Relative abundance of juvenile red snapper, *Lutjanus campechanus* in the northern Gulf of Mexico

Glenn Parsons

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ABSTRACT

During the testing of bycatch reduction devices in the northern Gulf of Mexico (nGOM), we were afforded the opportunity to gather information on the relative abundance of juvenile red snapper, *Lutjanus campechanus* taken in shrimp trawls. Only snapper captured in control trawls (no bycatch reduction device) were used for this analysis. Juvenile red snapper are essentially absent from shrimp trawls in the nGOM during much of the year, but can be taken in large numbers from August through October. Trawling aboard a commercial shrimp vessel operating south of the Alabama and Mississippi coasts during September, 2007 revealed an average catch rate of 43.1 snapper/50 foot trawl hr (all catch rates are standardized to a 50 foot trawl). Catch rates ranged from 21.4 to 66.7 snapper/50 foot trawl hr. Using the NMFS vessel *R/V Caretta* and trawling in the same general area, we observed red snapper catch rates averaging 126.9 snapper/50 foot trawl hr (catch ranged from 90 to 180 snapper/50 foot trawl hr, 72 to 90 feet depth) during August 2008. While comparisons across vessels and years is difficult, ANOVA suggests a significant ($p \ll 0.0001$) difference between catch rates in shallower waters off of the Mississippi/Alabama coasts, when compared to those from deeper waters. Trawling south of the Texas coast during November, 2011 likewise revealed a significant (ANOVA, $p < 0.001$) relationship between the relative abundance of snapper and the depth of capture. In waters shallower than about 180 feet, catch rates averaged 55 fish/hr (range = 10 to 300) and in waters greater than 180 feet catch rates averaged 12.4 snapper/hr (range = 1.2 to 40.2). While snapper captures were highly depth dependent there was no relationship of shrimp captured or total bycatch with depth between about 130 and 220 feet. When the fish to shrimp ratio was calculated, a significant ($p = 0.0009$) relationship was observed with higher numbers of bycaptured fish relative to shrimp captures in shallower waters. (These relationships appear in Figures below).
