Morphometric Conversions for 33 Shark Species from the Western North Atlantic Ocean

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Introduction

It is well-established that accurate morphological data are important for a variety of fisheries science and management applications (Kohler et al., 1996; Mejuto and Garcia-Cortéz, 2005; Francis, 2006). For example, many recreational harvest regulations are length-based, while commercial landings data are often reported in weight which needs conversion to length for use in stock assessment models. Traditional stock assessment models use length-based parameters, such as size-at-age and size-at-maturity, as essential inputs (Maunder and Punt, 2013), while multiple data-limited assessment approaches estimate fishing mortality from changes in the length distribution (Chong et al., 2020). Further, assessing progress relative to management regulations often requires the ability to accurately convert among length measurements, such as precaudal, standard, fork, natural total, and stretched total lengths, due to inconsistencies in the types of standard measurements collected among various research programs (Francis, 2006). For example, straight-line fork length (FL_{SL}), which is measured as the straight-line distance from the tip of the snout to the fork of the tail, is the measurement type designated for shark regulations in the Atlantic Ocean by both the International Commission for the Conservation of Atlantic Tunas (ICCAT) and by NOAA's National Marine Fisheries Service Highly Migratory Species Division[1] (ICCAT, 2016). However, particularly for large fish, many researchers and fishermen use over-the-body (OTB; synonymous with curved measurements for this paper) measurements in which a measuring tape is laid along the surface of the body from the snout to various points on the tail. In wide-bodied species, such as the shortfin mako, *Isurus oxyrinchus*, and porbeagle, *Lamna nasus*, a fish measured OTB at the legal minimum size could be illegal using a straight-line measurement as they are generally shorter than OTB measurements.

Kohler et al. (1996) used data collected over a 29-year period by the NMFS Apex Predators Program, which included data from commercial, recreational, and scientific sampling to produce length-length and length-weight conversions for 13 shark species occurring off the U.S. Atlantic Coast from the Gulf of Maine to the Florida Keys. That study has been cited over 100 times in peer-reviewed literature and used extensively in stock assessments. Additionally, sport fishermen who enter many fishing tournaments in the U.S. Northeast are given Kohler et al.'s (1996) Table 2, length-weight key, so they can estimate the weight of their catch to verify that it meets tournament minimum weight. Herein, we compiled the data used in Kohler et al. (1996) (collected between 1961 and 1989), with additional data collected by the NMFS Apex Predators Program from 1990 to 2021, and data collected by eight additional programs (1993–2020) to expand upon previous results. This increased sample size

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[1]https://media.fisheries.noaa.gov/2020-12/HMS%20Recreational%20Compliance%20Guide_01_01_2020.pdf?nul=

ABSTRACT—This study generates and updates mathematical conversions among body length and weight measurements of sharks commonly encountered in the western North Atlantic Ocean. At the initiation of individual research programs, standardized measurements are determined to meet program objectives, yet these measurements often vary among programs and may differ within programs over time. Since length is of vital importance to understanding the basic biology of a species (e.g., growth, length at maturity) and to enforce management regulations based on size, it is necessary to have length-length and length-weight conversions to be able to standardize measurements for individual species. We compiled length and weight data on sharks from nine research programs operating in the western North Atlantic Ocean from Canada through the Gulf of Mexico to obtain length-length and length-weight conversions for 27 species and 3 genera consisting of 6 species. Length-length and length-weight conversions are presented for all species using over the body fork length as the independent variable. This study updates and expands previous conversions with new information.

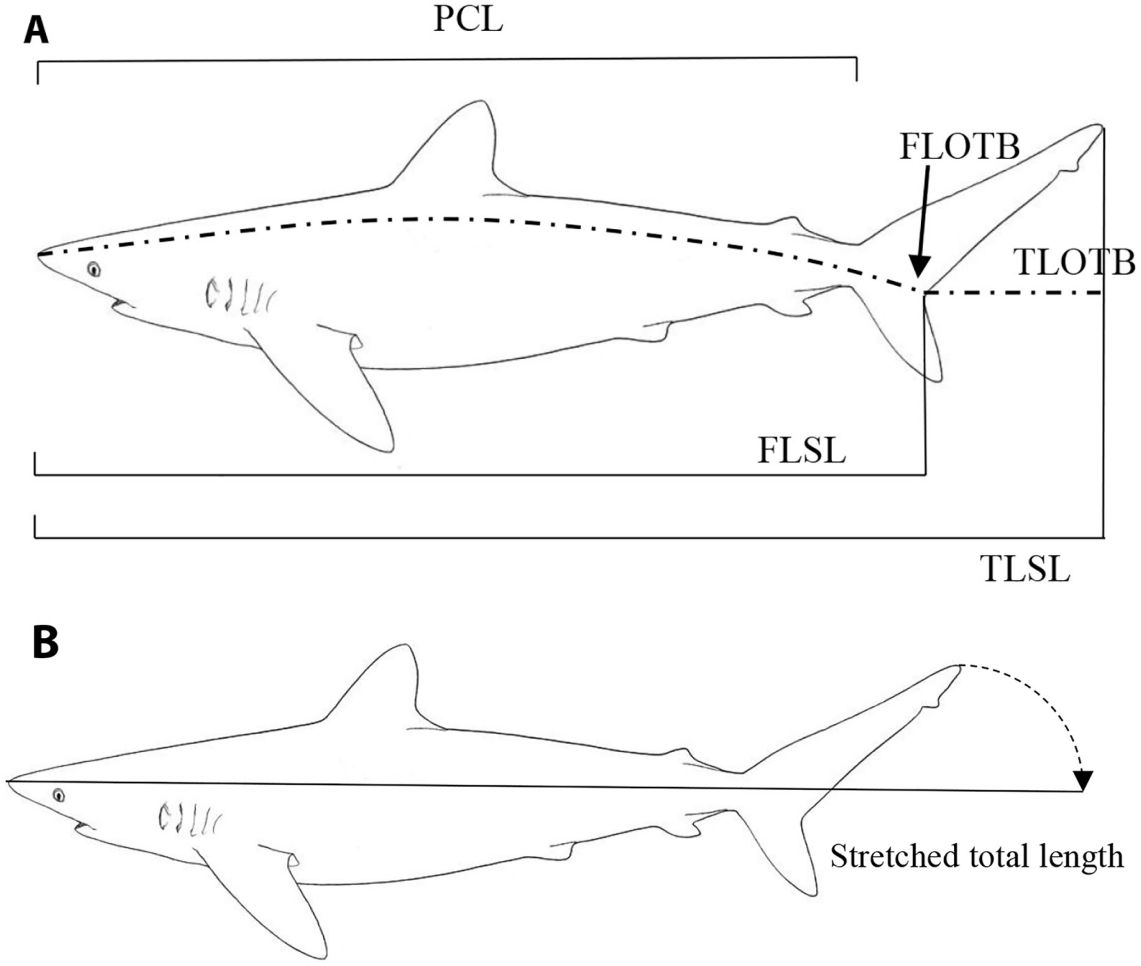

Figure 1.−Diagram showing the measurements that were used in this study. Straight-line measurements are denoted by the solid line while over-the-body (OTB; curved) measurements are denoted by a dash-dotted line. A) Straight-line and over-the-body total and fork length and straight-line precaudal length measurements. FLOTB=over-the-body fork length, FLSL = straight-line fork length, TLOTB=over-the-body total length, TLSL = straight-line total length, PCL = precaudal length. B) Stretched total length is taken with the upper lobe of the caudal fin stretched down to its fullest length in line with the center of the body.

allowed for a greater number of species to be included in these analyses along with a greater number of conversion formulas developed.

Methods

Data were compiled from nine programs conducting research in the western North Atlantic Ocean between Canada and the U.S. Gulf of Mexico (Table 1). Measurements of shark body length and weight data were obtained during research activities (e.g., fisheries-independent surveys) and from fishery-dependent sampling of commercial and recreational catch (e.g., sampling on commercial vessels and at sportfishing tournaments). Sharks were caught primarily on rod and reel at sportfishing tournaments and by gillnet and longline gear aboard research and commercial fishing vessels. Only lengths and weights measured by the authors or by cooperating biologists were used for this study.

Measurement types are defined as starting at the tip of the snout and ending at either the precaudal pit (PCL, where available), fork in the tail (FL, where available), or the tip of the caudal fin in its natural (TL) or stretched (TL_{STR}) position (Fig. 1). Measurements were taken either OTB or along a straight line (SL). The OTB measurements (e.g., FL_{OTB} and TL_{OTB}) used a flexible measuring tape over the dorsomedial curve of the body from point-to-point beneath the dorsal curve, while the SL measurements (e.g., FL_{SL} and TL_{SL}; also called caliper measurements) were taken from point-to-point along a straight line under or next to the body (Fig. 1A). Stretched TL was taken with the upper lobe of the caudal fin stretched to its fullest extension (Fig. 1B), while TL_{SL} and TL_{OTB} were taken at the perpendicular intercept of the tip of the upper lobe of the caudal fin in its "natural" position (Fig.

Table 1.–List of research programs contributing data for this study and the associated methods and measurement types. APP= Apex Predators Program, NMFS Narragansett Laboratory; DBC = Delaware Bay Cooperative Atlantic States Shark Pupping and Nursery (COASTSPAN) survey, NMFS Narragansett Laboratory; SEFSC MS = NMFS Southeast Fisheries Science Center (SEFSC) Pascagoula Laboratory; USM/GCRL = University of Southern Mississippi's Gulf Coast Research Laboratory; SEFSC PC = NMFS SEFSC Panama City Laboratory; CASRL = Canadian Atlantic Shark Research Laboratory, Department of Fisheries and Oceans, Dartmouth, Canada; UNF = University of North Florida; CRD = Coastal Resources Division of the Georgia Department of Natural Resources; SCDNR = South Carolina Department of Natural Resources Marine Resources Research Institute. FL = fork length; TL = total length; PCL = precaudal length; W = weight; OTB = over-the-body; SL = straight line; STR = stretched.

	Length Type											
Program	FL_{OTB}	FL_{SL}	TL_{OTB}	TL_{SL}	TL_{STR}	PCL	W	Measuring tape type	Board	Body position	End of PCL	Precision
APP	X	X	X	X	X		X	Metal	X[2]	Side		mm
DBC[1]	X		X		X	X	X	Flexible plastic	<90 cm	Side	Anterior margin	0.5 cm
SEFSC MS[1]	X	X	X	X	X	X	X	Flexible plastic	<200 cm FL	Side	Anterior margin	mm
USM/GCRL[1]		X		X	X	X	X	Flexible plastic	<150	Side	Center	mm
SEFSC PC[1]		X					X	Flexible plastic	X	Side		mm
CASRL	X	X					X	Flexible plastic		Side		0.5 cm
UNF[1]	X	X	X	X	X	X	X	Fabric	<120 cm	Belly	Deepest part	0.5 cm
CRD[1]		X		X	X		X	Fabric	< 4´	Side		mm
SCDNR[1]	X	X		X	X		X	Flexible plastic	<160 TL	Side		mm/cm[3]

[1]Used measuring board on smaller sharks changed to over-the-body on larger sharks.
[2]In the beginning few years of the APP small sharks were measured on a board, no longer used.
[3]Nearest mm for board and cm for OTB in the water.

1A). There were not enough verified data to determine if either PCL or TL_{STR} were OTB or SL, therefore, the measurements are combined. However, the majority of the programs either used SL for all of both measurements or for small sharks and then OTB on larger sharks; with the exception of the TL_{STR} for the common thresher shark, *Alopias vulpinus,* which was all OTB. Weight was measured in pounds (lb) or kilograms (kg) and standardized to kilograms for analyses. Species with ≥13 samples of any one combination of length–length or length–weight data with the sexes combined were chosen for analysis following Kohler et al. (1996).

The programs contributing to this publication used broadly similar measurement techniques with minor variations (Table 1). For example, in many cases, small sharks (size categories dependent on the program) were measured on a board using straight-line methods while larger sharks were measured OTB using a flexible measuring tape. All programs but one placed fish laterally for measurement, and all but three measured fish to the nearest millimeter. All length data were standardized to centimeter for analyses. The specific endpoint of the PCL measurement also varied among programs (Table 1). Weight (W) data were taken with varying resolutions depending on the type of scale used (e.g., 0.1 kg vs 0.5 kg).

After identifying and accounting for methodological differences to the extent possible, PCL, TL_{OTB}, TL_{STR}, and W were compiled according to species and plotted relative to FL_{OTB}; however, due to variations in reporting some FL_{SL} measurements may be included in the FL_{OTB} data for these relationships. Additionally, FL_{SL} and FL_{OTB} were compared for four species where these measurements were taken specifically to obtain this conversion (shortfin mako, porbeagle, common thresher shark, and blue shark, *Prionace glauca*). Due to the lack of a defined precaudal pit or forked tail in the nurse shark, *Ginglymostoma cirratum*, TL_{OTB} was used instead of FL_{OTB} and compared to W only. While it is recognized that the recently-described Carolina hammerhead, *Sphyrna gilberti*, differs genetically from the scalloped hammerhead, *S. lewini*, the two species are morphologically indistinguishable (Quattro et al., 2013). Therefore, while it is possible that length data from Carolina hammerheads was unknowingly included within the scalloped hammerhead data, the length-length relationships would be unaffected. Additionally, six species (*Mustelus norrisi, M. sinusmexicanis, Centrophorus granulosus, C. uyato, Squalus cubensis, S. mitsukurii*), collected by programs solely in the Gulf of Mexico, were combined into the genus groupings *Mustelus* spp., *Centrophorus* spp., and *Squalus* spp. due to close morphological similarities among congeners as well as taxonomic uncertainties (e.g., Verissimo et al., 2014; Giresi et al., 2015). All plots were rigorously examined for outliers which when identified were verified or corrected by each program. Any data that could not be verified were deleted (<1% of specimens).

Linear models in the form of $Y = a + b*FL_{OTB}$ were fitted for all potential length-length relationships for each species individually. Regressions for the length-length equations were tested for significant differences ($p<0.05$) in slopes and intercepts between the sexes using an ANCOVA and differences between the means were tested with an ANOVA. Fork length OTB–weight relationships were calculated separately for each sex and for sexes combined (with the exception of the nurse shark which

used TL_{OTB} rather than FL_{OTB}), and were fitted with power curves in the form of $W = aL^b$, where W = weight and L = FL_{OTB}. All analyses were conducted using R (R Core Development Team, 2020). Each species is presented alphabetically by common name in a two-page format with corresponding plots and data. For each species, a series of figures is presented depicting each length-length and length-weight relationship followed by tables with corresponding length ranges, regression coefficients, and sample sizes for each regression.

Results and Discussion

A total of 126,439 sharks representing 33 species were measured in this study. Data from 27 individual species and 3 genera consisting of six species, led to the 104 conversions calculated (Fig. 2–31; Suppl. Table 1). In 60 of the 74 length-length relationships no significant differences were found between the sexes ($p > 0.05$). For relationships with significant differences, one sex, usually females, achieved larger sizes than the other, therefore we truncated the data to include only those lengths where the sexes overlapped. These truncated datasets were then retested and no significant differences were detected in 12 of the 14 relationships. In one of these datasets, *Squalus* spp. FL_{OTB} to TL_{OTB}, the sample size of males was too small to use for an adequate comparison. The other dataset, blacktip sharks, *Carcharhinus limbatus*, showed significant differences between FL_{OTB} to PCL based on sex. Although this could not be explained, visual examination of the graph clearly shows no biological difference between the sexes, thus all sexes were combined for the length-length regressions (Fig. 2–31; Table 2–31).

Building upon the much-used morphometric conversions for 13 shark species in the western North Atlantic Ocean (Kohler et al., 1996), the incorporation of new data from the NMFS Apex Predators Program and other research programs allowed us to present more comprehensive and statistically robust conversion factors. Relative to sample size, the number of measurements from rarely-encountered species (n <200 in Kohler et al., 1996) increased by 24.0% to 98.2% and for more commonly-encountered species (n >200 in Kohler et al., 1996) from 47.9% to 91.4%. Relative to the number of conversions per species, we were able to add types of conversions (e.g., PCL and/or TL_{STR}) to 10 of the original 13 species. Additionally, we were able to report FL_{SL} to FL_{OTB} for some lamnids (i.e., porbeagle, shortfin mako), providing the first published conversions of this type for these species. For the 14 newly-included species and 3 genera, we were able to calculate >1 type of conversion for 94%, and > 2 for 82%.

Francis (2006) examined the variability of morphometric measurements to determine the best measurement methods for elasmobranchs and suggested that SL measurements are preferable to OTB measurements. However, SL measurements are often difficult or impossible to implement in the field, particularly when measuring large, active sharks. Therefore, several programs use SL measurement (measured on a board) for smaller animals and switch to OTB measurement for larger animals (Table 1). Francis (2006) found the SL and OTB performed equally as well but postulated that increased girth exhibited by a gravid female or a large feeding event, could inflate the OTB measurement. With the exception of one program, the OTB measurements used in the current study were reported as taken along the dorsomedial surface, not the lateral, thus, eliminating this concern. Despite the possibility that some of the FL_{OTB} dataset may contain some FL_{SL} measurements, we have good linear regressions with good fits and high r^2 values (Table 2–31). The difference in OTB and SL is smaller in the smaller sharks which are the only range where SL was possibly mixed into the OTB dataset.

In agreement with Kohler et al. (1996), we found FL to be measured more consistently than TL or PCL, mostly due to the lack of ambiguity in the fork as opposed to the TL (i.e., stretched or natural TL), or PCL which can be variable depending on the end point of the measurement (anterior, middle, or posterior margin of the precaudal pit). Additionally, as mentioned, in the field FL is the easiest and most consistent method for live fish, thus for consistency, using it for all size ranges is suggested when possible. Further, due to the subjectivity concerning the "natural" position of the flexible upper lobe of the caudal fin for many shark species (e.g., carcharhinids), we agree with Francis (2006) that natural TL is the least preferable measure, but it should be taken in cases where robust conversions among this and other measures are not available for a given species. While Francis (2006) suggested at least two measurement methods be taken for each fish to facilitate conversions, we instead suggest that a minimum of three length measurements or two lengths and a weight measurement be taken, to prevent single errors in data transcription from rendering an entire sample useless.

The need for accurate and precise morphometric conversions cannot be overstated. Conversions are the building block of biological analysis of a species. Depending on the intended use of the data, the first step in many studies is to ensure all the measurements are in the same format. Using inaccurate lengths, for example, in an age analysis, will lead to inaccurate age estimates amplifying errors in downstream analyses. These compounded errors affect the accuracy of cohort tracking through stock assessments, which can become particularly problematic for the oldest, least abundant age classes. These updated and expanded length and weight conversions provide a more definitive resource to aid shark stock assessment and fisheries management in the Atlantic Ocean.

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Atlantic Sharpnose Shark, *Rhizoprionodon terraenovae*

Table 2A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for Atlantic sharpnose sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	25.0–99.0	29.0–116.5	3.35	1.15	0.979	18,005
Female	26.0–99.0	29.0–116.5				9,574
Male	25.0–97.4	29.5–113.0				8,365

Table 2B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for Atlantic sharpnose sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	20.0–105.5	24.9–129.4	2.09	1.18	0.996	36,736
Female	21.0–105.5	26.4–129.4				11,597
Male	20.0–101.5	24.9–123.3				24,859

Table 2C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for Atlantic sharpnose sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	21.0–99.0	19.0–92.1	-0.979	0.932	0.997	11,758
Female	21.0–99.0	19.0–92.1				4,104
Male	23.0–95.8	20.0–88.2				7,586

Table 2D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for Atlantic sharpnose sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	26.5–99.0	0.1–7.2	5.92E-06	3.06	0.350	25,699
Female	26.5–99.0	0.1–7.2	6.14E-06	3.05	0.365	12,737
Male	28.1–97.4	0.1–6.8	9.27E-06	2.95	0.316	12,857

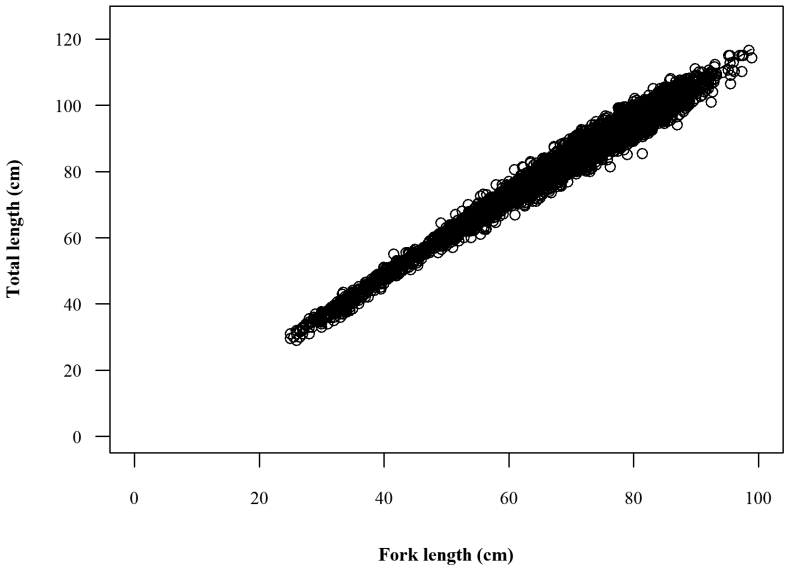


Figure 2A.—Relationship between over-the-body fork length and total length for Atlantic sharpnose sharks from the western North Atlantic Ocean (sexes combined).

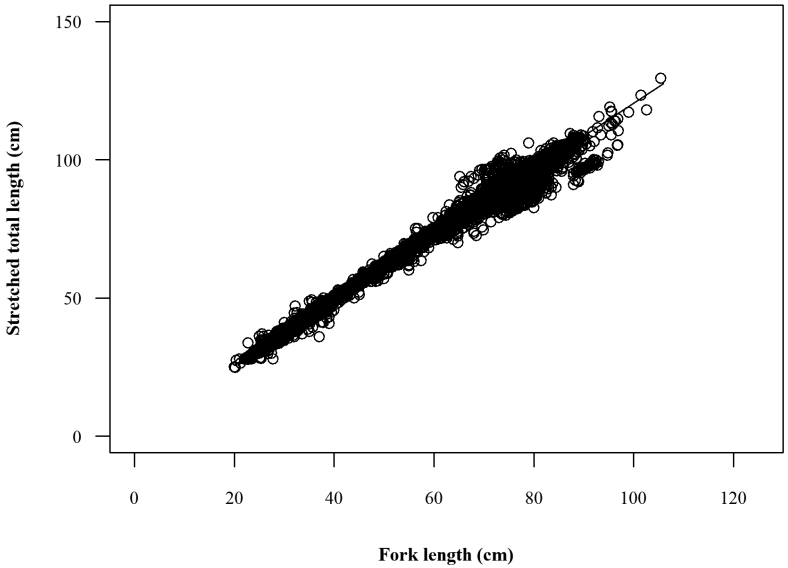


Figure 2B.—Relationship between over-the-body fork length and stretched total length for Atlantic sharpnose sharks from the western North Atlantic Ocean (sexes combined).

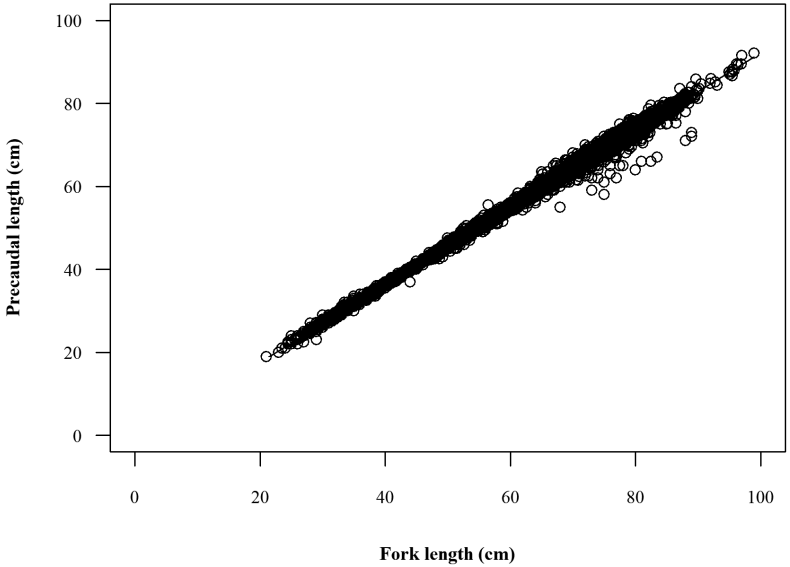


Figure 2C.—Relationship between over-the-body fork length and precaudal length for Atlantic sharpnose sharks from the western North Atlantic Ocean (sexes combined).

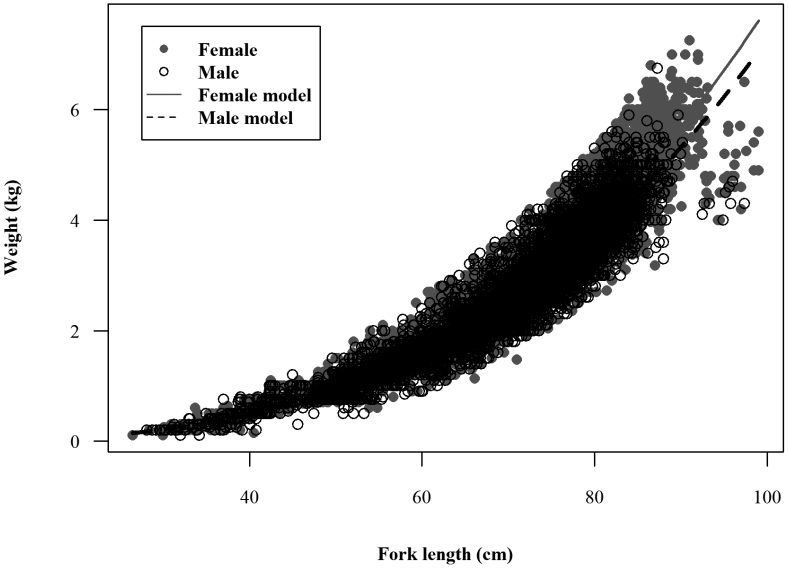


Figure 2D.—Relationship between over-the-body fork length and total weight for Atlantic sharpnose sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Basking Shark, *Cetorhinus maximus*

Table 3.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for basking sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	320.0–780.9	362.0–855.3	-3.48	1.13	0.987	12

Basking shark. Photo: Greg Skomal.

