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Investigating Life History Differences Between Finetooth Sharks, *Carcharhinus isodon,* in the Northern Gulf of Mexico and the Western North Atlantic Ocean

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The life history of the finetooth shark, *Carcharhinus isodon*, off South Carolina was studied by determining age, growth, and size and age at maturity. These data were compared to a recent study describing the same parameters for finetooth sharks in the northern Gulf of Mexico. Cervical vertebrae were extracted from 168 specimens (71 males and 97 females), ranging in size from 376 to 1,262 mm fork length (FL), and prepared for age analysis using standard techniques. Sex-specific von Bertalanffy growth models were generated and yielded the following growth equations: L_t = 1,311 mm FL $(1 - e^{-0.19(t - (-2.17))})$ for females and L_t = 1,151 mm FL $(1 - e^{-0.33(t - (-1.43))})$ for males. The oldest female and male aged were 12.4 yr and 10.4 yr, respectively. Median length where 50% of the population was mature was 1,021 mm FL for females, corresponding to an age of 6.3 yr and 1,015 mm FL for males, corresponding to an age of 5.0 yr. Finetooth sharks in the western North Atlantic Ocean had higher observed ages and there was a significant difference in size at age between neonate finetooth sharks in the western North Atlantic Ocean and the northern Gulf of Mexico; however, there were no significant differences among von Bertalanffy growth function parameters between regions examined. Results indicate lower amounts of regional variation in life history parameters for finetooth sharks when compared to other small coastal sharks.

Studies on numerous shark species have shown significant regional and latitudinal variation in several aspects of their life histories. Differences in von Bertalanffy growth function (VBGF) parameters have been shown to occur in blacknose sharks (*Carcharhinus acronotus*) between the Gulf of Mexico and the western North Atlantic Ocean (Driggers et al., 2004a) and different growth rates have been documented in bonnethead (*Sphyrna tiburo*) and blacknose sharks within Florida waters (Carlson et al., 1999; Lombardi-Carlson et al., 2003). Differences in size and age at maturity for sharpnose sharks (*Rhizoprionodon terraenovae*) have been reported for females in the Gulf of Mexico compared to females off the southeastern United States (Loefer and Sedberry, 2003). Differences in size at birth, length at maturity, and maximum size have been shown in blacktip sharks (*Carcharhinus limbatus*) between the Gulf of Mexico (Branstetter, 1987a; Killiam and Parsons, 1989) and the east coast of South Africa (Wintner and Cliff, 1996). Differences in life history parameters lend support to the idea that state and federal regulations may need to account for regional life history differences impacting a species' ability to withstand exploitation. The life history and population dynamics of the finetooth shark have recently been examined in the northern Gulf of Mexico (Carlson et al., 2003) but no studies have examined finetooth shark age and growth in the western North Atlantic Ocean. Given the growing evidence regarding differences in life history parameters, it is reasonable to assume differences may exist between finetooth sharks in these two regions.

The finetooth shark is a small carcharhinid inhabiting the Atlantic Ocean from South Carolina to Brazil including the Gulf of Mexico and occurs as far north as New York (Castro, 1983; Compagno, 2002). Finetooth sharks are managed in the small coastal shark complex under the U.S. Fishery Management Plan for Atlantic tunas, swordfish, and sharks [National Marine Fisheries Service (NMFS), 1999]. The small coastal shark complex also includes blacknose, Atlantic sharpnose, and bonnethead sharks. Finetooth sharks are targeted in coastal fisheries, including the southeast U.S. drift gillnet fishery (Trent et al., 1997) and constitute a portion of the bycatch in the gulf menhaden (*Brevoortia patronus*) purse seine fishery (de Silva et al., 2001). In 2001 the commercial harvest of finetooth sharks was 86.3 metric tons and recreational catches were estimated to be 1,200 individuals in 2000 (Cortés, 2002). A recent stock assessment indicated that finetooth shark stock biomass at the beginning of 2001 was at or above maximum sustainable yield (MSY), and they are thus not considered overfished. However, model estimates of recent fishing mortality levels are above fishing levels to produce MSY (F_{MSY}), indicating that recent levels of effort directed at this species, if continued, could result in an overfished status in the near future (Cortés, 2002). The objectives of this study were to describe the life history of the finetooth shark in the western North Atlantic Ocean and to observe any differences in life history traits for finetooth sharks between the western North Atlantic Ocean and the Gulf of Mexico.

