

Tabular Data on Marine Fishes From Southern Africa, Part I: Length-Weight Relationships*

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Abstract

The parameters a and b of length-weight relationship of the form $W = aL^b$ were computed for 122 species from graphs presented in R. van der Elst's "Guide to the Common Sea Fishes of Southern Africa".

Introduction

Van der Elst (1981) provided in his "Guide to the Common Sea Fishes of Southern Africa" excellent accounts on 313 species of marine fishes, covering not only the taxonomy and distribution of each species but also various aspects of their biology.

Particularly, he provided in the form of simple graphs length-weight (L-W) relationships for 122 of the species, from 93 genera and 44 families covered in his book.

In view of enabling subsequent entry of this useful information into FISHBASE (Froese 1990), the parameters a and b of equations of the form

$$W = a \cdot L^b \quad \dots 1)$$

are presented here for these 122 species.

Materials and Methods

Four L-W data pairs were read off from each L-W graph presented in van der Elst (1981); base-10 logarithm were taken, and the parameters a and b estimated using the linear regression routine of the Lotus 1-2-3 software. As the data were read off computed curves, perfect correlations were obtained in all cases, obviating the need to report here correlation coefficients, standard error of estimates, degrees of freedom, etc.

Results and Discussion

Table 1 presents the result obtained here by species. Fig. 1 shows that the estimates of the parameter "b" obtained here tend to be normally distributed, as previously shown for other groups of fishes by Carlander (1969) and Cinco (1982). However, the mean value of $b = 2.88$ is significantly lower than the mean value of 3 reported by these authors (t-test, $df = 121$, $\alpha = 0.01$).

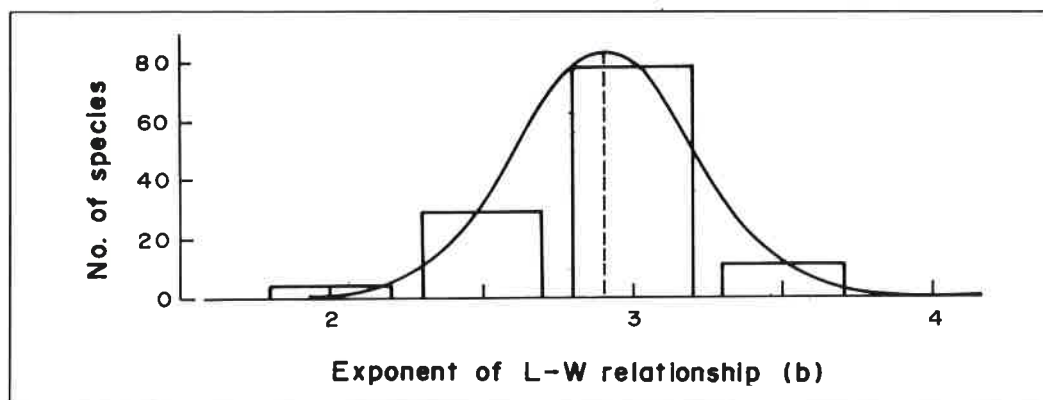


Fig. 1 Frequency distribution of 122 values of the exponent (b) the length-weight relationships of marine fishes from Southern Africa, with superimposed normal distribution ($\bar{X} = 2.88$, s.d. 0.30).

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Table 1. Parameters (a, b) of the length-weight relationship and maximum size of 122 species of marine fishes from Southern Africa, with length (Fork or Total) or width (W, for rays only) in cm, and weight in kg (adapted from data in van der Elst 1981).