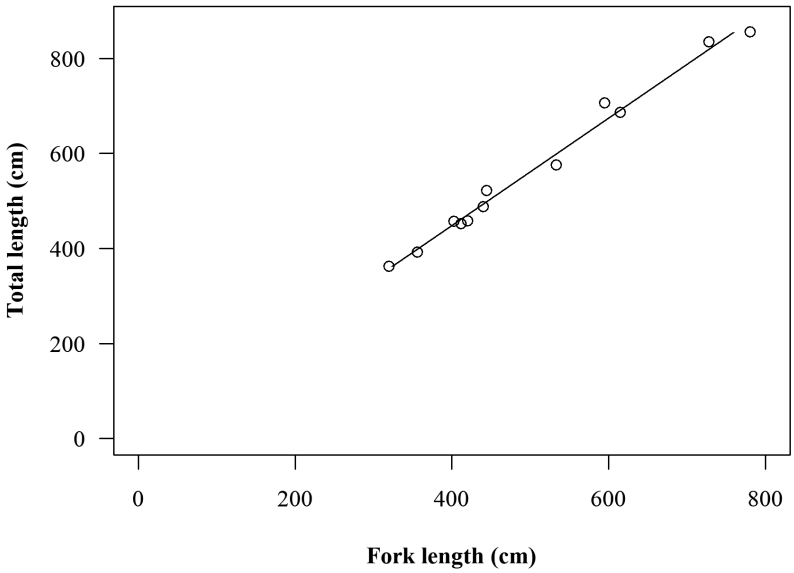


Figure 3.−Relationship between over-the-body fork length and total length for basking sharks from the western North Atlantic Ocean (sexes combined).

Bigeye Thresher, *Alopias superciliosus*

Table 4A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for bigeye thresher sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	100.0–228.0	155.0–371.0	5.55	1.60	0.887	58
Female	138.0–228.0	233.0–371.0				28
Male	100.0–221.0	155.0–363.0				30

Table 4B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for bigeye thresher sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	100.0–228.0	11.3–170.1	8.03E-06	3.10	9.74	57
Female	123.0–228.0	23.1–170.1	1.49E-05	3.00	9.43	23
Male	100.0–221.0	11.3–149.7	6.09E-06	3.15	8.60	34

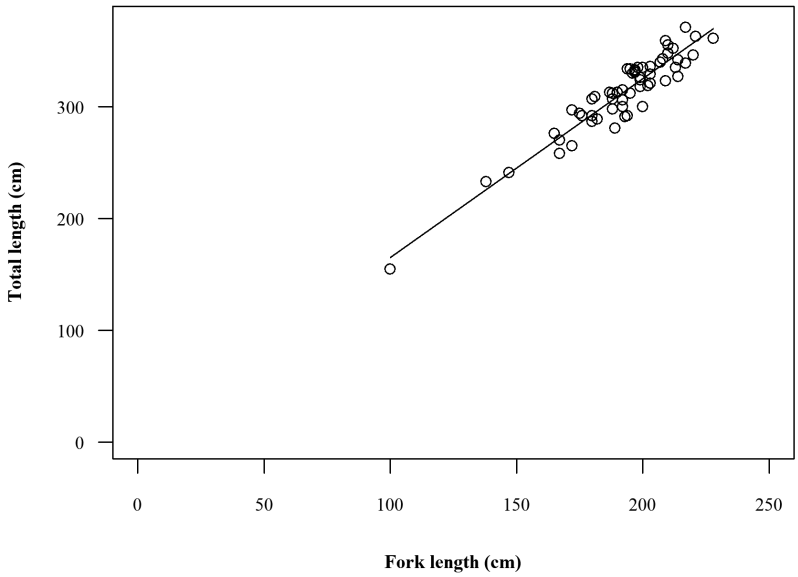


Figure 4A.−Relationship between over-the-body fork length and total length for bigeye thresher sharks from the western North Atlantic Ocean (sexes combined).

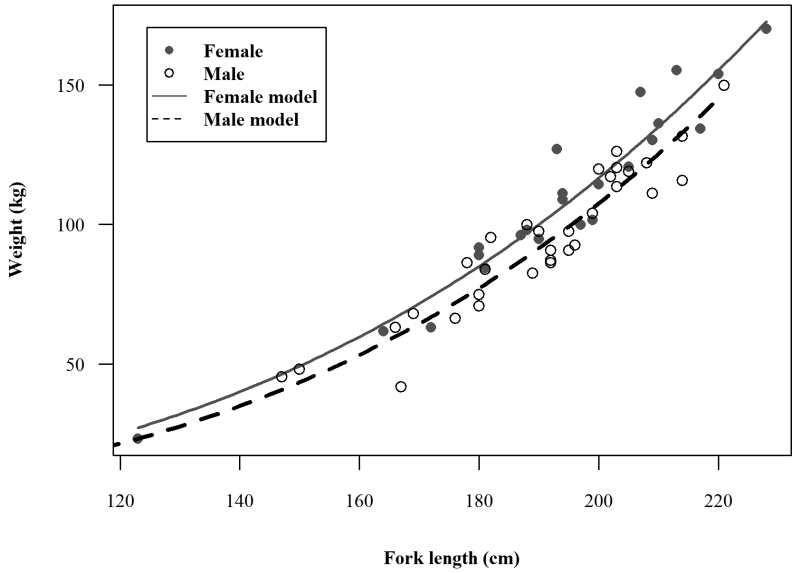


Figure 4B.−Relationship between over-the-body fork length and total weight for bigeye thresher sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Bignose Shark, *Carcharhinus altimus*

Table 5A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for bignose sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	67.8–192.0	81.5–228.0	0.877	1.17	0.994	21
Female	73.5–192.0	87.5–228.0				13
Male	67.8–140.0	81.5–168.0				8

Table 5B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for bignose sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	67.8–210.0	3.7–142.9	1.43E-06	3.40	8.46	48
Female	73.5–210.0	3.9–142.9	7.58E-07	3.53	9.60	30
Male	67.8–205.0	3.7–98.9	4.62E-06	3.16	5.22	18

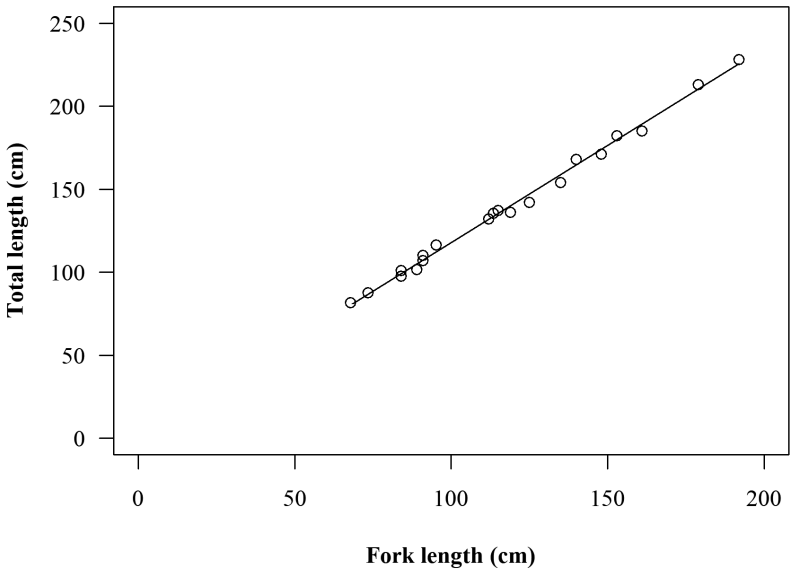


Figure 5A.−Relationship between over-the-body fork length and total length for bignose sharks from the western North Atlantic Ocean (sexes combined).

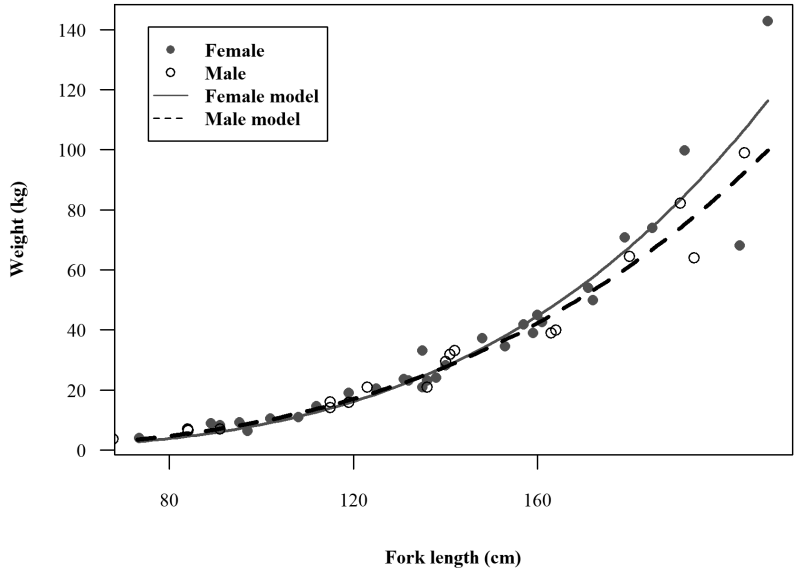


Figure 5B.−Relationship between over-the-body fork length and total weight for bignose sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Blacknose Shark, *Carcharhinus acronotus*

Table 6A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for blacknose sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	40.0–110.0	47.5–130.0	7.73	1.10	0.940	2,386
Female	40.0–110.0	47.5–130.0				1,029
Male	43.0–107.0	51.5–126.8				1,337

Table 6B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for blacknose sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	33.3–128.0	41.7–156.0	5.73	1.17	0.970	4,942
Female	33.3–128.0	41.7–156.0				2,528
Male	37.3–121.1	46.5–152.3				2,388

Table 6C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for blacknose sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	44.5–128.0	39.8–104.0	0.128	0.909	0.982	1,052
Female	44.5–128.0	39.8–104.0				467
Male	45.7–113.0	41.3–99.0				579

Table 6D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for blacknose sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	33.3–118.0	0.35–24.0	2.52E-06	3.32	1.25	3,997
Female	33.3–118.0	0.35–24.0	2.10E-06	3.37	1.42	1,872
Male	37.3–113.0	0.42–20.0	3.39E-06	3.25	1.02	2,106

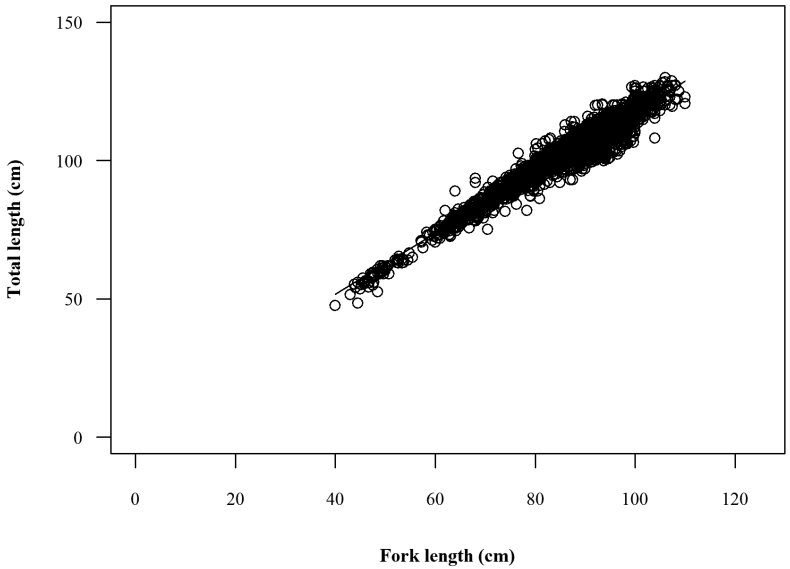


Figure 6A.—Relationship between over-the-body fork length and total length for blacknose sharks from the western North Atlantic Ocean (sexes combined).

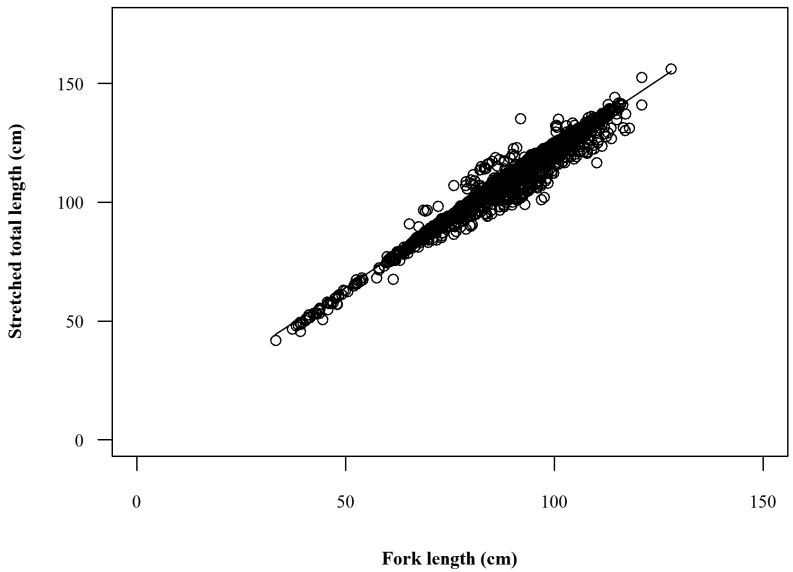


Figure 6B.—Relationship between over-the-body fork length and stretched total length for blacknose sharks from the western North Atlantic Ocean (sexes combined).

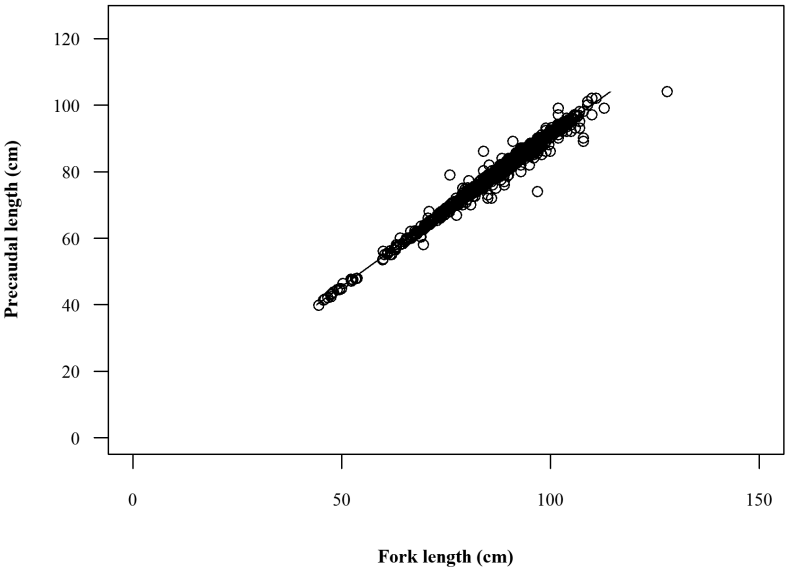


Figure 6C.—Relationship between over-the-body fork length and precaudal length for blacknose sharks from the western North Atlantic Ocean (sexes combined).

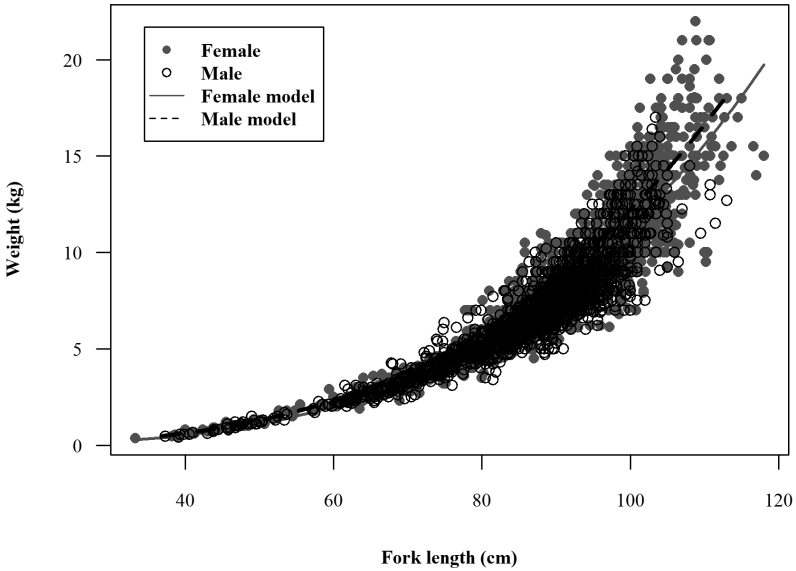


Figure 6D.—Relationship between over-the-body fork length and total weight for blacknose sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Blacktip Shark, *Carcharhinus limbatus*

Table 7A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for blacktip sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	42.0–158.0	51.0–188.0	2.83	1.17	0.976	1,541
Female	42.0–158.0	51.0–188.0				777
Male	45.0–150.0	53.0–182.0				737

Table 7B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for blacktip sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	36.5–166.0	44.3–197.0	1.50	1.23	0.996	5,880
Female	36.5–166.0	44.3–197.0				3,296
Male	37.0–149.5	48.0–189.0				2,504

Table 7C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for blacktip sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	36.5–166.0	30.0–146.0	-0.186	0.904	0.998	2,276
Female	36.5–166.0	30.0–146.0				1,245
Male	38.0–143.0	34.2–128.0				996

Table 7D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for blacktip sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	38.0–175.0	0.2–66.0	1.17E-05	3.02	2.42	2,639
Female	41.0–158.0	0.2–65.0	7.12E-06	3.13	2.57	1,328
Male	38.0–151.7	0.2–44.0	2.77E-05	2.82	1.90	1,275

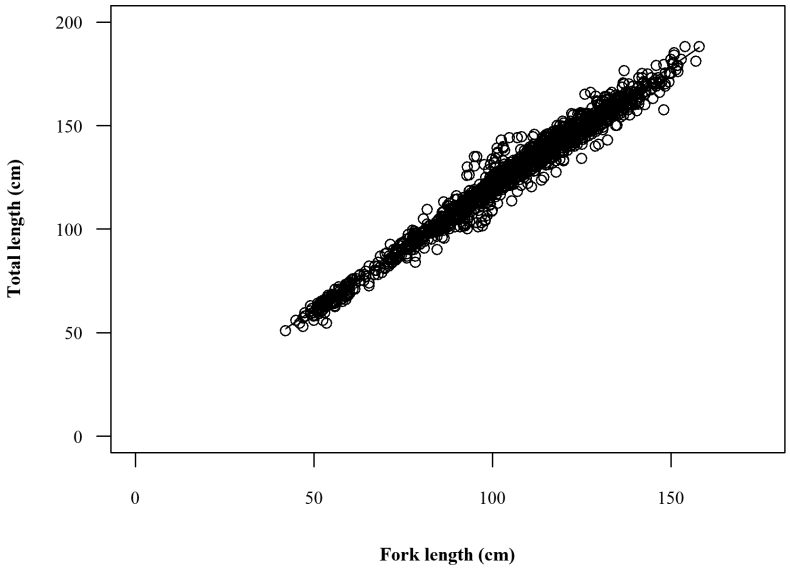


Figure 7A.—Relationship between over-the-body fork length and total length for blacktip sharks from the western North Atlantic Ocean (sexes combined).

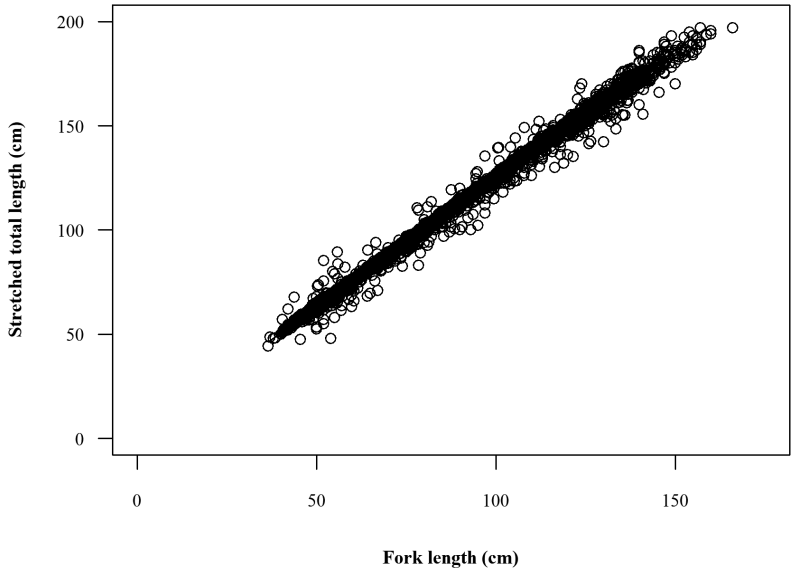


Figure 7B.—Relationship between over-the-body fork length and stretched total length for blacktip sharks from the western North Atlantic Ocean (sexes combined).

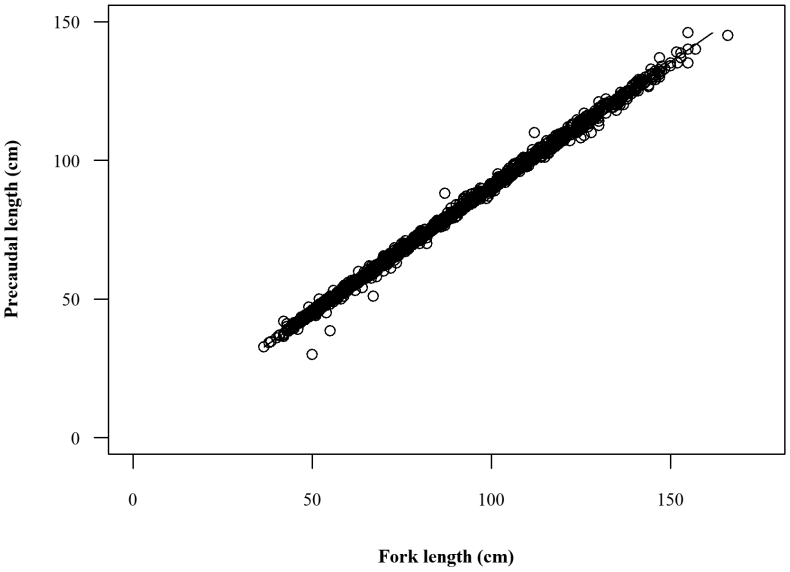


Figure 7C.—Relationship between over-the-body fork length and precaudal length for blacktip sharks from the western North Atlantic Ocean (sexes combined).

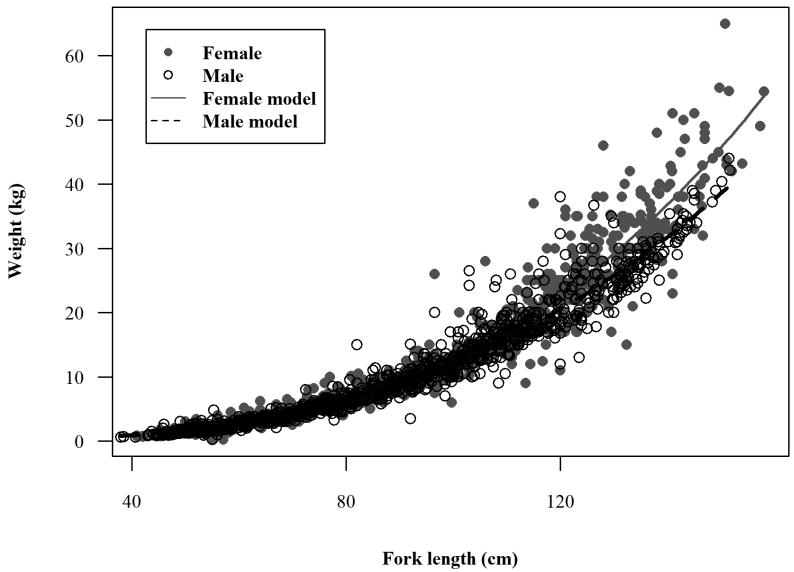


Figure 7D.—Relationship between over-the-body fork length and total weight for blacktip sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Blue Shark, *Prionace glauca*

Table 8A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for blue sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	52.0–299.2	64.0–373.0	0.459	1.19	0.989	946
Female	52.0–266.0	64.0–316.0				178
Male	54.0–299.2	65.0–373.0				762

Table 8B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for blue sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	52.0–300.0	0.45–213.4	3.76E-06	3.10	7.32	7,879
Female	52.0–273.0	0.45–148.3	3.64E-06	3.11	4.16	1,566
Male	54.0–300.0	0.91–213.4	2.87E-06	3.15	7.88	6,248

Table 8C.–Relationship between over-the-body fork length (FL_{OTB}) and straight-line fork length (FL_{SL}) for blue sharks from the western North Atlantic Ocean in the form of $FL_{SL} = a + b* FL_{OTB}$.

Sex	FL_{OTB} range	FL_{SL} range	a	b	r^2	*n*
Combined	76.5–294.6	73.0–291.2	-0.9004	0.9803	0.9928	790
Female	76.5–207.0	73.0–200.0				486
Male	140.0–294.6	139.0–291.2				304

NOTE: The equation in this table has been corrected. The original version transposed the length variables in the conversion equation for straight line fork length (FL_{SL}) to curved fork length (FL_{OTB}).

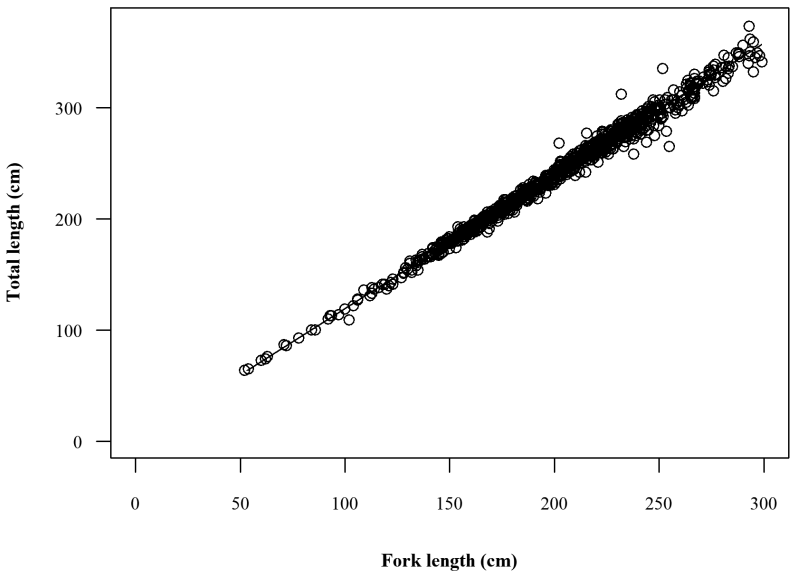


Figure 8A.–Relationship between over-the-body fork length and total length for blue sharks from the western North Atlantic Ocean (sexes combined).