Materials and Methods

Finetooth sharks were collected from April 2002 through Aug. 2003 in the estuarine and nearshore waters of South Carolina. Estuarine sampling was conducted using gill nets and hand-deployed longlines. For a description of the sampling gear and location see Driggers et al., 2004b. Nearshore sampling was conducted using a bottom longline. The 272-kg test monofilament mainline was 1,829 m in length and supported the use of 120 gangions, spaced approximately 15 m apart. Gangions were constructed of 91-kg monofilament line with a longline snap, a swivel, and a 15/0 circle hook. Hooks were baited with Atlantic mackerel (*Scomber scombrus*) or spot (*Leiostomus xanthurus*), depending on availability. The bottom longline was soaked for 45-min intervals.

The length (mm) and weight (kg) of each shark captured was measured and sex recorded. Length measurements included precaudal length (PCL), fork length (FL), and stretch total length (STL, the distance from the tip of the rostrum to the termination of the upper lobe of the caudal fin while fully extended). STL was chosen over natural total length (NTL) to eliminate ambiguity in determining the natural placement of the caudal fin (Castro, 1993a). Presence of an umbilical scar was noted as open, partially healed, mostly healed, or healed to estimate size at parturition. Maturity in males was assessed as described in Clark and Von Schmidt (1965). Females were considered mature if gravid or when the oviducal glands were 20 mm or greater in width (Castro, 1993a).

A section of the vertebral column anterior to the origin of the first dorsal fin was removed and prepared for age analysis using standard techniques as described in Driggers et al. (2004a). A growth band was defined as one translucent and one opaque zone. It was assumed that 1) the birthmark was formed at age 0 and was associated with a pronounced angle change in the corpus calcerum, 2) the second growth band was formed approximately 6 mo later, and 3) the third growth band was formed the following winter, approximately 1 yr after the second. Therefore, ages were calculated using the following algorithm: age = Σ [(total increment count $-$ 1.5) + the proportion of the year from the formation of the last increment until the date of capture]. Two readers counted each sample twice each without knowledge of the sex, size, date of capture, or previous age estimates. The index of precision, coefficient of variation (CV) (Chang, 1982; Kimura and Lyons, 1991), and percentage of agreement between readers were used to estimate error in increment counts. Marginal-increment analysis was used to verify the periodicity of growth band deposition. The marginal increment was measured on each vertebra from the edge of the last growth band to the distal edge of the corpus calcerum. The mean increment ratio (MIR) was calculated as follows:

$$MIR = (CR - R_n)/(R_n - R_{n-1})$$

where CR = centrum radius, R_n = distance from focus to last fully formed growth band, and R_{n-1} = distance from focus to last fully formed growth band preceding R_n.

The mean increment ratio was used to compensate for differences in growth rates among age classes (Natanson et al., 1995; Lessa et al., 1999; Wintner and Cliff, 1999). Vertebral radii in full-term embryos were compared to birthmarks in neonate vertebra to determine when the birthmark was deposited (Natanson et al., 2001; Skomal and Natanson, 2003).

The VBGF (von Bertalanffy, 1938) was fitted to estimated ages at length and was employed because of its frequent use in elasmobranch age and growth literature (Calliet and Tanaka, 1990; Calliet and Goldman, 2004).

$$L_t = L_\infty(1 - e^{-k(t-t_0)})$$

where L_t = length at age t, L_∞ = theoretical maximum length, k = growth coefficient, and t_0 = theoretical age at which length equals zero.

Initial parameter estimates for the von Bertalanffy parameters (L_∞, k, and t_0) were those reported by Carlson et al. (2003) for finetooth sharks in the Gulf of Mexico. Model parameter estimates were calculated using the Marquardt algorithm through an iterative fitting process using the computer software program Statgraphics (Statgraphics, 2002). Separate growth curves for males and females and a curve for

TABLE 1. Morphometric relationships between precaudal length (PCL, mm), fork length (FL, mm), total length (TL, mm) and weight (WT, kg). Both r^2 and P values are shown.

