

Assessment History of Red Snapper (*Lutjanus campechanus*) in the U.S. Atlantic

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In the early 1990s, a series of reports were prepared by the SAFMC Plan Development Team (in 1990) and by the NOAA-Beaufort Reef Fish Team (in 1991 and 1992), intended for prioritizing stocks for assessment. Those reports described “snapshot” analyses conducted on several snapper-grouper species, including red snapper. The analyses included the estimation of SPR (spawning potential ratio) based on a single year of data.

The first formal assessment of red snapper in the U.S. Atlantic was conducted by Manooch et al. (1998; abstract below). In that assessment, two age-structured models were used: an un-calibrated separable VPA and FADAPT. The results from FADAPT were downplayed because the model was calibrated to an abundance index derived from MARMAP chevron trap data, which had very low sample sizes. Manooch et al. (1998) concluded that “the status is less than desirable, but does appear to be responsive to recent management actions.” They found that the fishing mortality rate (F) should be reduced by 33% to 68%, depending on the natural mortality rate and desired SPR. Prior to publication, a report of that assessment was submitted to the SAFMC. After publication, the results were revisited by Potts and Brennan (2001) in a trends report, also prepared for the SAFMC. Potts and Brennan (2001) repeated the findings of Manooch et al. (1998), but suggested a broader range of reduction in F, from 30% to 80%.

This stock of red snapper was first assessed through the SEDAR process in 2007 (SEDAR review held Jan. 28 – Feb. 1, 2008). That assessment applied a statistical catch-age model using data through 2006 (SEDAR15, 2008). Because the spawner-recruit parameter of steepness was not estimable (hit its upper bound), the SEDAR review panel recommended using proxies for MSY-related benchmarks based on 40% SPR. Relative to those benchmarks, the assessment found that since the 1960s, overfishing had been occurring and the stock had been overfished. In the terminal year, the assessment estimated $F_{2006}/F_{40\%}=7.7$ and $SSB_{2006}/SSB_{F40\%}=0.03$. Although quantitative results varied, these qualitative results of overfishing a depleted stock were consistent across all catch-age model configurations examined during and after the assessment process (~40 sensitivity runs), as well as with an alternative model formulation (surplus-production model).

References

Manooch, C.S., III, J.C. Potts, D.S. Vaughan, and M.L. Burton. 1998. Population assessment of the red snapper from the southeastern United States. *Fisheries Research* 38:19–32.

Potts, J.C. and K. Brennan. 2001. Trends in catch data and estimated static SPR values for fifteen species of reef fish landed along the southeastern United States. Report prepared for SAFMC.

SEDAR 15. 2008. Stock assessment report (SAR 1) South Atlantic red snapper. (Revised March, 2009) Available at <http://www.sefsc.noaa.gov/sedar/>

Abstract from Manooch et al. (1998): Changes in the age structure and population size of red snapper, *Lutjanus campechanus*, from North Carolina through the Florida Keys were examined using records of landings and size frequencies of fish from commercial, recreational, and headboat fisheries from 1986 to 1995. Population size in numbers at age was estimated for each year by applying separable virtual population analysis (SVPA) to the landings in numbers at age. SVPA was used to estimate annual, age-specific fishing mortality (F) for four levels of natural mortality ($M=0.15, 0.20, 0.25, \text{ and } 0.30$). Although landings of red snapper for the three fisheries have declined, minimum fish size regulations have also resulted in an increase in the mean size of red snapper landed. Age at entry and age at full recruitment were age-1 for 1986-1991, compared with age-2 and age-6, respectively, for 1992-1995. Levels of mortality from fishing (F) ranged from 0.31 to 0.69 for the entire period. Spawning potential ratio (SPR) increased from 0.09 to 0.24 ($M=0.25$) from 1986 to 1995. The SPR level could be improved with a decrease in F , or an increase in age at entry to the fisheries. The latter could be enhanced now if fishermen, particularly recreational fishermen, comply with minimum size regulations.