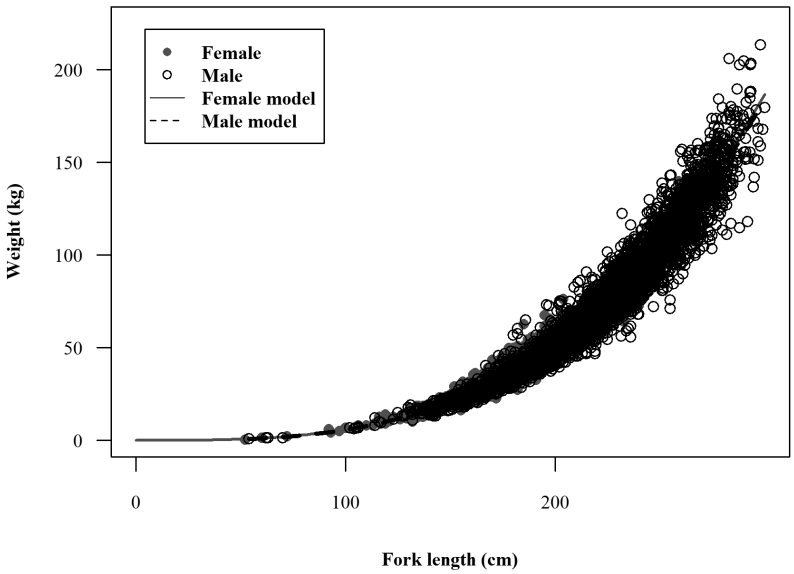


Figure 8B.−Relationship between over-the-body fork length and total weight for blue sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

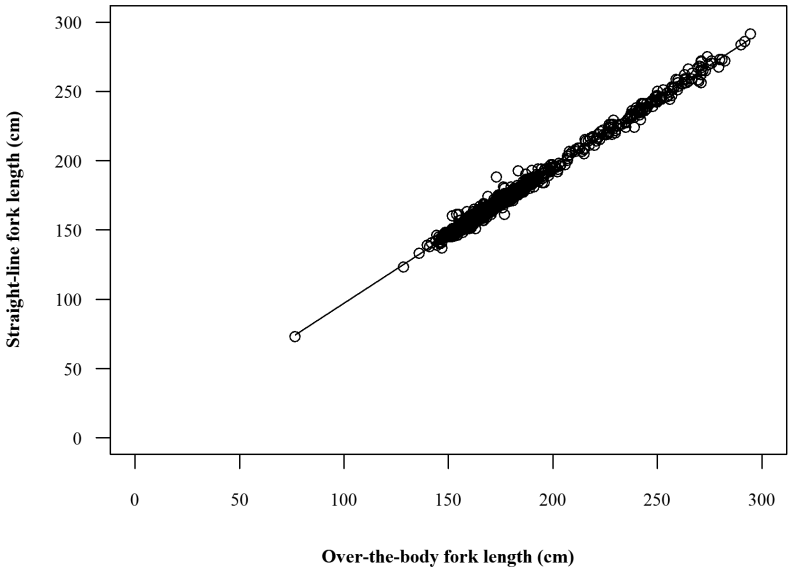


Figure 8C.−Relationship between over-the-body fork length and straight-line fork length for blue sharks from the western North Atlantic Ocean (sexes combined).

Bonnethead, *Sphyrna tiburo*

Table 9A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for bonnetheads from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	36.5–100.0	44.0–124.0	4.73	1.14	0.980	172
Female	36.5–100.0	44.0–124.0				126
Male	37.0–84.0	45.0–101.0				45

Table 9B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for bonnetheads from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	22.0–107.4	27.9–132.0	3.70	1.20	0.992	7,627
Female	23.0–107.4	29.3–132.0				5,635
Male	22.0–86.1	27.9–107.0				1,922

Table 9C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for bonnetheads from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	27.0–105.5	24.0–96.5	-0.583	0.926	0.997	765
Female	31.5–105.5	28.5–96.5				387
Male	27.0–86.0	24.0–80.0				372

Table 9D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for bonnetheads from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	22.0–105.5	0.05–12.0	1.31E-06	3.43	0.623	2,467
Female	23.0–105.5	0.09–12.0	2.70E-06	3.27	0.777	1,384
Male	22.0–85.5	0.05–7.0	6.53E-06	3.03	0.282	1,035

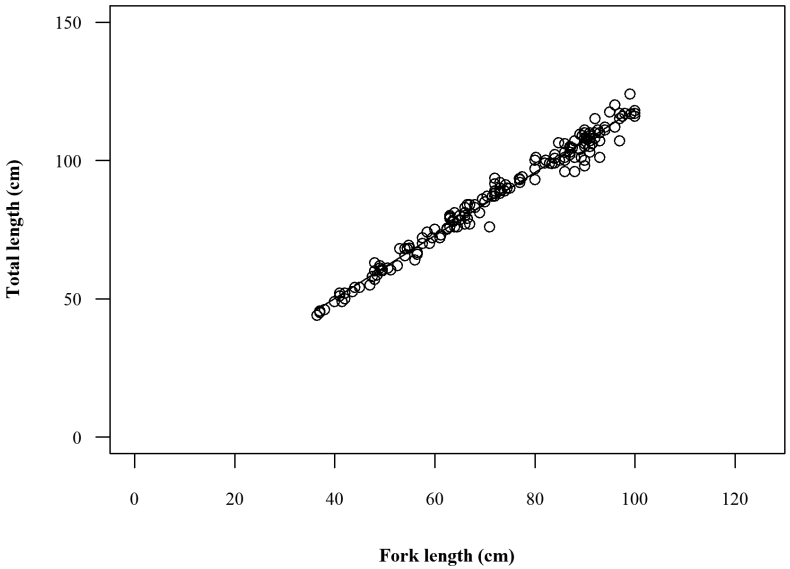


Figure 9A.−Relationship between over-the-body fork length and total length for bonnetheads from the western North Atlantic Ocean (sexes combined).

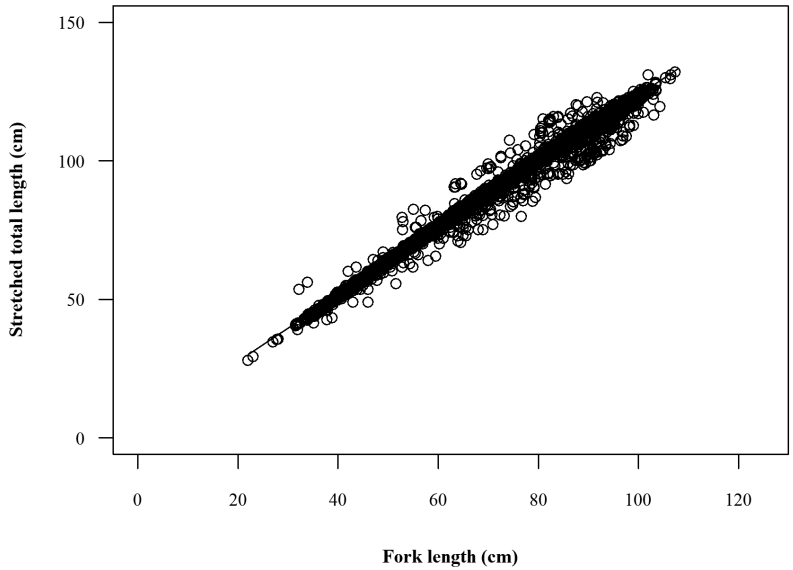


Figure 9B.−Relationship between over-the-body fork length and stretched total length for bonnetheads from the western North Atlantic Ocean (sexes combined).

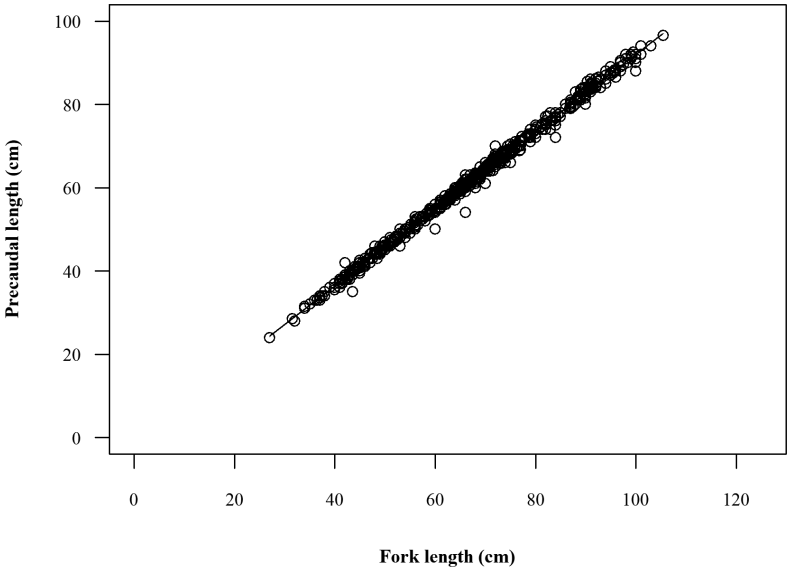


Figure 9C.−Relationship between over-the-body fork length and precaudal length for bonnetheads from the western North Atlantic Ocean (sexes combined).

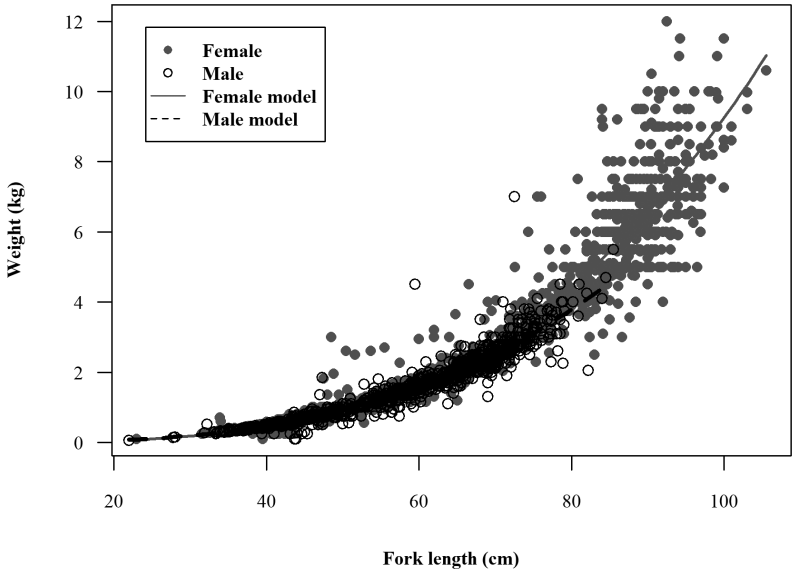


Figure 9D.−Relationship between over-the-body fork length and total weight for bonnetheads from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Bull Shark, *Carcharhinus leucas*

Table 10A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for bull sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	59.0–225.0	70.0–260.0	2.93	1.16	0.990	115
Female	61.0–213.0	73.0–260.0				41
Male	59.0–225.0	70.0–250.0				74

Table 10B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for bull sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	36.4–310.0	43.5–355.0	2.80	1.21	0.992	386
Female	54.0–310.0	66.5–355.0				161
Male	57.0–208.1	71.5–253.1				216

Table 10C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for bull sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	36.4–235.0	34.0–212.2	-0.325	0.899	0.999	289
Female	54.0–235.0	48.0–212.2				119
Male	57.0–208.1	50.0–189.0				164

Table 10D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for bull sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	36.4–225.0	1.0–170.5	1.31E-05	3.01	9.86	136
Female	54.0–213.0	2.0–170.5	2.16E-06	3.37	9.80	43
Male	57.0–225.0	2.7–151.0	3.05E-05	2.85	9.64	92

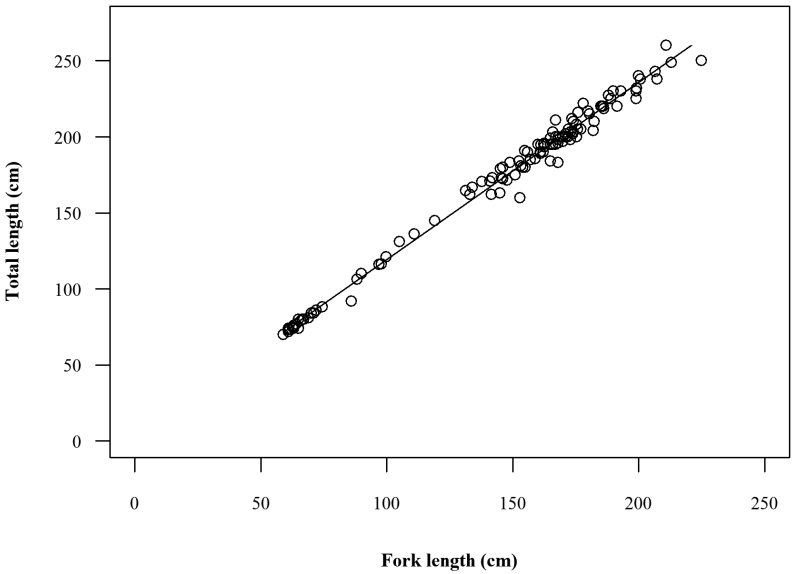


Figure 10A.—Relationship between over-the-body fork length and total length for bull sharks from the western North Atlantic Ocean (sexes combined).

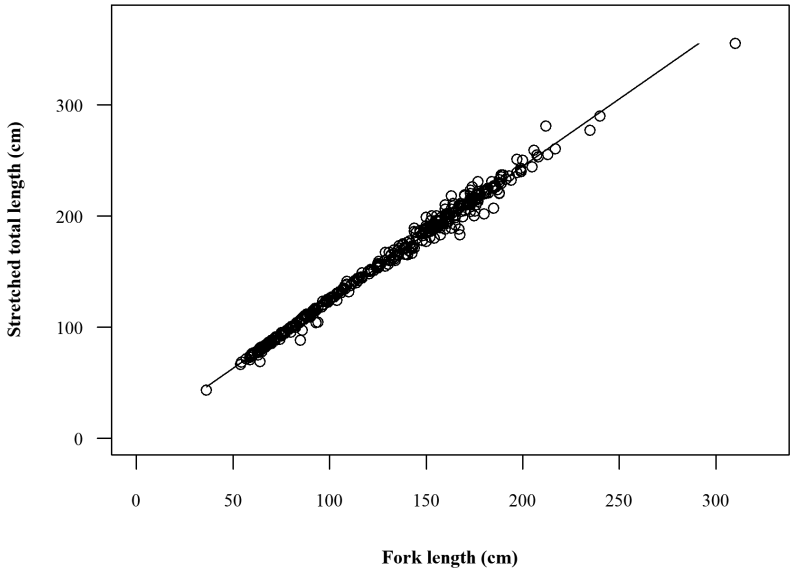


Figure 10B.—Relationship between over-the-body fork length and stretched total length for bull sharks from the western North Atlantic Ocean (sexes combined).

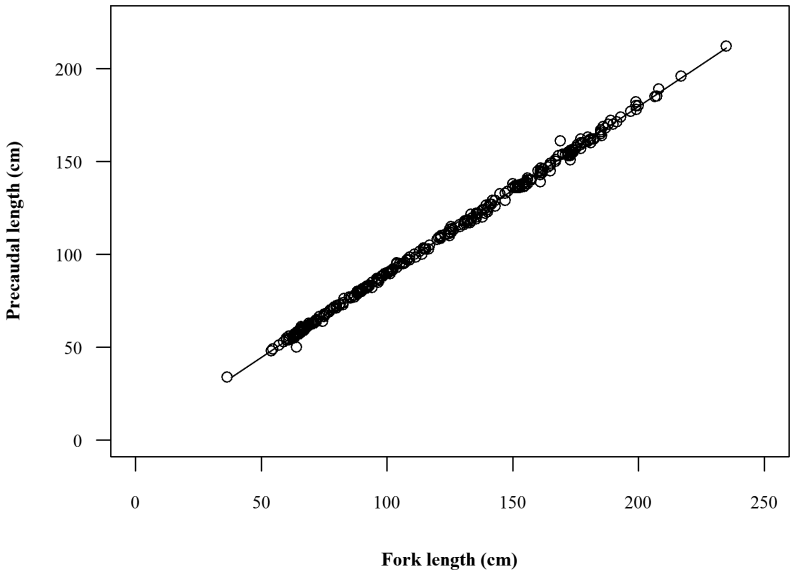


Figure 10C.—Relationship between over-the-body fork length and precaudal length for bull sharks from the western North Atlantic Ocean (sexes combined).

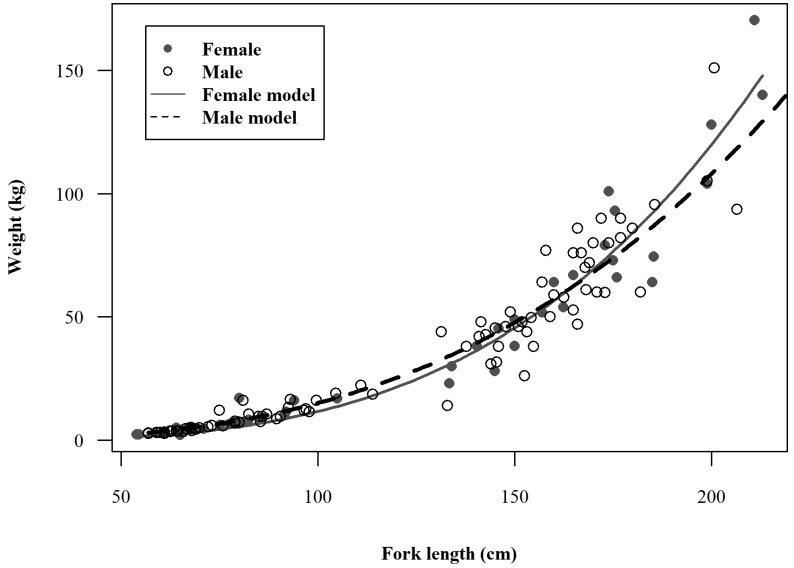


Figure 10D.—Relationship between over-the-body fork length and total weight for bull sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Centrophorus spp.

Table 11A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for *Centrophorus* spp., from the Gulf of Mexico in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	47.4–94.2	52.9–106.5	0.122	1.10	0.977	123
Female	47.4–94.2	52.9–106.5				114
Male	55.2–76.7	61.8–87.3				8

Table 11B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for *Centrophorus* spp., from the Gulf of Mexico in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	52.0–95.2	59.9–108.4	0.855	1.13	0.997	76
Female	52.0–95.2	59.9–108.4				55
Male	55.2–79.5	63.1–90.6				21

Table 11C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for *Centrophorus* spp., from the Gulf of Mexico in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	66.0–95.2	58.0–85.4	-2.05	0.931	0.961	45
Female	77.6–95.2	71.2–85.4				31
Male	66.0–79.5	58.0–70.9				14

Table 11D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for *Centrophorus* spp., from the Gulf of Mexico in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	47.4–95.2	0.6–8.5	1.03E-05	2.97	0.567	180
Female	47.4–95.2	0.6–8.5	4.04E-05	2.67	0.587	156
Male	55.2–79.5	1.4–4.2	3.36E-05	2.68	0.234	22

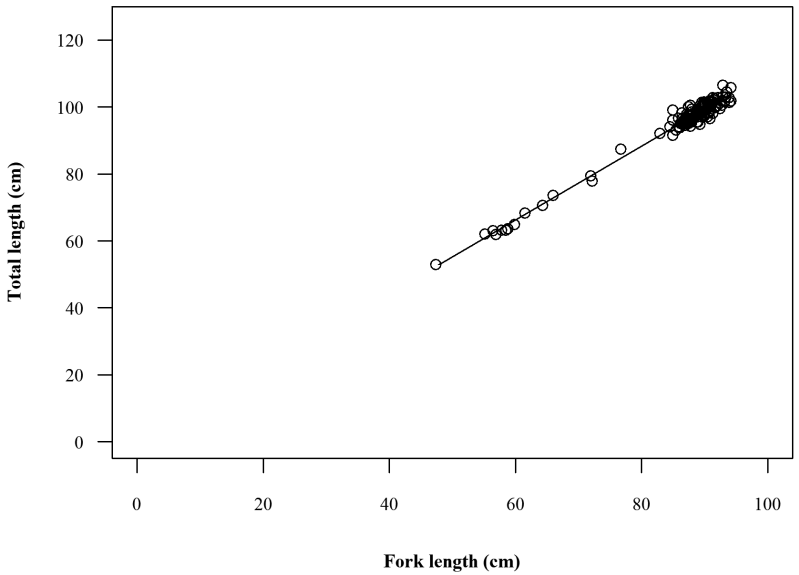


Figure 11A.−Relationship between over-the-body fork length and total length for *Centrophorus* spp., from the Gulf of Mexico (sexes combined).

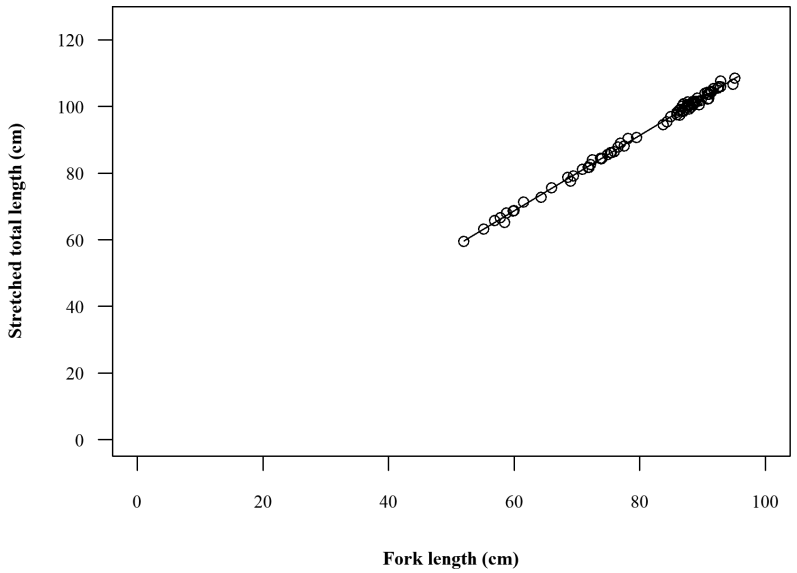


Figure 11B.−Relationship between over-the-body fork length and stretched total length for *Centrophorus* spp., from the Gulf of Mexico (sexes combined).

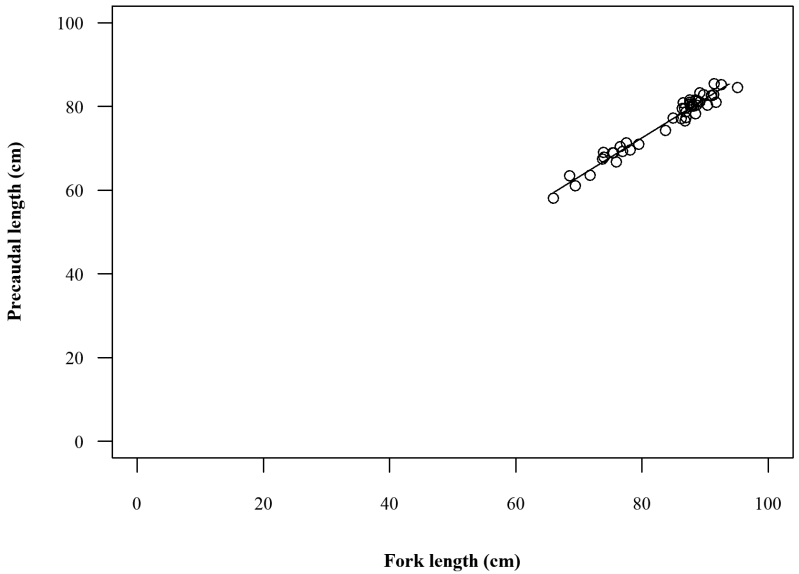


Figure 11C.−Relationship between over-the-body fork length and precaudal length for *Centrophorus* spp., from the Gulf of Mexico (sexes combined).

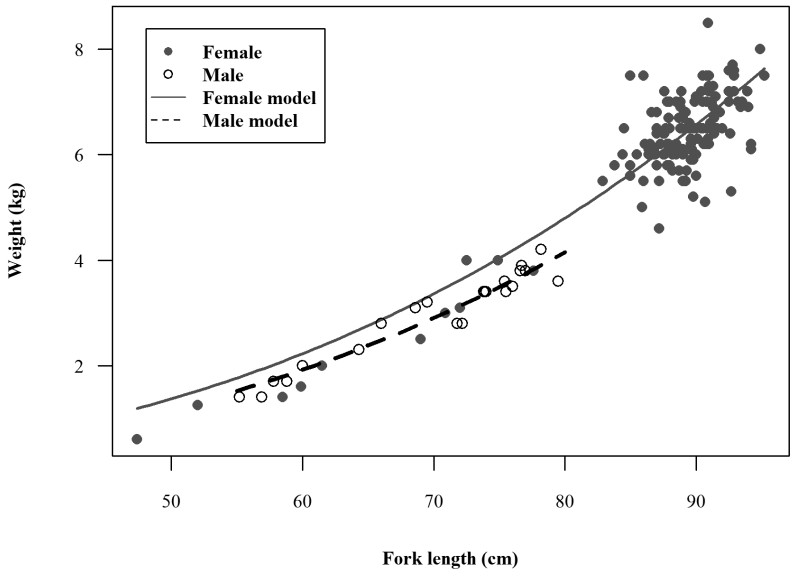


Figure 11D.−Relationship between over-the-body fork length and total weight for *Centrophorus* spp., from the Gulf of Mexico. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Common Thresher Shark, *Alopias vulpinus*

Table 12A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for common thresher sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	149.5–264.7	240.0–470.0	23.6	1.67	0.810	284
Female	149.5–264.7	240.0–470.0				133
Male	157.7–233.6	252.5–466.1				149

Table 12B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for common thresher sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	152.0–261.0	235.8–468.0	33.3	1.68	0.957	104
Female	154.2–261.0	285.0–468.0				41
Male	152.0–233.0	235.8–423.0				63

Table 12C.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for common thresher sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	143.0–268.0	49.4–287.1	4.49E-05	2.79	11.4	1,098
Female	149.5–268.0	49.4–287.1	2.94E-05	2.87	12.1	571
Male	143.0–248.0	50.6–192.8	7.35E-05	2.70	10.5	519

Table 12D.–Relationship between over-the-body fork length (FL_{OTB}) and straight-line fork length (FL_{SL}) for common thresher sharks from the western North Atlantic Ocean in the form of $FL_{SL} = a + b* FL_{OTB}$.

Sex	FL_{OTB} range	FL_{SL} range	a	b	r^2	*n*
Combined	168.0–257.2	162.7–255.0	-17.01	1.05	0.9669	20
Female	195.0–257.2	185.5–255.0				5
Male	168.0–224.5	162.7–217.5				15

NOTE: The equation in this table has been corrected. The original version transposed the length variables in the conversion equation for straight line fork length (FL_{SL}) to curved fork length (FL_{OTB}).