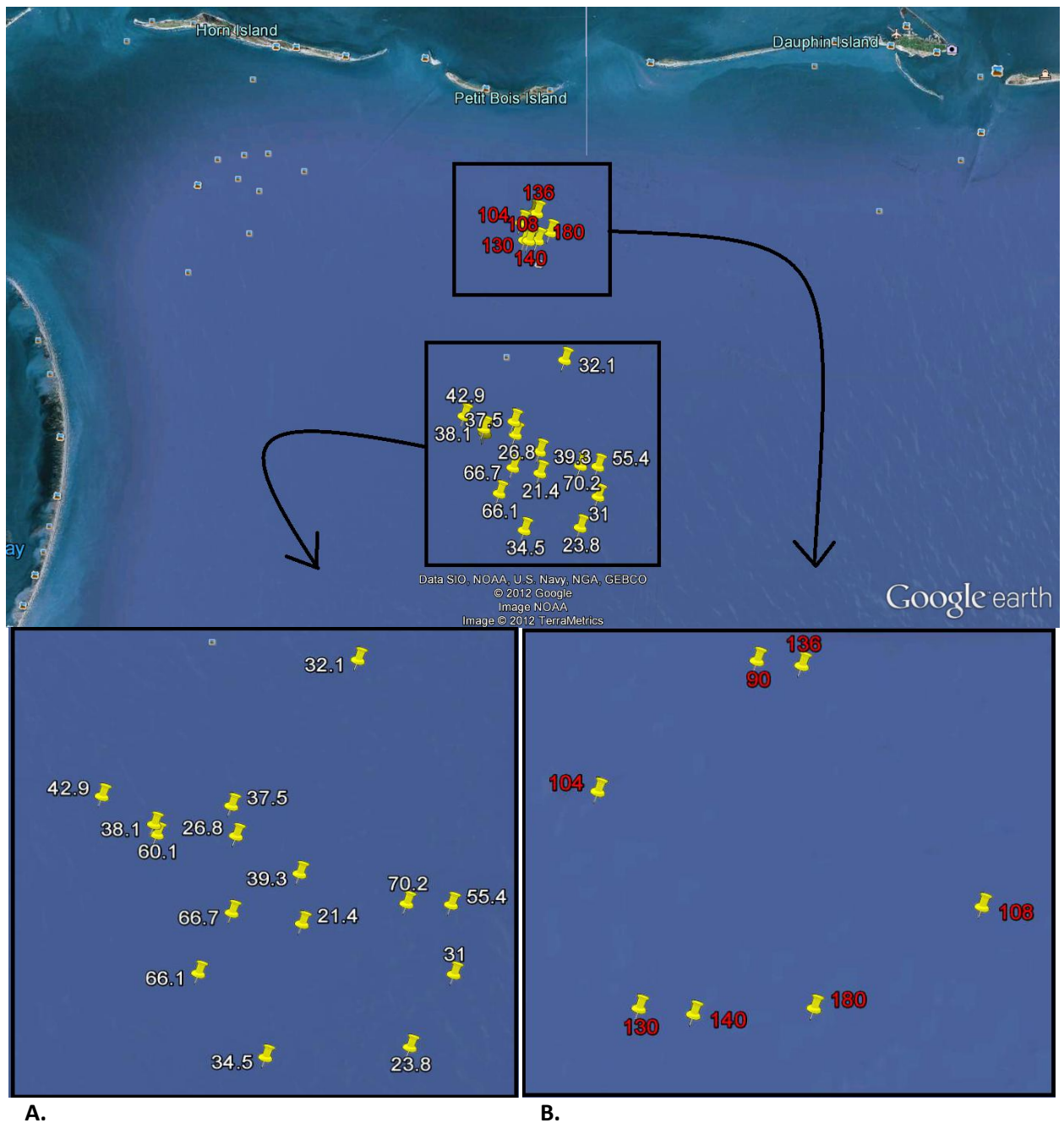
Figure 1. (A.) Snapper relative abundance from commercial shrimp vessel trawling September 2007. These snapper were captured at 96 to 120 feet depth. **(B.)** Snapper trawling from R/V Caretta, August 2008. These snapper were captured at 72 to 90 feet depth. There was a significant difference (ANOVA, p= << 0.0001) between catches from shallow depths when compared to deep.
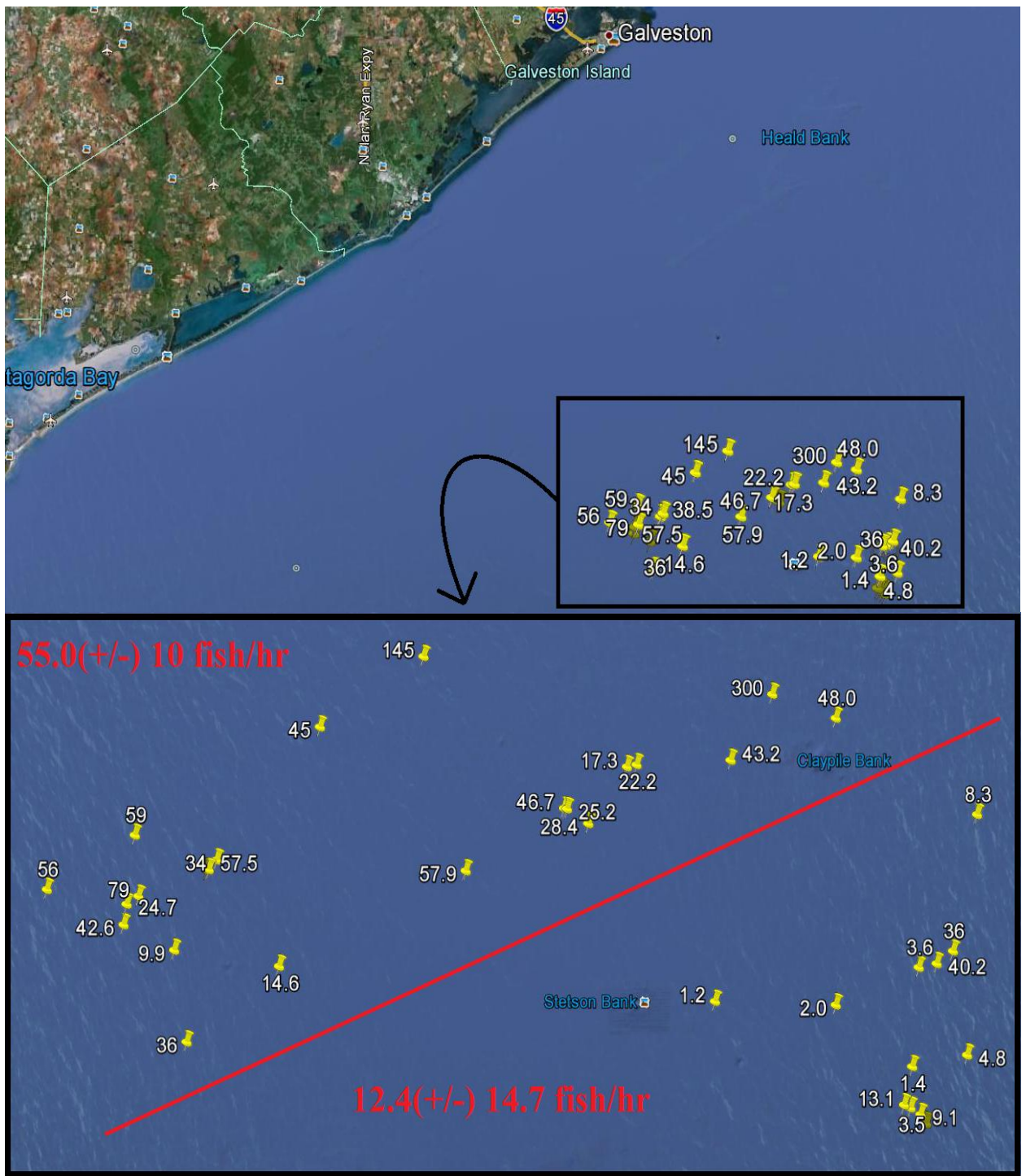
Figure 2. Snapper captures in fish/50 foot trawl hour. These data are from trawling off of the Texas coast. There is an ANOVA significant difference (p=0.026) between catch below and above line. Note that the location where 9.9 snapper were encountered was one of the deepest (172 feet) on that side of the line and the two sites where 36 and 40.2 snapper were encountered were the two shallowest sites (163 and 174.5 feet, respectively) on the other side of the line.