Conversation	Morphometric relationships	r^2 value	P value
FL to PCL	PCL = 0.91(FL) − 5.31	$r^2 = 0.99$	$P < 0.01$
FL to TL	TL = 1.24(FL) + 12.03	$r^2 = 0.99$	$P < 0.01$
FL to WT	W = 4.09 − 0.02(FL) + 0.01(FL)^2	$r^2 = 0.95$	$P < 0.01$

both sexes combined were fitted to observed data.

The maximum likelihood ratio test (Cerrato, 1990) was used to compare growth curves between sexes from this study and between finetooth sharks from this study and the study by Carlson et al. (2003) of finetooth shark age and growth in the Gulf of Mexico. A series of two-way analyses of variance (ANOVAs) were used to test the effect of sex and location on size at age. An adjustment was made by dividing the number of age groups tested by 0.05 to maintain a family-wise alpha rate at 0.05. To determine size and age at which 50% of the population was mature, a logistic model [$Y = 1/(1 + e^{-(a + bx)})$] was fitted to binomial maturity data using least squares nonlinear regression, where 0 = immature and 1 = mature. Median age and FL at maturity were determined as −a/b (Mollet et al., 2000), where a = y-intercept and b = slope. A chi-square test was used to test for deviation from the expected sex ratio of 1:1. Linear regressions that included combined sexes were compared using analysis of covariance (ANCOVA). Theoretical longevity was estimated as the age at which 95% of the theoretical maximum size is reached using the expression [5(ln2)]/k (Fabens, 1965). All tests were considered statistically significant at an alpha level of 0.05.

RESULTS

A total of 195 finetooth sharks (112 female and 83 male) were collected over the course of the study. Females ranged in size from 380 to 1,262 mm FL and males ranged in size from 376 to 1,174 mm FL. Morphometric relationships using all length measurements were derived to facilitate comparisons with other age and growth studies (Table 1). Analyses revealed no covariate effect of sex for the regression of FL on centrum radius (ANCOVA, F = 0.06, $P = 0.81$); therefore, males and females were combined for regression analysis. The relationship between FL and CR for combined sexes was highly significant ($P < 0.01$, n = 168).

Ages were assigned to 168 finetooth sharks (71 males and 97 females). After the first age reading, 77% of the counts agreed between readers, 14% were within 1 yr and 4% were within 2 yr. When there was no agreement in counts, specimens were counted a third time. A consensus was reached on all vertebrae and no vertebrae were discarded. The mean CV was 0.04 (SD = 0.03) and the mean index of precision (D) was 0.10 (SD = 0.07).

The MIR was calculated for each month. Monthly MIR values were not significantly different (single factor ANOVA, $P > 0.22$, n = 85); however, a positive sloped regression line fit through monthly mean data points explained 89% of the variability in the data and was highly significant ($P < 0.01$).

Maximum likelihood analysis revealed that length-at-age data were significantly different between sexes (likelihood ratio statistic = 15.64, $P < 0.01$); therefore, the VBGF was fit to observed length-at-age data for each sex (Figure 1). VBGF parameter estimates are listed in Table 2. The oldest female specimen was 12.4 yr old and the oldest male was 10.4 yr old, and theoretical longevity estimates were 18.2 and 10.5 yr for females and males, respectively. Model parameter estimates indicate that females grow more slowly, attain larger sizes and are longer lived than males. Mean size at age was calculated and compared to size at age estimates from the Gulf of Mexico. ANOVA revealed a significant difference in size at age for neonate sharks between this study and Carlson et al. (2003). A comparison of parameter estimates from this study and Carlson et al. (2003) is shown in Table 2.

The length at which 50% of the population reached maturity was 1,021.2 mm FL for females and 1,015.4 mm for males, corresponding to 6.3 and 5.0 yr, respectively (Figure 2). The smallest mature female was 1,046 mm FL and largest immature female was 1,000 mm FL. The smallest mature male was 916 mm FL and the largest immature male was 995 mm FL. Several pregnant females were collected during the study. A pregnant female with four near-term embryos was caught on 27 May

