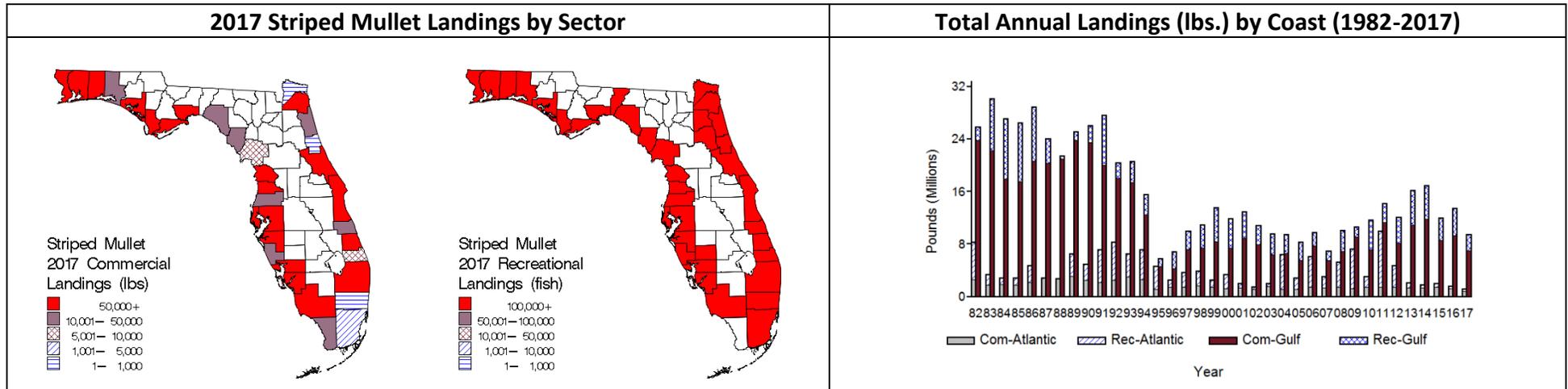


## Striped Mullet, *Mugil cephalus* (Linnaeus, 1758)



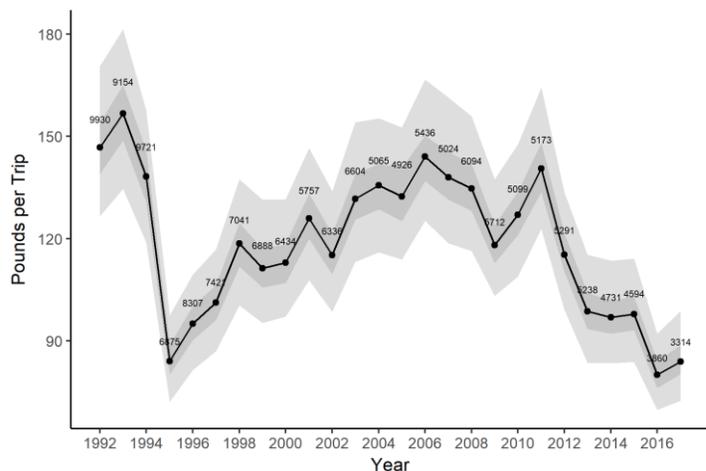
### Life History

Striped Mullet are distributed worldwide in most coastal waters and estuaries of tropical and subtropical seas. They exhibit pronounced population genetic structuring on a global scale, e.g., Mediterranean vs. Galapagos Islands (Crosetti *et al.* 1994), but in Florida, Striped Mullet are considered one genetic stock (Campton and Mahmoudi 1991). Tagging data show that some Striped Mullet move between Florida's Atlantic and Gulf coasts (Funicelli *et al.* 1989). They have a loosely defined catadromous life cycle, i.e., they reside in fresh waters but spawn in the sea. Juveniles actively recruit to estuaries in Florida and ascend toward freshwater rivers. Striped Mullet grow to about 6.1–7.3 inches fork length (FL) in one year and can reach 9–13 years of age. Typically, they get no larger than about 20 inches total length (TL) (Leard *et al.* 1995). Females mature at 2–3 years old when about 11.5 inches FL (Leard *et al.* 1995). Spawning occurs in depths of up to 5,400 feet over the outer continental shelf and slope during November through early January. Diet and feeding behavior of juvenile and adult Striped Mullet may vary by location, but they primarily feed on epiphytic and benthic microalgae, macrophyte detritus, or inorganic sediment particles. Sediment particles function as a grinding paste in the gizzard-like pyloric portion of the stomach (Odum 1970). Larval and post-larval mullet feed on zooplankton (Nash *et al.* 1974). The major predators of juvenile and adult mullet are fishes and birds (Thomson 1963). Among fishes, common snook, spotted seatrout, red drum, hardhead catfish, southern flounder, bull shark, and alligator gar are known to prey on mullet (Gunter 1945, Breuer 1957, Simmons 1957, Darnell 1958). Wading birds also prey on mullet (Powell, unpublished data cited by Sogard *et al.* 1989).