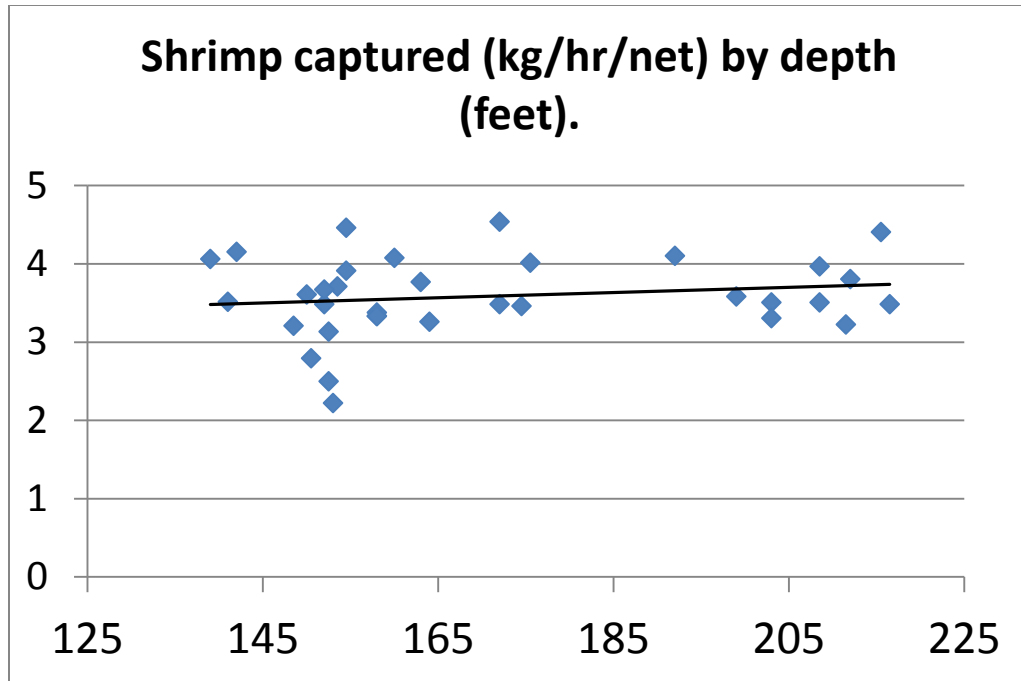
Figure 3. Plot of the catch of red snapper (y-axis, snapper/50 foot trawl hr) from Figure 2 above against depth of capture (x-axis, feet). ANOVA significant effect of depth on red snapper capture (p<0.001). These data are only for captures in control nets, NO BRD. Depth was calculated as the mean depth between the beginning of the tow and the end of the tow.

Figure 4. There was no significant relationship between shrimp captured (y-axis) and depth (x-axis). Same data set from Figure 2 above.
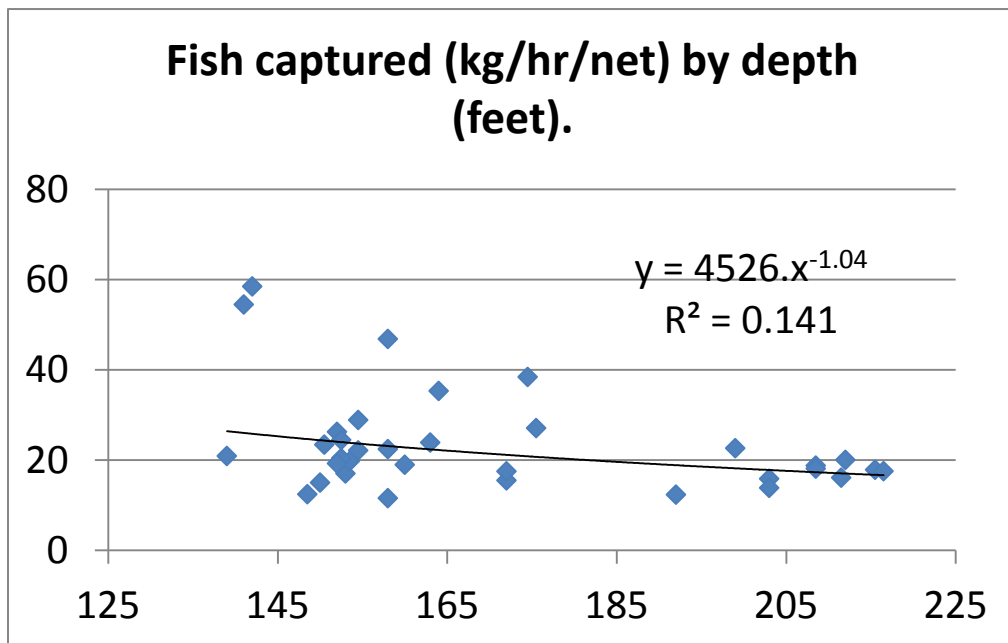

Figure 5. There was no significant relationship between fish captured (y-axis) and depth (x-axis). Same data set from Figure 2 above.

