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Growth of Spiny Lobster (*Panulirus penicillatus*) Caught off San Vicente, Cagayan, Philippines

Croissance de la langouste fourchette* (Panulirus penicillatus) *pêchée aux abords de San Vicente, Cagayan, Philippines

R.V. Arellano

Abstract

Estimates of growth parameters for male and female *Panulirus penicillatus* caught in coral reef areas off San Vicente, Cagayan, Philippines are presented. Length-weight relationship parameters are also given. The results indicate that the slope (b) is significantly below 3.0 and does not differ significantly between males and females.

Résumé

Cet article présente les données de croissance ainsi que les rapports poids pour longueur des mâles et des femelles Panulirus penicillatus *pêchés dans les récifs coralliens aux abords de San Vicente, Cagayan aux Philippines. Les résultats indiquent que la pente (b) est significativement inférieure à 3,0 et ne diffère pas significativement entre mâles et femelles.*

parameters are available for Nigerian fishes. An earlier study by King (1996) provided information on the LWR of 73 populations of inlandwater fishes of Nigeria. The present compilation focuses on the length-weight parameters of 76 fish populations in Nigerian coastal (i.e., marine/brackish) waters.

Materials and Methods

Fishes were sampled from Nigerian coastal waters over an 11-year period (1984-1994 inclusive), using set gillnets, beach seine, cast nets, hooks and traditional valved basket traps. They were identified (nomenclature of the taxa conformed to Lévèque et al. (1992) and Teugels et al. (1992)), measured (cm, total or standard length), and weighed (g, total fresh weight) after draining water from the buccal cavity and blot-drying excess water on the body.

For each species or population, the parameter a (proportionality constant or intercepts) and b (exponent) of the LWR of the form:

$$W = aL^b \qquad \ldots 1)$$

were estimated through base-10 logarithm transformation of length-weight data pairs and ordinary least-squares linear regression (i.e., log transformation version of equation 1) viz:

$$\log W = \log a + b \log L \qquad \ldots 2)$$

Whenever possible, estimates of length-weight parameters were made for male and female fishes, along with estimates for combined sexes. These estimates are treated here as separate populations.

Additional LWR parameters were derived from the literature. In some of these cases, important information was missing (e.g., sample sizes, correlation coefficients and size ranges). All results presented here are cm for lengths and g for weights.

Results and Discussion

Table 1 summarizes the LWR parameters for 76 Nigerian coastal water fish populations from 11 families, 18 genera and 22 species. These comprised 39 cases analyzed using original data, and 37 cases derived from the literature. Interpopulational variability in the value of the intercept a was highly heterogenous (CV = 142.6%) and varied from $a_{min} = 1.1 \times 10^{-3}$ in *Pseudotolithus elongatus* to $a_{max} = 1.533 \times 10^{-1}$ in *Periophthalmus barbarus*. Interpopulational variability in the exponent b revealed high homogeneity (CV = 10.1%), with values ranging from $b_{min} = 2.168$ in *Gobioides ansorgii* to $b_{max} = 3.635$ in *P. elongatus*. These estimates are mostly within the limits reported by Carlander (1969), Royce (1972) and Lagler et al. (1977).

The mean exponent ($\bar{b} = 2.912$, s.d. = 0.295) is significantly less than 3 ($t = 2.597$, $df = 75$, $P < 0.02$). Similarly, Torres (1991) reported a value of $\bar{b} < 3$ in a multispecies study of LWR. As an 'assemblage', thus, the Nigerian coastal water fishes exhibit allometric LWR, i.e., they tend to become thinner with increasing length. It may therefore be erroneous to generally apply the 'cube law (b = 3)' to the length-weight function of the fishes. In an earlier compilation of the LWR of Nigerian freshwater fishes, King (1996) also demonstrated an interpopulational negative allometric function ($\bar{b} = 2.911$, s.d. = 0.313). This estimate does not significantly depart from the $\bar{b}$ for the coastal water fishes ($t = 0.030$, $df = 75$, $P > 0.05$), connoting that the two broad categories of aquatic ecosystems (i.e., fresh and marine/brackish waters) are not different in terms of their impact on the shape of their fish populations.

Population-specific values of b (Table 1) indicate that 33 (43.4%) populations exhibited approximately isometric LWR (b = 2.94 - 3.28), 40 (52.6%) populations revealed negative allometric LWR (b < 2.94) and only 3 (4.0%) populations displayed positive LWR (b > 3.28). Variance-mean ratios were significantly less than unity (i.e., they tend strongly toward zero) in the case of a (VMR = 0.038: $t = 5.891$, $df = 75$, $P < 0.005$) and b (VMR = 0.030: $t = 5.940$, $df = 75$, $P < 0.005$), thus suggesting that both parameters are uniformly dispersed variates among the populations studied. King (1996) similarly noted that a and b were uniformly dispersed among the freshwater fishes of Nigeria.

for females). The slope for males is not significantly different from females (t = 2.02 d.f. 37 p <0.01).

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Length-Weight Relationships of Nigerian Coastal Water Fishes

Rapports de poids pour longueur des poissons du littoral nigérian

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Abstract

Length-weight relationships (LWR) of 76 fish populations, distributed among 11 families, 18 genera and 22 species, inhabiting coastal (marine/brackish water) ecosystems in Nigeria were estimated (39 cases) or assembled from the literature (37 cases). The mean exponent ($\bar{b}$ = 2.912) is significantly less than 3. While the frequency distribution of a was positively skewed, that of b was approximately normal. The mean a and b data are also presented by fish genera and families.

Résumé

Les rapports de poids pour longueur de 76 populations de poissons réparties en 11 familles, 18 genres et 22 espèces formant part des écosystèmes du littoral nigérian (espace marin et saumâtre) ont été calculés pour 39 cas ou restitués de la littérature pour 37 cas. L'exposant moyen ($\bar{b}$ = 2,912) était significativement inférieur à 3. Tandis que la distribution des fréquences de a était positivement biaisée, celle de b était pratiquement normale. Les valeurs moyennes pour a et b sont également représentées par genre et par famille.

Introduction

The length-weight relationships (LWR) of fish are important in fisheries biology. Applications of LWR include: estimation of mean weight of fish of a given body length, determination of body condition factors (an interpretation of relative well-being), and conversion of length-growth models to corresponding weight-growth models (e.g., Tyler and Gallucci 1980; Bolger and Connolly 1989; Kulbicki et al. 1993; King 1996). Only a few estimates of species-specific LWR