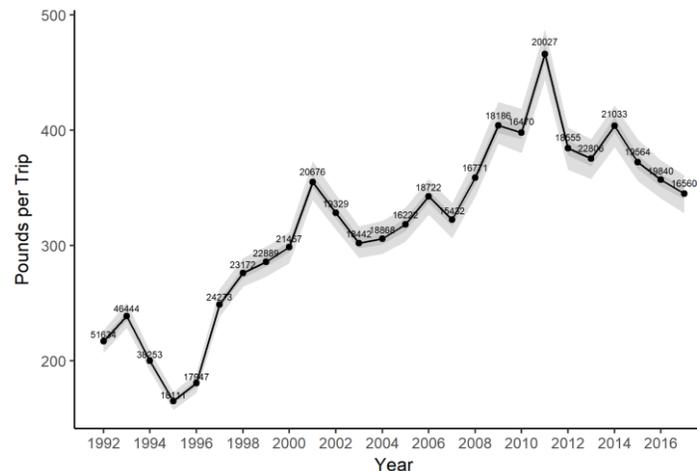


Fishers landed 10,517,491 pounds in 2017 which were 36.1% lower than the previous 5-year average (2012-2016). Coastwide, 89.3% of these were from the Gulf and 10.7% were from the Atlantic. Commercial landings constituted 73.5% of the total landings while recreational landings constituted 26.5%. Striped Mullet harvest, under increasing regulation since 1989, was severely restricted by Florida's 1995 constitutional amendment eliminating the use of entangling nets in Florida waters.

**Atlantic Coast**

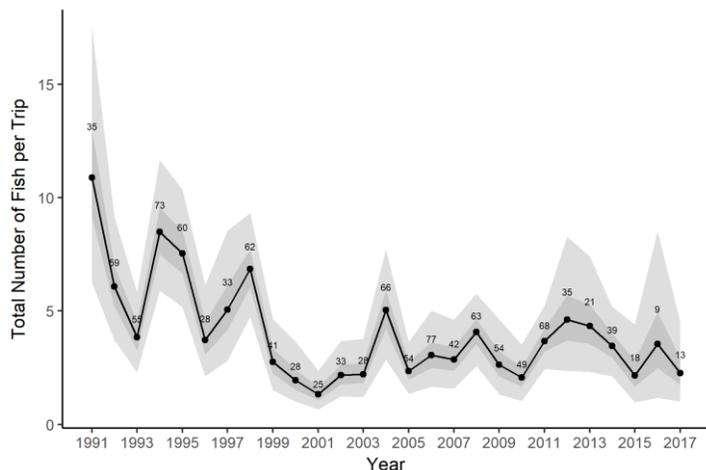


**Gulf Coast**

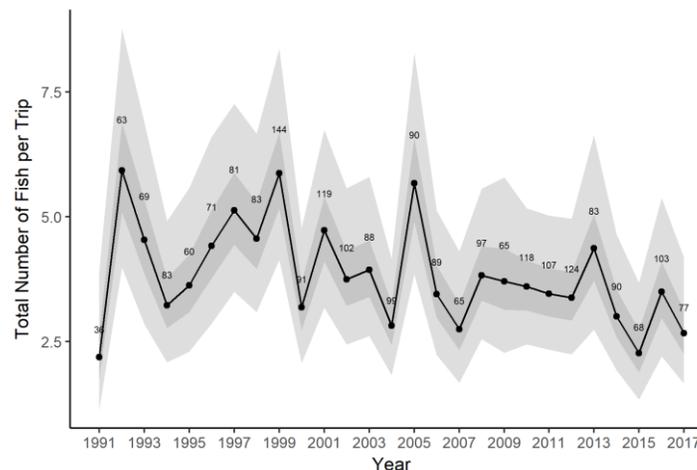


**Standardized Commercial Catch Rates:** Trends in commercial landings rates are strongly influenced by changes in quotas, gear restrictions, and time closures occurring during 1989-1993, by market demand, and by the July 1995 elimination of entangling nets. Commercial landings rates on the Atlantic coast showed a gradual, long-term increase from 1995-2006 followed by gradual decline through 2017. Gulf coast commercial landings rates increase from 1995-2011, with decreases in 2012-2017. Dark grey figure lines represent first and third quartiles while the light grey lines represent the 2.5% – 97.5% quantiles.