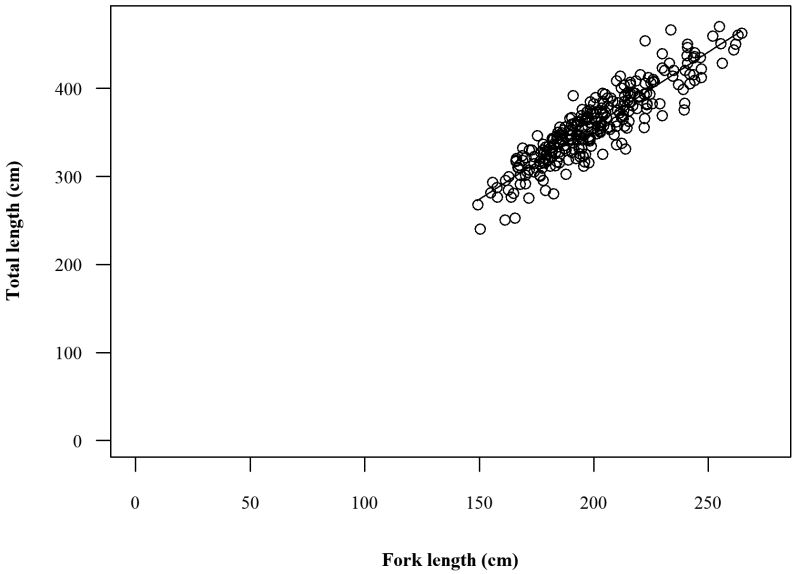


Figure 12A.—Relationship between over-the-body fork length and total length for common thresher sharks from the western North Atlantic Ocean (sexes combined).

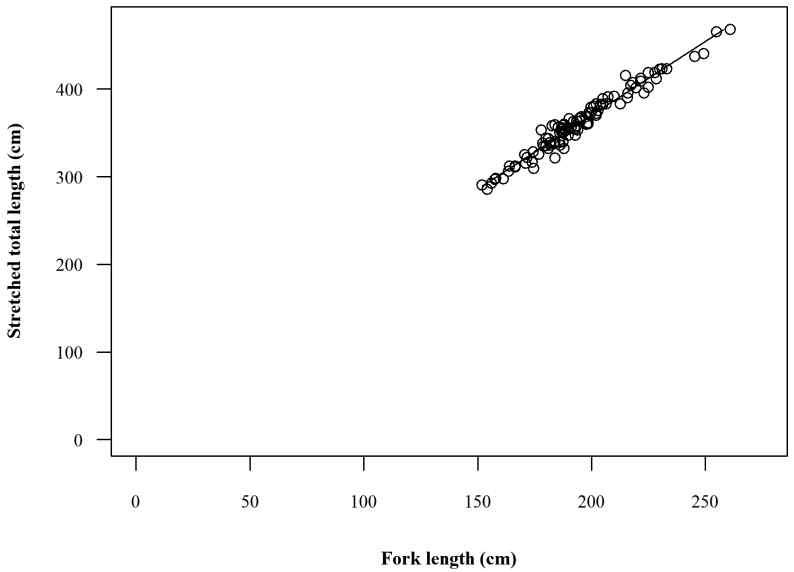


Figure 12B.—Relationship between over-the-body fork length and stretched total length for common thresher sharks from the western North Atlantic Ocean (sexes combined).

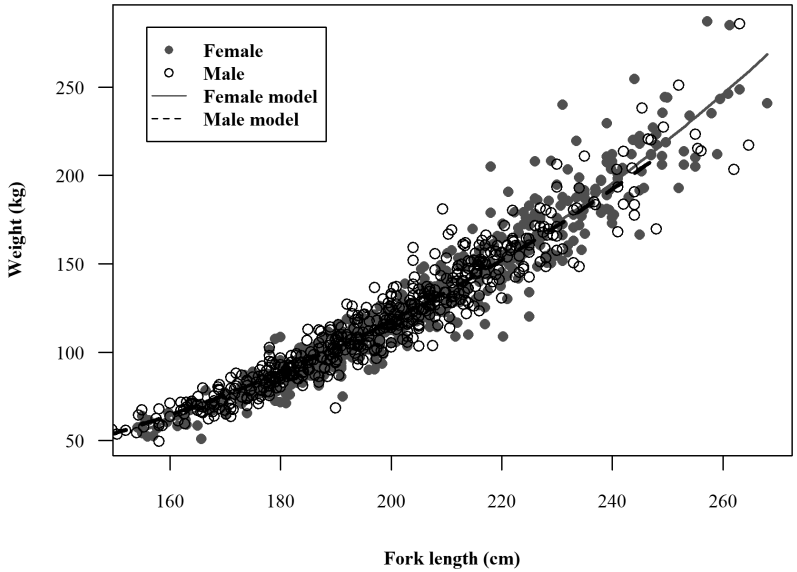


Figure 12C.—Relationship between over-the-body fork length and total weight for common thresher sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

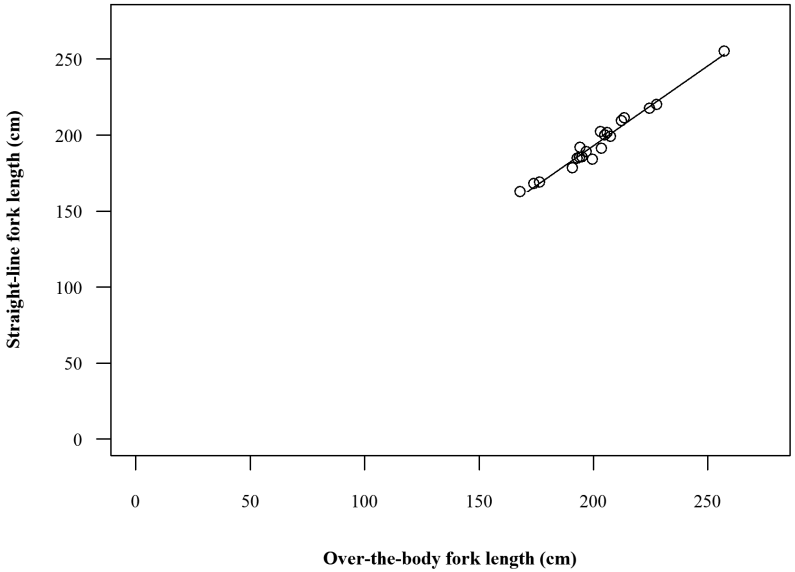


Figure 12D.—Relationship between over-the-body fork length and straight-line fork length for common thresher sharks from the western North Atlantic Ocean (sexes combined).

Dusky Shark, *Carcharhinus obscurus*

Table 13A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for dusky sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	64.3–277.0	78.0–333.0	2.10	1.19	0.993	264
Female	64.3–277.0	78.0–333.0				131
Male	74.0–276.0	89.2–330.0				133

Table 13B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for dusky sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	62.7–238.0	77.8–300.0	2.44	1.21	0.996	44
Female	62.7–221.0	77.8–276.4				28
Male	81.6–238.0	101.6–300.0				16

Table 13C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for dusky sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	127.6–238.0	115.5–217.0	-2.73	0.917	0.998	6
Female	127.6–215.0	115.1–195.0				3
Male	190.0–238.0	170.0–217.0				3

Table 13D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for dusky sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	64.3–287.0	2.04–269.9	2.69E-05	2.82	11.7	416
Female	64.3–287.0	2.04–269.9	2.44E-05	2.84	13.9	245
Male	77.5–276.0	2.16–216.4	2.12E-05	2.87	7.39	170

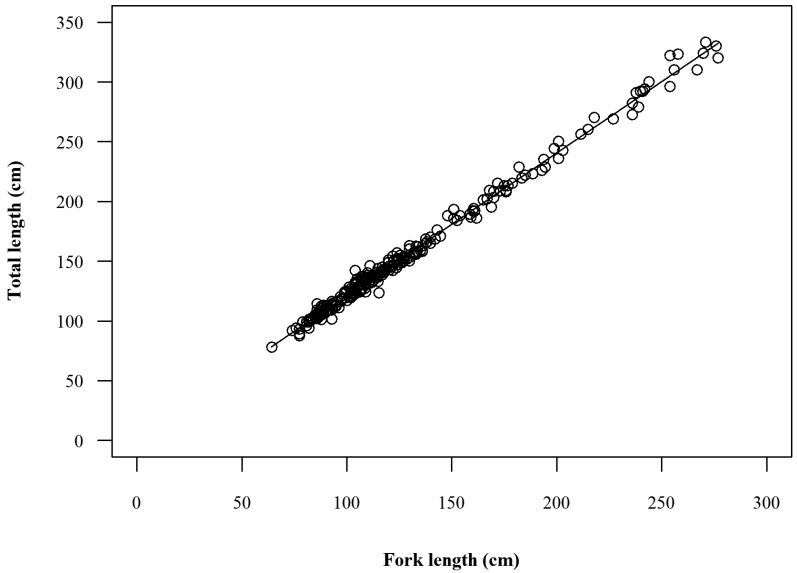


Figure 13A.—Relationship between over-the-body fork length and total length for dusky sharks from the western North Atlantic Ocean (sexes combined).

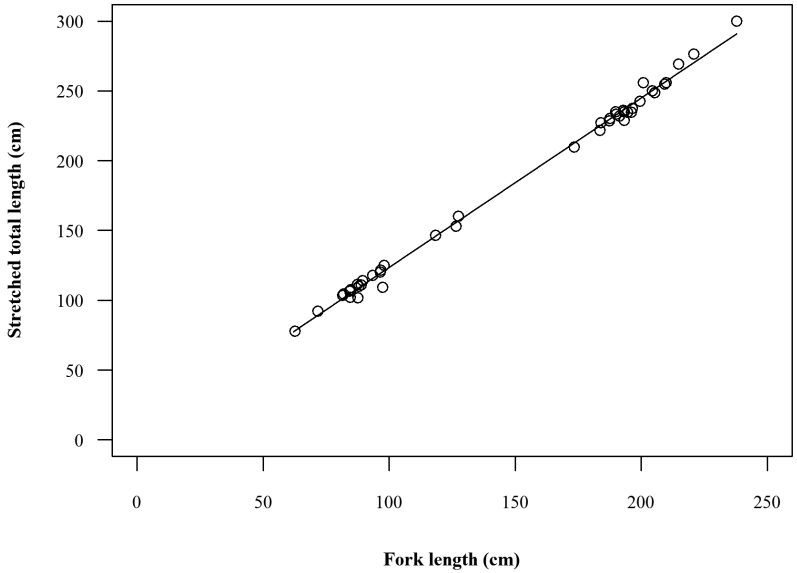


Figure 13B.—Relationship between over-the-body fork length and stretched total length for dusky sharks from the western North Atlantic Ocean (sexes combined).

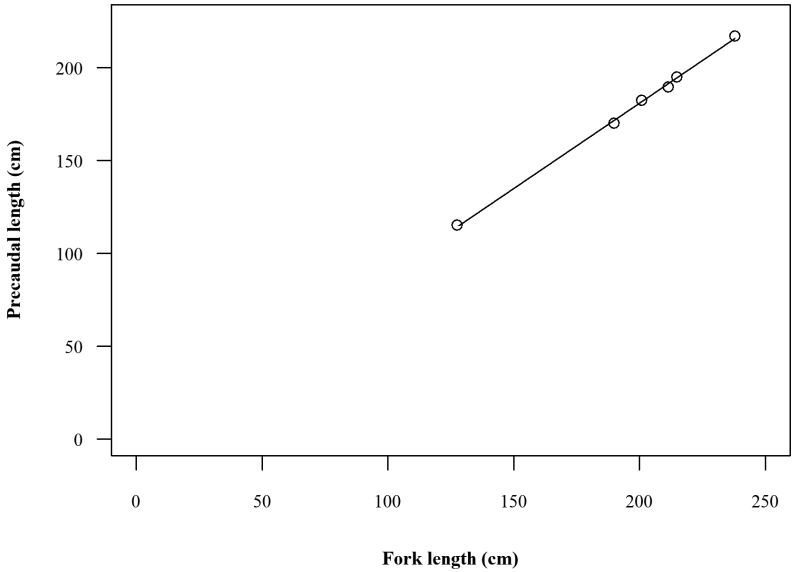


Figure 13C.—Relationship between over-the-body fork length and precaudal length for dusky sharks from the western North Atlantic Ocean (sexes combined).

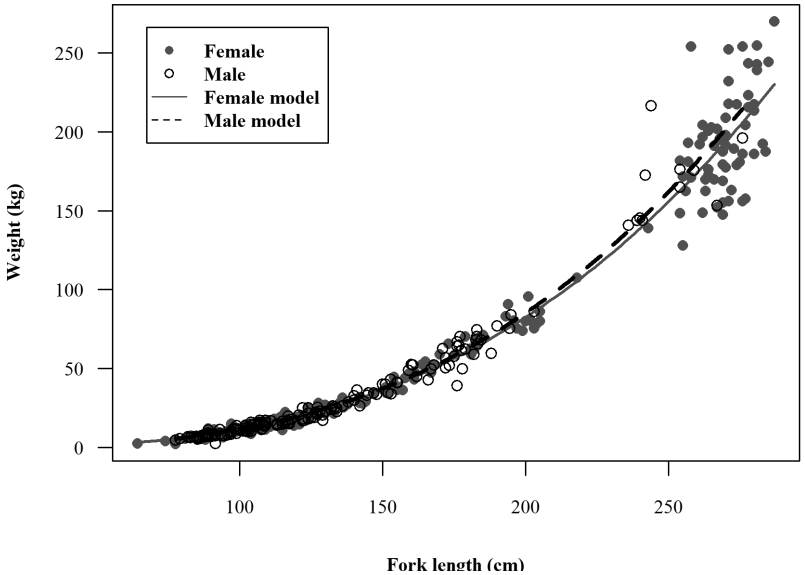


Figure 13D.—Relationship between over-the-body fork length and total weight for dusky sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Finetooth Shark, *Carcharhinus isodon*

Table 14A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for finetooth sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	41.5–129.0	49.5–154.0	-0.786	1.22	0.988	100
Female	42.0–129.0	49.5–154.0				44
Male	41.5–118.0	50.0–145.0				54

Table 14B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for finetooth sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	25.5–137.0	36.9–164.4	0.336	1.25	0.999	7,265
Female	25.5–137.0	36.9–164.4				3,754
Male	34.7–126.5	40.0–157.1				3,464

Table 14C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for finetooth sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	35.0–137.0	32.0–120.0	-0.117	0.905	0.998	934
Female	38.5–137.0	35.0–120.0				454
Male	35.0–118.5	32.0–106.0				473

Table 14D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for finetooth sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	35.0–126.5	0.07–21.7	1.11E-05	2.99	0.706	755
Female	41.0–126.5	0.50–21.7	1.13E-05	2.99	0.818	367
Male	35.0–118.5	0.07–17.0	1.33E-05	2.94	0.553	381

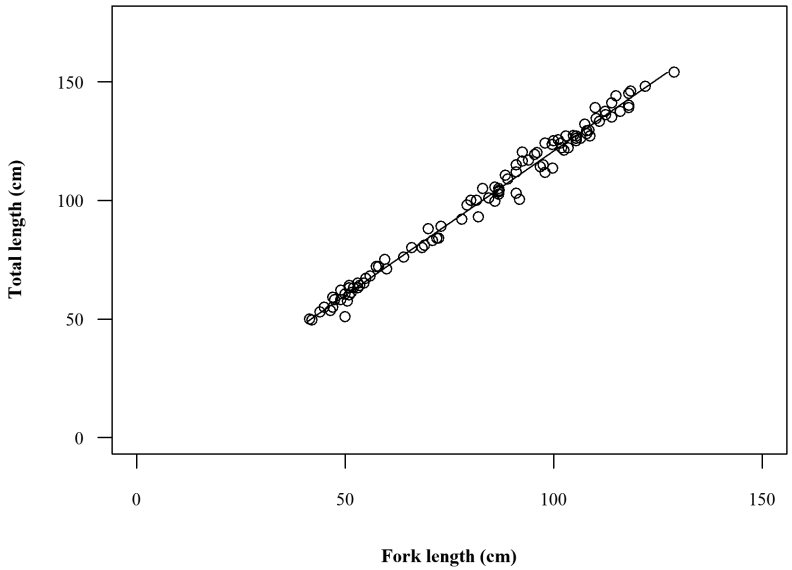


Figure 14A.—Relationship between over-the-body fork length and total length for finetooth sharks from the western North Atlantic Ocean (sexes combined).

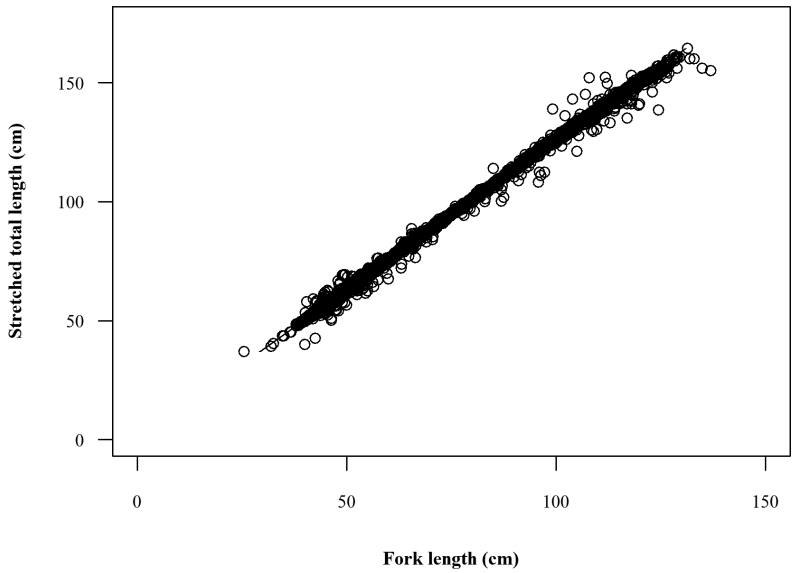


Figure 14B.—Relationship between over-the-body fork length and stretched total length for finetooth sharks from the western North Atlantic Ocean (sexes combined).

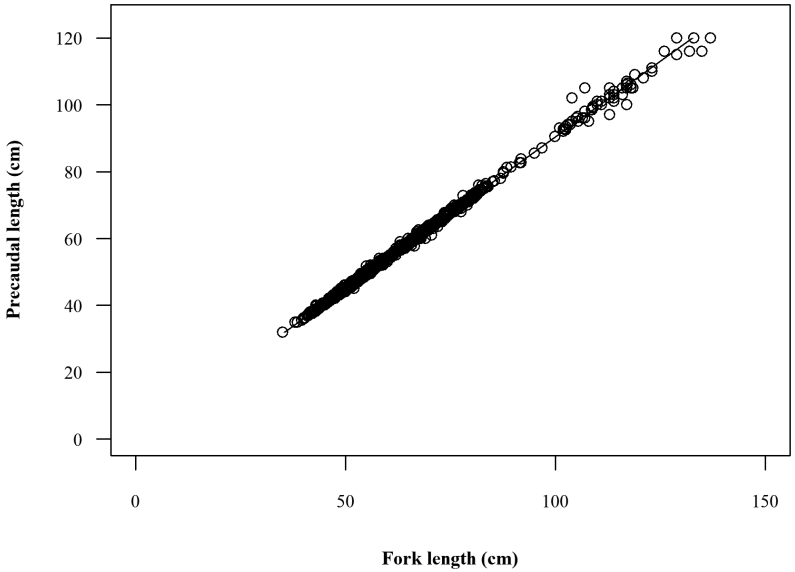


Figure 14C.—Relationship between over-the-body fork length and precaudal length for finetooth sharks from the western North Atlantic Ocean (sexes combined).

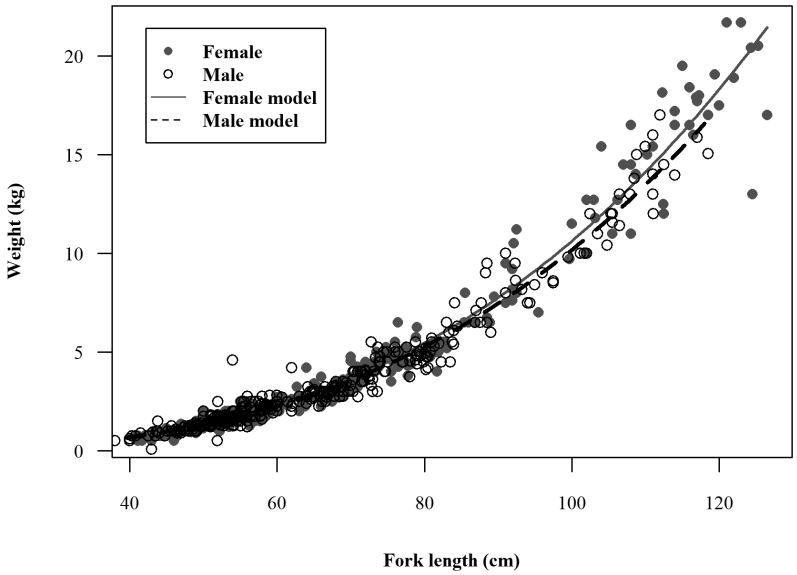


Figure 14D.—Relationship between over-the-body fork length and total weight for finetooth sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Great Hammerhead, *Sphyrna mokarran*

Table 15A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for great hammerheads from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	91.7–236.8	117.0–305.0	9.14	1.23	0.983	50
Female	91.7–236.8	117.0–291.5				23
Male	93.4–234.9	124.5–305.0				27

Table 15B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for great hammerheads from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	85.5–320.0	113.5–400.0	14.1	1.23	0.989	58
Female	85.5–320.0	115.5–400.0				35
Male	93.4–282.0	113.5–350.0				21

Table 15C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for great hammerheads from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	85.5–282.0	78.0–251.0	1.65	0.896	0.996	47
Female	85.5–253.0	78.0–229.0				27
Male	93.4–282.0	84.5–251.0				20

Table 15D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for great hammerheads from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	85.5–238.0	6.4–160.0	1.69E-05	2.91	11.3	50
Female	85.5–236.8	6.4–160.0	9.28E-06	3.03	10.6	24
Male	91.0–238.0	8.0–160.0	2.48E-05	2.84	12.0	26

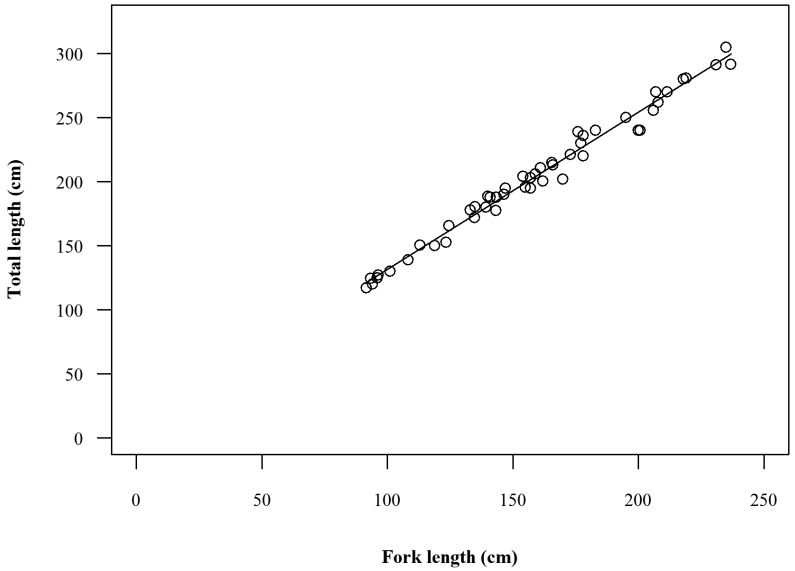


Figure 15A.—Relationship between over-the-body fork length and total length for great hammerheads from the western North Atlantic Ocean (sexes combined).

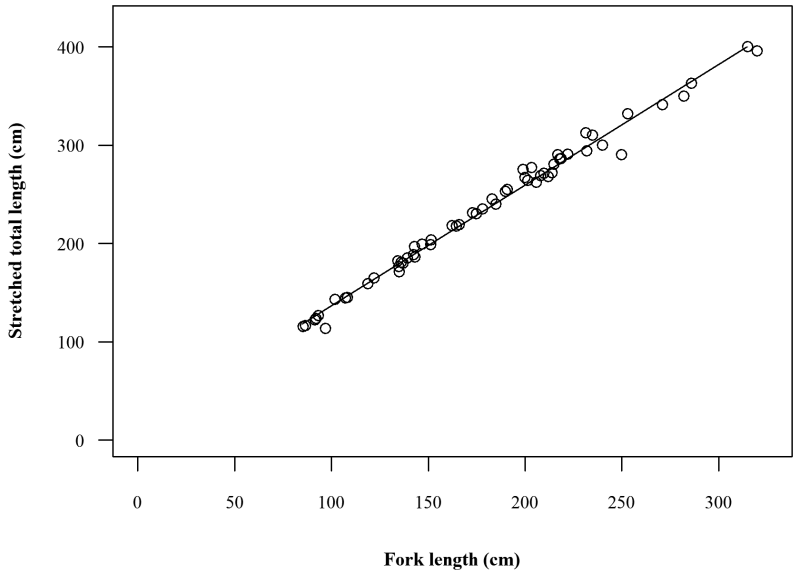


Figure 15B.—Relationship between over-the-body fork length and stretched total length for great hammerheads from the western North Atlantic Ocean (sexes combined).

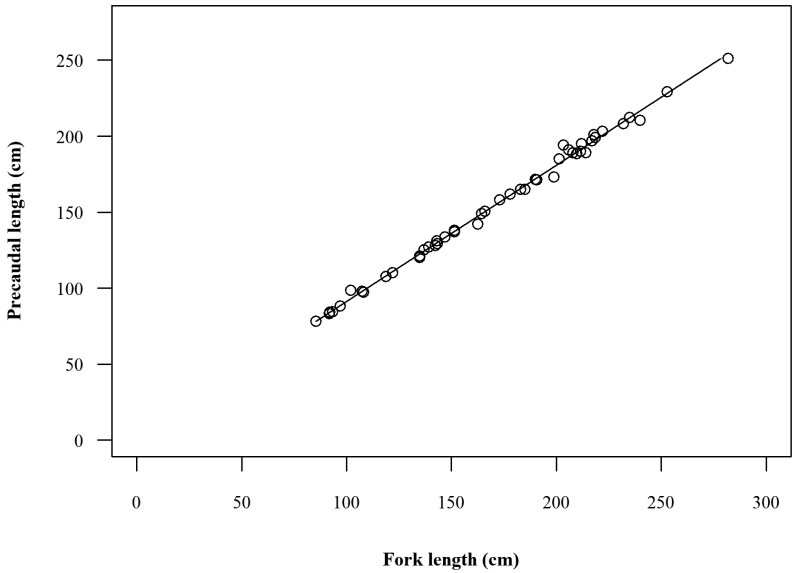


Figure 15C.—Relationship between over-the-body fork length and precaudal length for great hammerheads from the western North Atlantic Ocean (sexes combined).