| Species | Parameters | | Size (cm) | |
|----------------------------------|-----------------------|------|-----------|------------------|
| | a | b | Type | Max. |
| CARCHARHINIDAE | | | | |
| <i>Carcharhinus brachysurus</i> | 1.04×10^{-6} | 2.90 | T | 300 |
| <i>Carcharhinus leucas</i> | 2.22×10^{-5} | 2.82 | T | 320 |
| <i>Carcharhinus limbatus</i> | 7.14×10^{-6} | 3.01 | T | 250 |
| <i>Carcharhinus obscurus</i> | 9.45×10^{-6} | 2.93 | T | 350 |
| <i>Carcharhinus sealei</i> | 2.07×10^{-6} | 3.21 | T | 100 |
| <i>Galeocerdo cuvieri</i> | 1.22×10^{-6} | 3.30 | T | 740 |
| <i>Galeorhinus galeus</i> | 1.09×10^{-5} | 2.83 | T | 170 |
| <i>Mustelus canis</i> | 2.29×10^{-6} | 3.10 | T | 150 |
| <i>Rhizoprionodon acutus</i> | 1.51×10^{-5} | 2.72 | T | 100 |
| DASYATIDAE | | | | |
| <i>Dasyatis jenkinsii</i> | 7.89×10^{-5} | 2.77 | W | 90 |
| <i>Dasyatis pastinaca</i> | 2.51×10^{-5} | 3.11 | W | 75 |
| <i>Himantura uarnak</i> | 8.48×10^{-5} | 2.72 | W | 200 |
| <i>Gymnura natalensis</i> | 7.68×10^{-6} | 3.02 | W | 250 |
| LAMNIDAE | | | | |
| <i>Carcharodon carcharias</i> | 3.21×10^{-6} | 3.18 | T | 640 |
| MYLIOBATIDAE | | | | |
| <i>Aetobatus narinari</i> | 5.86×10^{-6} | 3.13 | W | 200 |
| <i>Pteromylaeus bovinus</i> | 2.52×10^{-7} | 3.84 | W | 175 |
| ODONTASPIDIDAE | | | | |
| <i>Odontaspis taurus</i> | 1.06×10^{-5} | 2.94 | T | 320 |
| PRISTIDAE | | | | |
| <i>Pristis pectinata</i> | 1.71×10^{-6} | 3.04 | T | 600 |
| RHINOBATIDAE | | | | |
| <i>Rhinobatus annulatus</i> | 1.30×10^{-5} | 2.67 | T | 120 |
| <i>Rhinobatus leocospilus</i> | 2.21×10^{-5} | 2.56 | T | 120 |
| <i>Rhyncobatus djeddensis</i> | 3.84×10^{-6} | 3.06 | T | 300 |
| SCYLIORHINIDAE | | | | |
| <i>Halaelurus lineatus</i> | 2.52×10^{-6} | 3.05 | T | 55 |
| <i>Poroderma africanum</i> | 8.02×10^{-6} | 2.92 | T | 95 |
| SPHYRNIDAE | | | | |
| <i>Sphyrna zygaena</i> | 1.42×10^{-6} | 3.30 | T | 350 |
| SQUALIDAE | | | | |
| <i>Squalus acanthias</i> | 1.47×10^{-6} | 3.22 | T | 80 |
| <i>Squalus megalops</i> | 1.16×10^{-5} | 2.78 | T | 80 |
| ALBULIDAE | | | | |
| <i>Albula vulpes</i> | 2.33×10^{-5} | 2.89 | F | 100 |
| BELONIDAE | | | | |
| <i>Ablennes hians</i> | 7.40×10^{-7} | 3.13 | F | 100 |
| <i>Strongylura leiurus</i> | 9.72×10^{-7} | 3.13 | T | 100 |
| CARANGIDAE | | | | |
| <i>Carangoides fulvoguttatus</i> | 1.02×10^{-4} | 2.53 | F | 120 |
| <i>Caranx ignobilis</i> | 2.39×10^{-5} | 2.96 | F | 165 ^a |
| <i>Caranx melampygus</i> | 2.37×10^{-5} | 2.90 | F | 100 |
| <i>Caranx sem</i> | 3.90×10^{-5} | 2.77 | F | 100 |
| <i>Caranx sexfasciatus</i> | 3.26×10^{-5} | 2.50 | F | 80 |
| <i>Lichia amia</i> | 5.47×10^{-5} | 2.65 | F | 150 |
| <i>Megalaspis cordyla</i> | 4.74×10^{-5} | 2.58 | F | 50 |
| <i>Scomberoides tala</i> | 1.67×10^{-5} | 2.82 | F | 50 |
| <i>Seriola lalandi</i> | 6.39×10^{-5} | 2.61 | F | 150 |
| <i>Trachinotus botla</i> | 2.77×10^{-5} | 2.85 | F | 60 |
| <i>Trachurus capensis</i> | 1.87×10^{-5} | 2.79 | F | 70 |
| CLUPEIDAE | | | | |
| <i>Hilsa kelee</i> | 2.01×10^{-6} | 3.49 | F | 40 |
| <i>Sardinops ocellata</i> | 2.03×10^{-5} | 2.83 | T | 30 |
| CORACINIDAE | | | | |
| <i>Coracinus multifasciatus</i> | 1.90×10^{-5} | 3.13 | F | 30 |
| CORYPHAENIDAE | | | | |
| <i>Coryphaena hippurus</i> | 6.23×10^{-5} | 2.53 | F | 180 |
| ELOPIDAE | | | | |
| <i>Elops machnata</i> | 4.06×10^{-5} | 2.47 | F | 90 |

^a From Smith (1986)