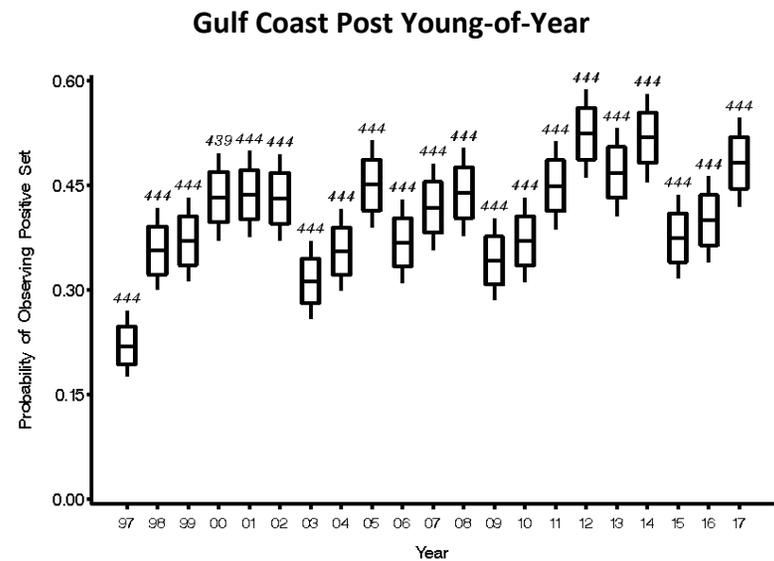
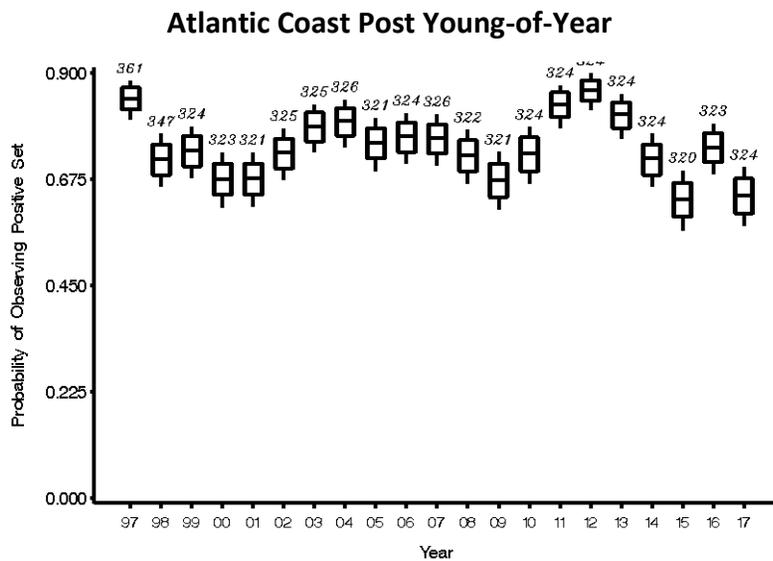
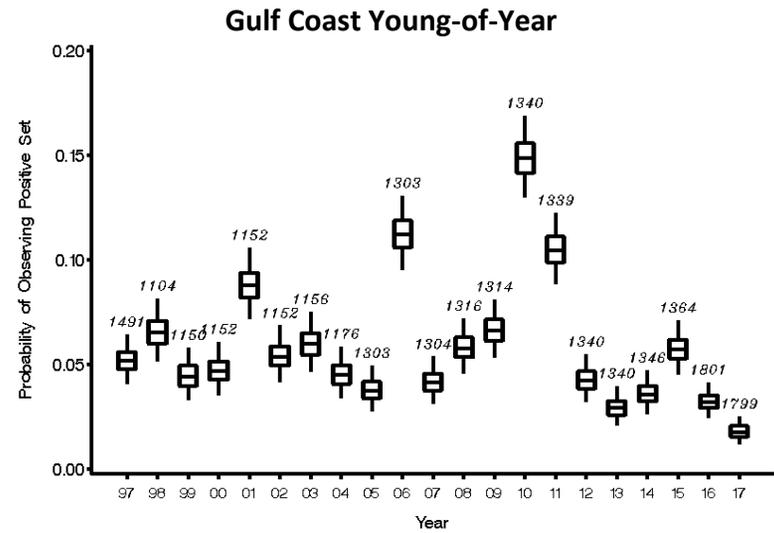
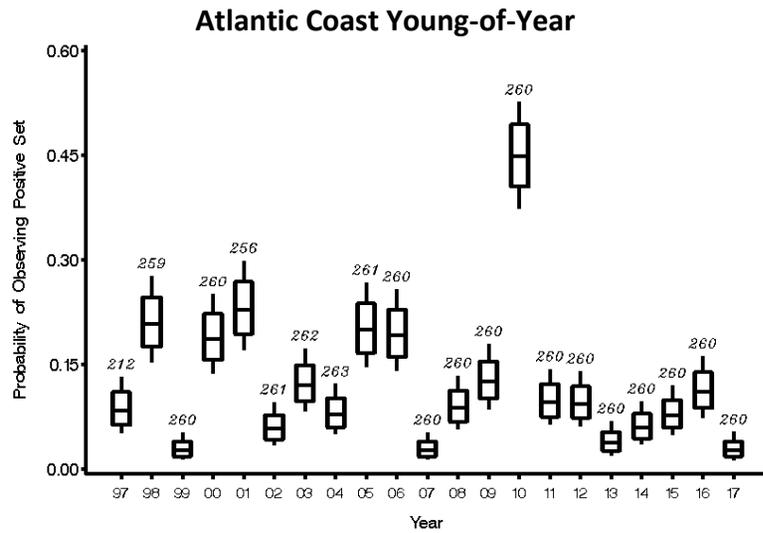
**Atlantic Coast**