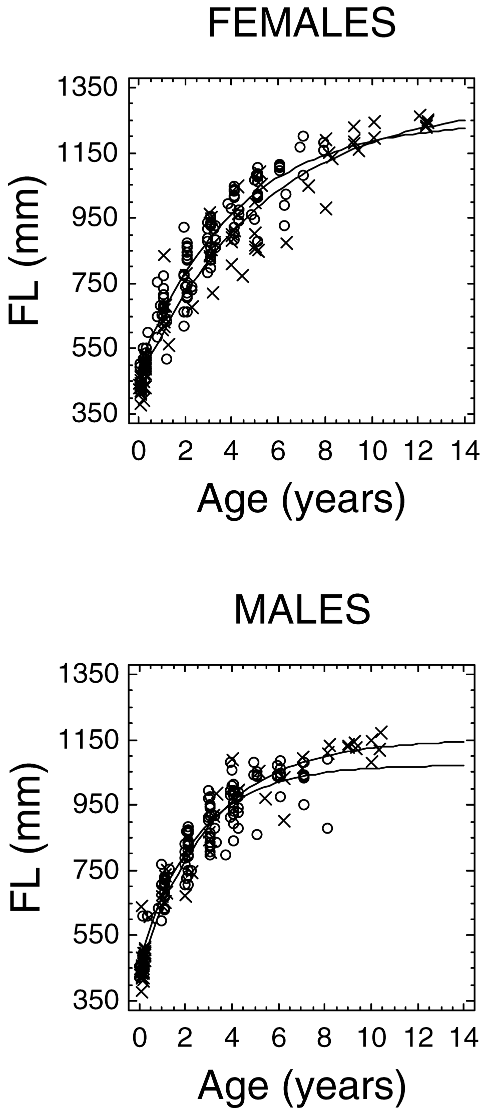

Fig. 1 (A) Von Bertalanffy growth function (VBGF) for females fitted to observed length-at-age data. Data points from this study, (×); data points from Carlson et al., 2003, (●). Current study: L_∞ = 1,311.45, k = 0.19, t_0 = −2.17, r^2 = 0.95, n = 97. Carlson et al., 2003: L_∞ = 1,251.24, k = 0.24, t_0 = −2.01, r^2 = 0.88, n = 117. (B) Von Bertalanffy growth function (VBGF) for males fitted to observed length-at-age data. Data points from this study, (×), data from Carlson et al., 2003, (●). Current study: L_∞ = 1,150.95, k = 0.33, t_0 = −1.43, r^2 = 0.96, n = 71. Carlson et al., 2003: L_∞ = 1073.14, k = 0.41, t_0 = −1.39, r^2 = 0.87, n = 123.

2003. All finetooth shark specimens with umbilical remains (n = 15) were caught between 27 May and 13 June. Of the neonates caught in July over a 3-yr period (n = 130), 92% had healed umbilical scars and the remaining 8% had mostly healed umbilical scars. These data strongly suggest that parturition occurs from late May through mid-June.

Mean size at birth was 439 mm FL (SE = 3.91, n = 15) with observed sizes ranging from 405 to 460 mm FL. The distance from the focus to the birthmark was averaged from all young-of-the-year (YOY, age 0+) sharks caught in the study and compared to vertebral radii of full-term embryos. Mean distance from focus to birthmark on YOY sharks was 2.93 mm (n = 81, SE = 0.04), and mean vertebral radius of near-term embryos was 2.84 mm (n = 4, SE = 0.12). These values were not significantly different (t-test, P = 0.64), indicating the birth mark was 1) accurately identified and 2) laid down prior to parturition.

Discussion

Finetooth sharks in the western North Atlantic Ocean show similar life history patterns to conspecifics in the northern Gulf of Mexico, reaching similar theoretical longevities and sharing comparable k values. No statistically significant difference was noted in finetooth shark VBGF parameters between regions, contrary to results published for the similar-sized blacknose shark (Driggers et al., 2004a). The VBGF model provided a good fit to observed age and length data. Asymptotic mean lengths (1,311 mm FL for females and 1,151 mm FL for males) matched well with observed maximum lengths (1,262 mm FL for females and 1,174 mm FL for males). Asymptotic mean lengths in this study were slightly larger than Carlson et al. (2003) found in the Gulf of Mexico (1,251 for females and 1,073 mm FL for males) (Table 2). This is not surprising given the fact that the oldest sharks in this study were 12.4 (female) and 10.4 (male) yr as compared to 8.0 (females) and 8.1 (males) yr in the Gulf of Mexico (Carlson et al., 2003). Comparing sizes, finetooth sharks collected in this study were slightly larger than those collected in the Gulf of Mexico; the largest female collected was 1,262 m FL compared to 1,183 mm in the Gulf of Mexico and the largest male was 1,174 mm FL compared to 1,089 mm in the Gulf of Mexico.