Table 1. (continued)

| Species | Parameters | | Type | Size (cm) | |
|----------------------------------|-----------------------|------|------|-----------|-----------------|
| | a | b | | | Max. |
| ENGRAULIDAE | | | | | |
| <i>Thryssa vitrirostri</i> | 3.65×10^{-6} | 3.22 | T | | 20 |
| EPHIPPIDAE | | | | | |
| <i>Drepare punctata</i> | 1.67×10^{-5} | 3.19 | T | | 45 |
| GEMPILIDAE | | | | | |
| <i>Thrysites atun</i> | 2.45×10^{-5} | 2.66 | F | | 110 |
| ISTIOPHORIDAE | | | | | |
| <i>Istiophorus platypterus</i> | 1.09×10^{-3} | 1.89 | F | | 300 |
| <i>Makaira indica</i> | 6.53×10^{-6} | 2.96 | F | | 400 |
| <i>Makaira nigricans</i> | 7.34×10^{-6} | 2.96 | F | | 400 |
| <i>Tetrapturus audax</i> | 1.30×10^{-5} | 2.81 | F | | 320 |
| LEIOGNATHIDAE | | | | | |
| <i>Leiognathus equulus</i> | 2.13×10^{-5} | 2.88 | T | | 25 ^a |
| LOBOTIDAE | | | | | |
| <i>Lobotes surinamensis</i> | 4.28×10^{-5} | 2.84 | T | | 100 |
| LUTJANIDAE | | | | | |
| <i>Aprion virescens</i> | 2.94×10^{-5} | 2.76 | F | | 110 |
| <i>Lutjanus argentimaculatus</i> | 7.10×10^{-6} | 3.18 | T | | 150 |
| <i>Lutjanus kasmira</i> | 1.65×10^{-5} | 2.98 | T | | 40 |
| <i>Lutjanus sanguineus</i> | 1.84×10^{-5} | 2.92 | F | | 90 |
| <i>Lutjanus sebae</i> | 2.08×10^{-5} | 2.96 | F | | 100 |
| MEGALOPIDAE | | | | | |
| <i>Megalops cyprinoides</i> | 1.50×10^{-5} | 2.84 | F | | 50 |
| MERLUCCIIDAE | | | | | |
| <i>Merluccius capensis</i> | 9.37×10^{-6} | 3.00 | T | | 110 |
| MUGILIDAE | | | | | |
| <i>Liza tricuspidens</i> | 3.61×10^{-5} | 2.61 | T | | 75 |
| <i>Mugil cephalus</i> | 9.35×10^{-6} | 3.02 | T | | 80 |
| <i>Valamugil cunnesius</i> | 1.59×10^{-5} | 2.88 | T | | 35 |
| MURAENESOCIDAE | | | | | |
| <i>Muraenesox bagio</i> | 4.20×10^{-7} | 3.37 | T | | 200 |
| OPLEGNATHIDAE | | | | | |
| <i>Oplegnathus conwayi</i> | 2.37×10^{-4} | 2.34 | F | | 80 |
| OPHIDIIDAE | | | | | |
| <i>Xiphiurus capensis</i> | 1.25×10^{-6} | 3.33 | T | | 150 |
| PLATYCEPHALIDAE | | | | | |
| <i>Platycephalus indicus</i> | 9.20×10^{-5} | 2.33 | T | | 100 |
| PLOTOSIDAE | | | | | |
| <i>Plotosus limbatus</i> | 9.06×10^{-6} | 2.94 | T | | 50 |
| POMADASYIDAE | | | | | |
| <i>Diagramma pictum</i> | 3.30×10^{-6} | 3.28 | F | | 100 |
| <i>Pomadasys commersonni</i> | 1.59×10^{-5} | 2.90 | T | | 80 |
| <i>Pomadasys hasta</i> | 4.24×10^{-5} | 2.66 | T | | 50 |
| <i>Pomadasys multimaculatum</i> | 3.54×10^{-5} | 2.75 | T | | 75 |
| <i>Pomadasys olivaceum</i> | 4.52×10^{-5} | 2.69 | F | | 25 |
| <i>Rhonciscus anas</i> | 3.00×10^{-5} | 2.84 | F | | 50 |
| POMATOMIDAE | | | | | |
| <i>Pomatomus saltator</i> | 2.17×10^{-5} | 2.82 | T | | 100 |
| RACHYCENTRIDAE | | | | | |
| <i>Rachycentron canadum</i> | 5.62×10^{-6} | 3.16 | F | | 200 |
| SCIAENIDAE | | | | | |
| <i>Argyrosomus hololepidotus</i> | 3.01×10^{-5} | 2.76 | T | | 200 |
| <i>Johnius belangerii</i> | 2.07×10^{-5} | 2.85 | T | | 30 |
| <i>Otolithes ruber</i> | 2.21×10^{-5} | 2.79 | T | | 70 |
| SCOMBRIDAE | | | | | |
| <i>Acanthocybium solandri</i> | 2.51×10^{-6} | 3.19 | F | | 200 |
| <i>Auxis thazard</i> | 5.47×10^{-5} | 2.70 | F | | 50 |
| <i>Euthynnus affinis</i> | 3.18×10^{-5} | 2.84 | F | | 100 |
| <i>Katsuwonus pelamis</i> | 4.84×10^{-6} | 3.37 | F | | 75 |
| <i>Rastrelliger kanagurta</i> | 6.36×10^{-6} | 3.17 | T | | 35 |
| <i>Sarda orientalis</i> | 2.17×10^{-5} | 2.87 | F | | 80 |