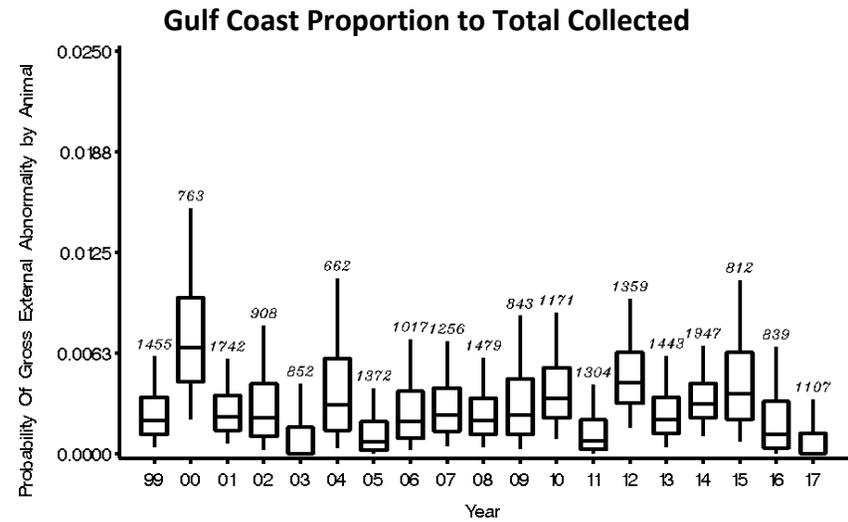
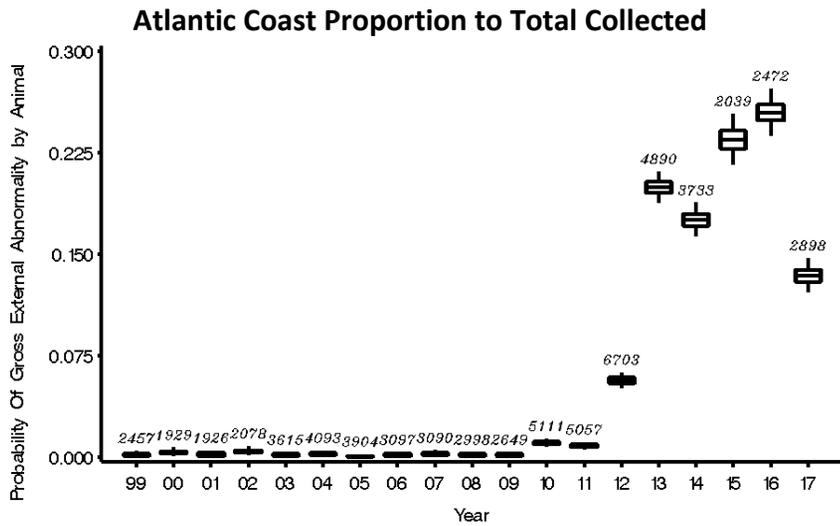
**Gulf Coast**



**Standardized Recreational Total Catch Rates:** Recreational catch-rate estimates are imprecise for Striped Mullet; available estimates show a variable declining trend on the Atlantic coast from 1991-2001 with stable yet variable rates through 2017. Gulf coast rates show a widely variable trend through 2017. Dark grey figure lines represent first and third quartiles while the light grey lines represent the 2.5% – 97.5% quantiles.