Theoretical longevities for males and females were higher in the western North Atlantic Ocean than in the northern Gulf of Mexico, with calculated values of 18.2 yr for females and 10.5 yr for males in the western North Atlantic Ocean as compared to 14.2 yr for females and 8.5 yr for males in the northern Gulf of Mexico. However, it should be noted that

TABLE 2. Comparison of von Bertalanffy growth function parameters between this study and Carlson et al., 2003.

von Bertalanffy growth parameters	Atlantic Ocean, current study		Gulf of Mexico, Carlson et al., 2003	
	Males	Females	Males	Females
L∞ (mm FL)	1,151	1,311	1,073	1,251
k	0.33	0.19	0.41	0.24
t_0 (years)	−1.4	−2.2	−1.4	−2.0
Theoretical longevity(years)	10.5	18.2	8.5	14.2
n	71	97	123	117
r^2 value of VBGF	0.96	0.95	0.87	0.88

these differences in theoretical longevities are driven by parameters derived from the VBGF, specifically the growth coefficient k. The oldest females in the present study were two individuals aged at 12.4 yr (1,245 and 1,250 mm FL), whereas the oldest females in the study by Carlson et al. (2003) were two individuals aged at 8.0 yr (1,158 and 1,183 mm FL). The oldest male in this study was estimated to be 10.4 yr old and measured 1,174 mm FL, compared to two males in the Gulf of Mexico measuring 878 and 1,089 mm FL with ages of 8.1 yr. A comparison of growth coefficients indicates females in both areas grow more slowly than do males (0.19 in the Atlantic Ocean compared to 0.24 in the Gulf of Mexico) and that both males and females grow more slowly in the western North Atlantic Ocean than in the Gulf of Mexico (0.19 vs 0.24 for females, 0.33 vs 0.41 for males) (Table 2).

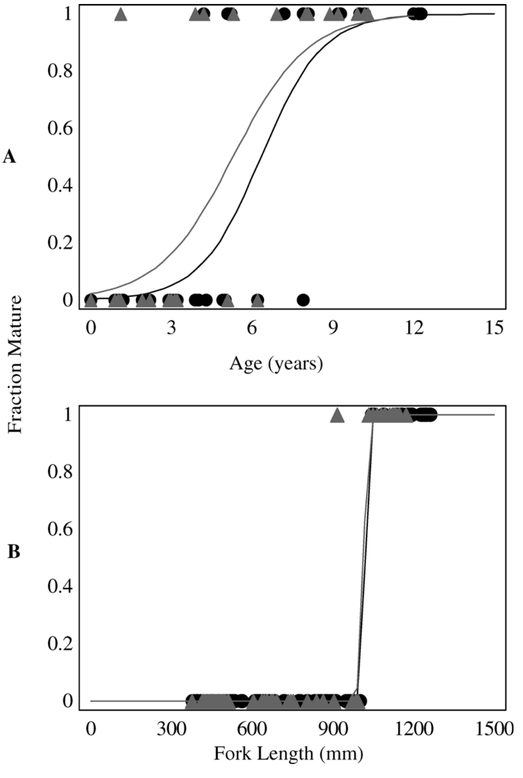

Fig. 2. (A): Age (years) at 50% maturity for females and males. Circles represent females, triangles represent males. Females: $a = -5.801$, $b = 0.92$, $r^2 = 0.77$, $n = 97$. Males: $a = -4.20$, $b = 0.84$, $r^2 = 0.78$, $n = 71$. (B): Fork length (FL)(mm) at 50% maturity for females and males. Females: $a = -141.92$, $b = 0.14$, $r^2 = 1.00$, $n = 97$. Males: $a = -122.17$, $b = 0.12$, $r^2 = 0.92$, $n = 71$.

