Total
Length-Wingspan
Relationships of
Three Stingray
Species

by
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Management Data Series
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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 Littell 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 stingray 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.
LITERATURE CITED


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

<table>
<thead>
<tr>
<th>Species</th>
<th>WS range (mm)</th>
<th>No. measured</th>
<th>a</th>
<th>b</th>
<th>Adjusted $r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern stingray</td>
<td>184-490</td>
<td>4</td>
<td>105.86</td>
<td>1.57</td>
<td>.78</td>
</tr>
<tr>
<td>Cownose ray</td>
<td>347-895</td>
<td>48</td>
<td>284.34</td>
<td>1.00</td>
<td>.71</td>
</tr>
<tr>
<td>Atlantic stingray</td>
<td>110-537</td>
<td>295</td>
<td>77.99</td>
<td>2.09</td>
<td>.87</td>
</tr>
</tbody>
</table>
Figure 1. Scatterplot of TL as a function of WS for cownose ray.
Wingspan (mm)

TL = 284.34 + 1.00(WS)
n = 48

\[ R^2 = 0.71 \]
Figure 2. Scatterplot of TL as a function of WS for Atlantic stingray.
\[ TL = 77.99 + 2.09(WS) \]

\[ n = 295 \]

\[ R^2 = 0.87 \]
Figure 3. Scatterplot of TL as a function of WS for Southern stingray.
$TL = 105.86 + 1.57(WS)$

$n = 4$

$R^2 = 0.78$
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