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Management Data Series
No. 72
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ABSTRACT

Total length (TL)-wingspan (WS) relationships were determined for Atlantic stingray (Dasyatis sabina), cownose ray (Rhinoptera bonasus) and southern stingray (D. americana). TL was measured from tip of snout to tip of tail. WS was measured at widest point of body. Parameters for equations of the form TL = a+b(WS) were estimated for each species using regression analysis. Regression explained 71-87% of the variation of TL. It is recommended wingspan measurements be collected if stingrays have damaged tails.

INTRODUCTION

Weight-length and length-length equations have been developed for several finfish species in Texas coastal waters (Harrington et al. 1979, Campbell 1984, Campbell et al. 1988, Classen et al. 1988, Matlock et al. 1988, Morris and Martin 1990). Classen et al. (1988) described the weight-length relationship for Atlantic stingray (Dasyatis sabina). There are no known published reports describing the relationship of total length (TL) to wingspan (WS) of stingrays.

TL-WS conversion equations facilitate determination of TL from WS when a stingray tail has been damaged due to cutting by fishermen or to natural causes. This ensures that no stingray lengths are excluded from population analyses and thus removes a potential source of bias.

Objectives of the current study were to determine 1) regression equations to allow conversion of WS to TL measurements for Atlantic stingray, southern stingray, (Dasyatis americana) and cownose ray (Rhinoptera bonasus); and 2) percent of stingrays with damaged tails.

MATERIALS and METHODS

Stingrays were collected in coastwide Texas Parks and Wildlife Department (TPWD) fisheries independent bag seine, trawl and gill net samples during 1989. All stingrays were measured (nearest 1 mm) from wingtip to wingtip (WS) and from tip of snout to tip of tail (TL). Measurements were coded to distinguish stingrays with tails intact from those with damaged or missing tails.

Linear regression was performed to determine TL as a function of WS for each stingray species after eliminating outliers (studentized residuals >3). Stingrays with damaged or missing tails were not included in the TL-WS regression analyses.

Coefficients of determination were calculated for each equation; 95% confidence intervals were calculated for the Y intercept (a) and slope (b) of the formula $TL = a + b(WS)$. Regressions were performed using SAS-STAT (Freund and Littel 1986).

RESULTS

The TL-WS regressions for southern stingray, Atlantic stingray and cownose ray explained 71-87% of the variation of TL-WS (Table 1; Figures 1-3). Of all stingrays measured, 80%, 94% and 93% of southern stingray, cownose ray and Atlantic stingray, respectively, had tails intact.

DISCUSSION

The present report is the only known published information on the TL-WS relationship. Conversion equations developed in this study allow for conversion of data collected utilizing either TL or WS measurements. However, accurate conversions can only be produced for stingrays in the range of lengths used to derive the equations. Furthermore, the equation for southern stringray should be used with caution because only four individuals were measured. Based on the results of the present study it is recommended that wingspan measurements be obtained on all stingrays with damaged tails caught in TPWD samples. This will insure inclusion of all stingray lengths in required analyses.

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Table 1. TL-WS relationships using TL = a + b (WS) for Atlantic stingray, cownose ray and southern stingray.

Species	WS range (mm)	No. measured	a	b	Adjusted r2
Southern stingray	184-490	4	105.86	1.57	.78
Cownose ray	347-895	48	284.34	1.00	.71
Atlantic stingray	110-537	295	77.99	2.09	.87

Figure 1. Scatterplot of TL as a function of WS for cownose ray.