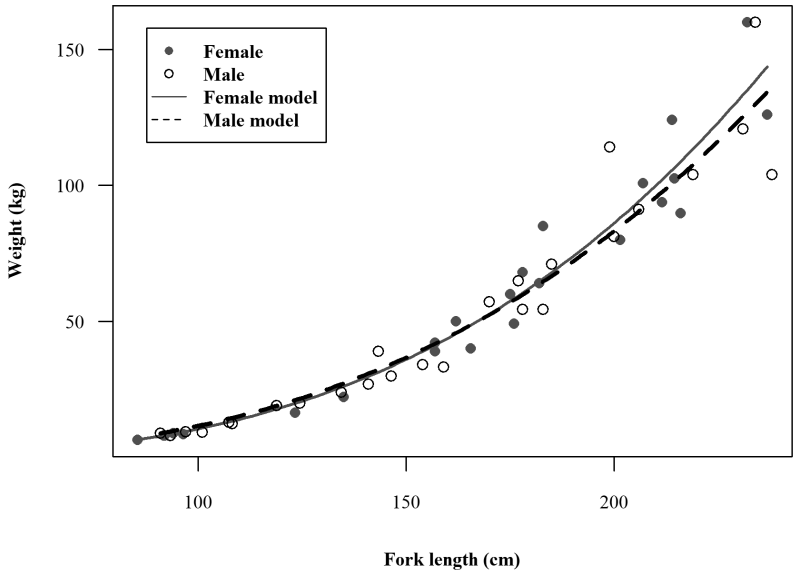


Figure 15D.—Relationship between over-the-body fork length and total weight for great hammerheads from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Lemon Shark, *Negaprion brevirostris*

Table 16A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for lemon sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	59.0–221.0	69.0–266.0	-1.88	1.20	0.994	22
Female	60.0–208.0	72.0–248.0				12
Male	59.0–221.0	69.0–266.0				9

Table 16B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for lemon sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	49.8–260.0	61.3–320.0	-2.65	1.23	0.991	113
Female	54.5–260.0	65.5–320.0				42
Male	49.8–240.0	61.3–290.0				64

Table 16C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for lemon sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	54.5–235.0	50.0–210.0	-2.09	0.923	0.996	35
Female	54.5–224.0	50.0–204.0				16
Male	59.0–235.0	54.0–210.0				18

Table 16D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for lemon sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	54.5–222.0	1.81–118.0	5.56E-05	2.67	7.28	18
Female	54.5–222.0	1.81–118.0	1.91E-05	2.88	4.47	13
Male	59.0–217.0	1.81–75.0	7.59E-04	2.14	1.94	5

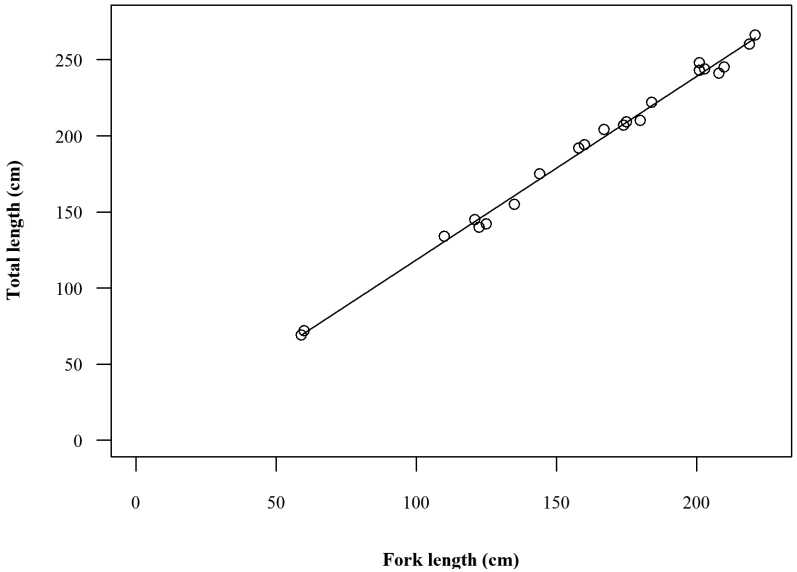


Figure 16A.−Relationship between over-the-body fork length and total length for lemon sharks from the western North Atlantic Ocean (sexes combined).

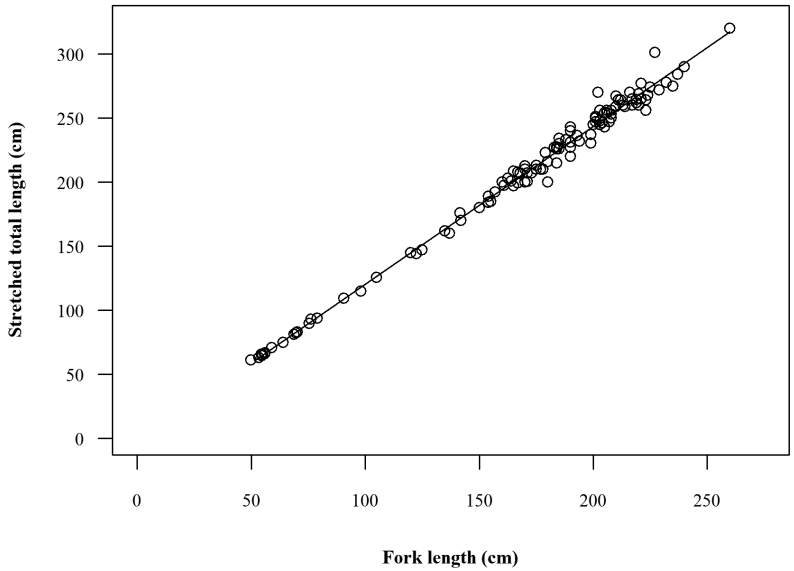


Figure 16B.−Relationship between over-the-body fork length and stretched total length for lemon sharks from the western North Atlantic Ocean (sexes combined).

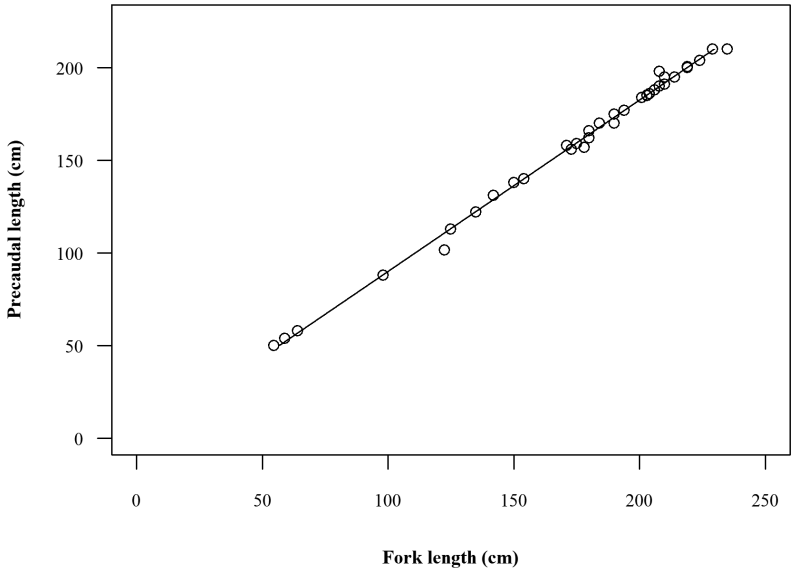


Figure 16C.−Relationship between over-the-body fork length and precaudal length for lemon sharks from the western North Atlantic Ocean (sexes combined).

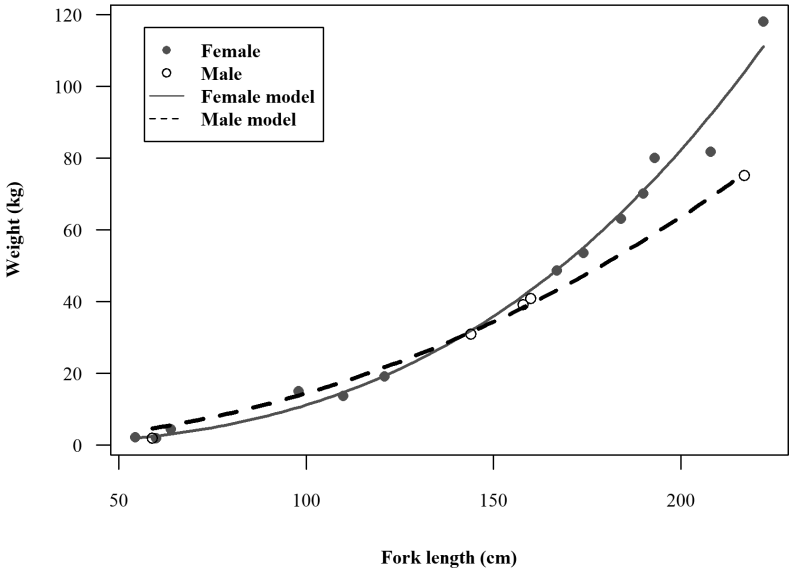


Figure 16D.−Relationship between over-the-body fork length and total weight for lemon sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Mustelus spp.

Table 17A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for *Mustelus* spp., from the Gulf of Mexico in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	48.0–125.5	53.9–141.0	3.04	1.10	0.983	1,190
Female	48.0–125.5	56.0–141.0				874
Male	48.7–111.5	53.9–132				312

Table 17B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for *Mustelus* spp., from the Gulf of Mexico in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	45.0–121.2	52.5–138.5	2.96	1.12	0.989	534
Female	48.2–121.2	56.7–138.5				383
Male	45.0–103.5	52.5–120.5				141

Table 17C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for *Mustelus* spp., from the Gulf of Mexico in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	48.2–121.2	43.9–112.9	-0.546	0.934	0.997	445
Female	48.2–121.2	43.9–112.9				317
Male	48.7–102.5	45.2–96.0				128

Table 17D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for *Mustelus* spp., from the Gulf of Mexico in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	48.0–125.5	0.45–12.5	1.64E-06	3.30	0.753	1,414
Female	48.0–125.5	0.45–12.5	3.53E-06	3.13	0.814	1,029
Male	48.7–111.5	0.5–10.8	3.37E-06	3.12	0.466	369

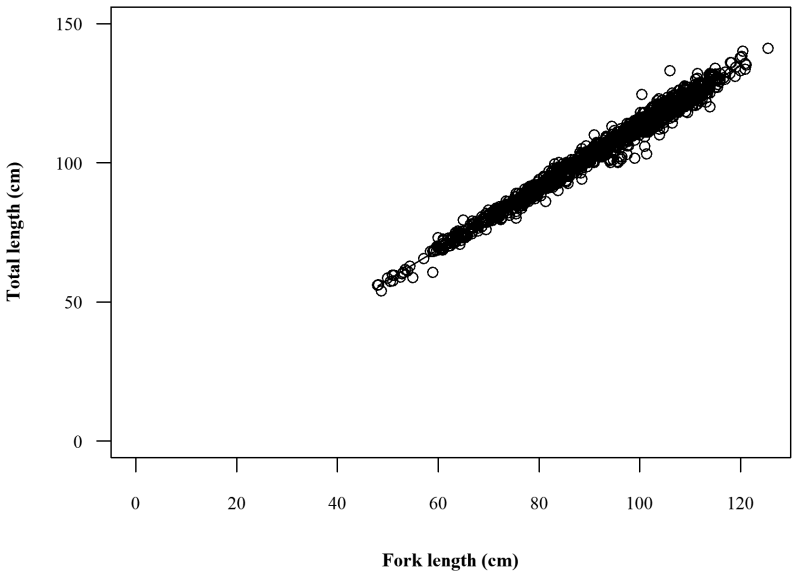


Figure 17A.−Relationship between over-the-body fork length and total length for *Mustelus* spp., from the Gulf of Mexico (sexes combined).

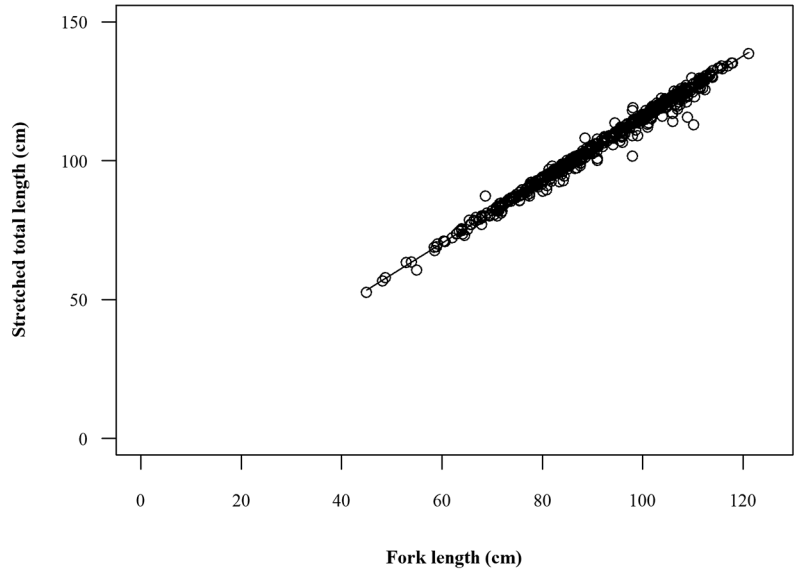


Figure 17B.−Relationship between over-the-body fork length and stretched total length for *Mustelus* spp., from the Gulf of Mexico (sexes combined).

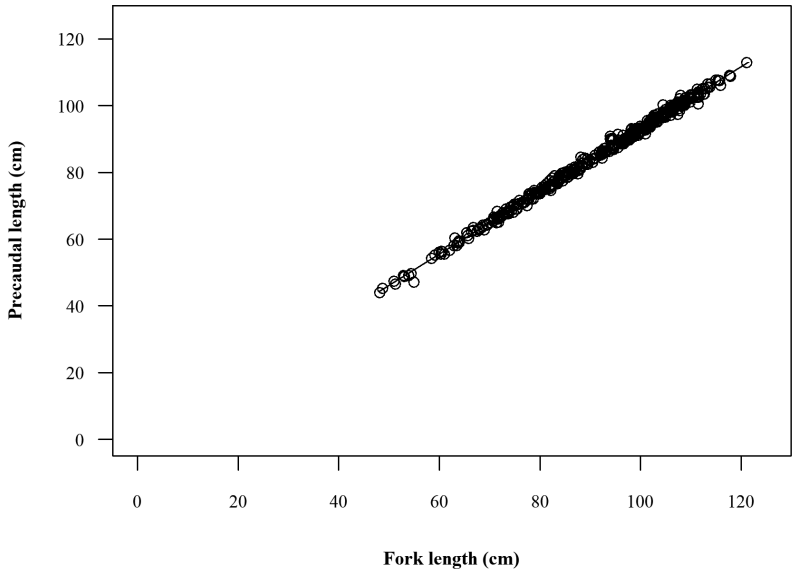


Figure 17C.−Relationship between over-the-body fork length and precaudal length for *Mustelus* spp., from the Gulf of Mexico (sexes combined).

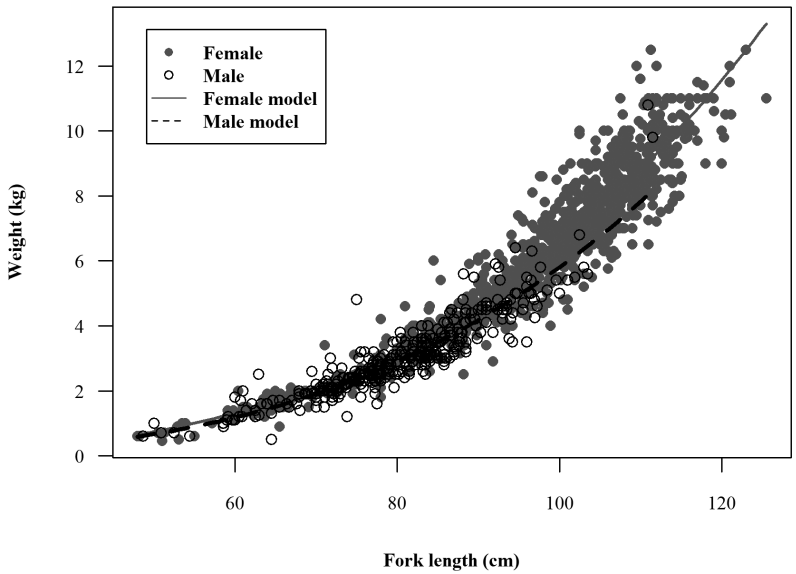


Figure 17D.−Relationship between over-the-body fork length and total weight for *Mustelus* spp., from the Gulf of Mexico. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Night Shark, *Carcharhinus signatus*

Table 18A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for night sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	46.0–213.0	53.4–247.0	1.55	1.17	0.995	67
Female	52.4–213.0	63.6–247.0				33
Male	46.0–195.0	53.4–235.0				34

Table 18B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for night sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	51.7–80.0	63.5–99.5	0.738	1.23	0.986	12
Female						7
Male						5

Table 18C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for night sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	51.7–80.0	46.8–73.0	-1.73	0.934	0.998	9
Female						6
Male						3

Table 18D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for night sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	46.0–213.0	0.8–103.9	4.36E-06	3.17	2.63	158
Female	52.4–213.0	1.2–103.9	4.44E-06	3.17	2.67	72
Male	46.0–195.0	0.8–64.0	3.00E-05	2.76	1.63	85

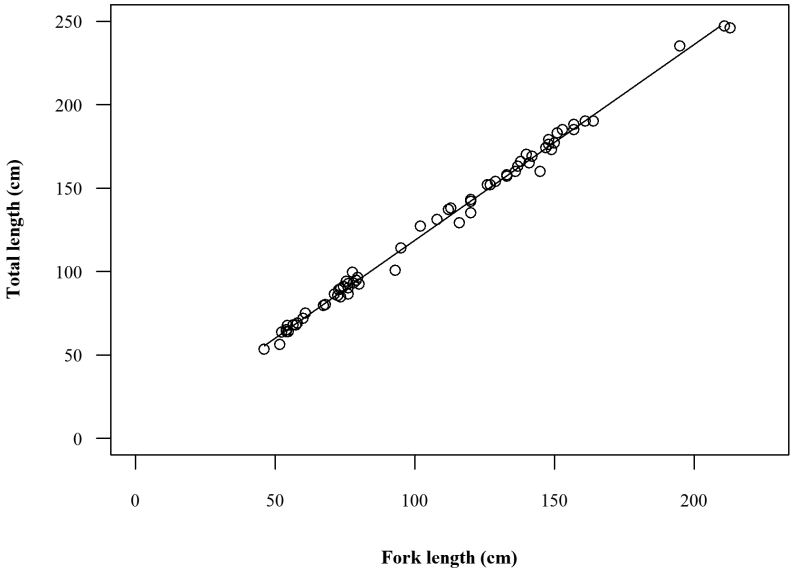


Figure 18A.−Relationship between over-the-body fork length and total length for night sharks from the Gulf of Mexico (sexes combined).

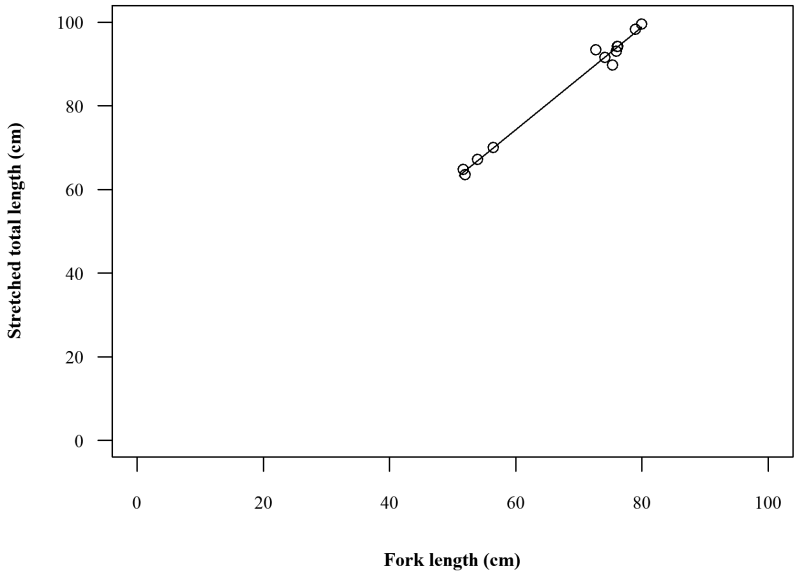


Figure 18B.−Relationship between over-the-body fork length and stretched total length for night sharks from the Gulf of Mexico (sexes combined).

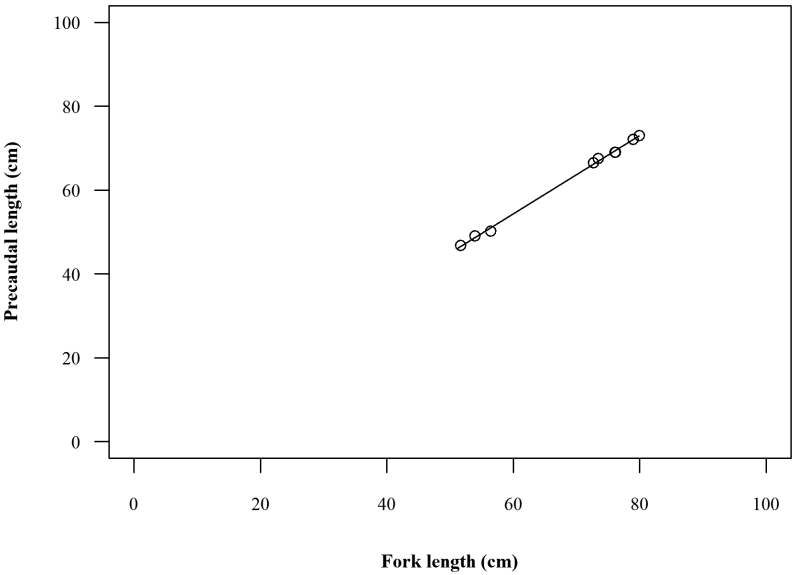


Figure 18C.−Relationship between over-the-body fork length and precaudal length for night sharks from the Gulf of Mexico (sexes combined).

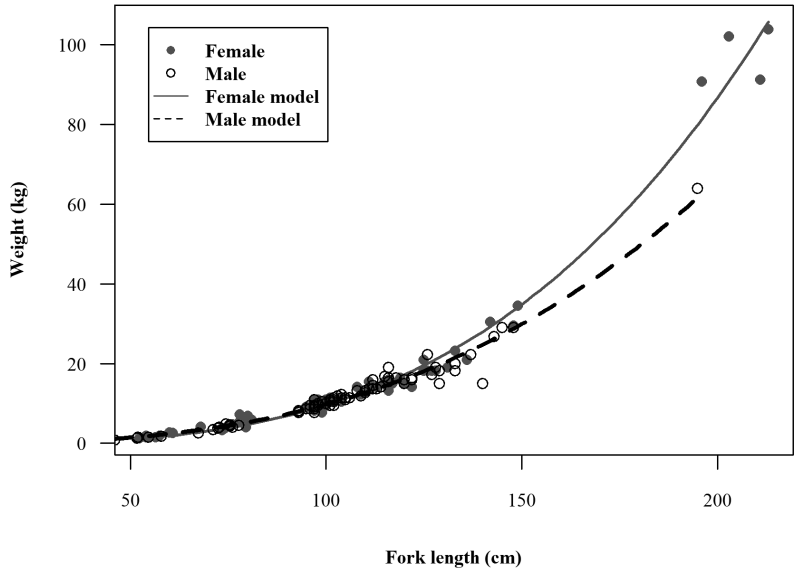
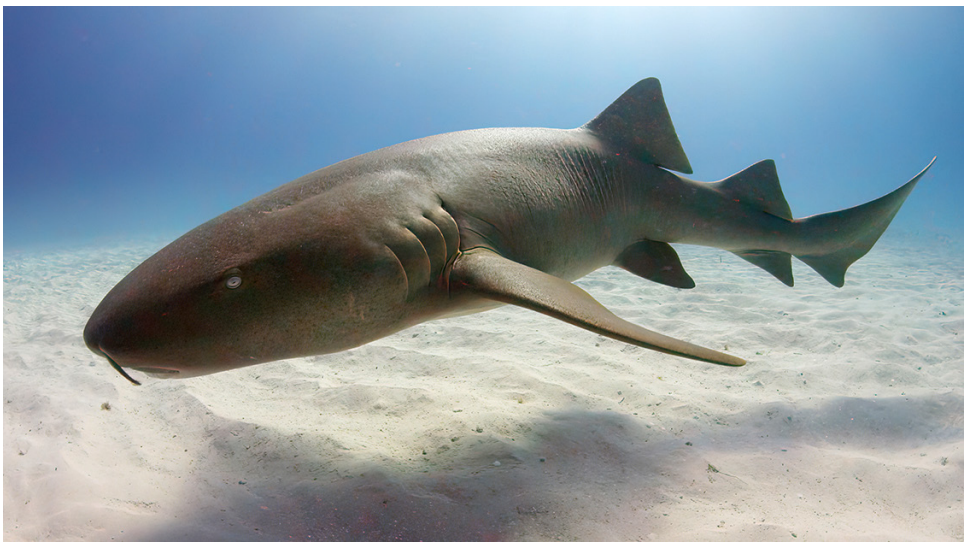


Figure 18D.−Relationship between over-the-body fork length and total weight for night sharks from the Gulf of Mexico. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Nurse Shark, *Ginglymostoma cirratum*

Table 19.–Relationship between over-the-body fork length (TL_{OTB}) and total weight (W) for nurse sharks from the western North Atlantic Ocean in the form of $W = aTL_{OTB}^{b}$.

Sex	TL range	Weight range	a	b	RSE	*n*
Combined	58.5–263.0	1.7–120.0	8.61E-04	2.085	16.3	58
Female	58.5–262.0	1.7–106.0	5.94E-04	2.143	15.4	26
Male	143.0–263.0	16.5–120.0	1.38E-03	2.007	16.9	31



Nurse shark. Photo: Joe Romeiro.