Although inconclusive because of the absence of samples from winter and early spring months (Nov.–April), marginal increment analysis indicates growth band formation during unsampled months. Winter deposition has been suggested for other carcharhinids, including the bull (*C. leucas,* Branstetter and Stiles, 1987), dusky (*C. obscurus,* Natanson et al., 1995), and blacknose sharks (Carlson et al., 1999; Driggers et al., 2004a) as well as for finetooth sharks (Carlson et al., 2003). Although definitive data are currently lacking for finetooth sharks, no pronounced decreases in the MIR were apparent during the months sampled in the current study. It is therefore likely that the growth band for finetooth sharks forms during winter months.

Size at which 50% of the population reaches maturity was similar for females and males. Castro (1993a) described size at maturity for female and male finetooth sharks in Bulls Bay, South Carolina, one of the principal collection sites for specimens from this study. He determined the size at maturity for females to be 1,350 mm TL (1,098 mm FL) and 1,330 mm TL (1,082 mm FL) for males. Size at maturity estimates from this study and Castro (1993a) are very similar; however, median sizes at maturity are slightly higher in this study than in Carlson et al., 2003. In addition, estimates of age at median maturity from this study were higher than those reported for the Gulf of

Mexico (6.3 compared to 4.3 for females and 5.0 compared to 3.9 for males) (Carlson et al., 2003). When comparing the findings of this study to those of Castro (1993a), there appears to be little, if any, change over time in size at maturity for finetooth sharks off South Carolina. However, finetooth sharks in the western North Atlantic Ocean may mature more slowly than those in the Gulf of Mexico, leading to potential differences in reproductive output, which could affect recruitment and sustainability.

Numerous studies have indicated the need for validation of age estimates for all age classes (Beamish and McFarlane, 1983; Calliet et al., 1986; Calliet, 1990; Calliet and Goldman, 2004) as well as verification of the periodicity of growth band formation. To verify age and growth estimates the South Carolina Department of Natural Resources tag–recapture data set was examined. Within this data set, nearly 1,000 finetooth sharks were tagged and released, many of which were sharks of known age (neonate). Of the recaptures that were reliably measured (n = 5), one fish was at liberty for 1,138 days and grew 298 mm FL. That fish was 662 mm FL at the time of first capture, which corresponds to an age of 1.2 as back transformed from the VBGF. The fish was at liberty for 1,138 days (3.12 yr) and was recaptured at 960 mm FL, equivalent to age 4.0 as calculated from the VBGF. Actual time at liberty (1,138 days, or 3.1 yr) closely matches time at liberty as predicted from the growth model, based on size at tagging and recapture (1,036 days, or 2.8 yr). This limited data is progress toward verifying age estimates in this study for fish between the ages of 1 and 4 yr. Future work in this regard should focus on injection of wild and captively reared fish with oxytetracycline (Branstetter, 1987b; Tanaka, 1990).

Fifteen young with umbilical remains were collected as early as 24 May and as late 13 June. The umbilicus was reported by Castro (1993a) to heal within 3 to 4 wk of parturition, which agrees with our observations. Observations suggest a portion of the umbilical cord attached to neonates remains for a few days following parturition; therefore, fish captured with umbilical remains were assumed to be good indicators of the birth size. In addition, on 27 May 2003 a pregnant female with near-term embryos, as evident by the dorsal pigmentation extending over the flanks to the abdomen (Castro, 1993a), was captured. The embryos had a mean size of 429 mm FL. Based on finetooth shark neonates captured with umbilical remains (n = 15), mean size at parturition was 439 mm FL. This size falls in the upper range of Castro's (1993a) study, which describes finetooth size at birth between 365 and 449 mm FL. Carlson et al. (2003) back-calculated size at birth for finetooth sharks in the Gulf of Mexico to be 421 mm FL (538 mm TL), slightly smaller than the current study's mean size at birth of 439 mm FL. However, Carlson (pers. comm.) describes a known size at birth for finetooth sharks in the Gulf of Mexico at 374–414 mm FL (480–530 mm TL). This range is lower than was observed off South Carolina. Comparing growth rates calculated using mean size at age, finetooth shark neonates and YOY in the western North Atlantic Ocean and the Gulf of Mexico showed similar growth rates during their first year. Atlantic coast finetooth sharks grew 18 mm/mo the first year for females and 17 mm/mo for males. Using the size-at-age data reported in Carlson et al. (2003), finetooth sharks in the Gulf of Mexico grew 14 mm/mo and 17 mm/mo for females and males, respectively.