The equation shown in Figure 5 is:

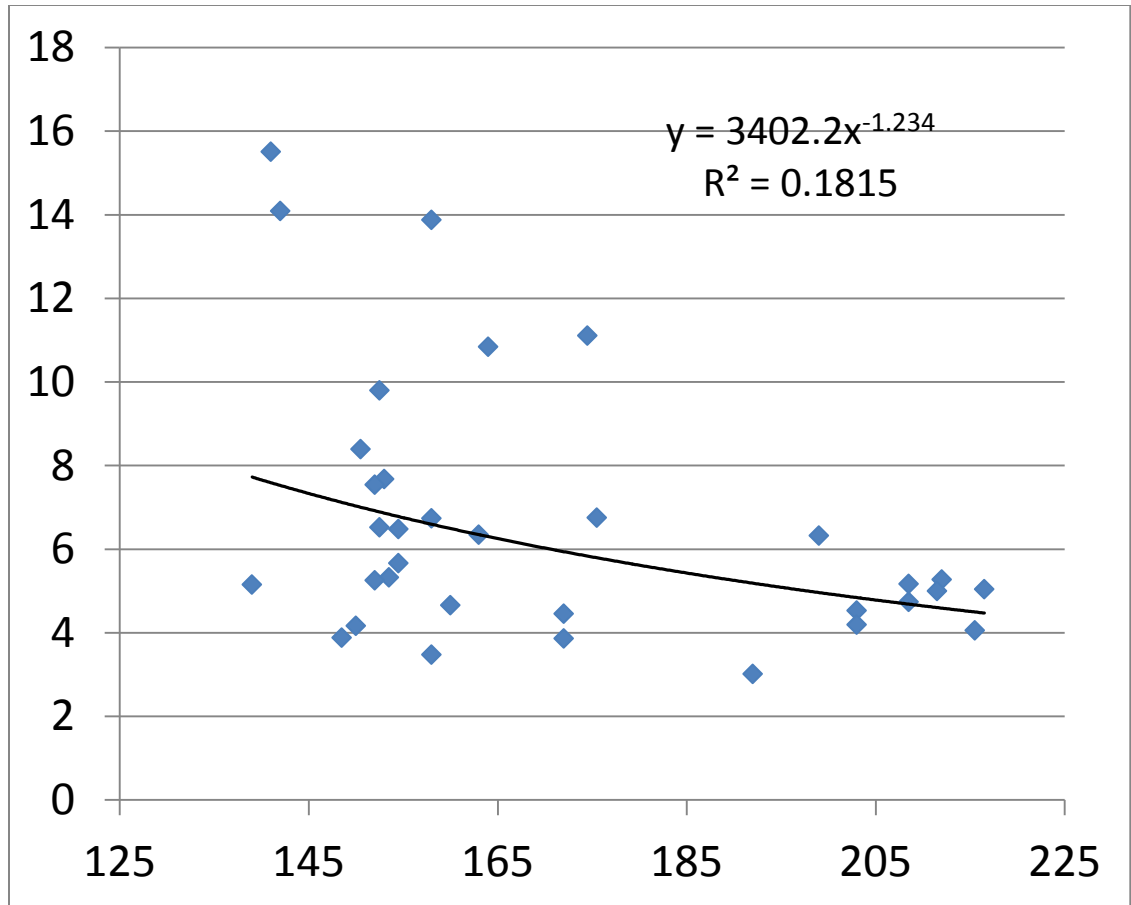$$y = 4526.x^{-1.04}$$
$$R^2 = 0.141$$

Figure 6. Fish to shrimp ratio (y-axis, calculated using (fish/hr)/(shrimp/hr) plotted against depth (feet). ANOVA significant (P=0.0009)