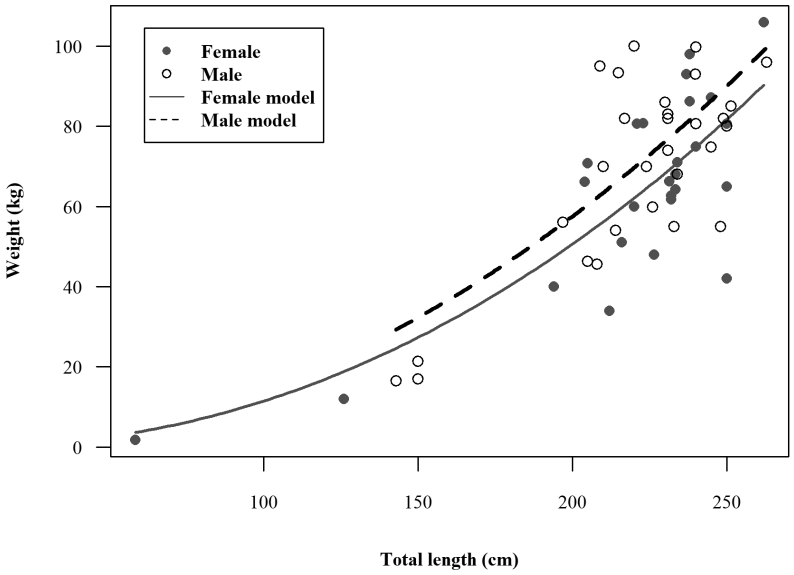


Figure 19.−Relationship between over-the-body total length and total weight for nurse sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Porbeagle,
Lamna nasus

Table 20A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for porbeagles from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	85.5–260.5	95.0–293.0	0.730	1.12	0.995	668
Female	94.0–260.5	102.5–293.0				311
Male	85.5–246.0	95.0–281.0				357

Table 20B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for porbeagles from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	85.5–260.5	7.0–278.2	1.84E-06	3.36	10.7	508
Female	94.0–260.5	12.0–278.2	1.87E-06	3.36	12.5	245
Male	85.5–246.0	7.0–198.0	1.63E-05	2.94	6.87	263

Table 20C.–Relationship between over-the-body fork length (FL_{OTB}) and straight-line fork length (FL_{SL}) for porbeagles from the western North Atlantic Ocean in the form of $FL_{SL} = a + b* FL_{OTB}$.

Sex	FL_{OTB} range	FL_{SL} range	a	b	r^2	*n*
Combined	86.2–264.0	83.0–253.5	0.1692	0.9595	0.9958	188
Female	86.2–264.0	84.0–253.5				91
Male	88.0–235.0	83.0–231.5				97

NOTE: The equation in this table has been corrected. The original version transposed the length variables in the conversion equation for straight line fork length (FL_{SL}) to curved fork length (FL_{OTB}).

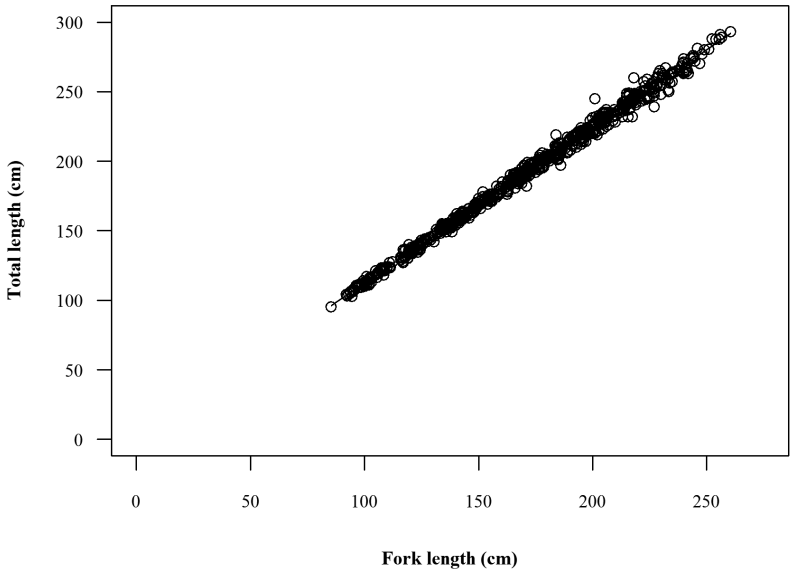


Figure 20A.–Relationship between over-the-body fork length and total length for porbeagles from the western North Atlantic Ocean (sexes combined).

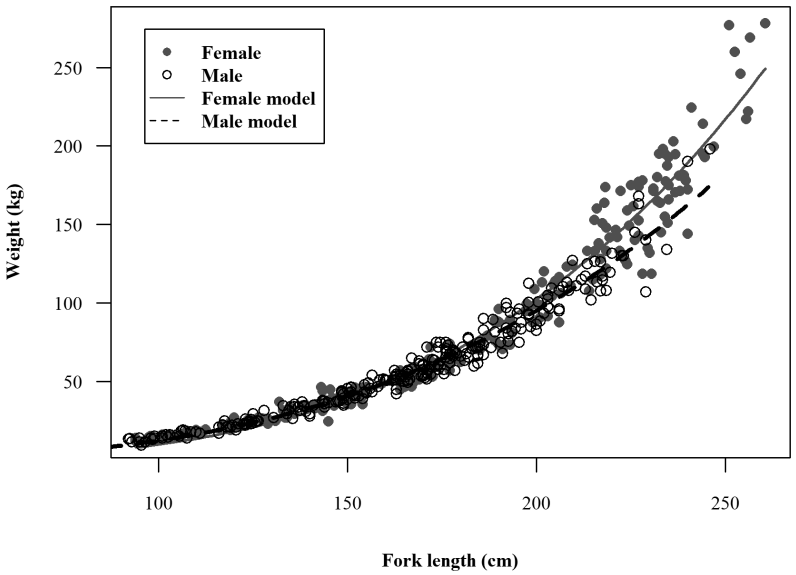


Figure 20B.−Relationship between over-the-body fork length and total weight for porbeagles from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

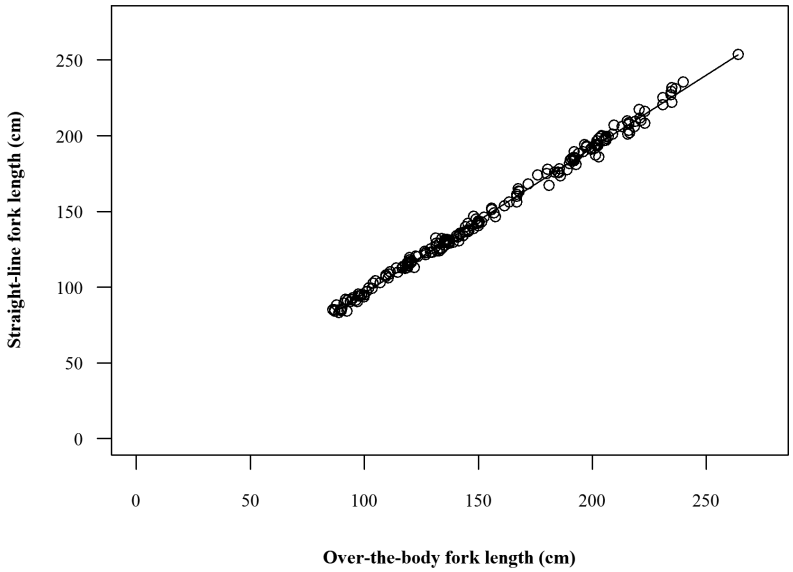


Figure 20C.−Relationship between over-the-body fork length and straight-line fork length for porbeagles from the western North Atlantic Ocean (sexes combined).

Sand Tiger, *Carcharias taurus*

Table 21A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for sand tigers from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	59.0–232.0	67.0–273.0	4.62	1.14	0.984	114
Female	60.0–232.0	69.0–273.0				60
Male	59.0–212.0	67.0–247.0				54

Table 21B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for sand tigers from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	78.0–294.0	95.9–335.0	9.98	1.15	0.979	65
Female	111.0–294.0	136.8–335.0				27
Male	78.0–212.0	95.9–254.0				38

Table 21C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for sand tigers from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	105.0–226.0	95.0–198.0	-2.06	0.885	0.989	87
Female	105.0–226.0	95.0–198.0				41
Male	112.0–212.0	98.0–192.0				46

Table 21D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for sand tigers from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	59.0–230.0	2.6–144.2	2.59E-06	3.25	7.58	26
Female	60.0–230.0	2.6–144.2	1.99E-06	3.32	5.01	15
Male	59.0–217.0	2.6–86.2	8.69E-05	2.57	5.13	11

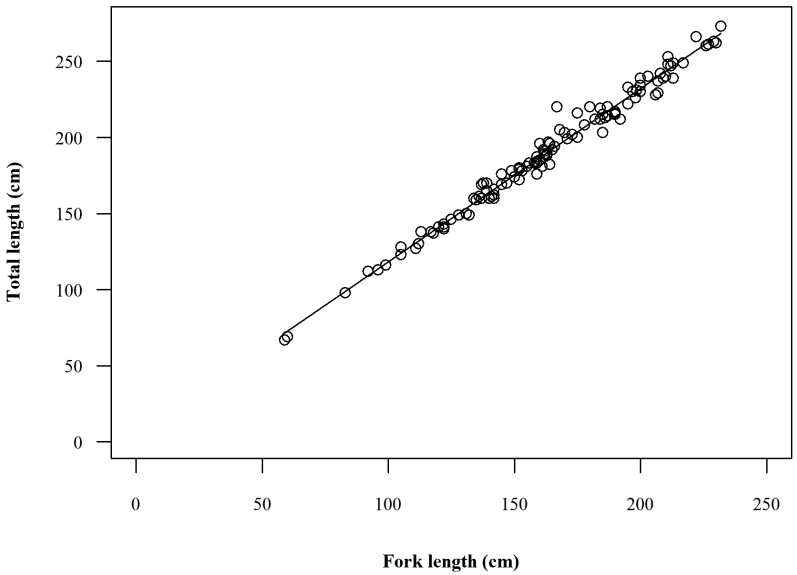


Figure 21A.−Relationship between over-the-body fork length and total length for sand tigers from the western North Atlantic Ocean (sexes combined).

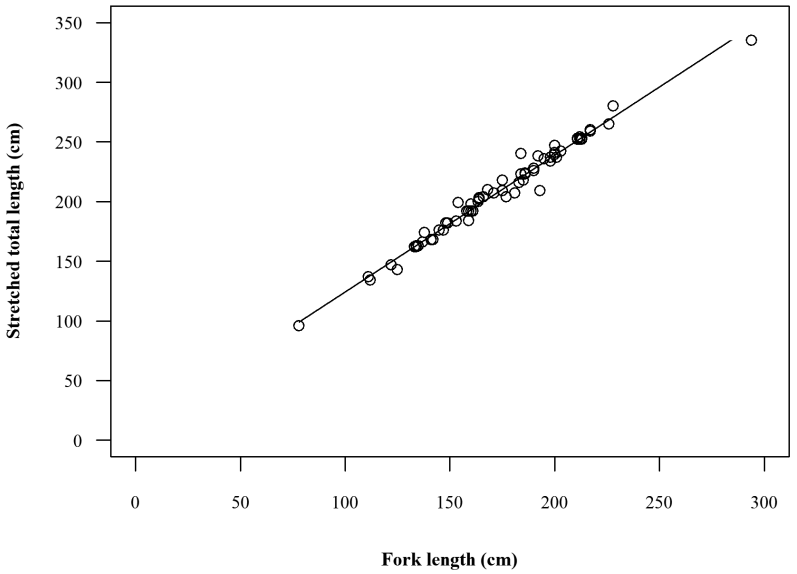


Figure 21B.−Relationship between over-the-body fork length and stretched total length for sand tigers from the western North Atlantic Ocean (sexes combined).

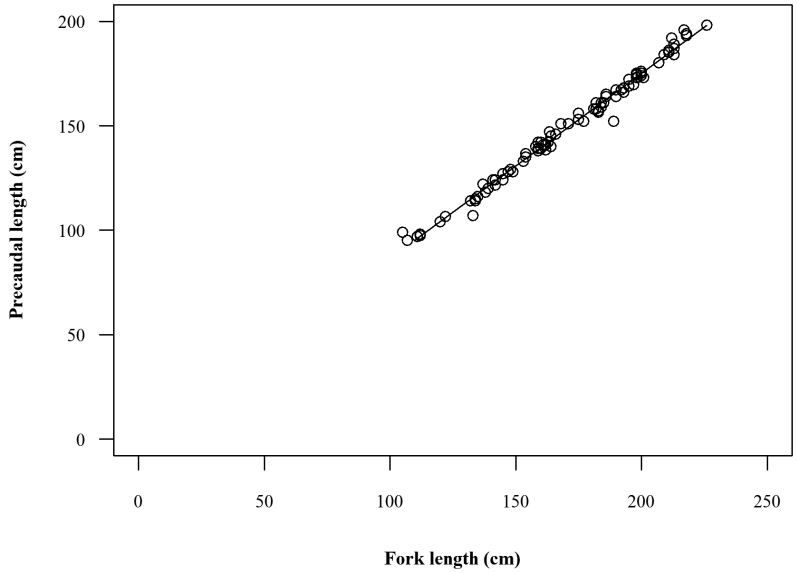


Figure 21C.−Relationship between over-the-body fork length and precaudal length for sand tigers from the western North Atlantic Ocean (sexes combined).

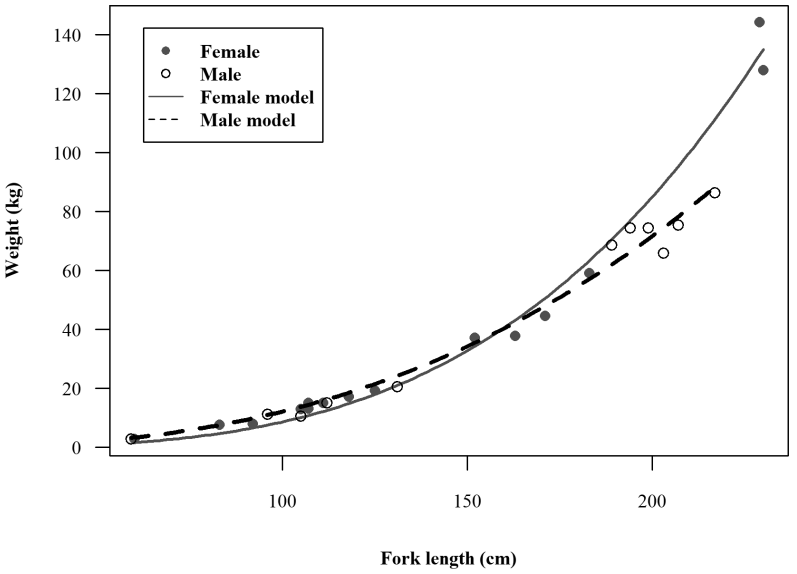


Figure 21D.−Relationship between over-the-body fork length and total weight for sand tigers from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Sandbar Shark, *Carcharhinus plumbeus*

Table 22A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for sandbar sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	37.0–216.0	43.0–249.0	-1.11	1.20	0.996	8,961
Female	39.0–216.0	47.0–249.0				4,941
Male	37.0–180.0	43.0–215.0				3,999

Table 22B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for sandbar sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	34.4–196.4	35.0–241.0	1.09	1.22	0.997	7,153
Female	34.4–196.4	45.8–241.0				3,721
Male	35.4–195.0	35.0–238.5				3,340

Table 22C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for sandbar sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	38.0–196.4	34.0–179.2	-0.028	0.904	0.998	1,900
Female	39.0–196.4	36.0–179.2				1,128
Male	38.0–195.0	34.0–176.0				762

Table 22D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for sandbar sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	37.0–201.0	0.32–104.3	1.22E-05	2.99	2.94	8,318
Female	39.0–201.0	0.60–104.3	1.26E-05	2.99	3.53	4,413
Male	37.0–183.0	0.32–70.0	2.33E-05	2.85	1.89	3,840

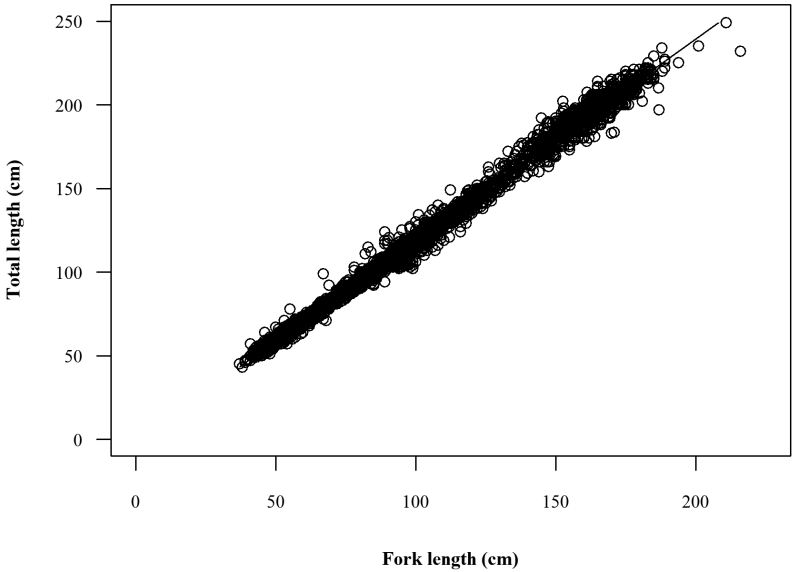


Figure 22A.−Relationship between over-the-body fork length and total length for sandbar sharks from the western North Atlantic Ocean (sexes combined).

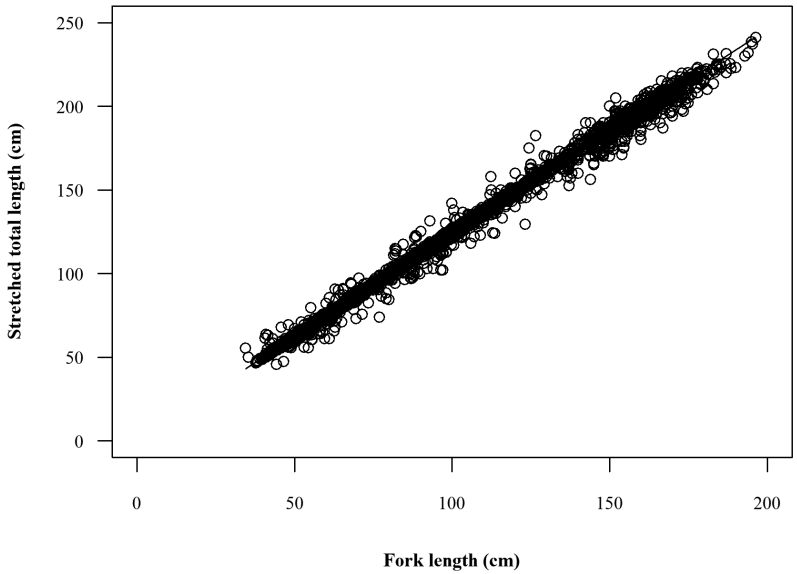


Figure 22B.−Relationship between over-the-body fork length and stretched total length for sandbar sharks from the western North Atlantic Ocean (sexes combined).

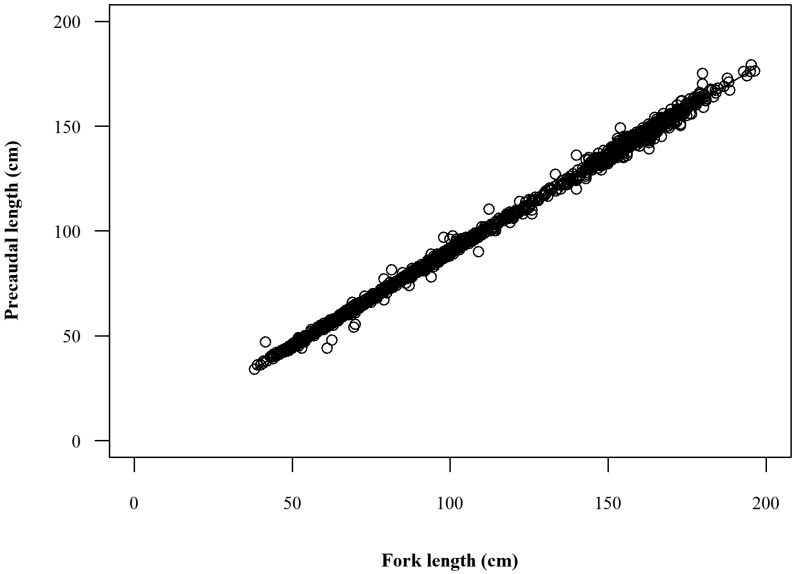


Figure 22C.−Relationship between over-the-body fork length and precaudal length for sandbar sharks from the western North Atlantic Ocean (sexes combined).

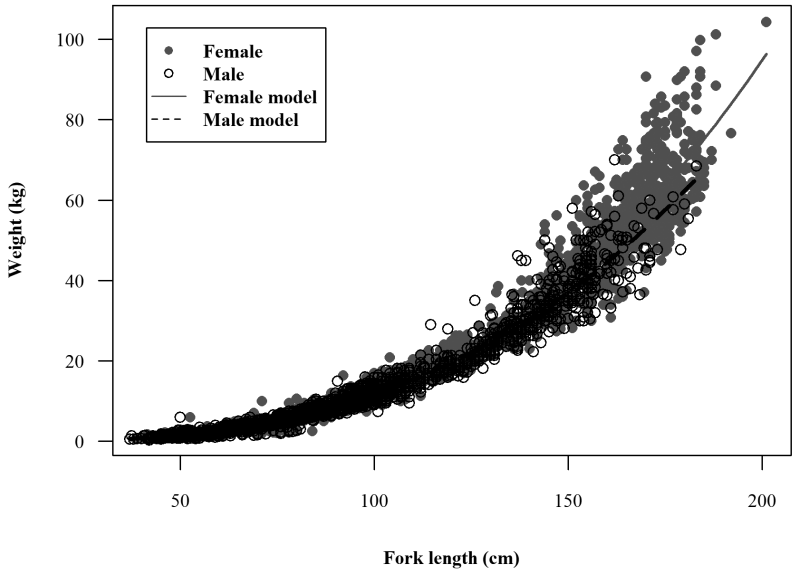


Figure 22D.−Relationship between over-the-body fork length and total weight for sandbar sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Scalloped Hammerhead, *Sphyrna lewini*

Table 23A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for scalloped hammerheads from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	30.5–250.0	39.5–316.0	0.218	1.28	0.995	534
Female	30.5–216.0	39.5–278.0				245
Male	32.0–250.0	40.5–316.0				284

Table 23B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for scalloped hammerheads from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	26.0–218.0	33.7–284.0	0.596	1.31	0.997	1,969
Female	27.8–185.0	36.8–242.0				929
Male	26.0–218.0	33.7–284.0				1,021

Table 23C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for scalloped hammerheads from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	29.0–212.2	24.0–192.5	-0.265	0.909	0.999	467
Female	29.0–150.0	24.0–142.0				201
Male	29.0–212.2	25.5–192.5				258

Table 23D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for scalloped hammerheads from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	29.0–250.0	0.15–165.6	1.17E-05	2.99	4.89	959
Female	29.0–243.0	0.20–165.6	6.03E-06	3.12	4.01	466
Male	29.0–250.0	0.15–158.8	1.78E-05	2.91	5.43	487

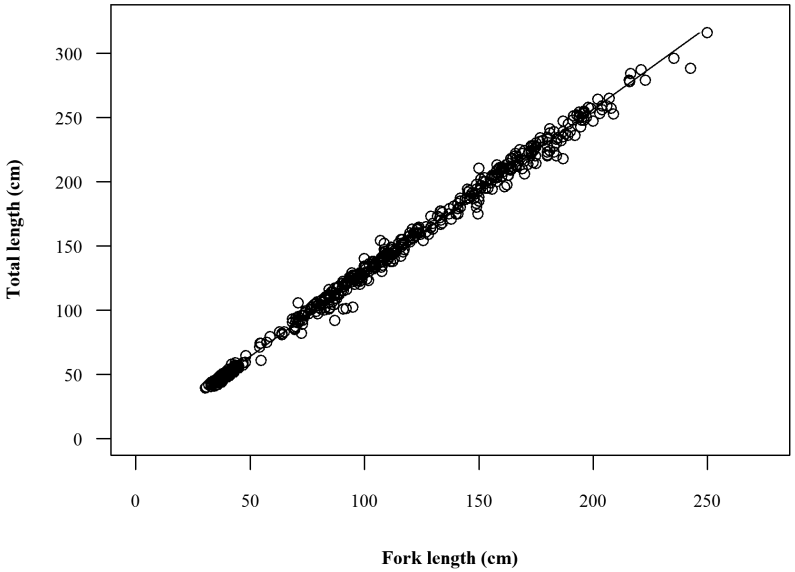


Figure 23A.−Relationship between over-the-body fork length and total length for scalloped hammerheads from the western North Atlantic Ocean (sexes combined).

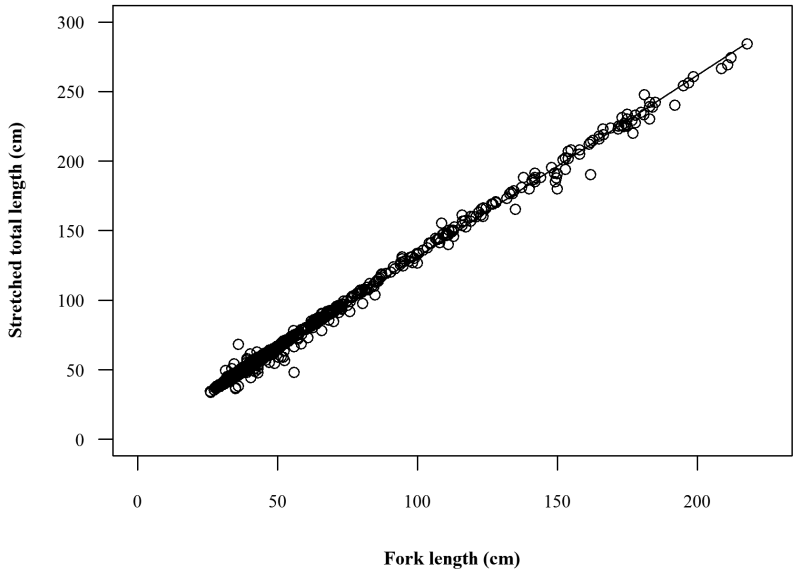


Figure 23B.−Relationship between over-the-body fork length and stretched total length for scalloped hammerheads from the western North Atlantic Ocean (sexes combined).

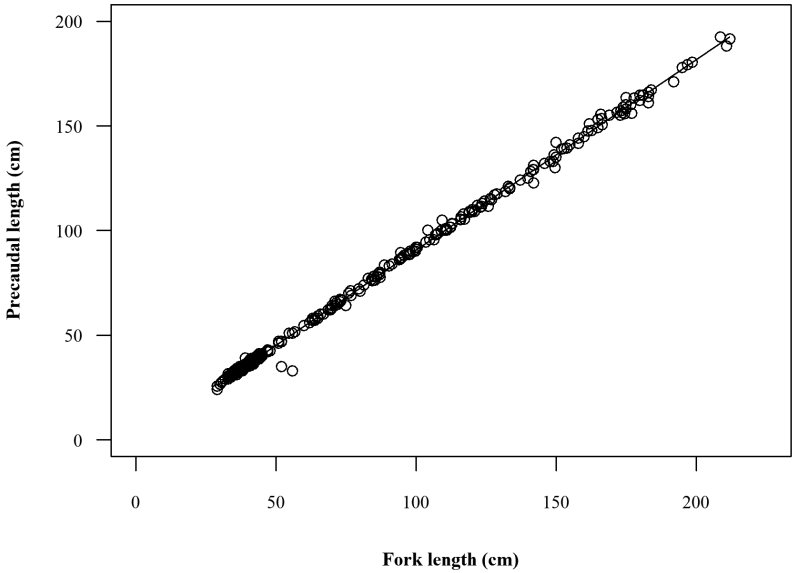


Figure 23C.−Relationship between over-the-body fork length and precaudal length for scalloped hammerheads from the western North Atlantic Ocean (sexes combined).

