There were no differences in the length-weight relationship of fish among areas of capture.

Food Habits

Twenty-one snook stomachs were examined for food items. All of these stomachs were found to be empty, therefore no information on food habits could be obtained.

Mortality

Annual mortality rates were calculated for fully recruited snook. Female snook were fully recruited by age four, male snook and combined sexes were fully recruited by age six.

Annual mortality rate of all fish was A = 0.78 $\pm$ .10. Annual mortality rate of males (0.86 $\pm$ .12) was higher than that of females (0.46 $\pm$ .09). Conditional natural mortality of males (n = 0.32) was higher than for females (n = 0.25).

Conditional fishing mortality was twice as high as conditional natural mortality for males but equal to conditional natural mortality for females. Exploitation ratios were also higher for males (E = 0.81) than for females (E = 0.53) (Table 3).

DISCUSSION

This study represents the first investigation of adult snook age and growth since Volpe's study in 1959, and only the second reported in the literature. The lack of biological information on snook is surprising considering its popularity among sport fishermen and drastic decline in catch in park waters (National Park Service Fishery Assessment, 1979). As a result of this study, age and growth information essential for sound management of snook can now be obtained without having to kill the fish to obtain otoliths.

Calculated lengths determined for snook in the park were similar at ages four through eight to lengths reported for the southwest Florida snook population aged by otoliths (Volpe, 1959) (Fig. 15). At ages one through three, lengths of park snook were greater than in Volpe's study because of the back calculation formula used. Volpe back calculated snook lengths directly, without a correction factor, according to the formula:

$$L_n = \frac{Sn}{St} Lt$$

where:

L_n = length at age; L_t = length at capture; S_n = scale radius to annulus n; S_t = total scale radius.

The correction factor used in the present study elevated the fish lengths at ages one through three. A larger sample size of small snook would have probably decreased the correction factor, making our estimated lengths of snook at ages one through three smaller. When lengths of park snook were calculated using Volpe's

approach, lengths were similar at every age in both studies (Fig. 15). Both studies found that calculated lengths of males were smaller than females at every age.

Back-calculated growth of snook was greatest at ages one through four in the seasonally brackish areas of Coot and Whitewater Bays, and least in the hypersaline areas of north Florida Bay and Cape Sable. This could be an artifact of the larger proportion of faster growing females taken from Whitewater Bay. Analysis of variance used for lengths at capture failed to substantiate area differences in calculated lengths. The differences in back-calculated growth may have also been caused by the species' environmental tolerances. Snook is an estuarine gamefish species that can tolerate salinities ranging from 0-36‰ (Marshall, 1958). The largest catches in this study were taken in seasonally brackish water mangrove areas where salinities normally range from 0 to 47°/oo (Tabb et al., 1962). Although snook are believed to spawn in saline waters and mature in brackish waters, tagging studies have shown that they are relatively non-migratory as adults (Volpe, 1959). Local environmental factors could affect snook growth because of their non-migratory habits.

Most snook in the park fishery were not fully recruited until age six, four years beyond the age (or size) at which they can be legally harvested. The high age at recruitment may reflect fishermen preference for large individuals. It may also reflect either the unavailability of snook at younger ages to fishermen or variable year-class recruitment. If yearly recruitment of park snook is highly variable, our estimates of annual mortality should be treated with caution because the method used to obtain annual mortality rates assumes constant recruitment.

The difference in age at full recruitment between males (6 yrs) and females (4 yrs) may be an artifact of the small sample size of fish at each age. Within our data, it is possible to artifically change the age at recruitment of each sex to five years by assuming the age of only three fish were to change by one year. The difference in ages at recruitment may also be due to size difference between males and females. The faster growing females might be caught by sportfishermen at an earlier age.

The sex ratio of the catch reflected sexual differences in annual mortality found in this study. Male mortality was greater than female mortality, therefore the number of males caught relative to females decreased with age. The sexual difference in annual mortality was not an artifact of the different ages of recruitment. If one assumes females were fully recruited at the same age as males, female mortality is still lower.

Estimates derived from Volpe's (1959) study provide the only other estimate of snook mortality in the literature. Annual mortality rate of all fish in his study was $0.67 \pm .05$. Males outnumbered females in the catch and had greater mortality. The size range (120-970 mm F.L.) of snook in Volpe's study was different than in the present study. His fish were collected by beach seine and included undersized (< 18 in) fish.