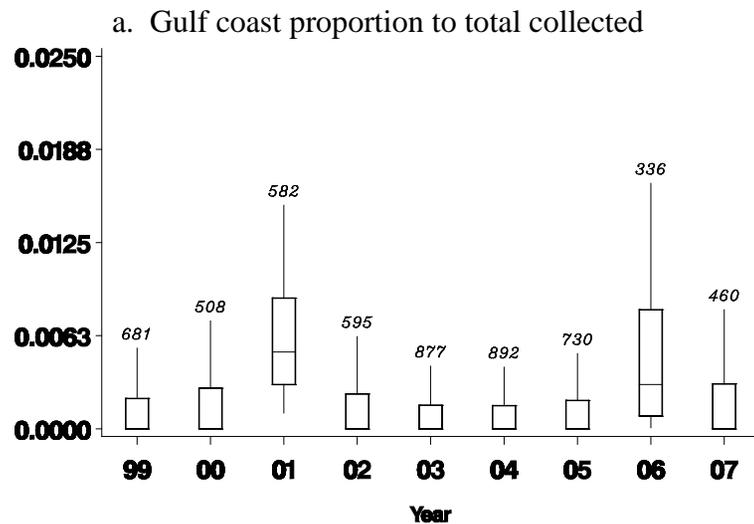


Figure 4(a)-(d). Proportion of fishery-independent-monitoring sets that captured gulf flounder from 1996-2007. Young-of-the-year (YOY): (a) Atlantic coast; (b) Gulf coast. Post-YOY: (c) Atlantic Coast; (d) Gulf coast.



b. Gulf coast percentage of abnormality types  
**Percentage of gross external abnormalities**

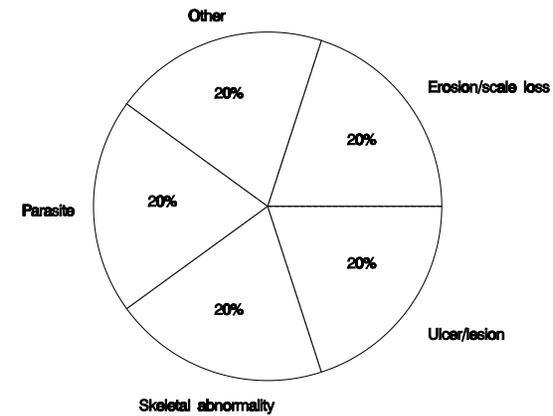


Figure 5(a)-(b). Gross external abnormalities of gulf flounder  $\geq 75$ mm collected in fishery-independent-monitoring sets, 1999-2007. Gulf coast: (a) Proportion of animals with gross external abnormalities to total animals collected; (b) Percentage of abnormalities by type.