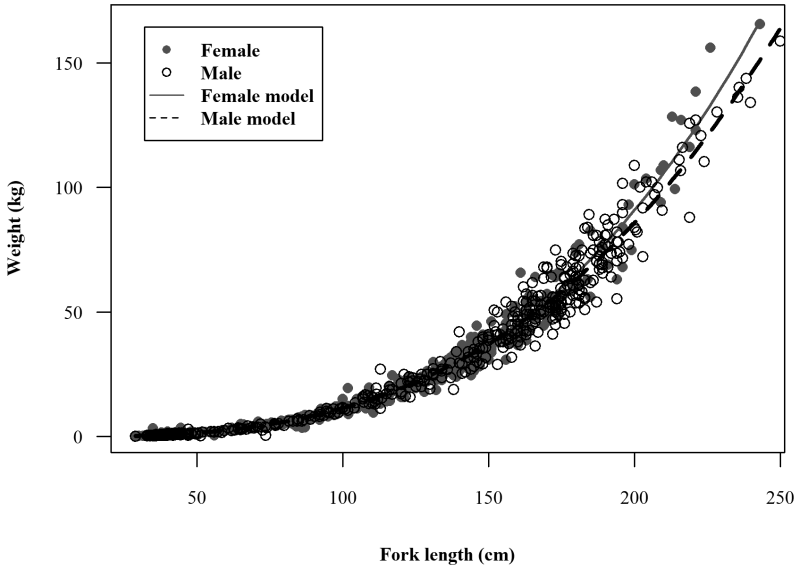


Figure 23D.−Relationship between over-the-body fork length and total weight for scalloped hammerheads from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Shortfin Mako, *Isurus oxyrinchus*

Table 24A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for shortfin makos from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	65.0–338.0	70.0–368.0	1.39	1.08	0.996	321
Female	65.0–338.0	70.0–368.0				149
Male	70.0–260.0	77.0–290.2				168

Table 24B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for shortfin makos from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	65.0–338.0	2.3–553.8	6.48E-06	3.10	9.19	3,948
Female	65.0–338.0	2.7–553.8	5.40E-06	3.14	9.93	1,906
Male	70.0–278.7	2.3–230.0	1.25E-05	2.97	8.11	1,989

Table 24C.–Relationship between over-the-body fork length (FL_{OTB}) and straight-line fork length (FL_{SL}) for shortfin makos from the western North Atlantic Ocean in the form of $FL_{SL} = a + b* FL_{OTB}$.

Sex	FL_{OTB} range	FL_{SL} range	a	b	r^2	*n*
Combined	154.0–272.0	150.0–264.7	3.335	0.9653	0.9937	35
Female	187.0–272.0	184.0–264.7				14
Male	154.0–269.4	150.0–262.5				21

NOTE: The equation in this table has been corrected. The original version transposed the length variables in the conversion equation for straight line fork length (FL_{SL}) to curved fork length (FL_{OTB}).

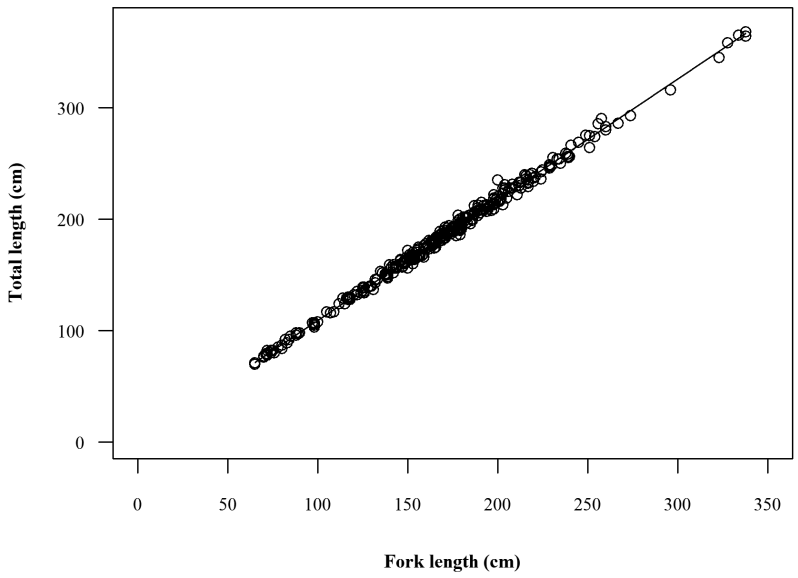


Figure 24A.–Relationship between over-the-body fork length and total length for shortfin makos from the western North Atlantic Ocean (sexes combined).

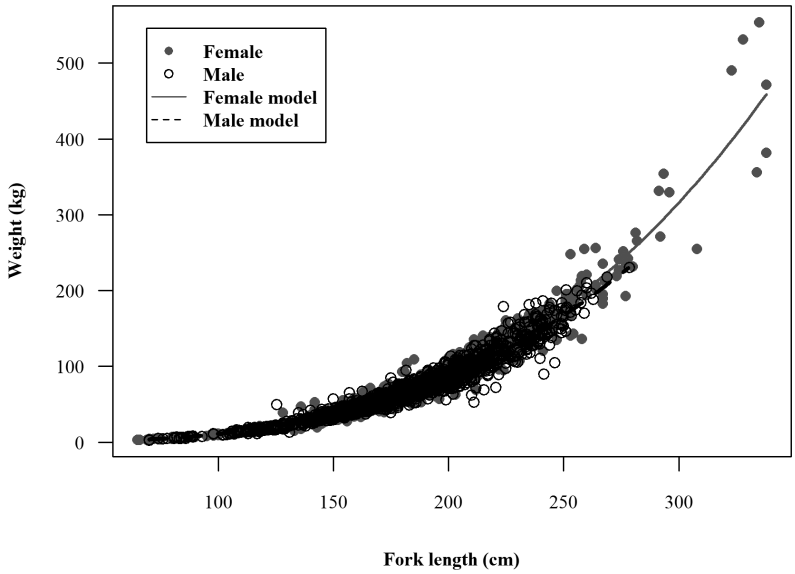


Figure 24B.−Relationship between over-the-body fork length and total weight for shortfin makos from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

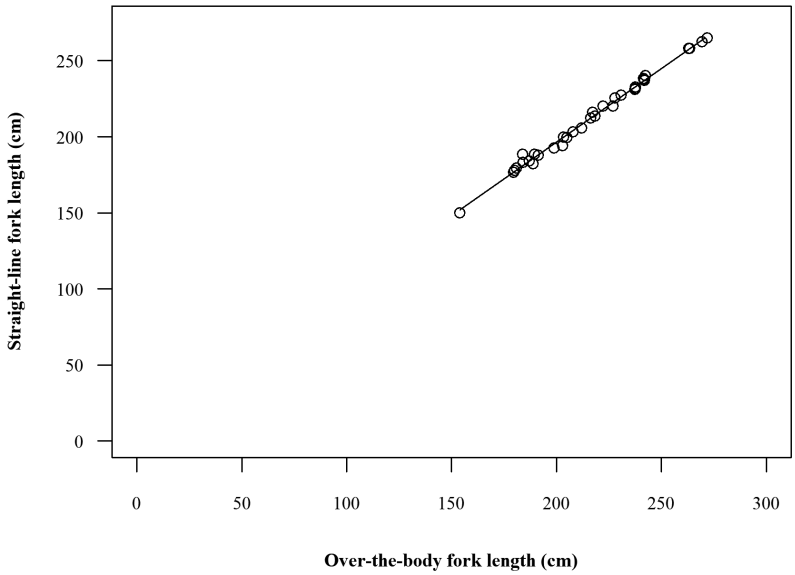


Figure 24C.−Relationship between over-the-body fork length and straight-line fork length for shortfin makos from the western North Atlantic Ocean (sexes combined).

Silky Shark, *Carcharhinus falciformis*

Table 25A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for silky sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	46.0–212.0	57.5–258.0	2.53	1.19	0.992	273
Female	49.7–212.0	66.0–258.0				144
Male	46.0–209.0	57.5–258.0				126

Table 25B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for silky sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	49.7–200.0	68.4–246.4	2.45	1.23	0.994	119
Female	49.7–200.0	68.4–246.4				66
Male	60.0–192.2	76.8–243.0				49

Table 25C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for silky sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	49.7–200.0	45.0–180.3	0.214	0.910	0.999	103
Female	49.7–200.0	45.0–180.3				58
Male	60.0–192.2	54.3–175.0				44

Table 25D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for silky sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	46.0–212.0	1.0–88.4	1.76E-05	2.90	2.73	358
Female	57.7–212.0	1.75–88.4	2.29E-05	2.85	3.19	198
Male	46.0–196.0	1.0–87.5	1.04E-05	3.01	1.94	157

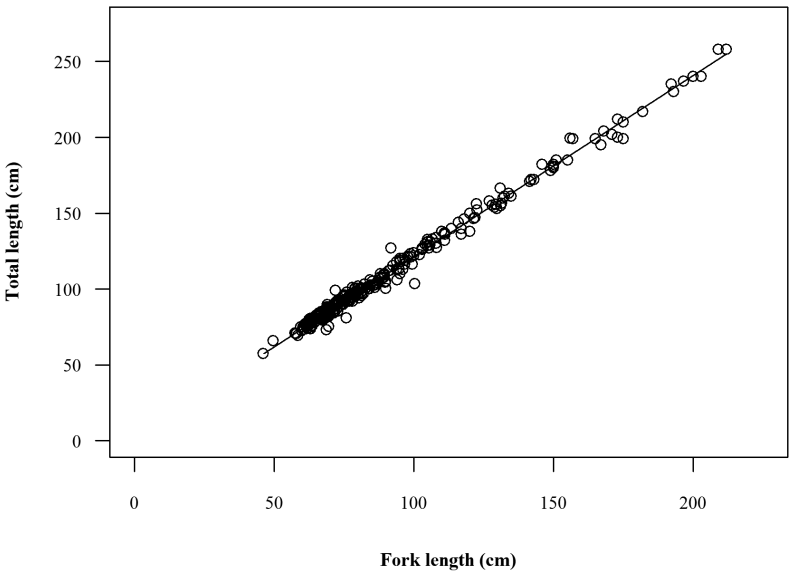


Figure 25A.—Relationship between over-the-body fork length and total length for silky sharks from the western North Atlantic Ocean (sexes combined).

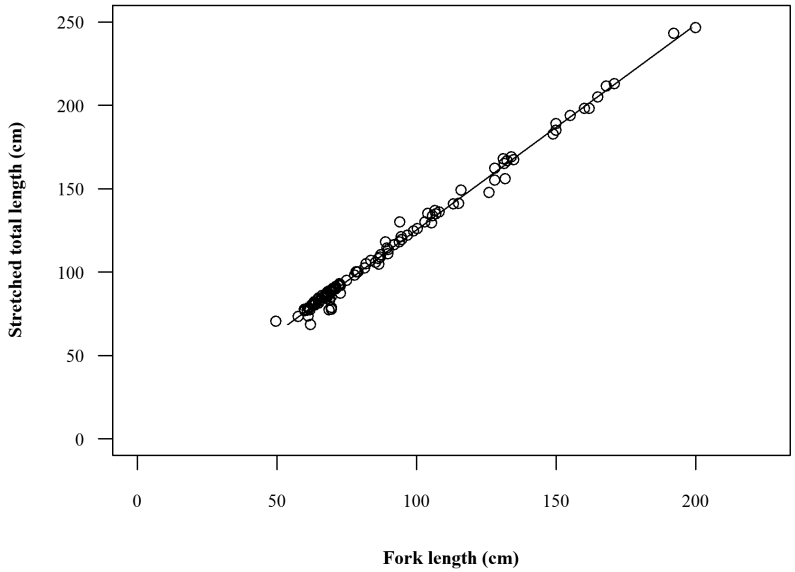


Figure 25B.—Relationship between over-the-body fork length and stretched total length for silky sharks from the western North Atlantic Ocean (sexes combined).

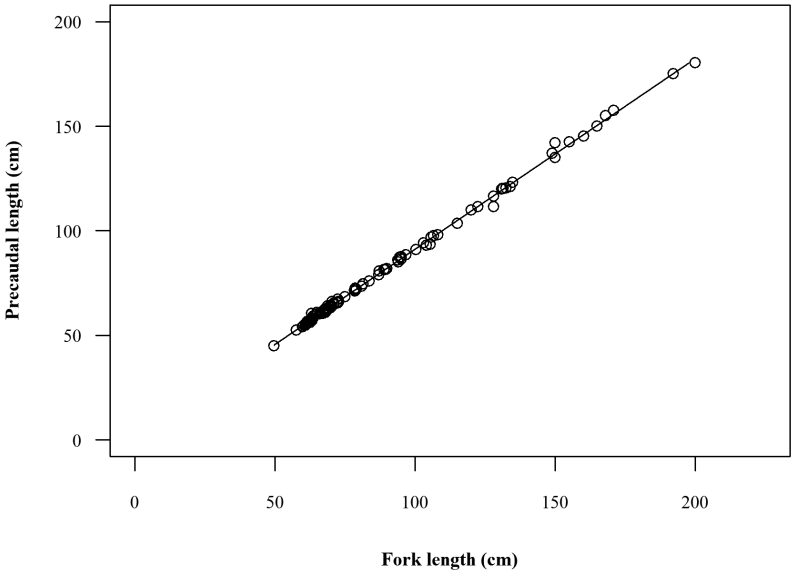


Figure 25C.—Relationship between over-the-body fork length and precaudal length for silky sharks from the western North Atlantic Ocean (sexes combined).

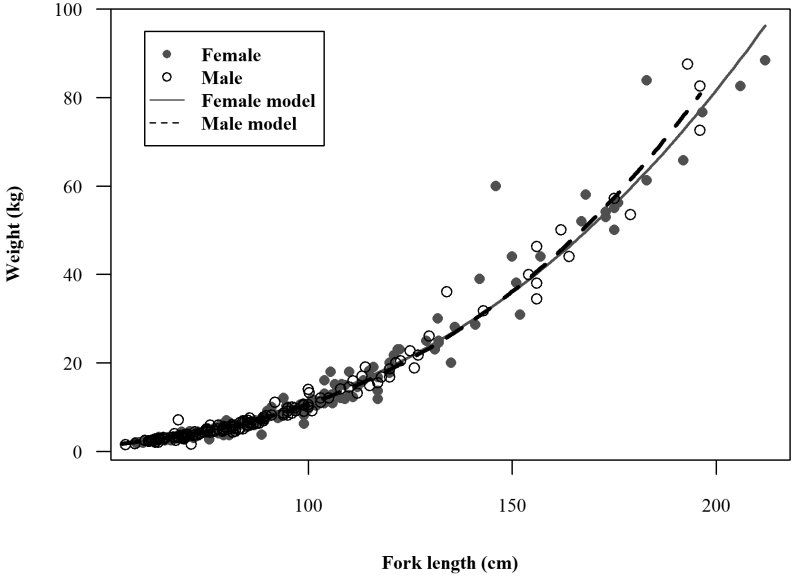


Figure 25D.—Relationship between over-the-body fork length and total weight for silky sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Smooth Dogfish, *Mustelus canis*

Table 26A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for smooth dogfish from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	26.0–122.0	29.0–134.0	2.01	1.10	0.996	1,746
Female	26.0–122.0	29.0–134.0				1,307
Male	26.0–104.5	30.0–116.0				431

Table 26B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for smooth dogfish from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	31.0–118.6	35.8–133.2	2.92	1.12	0.989	1,102
Female	32.0–118.6	37.0–133.2				999
Male	31.0–95.0	35.8–113.0				98

Table 26C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for smooth dogfish from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	31.0–122.8	28.1–105.0	-0.308	0.928	0.997	461
Female	32.0–112.8	29.0–105.0				376
Male	31.0–104.5	28.1–97.0				83

Table 26D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for smooth dogfish from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	29.0–118.0	0.05–9.0	3.67E-06	3.09	0.541	1,449
Female	29.0–118.0	0.01–9.0	1.10E-05	2.86	0.564	1,094
Male	30.0–104.5	0.05–6.5	6.69E-06	2.92	0.256	353

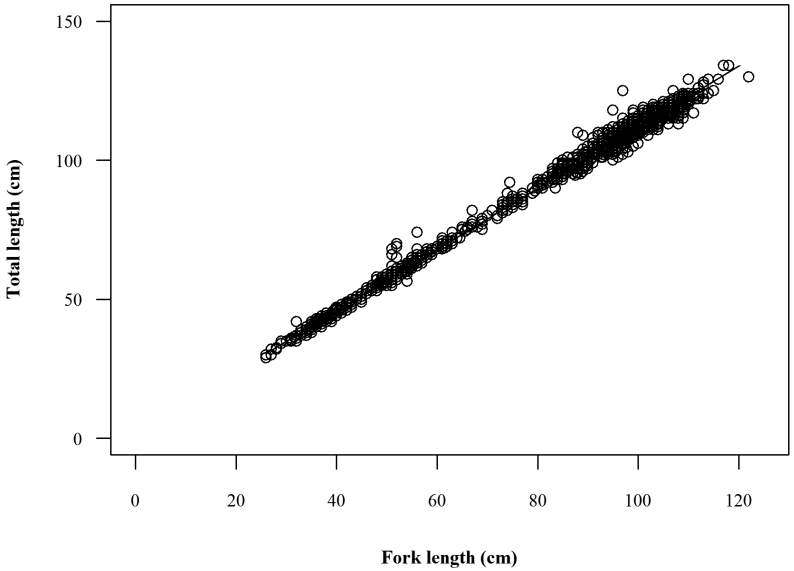


Figure 26A.—Relationship between over-the-body fork length and total length for smooth dogfish from the western North Atlantic Ocean (sexes combined).

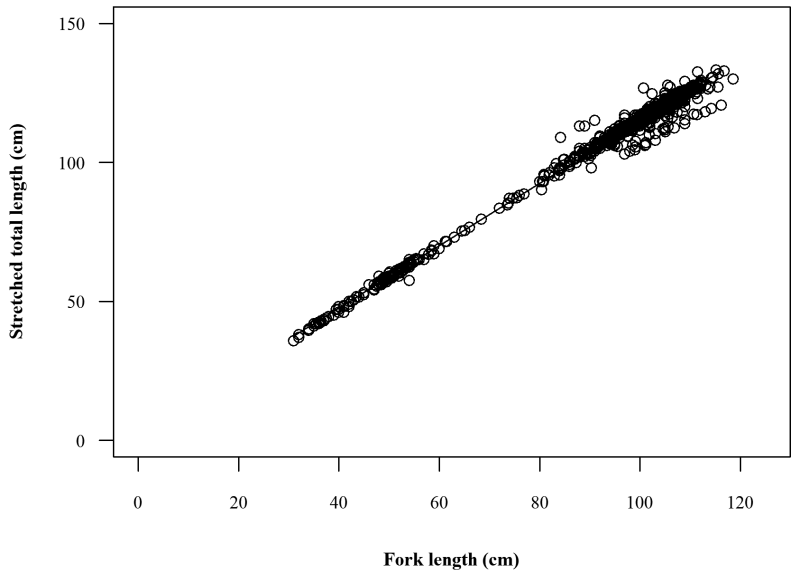


Figure 26B.—Relationship between over-the-body fork length and stretched total length for smooth dogfish from the western North Atlantic Ocean (sexes combined).

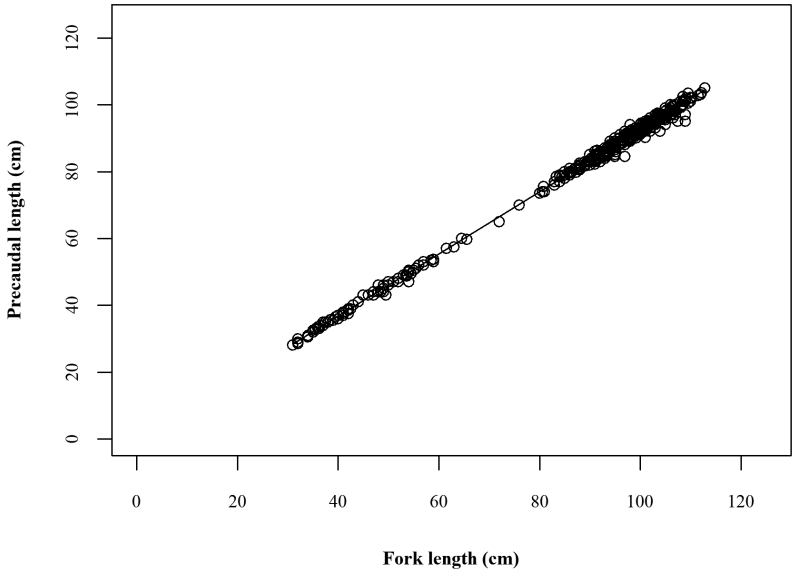


Figure 26C.—Relationship between over-the-body fork length and precaudal length for smooth dogfish from the western North Atlantic Ocean (sexes combined).

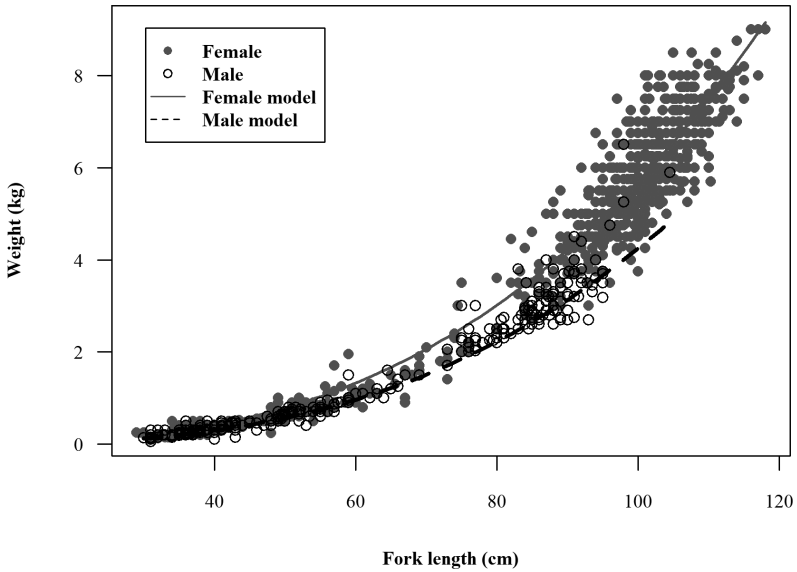


Figure 26D.—Relationship between over-the-body fork length and total weight for smooth dogfish from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Smooth Hammerhead, *Sphyrna zygaena*

Table 27A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for smooth hammerheads from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	40.0–234.0	51.0–292.0	0.925	1.24	0.996	13
Female	105.0–234.0	132.0–292.0				7
Male	40.0–169.0	51.0–208.0				6

Table 27B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for smooth hammerheads from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	45.0–240.0	0.91–127.9	1.35E-05	2.90	12.7	34
Female	105.0–234.0	9.5–127.9	1.06E-06	3.41	6.76	22
Male	45.0–187.0	0.91–48.5	9.57E-06	2.97	3.83	10

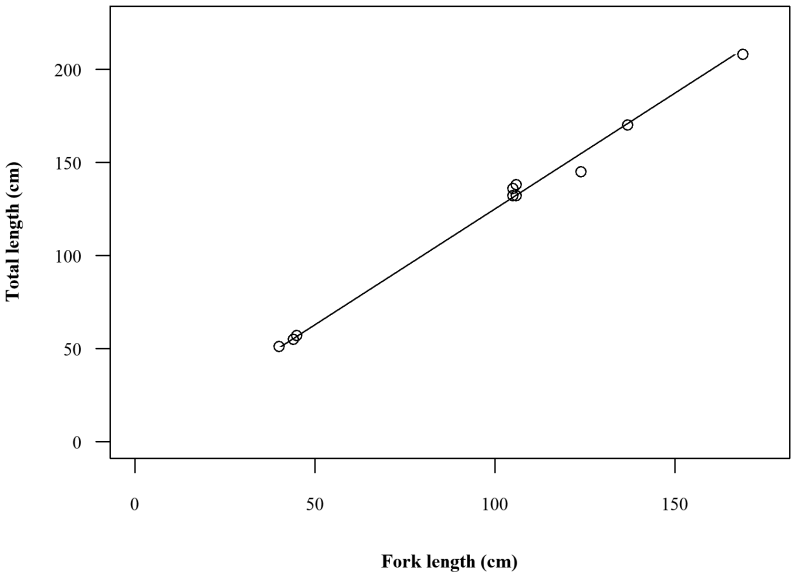


Figure 27A.−Relationship between over-the-body fork length and total length for smooth hammerheads from the western North Atlantic Ocean (sexes combined).