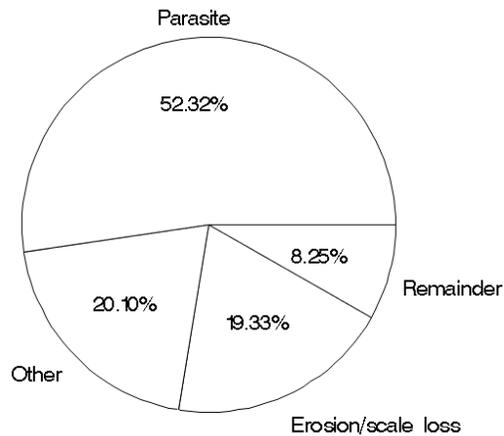


**Fishery-Independent Monitoring:** Indices of abundance for young-of-the-year (YOY) striped mullet appear to indicate strong recruitment to inshore waters in 1998, 2000-2001, 2005-2006, and 2010 on the Atlantic coast and in 2001, 2006, and 2010-2011 on the Gulf coast. Post-YOY striped mullet show cyclic trends on the Atlantic coast with highs in 1997, 2004, and 2012. On the Gulf coast, post-YOY abundances were also cyclic with highs in 2002, 2008, 2012, 2014, and 2017.



### Atlantic Coast Percentage of Abnormality Types

Percentage of gross external abnormalities



### Gulf Coast Percentage of Abnormality Types

No Data Available

**Fish Health:** Incidences of gross external abnormalities on the Atlantic coast have been most prevalent in 2012-2017 with parasites as the most common abnormalities observed in 2017. On the Gulf coast, incidences of abnormalities have remained stable with peaks in 2000, 2004, 2012, and 2015.

## **Stock Status**

**Current Condition:** not overfished nor undergoing overfishing.

**Management History:** The assessment of the Florida striped mullet population in 2000 (Mahmoudi 2000) found that transitional spawning potential ratios (SPR) had increased to 35% in 1999, thus the stock was not considered overfished for the first time since a threshold of 35% transitional SPR had been established. In the 2005 stock assessment (Mahmoudi 2005) the ratio of  $F_{2004}/F_{MSY}$  (2004 fishing mortality to the fishing mortality at maximum sustainable yield) was less than one and the ratio of  $B_{2004}/B_{MSY}$  (2004 stock biomass to the stock biomass at maximum sustainable yield) was greater than one suggesting that overfishing was not occurring and that the stock was not overfished in 2004. The stock assessment update in 2008 (Mahmoudi 2008) concluded that  $F/F_{MSY}$  and  $B/B_{MSY}$  ratios in prior years estimate the mullet stock to not be overfished in the three assessment regions (east, northwest, and southwest coasts), nor was overfishing occurring in the three regions. The surplus production model constructed in the assessment indicated that  $F/F_{MSY}$  values were consistently below 1 and the  $B/B_{MSY}$  values were consistently above 1 after the 1994 net ban. Additionally, observed high tSPR (transitional spawning potential ratios) estimates support the general conclusion that although there is uncertainty with model outputs, the upward trending spawning ratios in each region likely exceed the 35% SPR target (Mahmoudi 2008).

The most recent stock assessment for the Striped Mullet stock in Florida waters (Chagaris et al. 2014) used five modeling approaches ranging from a “data poor” method (i.e., depletion-based stock reduction analysis) to more complex approaches (i.e., stochastic stock reduction analysis, surplus production model, a two-age delay-difference model, and a fully age- and size-structured stock synthesis model). Models were developed separately for the east and west coasts, and all models indicated that striped mullet on both coasts are currently neither overfished ( $B_{current}/B_{SPR35\%} > 1$  or  $B_{current}/B_{msy} > 1$ ) nor undergoing overfishing ( $F_{current}/F_{SPR35\%} > 1$  or  $F_{current}/F_{msy} < 1$ ). The delay-difference and stock synthesis models both predicted the current SPR to be above the management target of  $SPR_{35\%}$ .