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Size and Age at Maturity for Vermilion Snapper (*Rhomboplites aurorubens*) (Lutjanidae) in the South Atlantic Bight

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**SIZE AND AGE AT MATURITY
FOR VERMILION SNAPPER
(*Rhomboplites aurorubens*)
(LUTJANIDAE)
IN THE SOUTH ATLANTIC BIGHT**

Vermilion snapper is a relatively small lutjanid occurring from North Carolina through the Gulf of Mexico to Brazil (Fischer 1978). Life history traits of this reef fish include serial spawning from late April to early October (Grimes and Huntsman 1980), and relatively high rates of growth (Grimes 1978) and natural mortality (Low and Ulrich 1982) compared to co-occurring species of importance to fisheries. Although vermilion snapper is an important recreational and commercial species in the South Atlantic Bight, there have apparently been no life history studies conducted since 1972-74 (Grimes 1978, Grimes and Huntsman 1980). We present preliminary evidence that, in comparison to these earlier data, vermilion snappers in the SAB become reproductively mature earlier in life and that a sexual difference in growth is manifested sooner, although length at age for one and two year old fish changed little if any.

METHODS

Vermilion snappers were collected from Cape Fear, North Carolina to Jacksonville, Florida during spring-summer 1978-1980 and during fall 1979. Collections were made with a $\frac{3}{4}$ scale version of the Yankee No. 36 otter trawl (Wilk and Silverman 1976), University of Rhode Island high-rise trawl (Hillier 1974), baited fish traps (Powles and Barans 1980), and hook and line. Specimens were measured to the nearest mm total length (TL), sexed, and assigned a reproductive condition (Hilge 1977). Scales were removed from behind the left pectoral fin

and stored dry. Ages were determined from acetate impressions of several scales from each fish by two independent readers using the criteria of Grimes (1978), and fish were deleted from analyses when the readers disagreed. Histological examination of formalin-fixed gonads from 21% of fish collected confirmed that sex and maturity stages determined by visual inspection in the field were accurate.

RESULTS AND DISCUSSION

Readability of scales from larger individuals was quite low. Ages were established for 152 (43.9%) of the 346 fish from which scales were examined, and all of these were ages 1 or 2. Back-calculated lengths at age using scales were previously established as 100-186 mm TL for age 1 and 186-256 mm TL for age 2 vermilion snapper from waters off North Carolina and South Carolina (Grimes 1978). Since observed mean lengths should be larger than back-calculated lengths due to growth between the times of annulus formation and capture, our lengths for fish at ages 1 and 2 (Table 1) support the conclusions of Grimes (1978). However, we found that females were significantly larger than males at age 2 (Student's $t: p < .01$) while Grimes (1978), using ages from otoliths, found no significant difference in size between sexes until age 8.

Table 1. Range, mean, and standard deviation (SD) of observed total lengths, and number of vermilion snapper successfully aged.

	Range	Mean	SD	n
Male				
Age 1	120-170	135.8	10.88	30
Age 2	163-216	186.9	10.88	28
Female				
Age 1	120-180	135.3	11.35	40
Age 2	140-248	197.8	17.93	54

52 Short papers and notes

Sex and maturity stage were determined for 833 individuals in spring-summer and 97 in fall. Ripe females were as small as 105 mm TL in spring-summer and 161 mm TL in fall. The smallest ripe males were 124 mm TL in spring-summer and 160 mm TL in fall. Based on a gonosomatic index, Grimes and Huntsman (1980) concluded that most vermilion snapper become sexually mature during their third or fourth years of life (186-256 and 256-324 mm TL, respectively), with only a few precocious individuals maturing in their second year. In the present study, however, over 60% of females and 90% of males examined were mature at 160 mm TL (Figure 1).

Differences between previous (Grimes 1978, Grimes and Huntsman 1980) and present results are probably not the result of gear selectivity (fish taken primarily by hook-and-line as opposed to fishes collected with a variety of gears) since no differences in size at age were apparent, but they could be partially due to differences in techniques used to determine maturity (a gonosomatic index rather than visual

and histological examination). However, it is also possible that the different results concerning size/age at maturity reflect real changes in the life history traits of this population of vermilion snapper during the years between studies. Tikhonov (1978, as cited by Roff 1982) found decreases in size and age at maturity over an identical time span for yellowfin sole (*Limanda aspera*), which has a longer generation time than vermilion snapper. Commercial (Low and Ulrich 1982) and probably recreational fishing pressures on vermilion snapper and associated reef species increased during the 1970's, and exploitation has previously been proposed as a driving force for similar changes in life history traits of fishes (Spangler *et al.* 1977). Most life history studies of exploited reef species in these waters were conducted several years ago, and management councils are currently basing plans on these studies. Because the fishing regime is now very different, and since our data suggest that life history traits of at least one species may have changed, updated studies of fish popula-