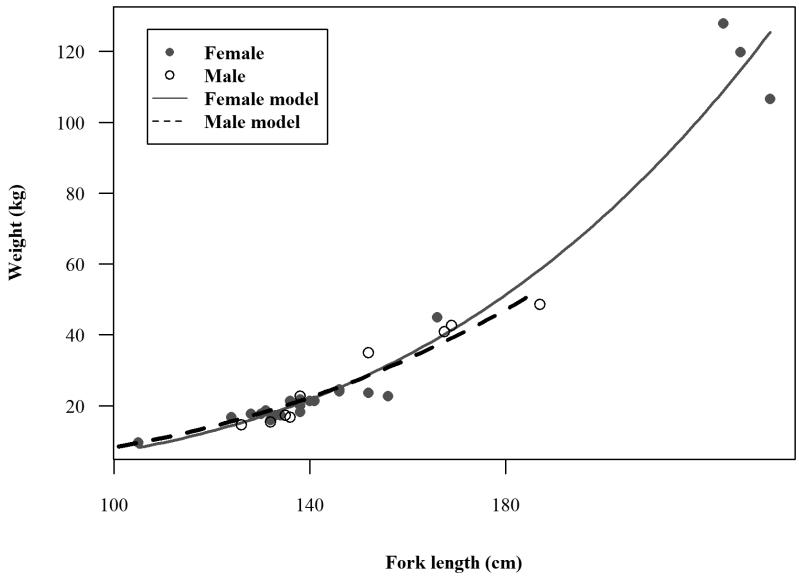


Figure 27B.−Relationship between over-the-body fork length and total weight for smooth hammerheads from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Spinner Shark, *Carcharhinus brevipinna*

Table 28A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for spinner sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	53.0–200.6	63.5–234.7	4.15	1.16	0.980	786
Female	53.0–200.6	64.0–234.7				411
Male	54.0–173.7	63.5–206.0				372

Table 28B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for spinner sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	50.4–188.0	63.4–227.0	2.50	1.21	0.996	835
Female	51.7–188.0	64.9–227.0				401
Male	50.4–162.0	63.4–204.0				426

Table 28C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for spinner sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	50.4–188.0	45.2–172.0	0.272	0.906	0.999	390
Female	52.0–188.0	46.5–172.0				184
Male	50.4–162.0	45.2–145.0				207

Table 28D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for spinner sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	50.4–186.2	0.37–71.0	4.75E-06	3.17	1.90	952
Female	51.7–186.2	1.25–71.0	4.11E-06	3.20	1.97	481
Male	50.4–179.0	1.0–55.0	8.57E-06	3.04	1.71	462

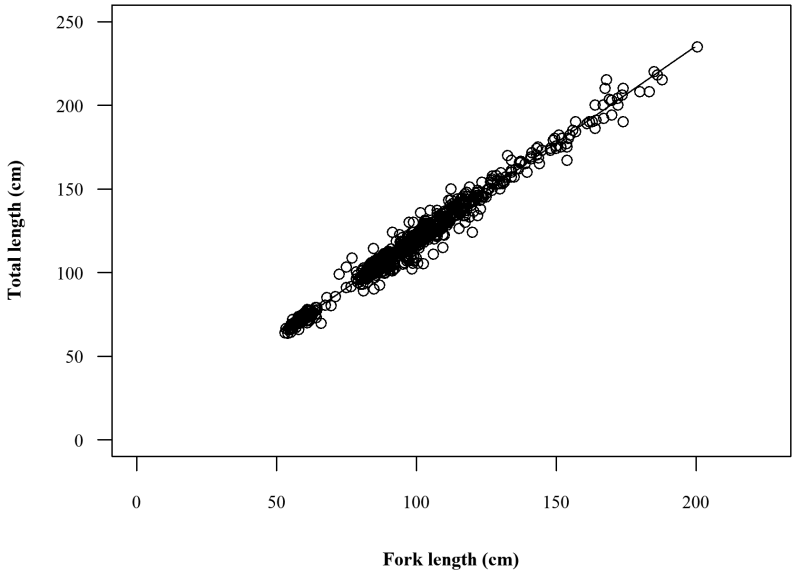


Figure 28A.−Relationship between over-the-body fork length and total length for spinner sharks from the western North Atlantic Ocean (sexes combined).

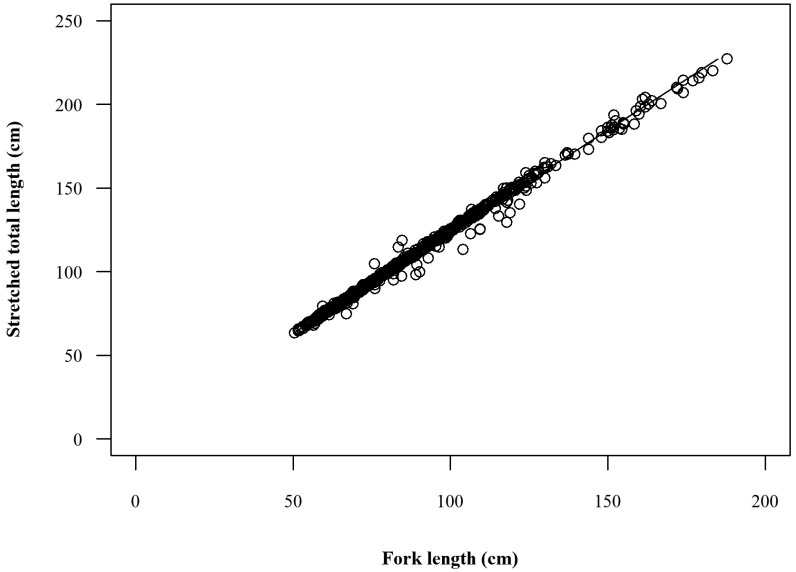


Figure 28B.−Relationship between over-the-body fork length and stretched total length for spinner sharks from the western North Atlantic Ocean (sexes combined).

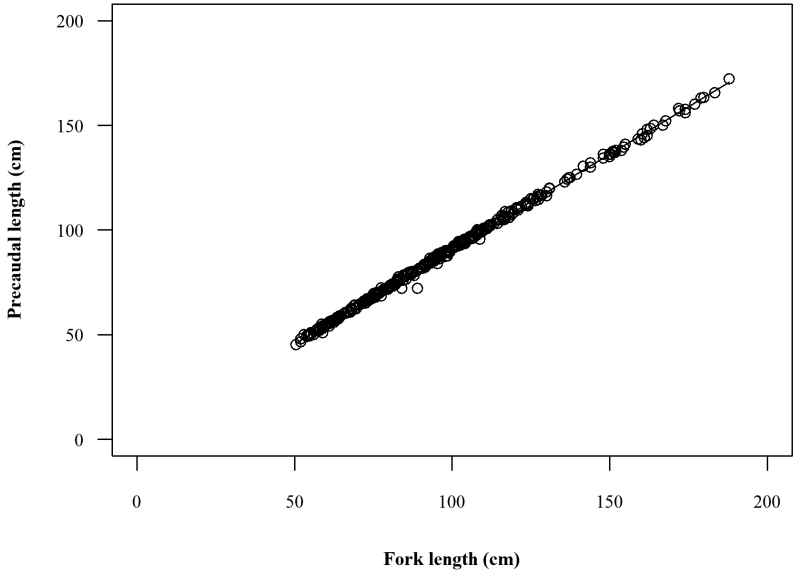


Figure 28C.−Relationship between over-the-body fork length and precaudal length for spinner sharks from the western North Atlantic Ocean (sexes combined).

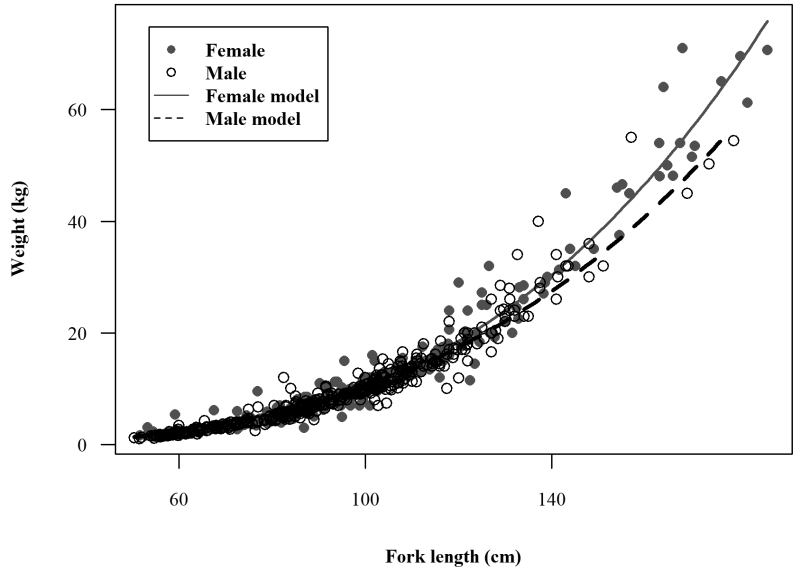


Figure 28D.−Relationship between over-the-body fork length and total weight for spinner sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Squalus spp.

Table 29A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for *Squalus* spp., from the Gulf of Mexico in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	31.5–86.5	35.0–97.0	0.019	1.11	0.993	86
Female	38.1–86.5	43.0–97.0				76
Male	31.5–81.0	35.0–91.0				10

Table 29B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for *Squalus* spp., from the Gulf of Mexico in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	35.0–68.8	40.0–75.4	3.59	1.06	0.987	45
Female	38.1–68.8	44.5–75.4				43
Male	35.0	40.0				2

Table 29C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for *Squalus* spp., from the Gulf of Mexico in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	31.5–68.8	28.5–62.3	-0.219	0.915	0.996	29
Female	38.1–68.8	35.1–62.3				26
Male	31.5–35.0	28.5–31.5				3

Table 29D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for *Squalus* spp., from the Gulf of Mexico in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	31.5–86.5	0.2–5.0	3.41E-06	3.19	0.227	110
Female	38.1–86.5	0.4–5.0	3.29E-06	3.20	0.227	99
Male	31.5–81	0.2–4.3	6.38E-06	3.05	0.236	11

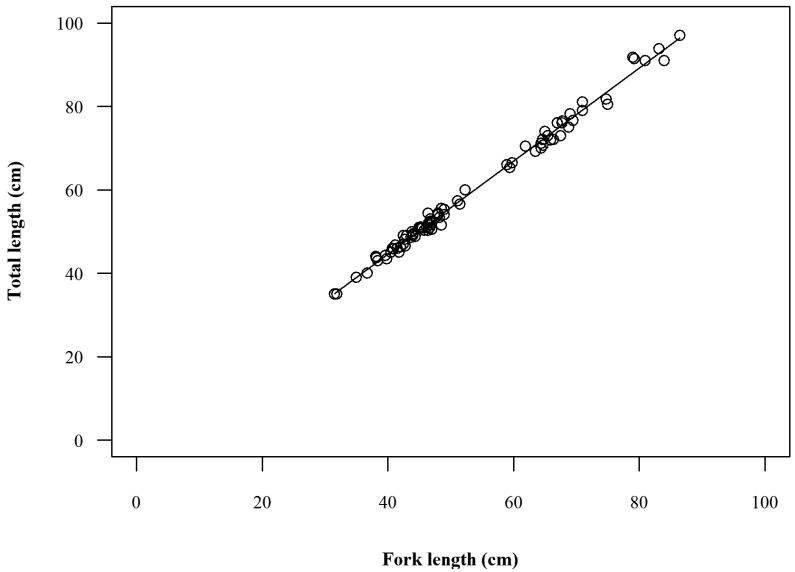


Figure 29A.−Relationship between over-the-body fork length and total length for *Squalus* spp., from the Gulf of Mexico (sexes combined).

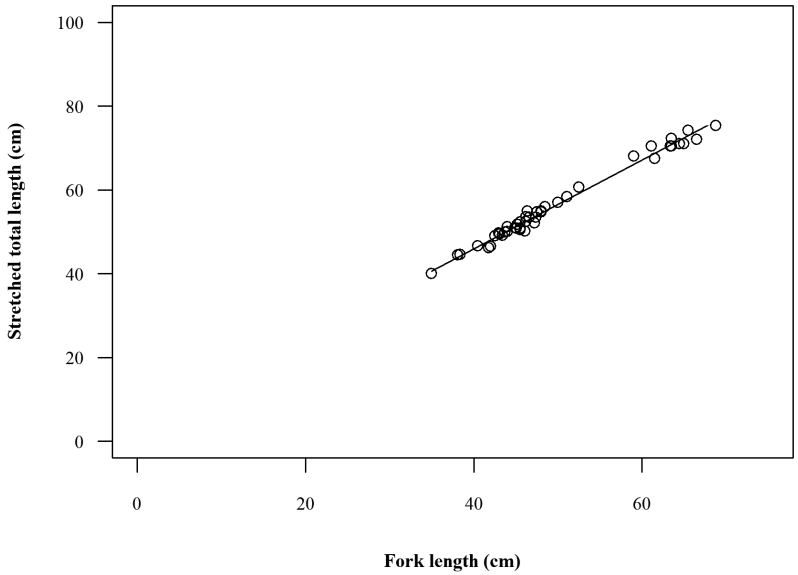


Figure 29B.−Relationship between over-the-body fork length and stretched total length for *Squalus* spp., from the Gulf of Mexico (sexes combined).

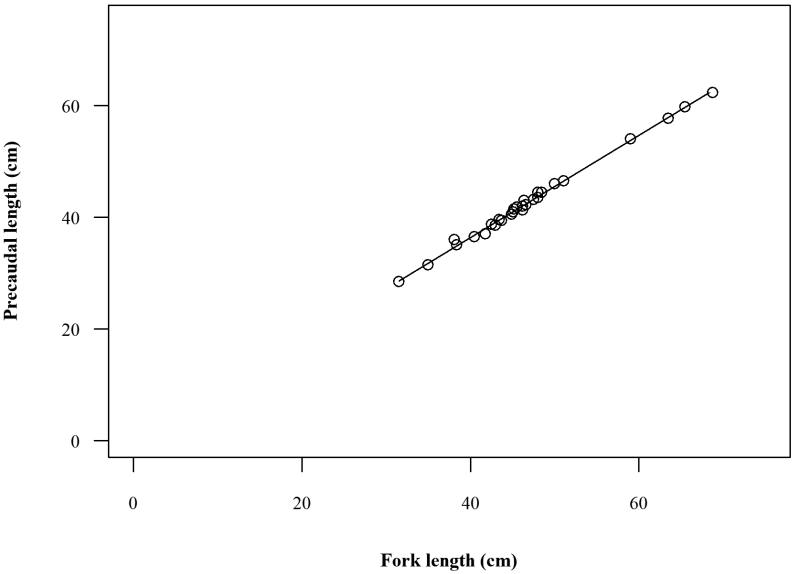


Figure 29C.−Relationship between over-the-body fork length and precaudal length for *Squalus* spp., from the Gulf of Mexico (sexes combined).

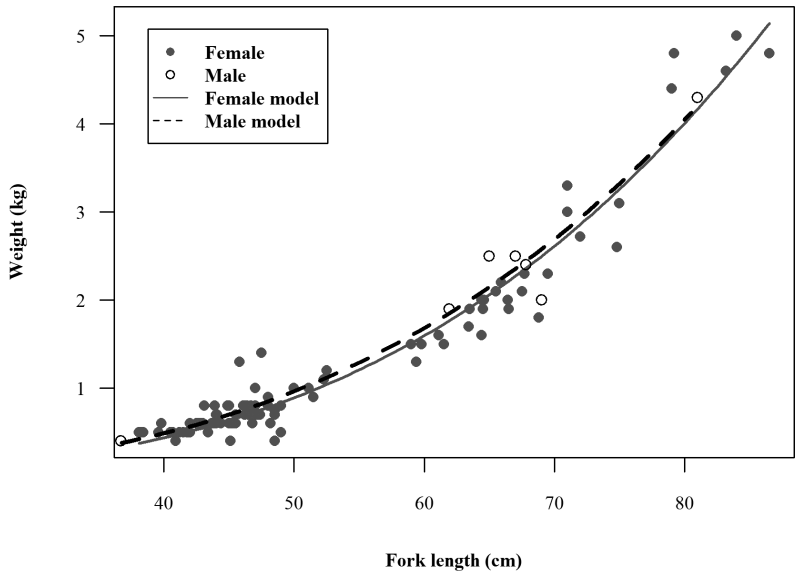


Figure 29D.−Relationship between over-the-body fork length and total weight for *Squalus* spp., from the Gulf of Mexico. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

Tiger Shark, *Galeocerdo cuvier*

Table 30A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for tiger sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	47.9–318.0	66.2–375.0	10.2	1.16	0.991	830
Female	47.9–318.0	66.5–375.0				411
Male	52.0–318.0	66.2–370.0				412

Table 30B.–Relationship between over-the-body fork length (FL_{OTB}) and stretched total length (TL_{STR}) for tiger sharks from the western North Atlantic Ocean in the form of $TL_{STR} = a + b*FL_{OTB}$.

Sex	FL range	TLS range	a	b	r^2	*n*
Combined	46.0–345.0	68.5–416.0	11.9	1.18	0.996	605
Female	51.5–345.0	72.0–416.0				331
Male	46.0–309.0	68.5–381.0				269

Table 30C.–Relationship between over-the-body fork length (FL_{OTB}) and precaudal length (PCL) for tiger sharks from the western North Atlantic Ocean in the form of $PCL = a + b*FL_{OTB}$.

Sex	FL range	PCL range	a	b	r^2	*n*
Combined	52.2–286.2	48.0–263.0	-0.863	0.911	0.999	339
Female	52.2–286.2	48.0–263.0				174
Male	56.3–280.0	50.0–258.0				164

Table 30D.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for tiger sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	46.0–349.0	0.2–540.2	3.04E-06	3.23	10.3	1,018
Female	47.9–349.0	0.2–540.2	1.97E-06	3.31	10.4	518
Male	46.0–318.0	0.5–348.4	4.98E-06	3.13	9.53	492

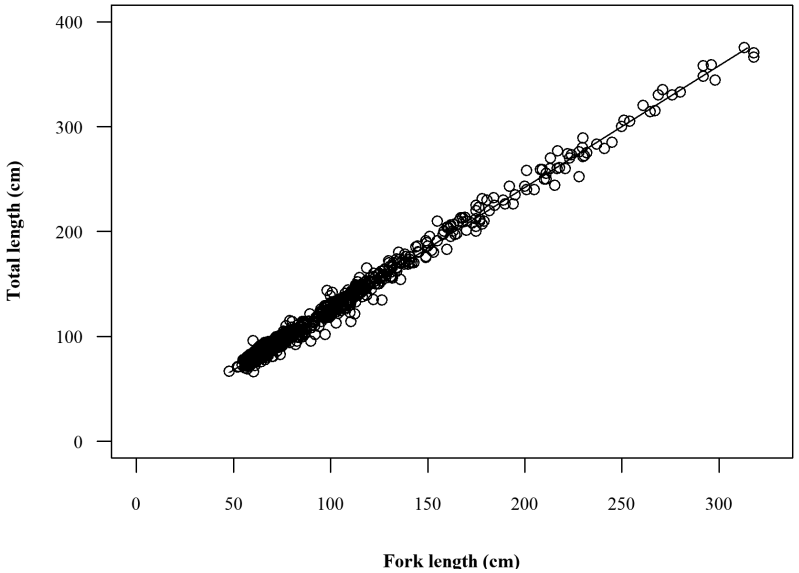


Figure 30A.−Relationship between over-the-body fork length and total length for tiger sharks from the western North Atlantic Ocean (sexes combined).

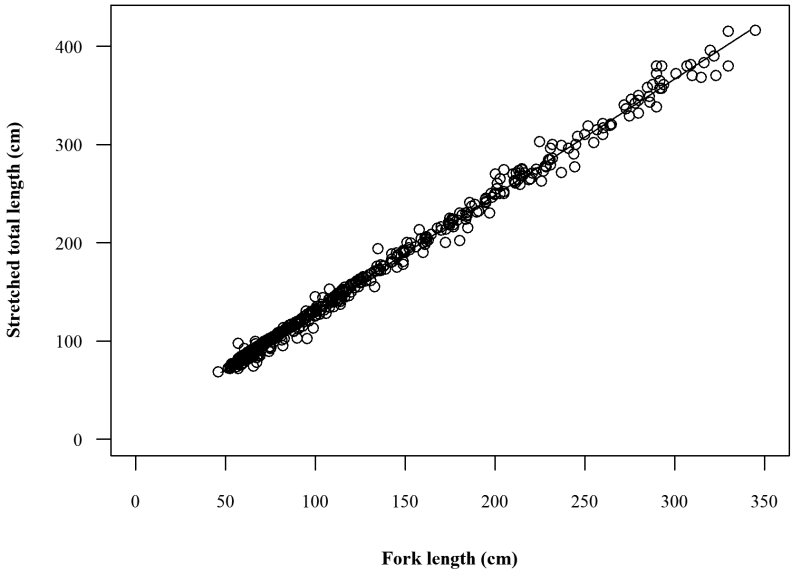


Figure 30B.−Relationship between over-the-body fork length and stretched total length for tiger sharks from the western North Atlantic Ocean (sexes combined).

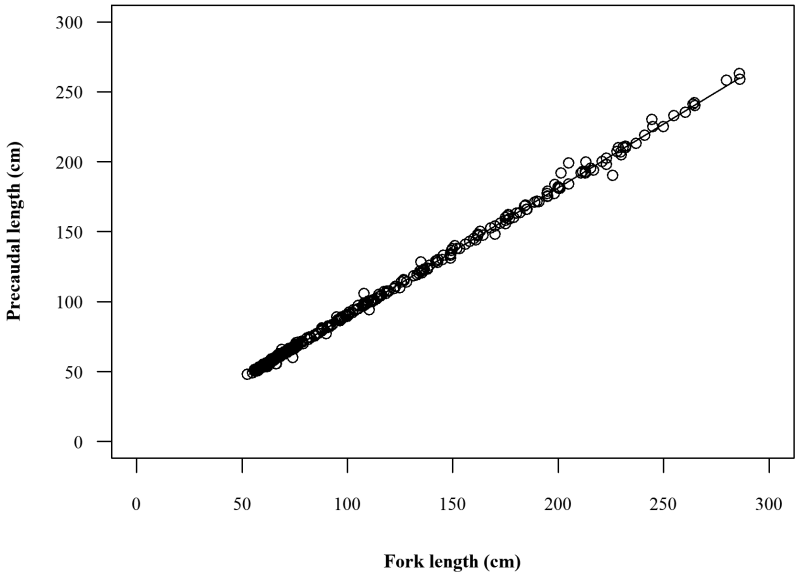


Figure 30C.−Relationship between over-the-body fork length and precaudal length for tiger sharks from the western North Atlantic Ocean (sexes combined).

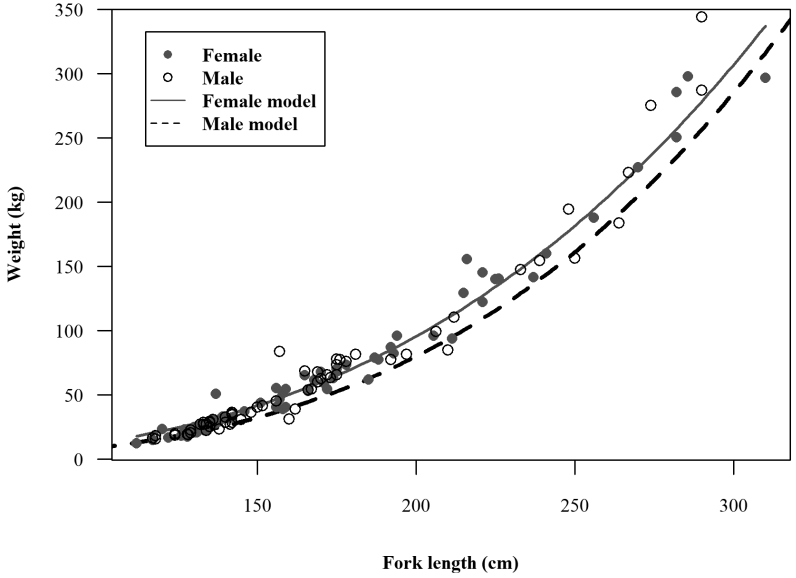


Figure 30D.−Relationship between over-the-body fork length and total weight for tiger sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.

White Shark,
Carcharodon carcharias

Table 31A.–Relationship between over-the-body fork length (FL_{OTB}) and total length (TL_{OTB}) for white sharks from the western North Atlantic Ocean in the form of $TL_{OTB} = a + b*FL_{OTB}$.

Sex	FL range	TL range	a	b	r^2	*n*
Combined	112.0–493.0	122.0–517.0	5.86	1.06	0.995	126
Female	112.0–376.0	122.0–406.0				59
Male	117.0–493.0	130.0–517.0				65

Table 31B.–Relationship between over-the-body fork length (FL_{OTB}) and total weight (W) for white sharks from the western North Atlantic Ocean in the form of $W = aFL_{OTB}^{b}$.

Sex	FL range	Weight range	a	b	RSE	*n*
Combined	112.0–493.0	12.2–1,554.5	7.47E-06	3.09	38.2	141
Female	112.0–310.0	12.2–298.0	2.33E-05	2.87	11.0	68
Male	117.0–493.0	15.9–1,554.5	9.06E-06	3.06	52.7	71

White shark. Photo: Greg Skomal.

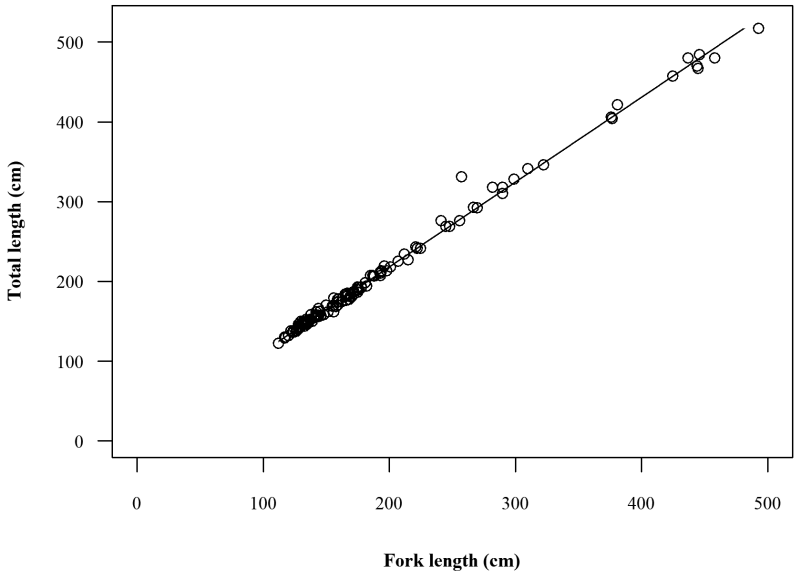


Figure 31A.−Relationship between over-the-body fork length and total length for white sharks from the western North Atlantic Ocean (sexes combined).

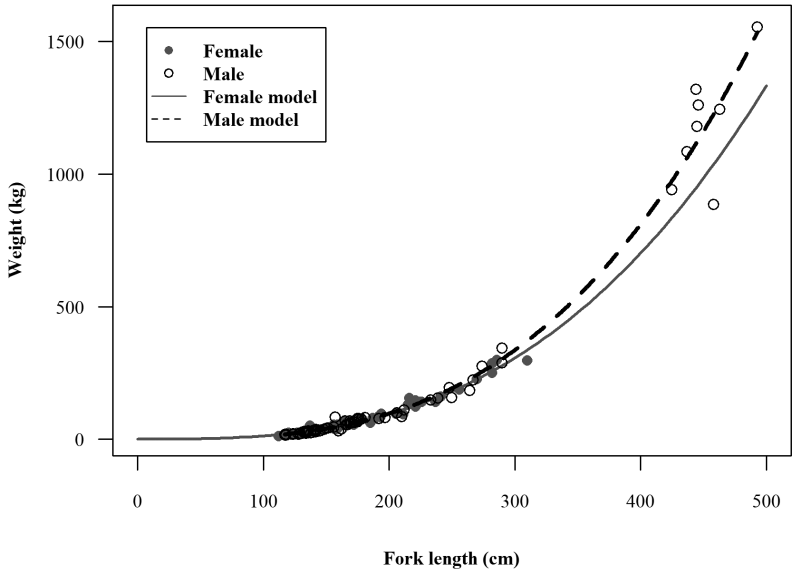


Figure 31B.−Relationship between over-the-body fork length and total weight for white sharks from the western North Atlantic Ocean. Solid circle = female, open circle = male, solid line = female, and dashed line = male.