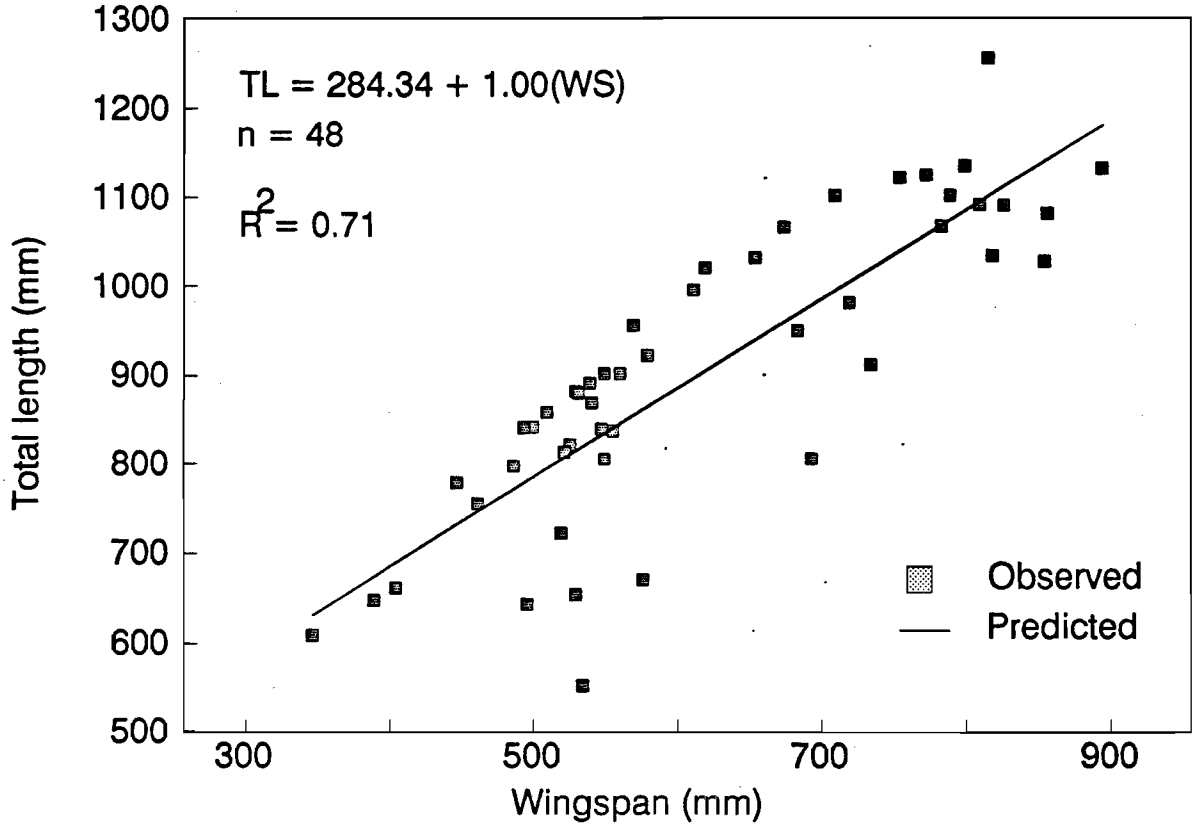

TL = 284.34 + 1.00(WS)
n = 48
R2 = 0.71
Observed
Predicted
Total length (mm)
Wingspan (mm)
1300
1200
1100
1000
900
800
700
600
500
300
500
700
900

Figure 2. Scatterplot of TL as a function of WS for Atlantic stingray.