^a From Smith (1986)

Table 1. (continued)

| Species | Parameters | | Size (cm) | |
|------------------------------------|-----------------------|------|-----------|------|
| | a | b | Type | Max. |
| SCOMBRIDAE | | | | |
| <i>Scomber japonicus</i> | 4.54×10^{-6} | 3.27 | F | 70 |
| <i>Scomberomorus commerson</i> | 1.06×10^{-5} | 2.94 | F | 200 |
| <i>Scomberomorus plurilineatus</i> | 2.30×10^{-4} | 2.23 | F | 120 |
| <i>Thunnus alalunga</i> | 8.95×10^{-6} | 3.21 | F | 140 |
| <i>Thunnus albacares</i> | 7.35×10^{-5} | 2.69 | F | 210 |
| SCORPIDAE | | | | |
| <i>Neoscorpis lithophilus</i> | 1.80×10^{-5} | 3.06 | F | 50 |
| SERRANIDAE | | | | |
| <i>Dinoperca petersii</i> | 2.49×10^{-5} | 2.96 | T | 75 |
| <i>Ephinephelus andersoni</i> | 2.00×10^{-5} | 2.89 | T | 80 |
| <i>Ephinephelus chlorostigma</i> | 9.76×10^{-5} | 2.44 | T | 70 |
| <i>Ephinephelus tukula</i> | 1.06×10^{-4} | 2.56 | T | 200 |
| SOLEIDAE | | | | |
| <i>Austroglossus pectoralis</i> | 3.60×10^{-6} | 3.11 | T | 45 |
| SPARIDAE | | | | |
| <i>Acanthopagrus berda</i> | 1.77×10^{-5} | 3.00 | T | 75 |
| <i>Argyrozona argyrozona</i> | 1.56×10^{-5} | 3.01 | F | 90 |
| <i>Boopsoida inornata</i> | 6.64×10^{-4} | 1.88 | T | 40 |
| <i>Cheimerius nufar</i> | 1.32×10^{-4} | 2.48 | F | 75 |
| <i>Chrysoblephus anglicus</i> | 8.93×10^{-5} | 2.68 | F | 80 |
| <i>Chrysoblephus laticeps</i> | 2.00×10^{-5} | 3.08 | T | 50 |
| <i>Chrysoblephus puniceus</i> | 5.31×10^{-5} | 2.80 | F | 60 |
| <i>Cymatoceps nasutus</i> | 2.27×10^{-5} | 3.05 | F | 100 |
| <i>Diplodus cervinus</i> | 6.79×10^{-5} | 2.65 | T | 50 |
| <i>Diplodus sargus</i> | 4.22×10^{-5} | 2.87 | F | 40 |
| <i>Pachymetopon blochii</i> | 2.31×10^{-5} | 3.03 | F | >35 |
| <i>Pachymetopon grande</i> | 1.70×10^{-4} | 2.46 | F | 70 |
| <i>Pagellus natalensis</i> | 6.74×10^{-6} | 3.38 | F | 35 |
| <i>Polysteganus praeorbitalis</i> | 9.08×10^{-5} | 2.58 | F | 75 |
| <i>Polysteganus undulosus</i> | 1.66×10^{-4} | 2.47 | T | 100 |
| <i>Rhabdosargus auriventris</i> | 2.50×10^{-5} | 3.03 | F | 50 |
| <i>Rhabdosargus holubi</i> | 3.05×10^{-5} | 2.92 | F | 40 |
| <i>Rhabdosargus sarba</i> | 3.22×10^{-5} | 2.82 | T | 80 |
| <i>Sarpa salpa</i> | 4.75×10^{-5} | 2.71 | F | 30 |
| <i>Sparodon durbanensis</i> | 8.33×10^{-5} | 2.61 | T | 120 |
| <i>SpondylIOSoma emarginatum</i> | 3.94×10^{-4} | 2.02 | T | 30 |
| SPHYRAENIDAE | | | | |
| <i>Sphyræna barracuda</i> | 1.92×10^{-5} | 2.84 | F | 180 |
| <i>Sphyræna jello</i> | 1.40×10^{-5} | 2.81 | F | 150 |
| SYNODONTIDAE | | | | |
| <i>Saurida undosquamis</i> | 9.06×10^{-6} | 2.99 | F | 50 |
| TRICHIURIDAE | | | | |
| <i>Trichiurus lepturus</i> | 2.16×10^{-7} | 3.29 | T | 150 |

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