Findings of this study are consistent with the suggestion that members of the small coastal shark complex demonstrate diverse life history traits (Carlson et al., 2003; Loefer and Sedberry, 2003; Driggers et al., 2004a). A comparison between bonnethead sharks and finetooth sharks shows that bonnethead sharks have a smaller maximum size (850–1,100 mm TL), younger age at maturity (1.6–4.0 yr) and larger growth coefficients (0.44–0.16) (Lombardi-Carlson et al., 2003) than finetooth sharks. A comparison of Atlantic sharpnose to finetooth sharks shows a similar trend, with Atlantic sharpnose sharks having smaller maximum sizes (1,050–1,070 mm TL), younger age at maturity (3–4 yr) and larger growth coefficients (0.49–0.50) (Loefer and Sedberry, 2003). Both Atlantic sharpnose and bonnethead sharks have substantially smaller sizes at parturition than do finetooth sharks, with sharpnose and bonnethead shark parturition occurring between 250 and 350 mm TL compared to finetooth shark mean size at parturition of 555 mm TL. When compared to the similarly sized blacknose shark, finetooth sharks in this study showed similar growth coefficients. However, when compared to the blacktip shark, a large coastal shark, finetooth sharks have a smaller maximum size (1,575 mm TL compared to 2,000 mm TL) and higher growth coefficients (0.19–0.33 compared to 0.20–0.27) (Cortés, 2000) (Table 3).

Based on the presence of neonate and juvenile sharks, Castro (1993b) described Bulls Bay, South Carolina, as an important nursery

TABLE 3. Comparison of life history parameters among members of the small coastal shark complex. Maximum sizes, size at birth, and k values are sometimes reported as ranges

Species	Sex	Maximum size (mm TL)	k	Size at birth (mm TL)	Age at maturity (years)	Reference
Carcharhinus isodon	F	1,575	0.19	555	6.3	Current study
	M	1,470	0.33		5.0	
Carcharhinus acronotus	F	1,361	0.18–0.21	450–500	3.0–4.5	Cortés, 2000; Driggers et al., 2004a, b
	M	1,310	0.21–0.48		3.0–4.3	
Rhizoprionodon terraenovae	F	1,070	0.49	300–350	4.0	Cortés, 2000; Loefer and Sedberry, 2003
	M	1,050	0.50		3.0	
Sphyrna tiburo	F	1,040–1,100	0.16–0.29	274–347	2.9–4.0	Cortés, 2000; Lombardi-Carlson et al., 2003
	M	850–930	0.25–0.44		1.6–3.0	

area for several species of carcharhinids, including finetooth sharks. Finetooth shark neonates and YOY were frequently caught in gill nets from late spring through early fall, and gravid females were noted in May through June, supporting Castro's (1993b) observations. Neonate finetooth sharks with umbilical remains were caught as early as 24 May and as late as 13 June. These observations agree well with Castro (1993a), who noted finetooth parturition to occur from the end of May through mid-June. In the Gulf of Mexico, YOY sharks made up only 7.3% of all males and 11.1% of all females, despite the use of a multiple-size mesh gill net known to target all available size classes (Carlson et al., 2003). YOY sharks dominated this study's sample, making up 58% of all males and 47% of all females. Assuming the gear wasn't selecting against YOY finetooth sharks and that fishing was targeting areas where finetooth shark young were abundant, YOY sharks appear to occur in much greater numbers and larger sizes in South Carolina's estuaries than in the Gulf of Mexico, supporting Castro's (1993b) claim that South Carolina represents an important nursery ground for finetooth sharks in the western North Atlantic Ocean.

Maximum likelihood analysis revealed no significant differences in growth model parameter estimates between this study and that of Carlson et al. (2003) in the Gulf of Mexico. Other aspects of the life history of the finetooth shark seem to vary between the western North Atlantic Ocean and the Gulf of Mexico, to differing magnitudes. For example, analysis of size-at-age data showed a significant difference in size at age for neonate sharks between regions ($P < 0.001$). As researchers continue to investigate the feasibility of single-species management plans for small coastal sharks, regional differences in life history parameters should continue to be considered.

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