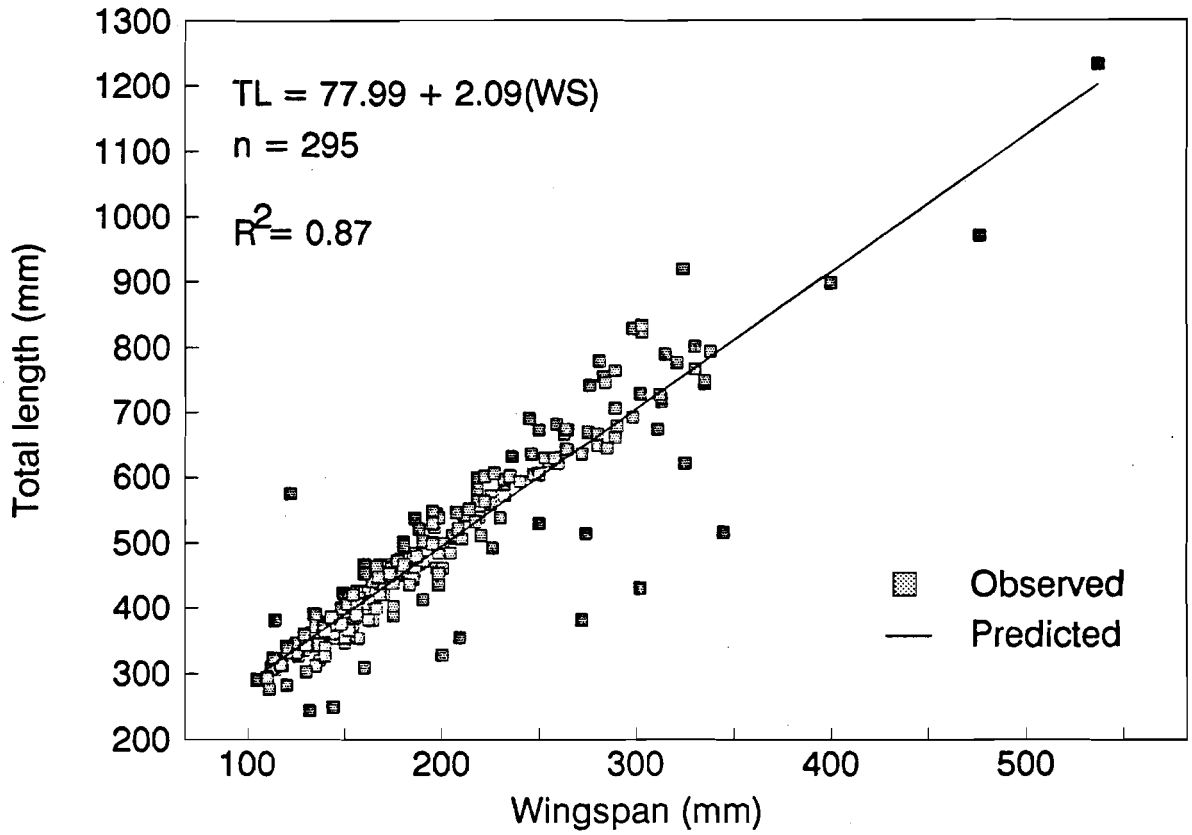
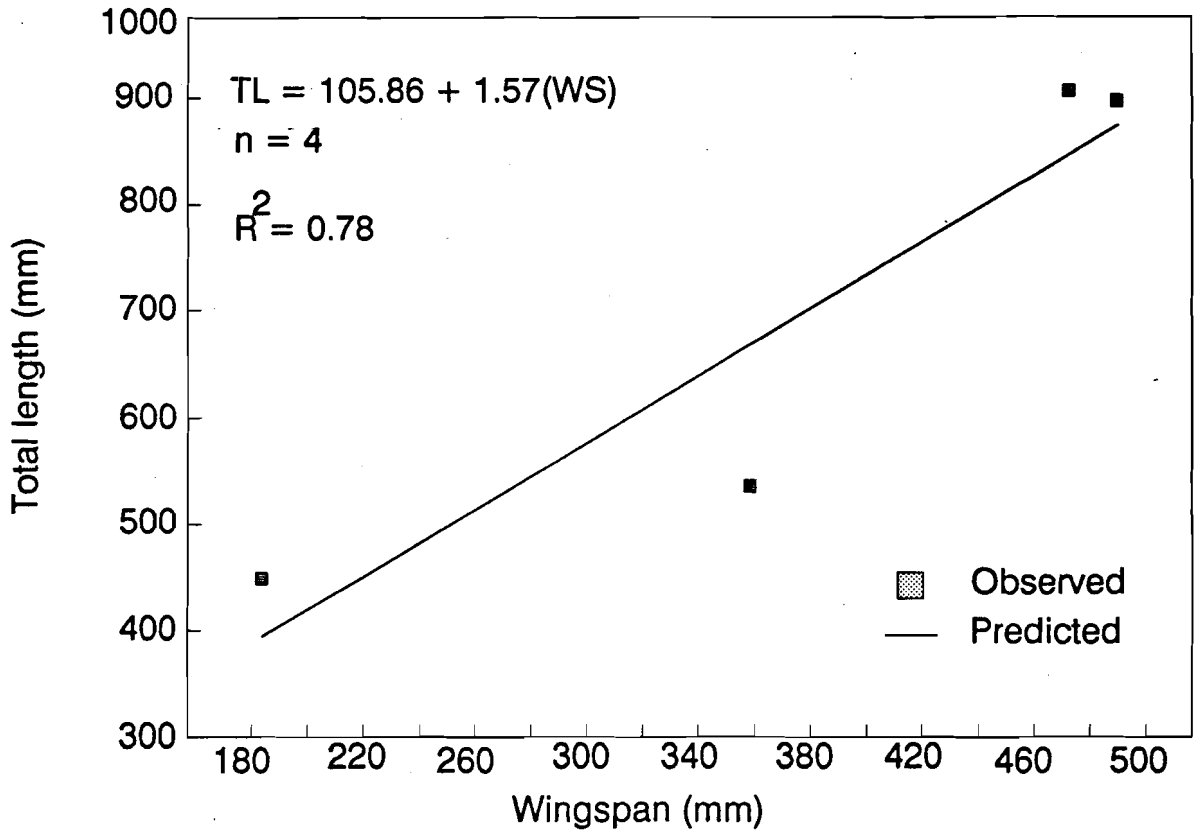

TL = 77.99 + 2.09(WS)
n = 295
R2= 0.87
Observed
Predicted
Total length (mm)
Wingspan (mm)
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
200
300
400
500

Figure 3. Scatterplot of TL as a function of WS for Southern stingray.


TL = 105.86 + 1.57(WS)
n = 4
R2 = 0.78
Observed
Predicted
Total length (mm)
Wingspan (mm)
1000
900
800
700
600
500
400
300
180
220
260
300
340
380
420
460
500

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