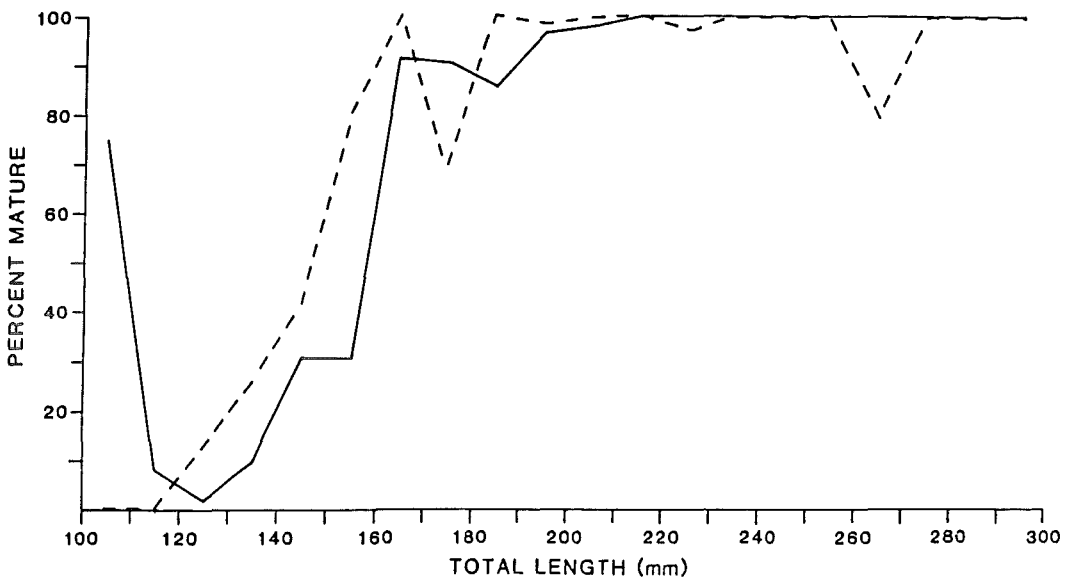


Figure 1. Percent vermilion snapper mature in each size class. Solid line = females, broken line = males.

tions in the South Atlantic Bight are in order.

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LITERATURE CITED

- Fischer, W. (editor). 1978. FAO species identification sheets for fishery purposes. Western Central Atlantic (fishing area 31). Food and Agricultural Organization of the United Nations, Rome. Vol. 5. pag. var.
- Grimes, C.B. 1978. Age, growth and length-weight relationship of vermilion snappers, *Rhomboplites aurorubens* from North Carolina and South Carolina waters. *Trans. Am. Fish. Soc.* 107:454-456.
- Grimes, C.B. and G.R. Huntsman. 1980. Reproductive biology of the vermilion snapper, *Rhomboplites aurorubens*, from North and South Carolina. *Fish. Bull.* 78:137-146.
- Hilge, V. 1977. On the determination of the stages of gonad ripeness in female bony fishes. *Meeresforschung* 25:149-155.
- Hillier, A.J. 1974. URI high rise series bottom trawl manual. Univ. Rhode Island, Mar. Bull. 20, 6 pp.
- Low, R.A. and G.R. Ulrich. 1982. Reef fishes and associated management issues in South Carolina. South Carolina Marine Resources Center, Educational Report No. 14. 49 pp.
- Powles, H. and C.A. Barans. 1980. Groundfish monitoring in sponge-coral areas off the southeastern United States. *Mar. Fish. Rev.* 42:21-35.
- Roff, D.A. 1982. Reproductive strategies in flatfish: a first synthesis. *Can. J. Fish. Aquat. Sci.* 39:1686-1698.
- Spangler, G.R., N.R. Payne, J.E. Thorpe, J.M. Byrne, H.A. Regier, and W.J. Christie. 1977. Responses of percids to exploitation. *J. Fish. Res. Board Can.* 34:1983-1988.
- Tikhonov, V.I. 1978. Changes in fecundity and rate of maturation of the yellowfin sole. *Biol. Morya (Vladivost.)* 00:64-69.
- Wilk, S.J. and M.J. Silverman. 1976. Fish and hydrographic collections made by the research vessels DOLPHIN and DELAWARE II during 1968-72 from New York to Florida. NOAA Tech. Rept. NMFS, SSRF-697. 159 pp.

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