Length-weight relationships of coral reef fishes from the Alacran Reef, Yucatan, Mexico

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Abstract

Length-weight relationships were computed for 42 species of coral reef fishes from 14 families from the Alacran Reef (Yucatan, Mexico). A total of 1 892 individuals was used for this purpose. The fish species were caught by different fishing techniques such as fishhooks, harpoons, gill and trawl nets. The sampling period was from March 1998 to January 2000.

Introduction

The relationship between the length and the weight of fishes are related with the metabolism in each species and the environment where they live (Claro and Garcia Arteaga 1994). In coral reef fish studies, it is common that researchers estimate densities and biomasses by each geomorphologic zone (e.g., reef slope, backreef) or by the sampling site. In order to make these estimations, it is necessary to know the length-weight relationships of the species studied. Since the length-weight (L-W) relationships should be considered as indicators only for a region, we need to estimate the values for each reef ecosystem, in order to improve the interpretation of the results. This paper contributes with length-weight relationships data from Alacran Reef. These values can be used in fishery or biomass assessment and in trophic studies in the region. This is the first attempt to determine the relationships between length and weight of coral reef fishes in the Mexican reefs in the Gulf of Mexico.

Materials and Methods

This study was conducted from March 1998 to January 2000 in the Alacran Reef in Yucatan, Mexico (Figure 1). A total of 1 892 fishes were caught by different fishing techniques: trawl nets (main method), gill nets, harpoon and fishhook. Thirty trawls were conducted (14 during the day and 16 at night), principally in the southeast of Perez Island. Gill nets were also used in the south of the Alacran Reef. Harpoons and fish hooks were used in the different reef habitats (e.g. coral patches) where nets could not be utilized. A total of 42 species of coral fishes were identified to 14 families and 23 genera. The standard length for each fish was measured with an ichtiometer (0.1 cm precision) and the fish were weighed using a Portable Standard Ohaus balance (0.2 g precision). The relationship between the length and the weight ($W=a \cdot L^b$) were calculated through a logarithmic transformation: ln W= ln a + b ln L, where **a** is the intercept and **b** is the slope.

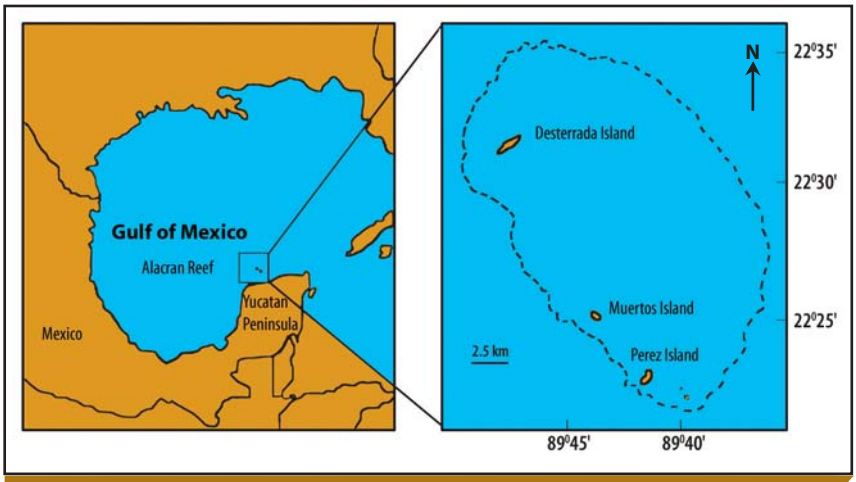

Fig. 1. Geographic location of the Alacran Reef, Yucatan, Mexico.

Results

The data of length-weight analysis are presented in Table 1. Figure 2 shows the frequency distributions of **b** values. This distribution is similar to those calculated by Garcia et al. (1998) and Duarte et al. (1999) in the Gulf of Salamanca, Colombia. The estimates of the parameter **b** ranged from 2.1 to 3.3, where *Haemulon striatum* (Linnaeus, 1758) presented the lowest value and *Lutjanus mahogoni* (Cuvier, 1828) the highest. The mean value and the standard deviation were estimated as being 2.8 and 0.30 respectively. In general, the values of **a** and **b** for the fish species were similar to those reported by Claro and Garcia-Arteaga (1994), Duarte et al. (1999) and Garcia et al. (1998).

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Table 1. Length-weight (L-W) relationships for the 42 species of coral reef fishes caught in the Alacran Reef, Yucatan, Mexico, between March 1998 and January 2000. a and b are the parameters of length-weight relationship. n=number of fishes used in the analysis, r^2 = regression coefficient, min=minimum size, and max=maximum size.

		Standard Length range (cm)					
Family	**Species**	**min**	**max**	**a**	**b**	**n**	**r^2**
Mugilidae	*Mugil curema*	5.7	31.9	0.015	3.1	154	0.98
Serranidae	*Cephalopholis cruentata*	8.5	22.3	0.048	2.8	14	0.98
	Epinephelus adscensionis	11.0	36.0	0.074	2.7	55	0.88
	Epinephelus guttatus	13.6	41.0	0.040	2.8	49	0.80
	Epinephelus morio	17.0	41.5	0.100	2.6	22	0.83
	Mycteroperca bonaci	20.0	69.0	0.020	3.0	56	0.84
Carangidae	*Caranx ruber*	30.0	56.6	0.291	2.2	48	0.78
	Caranx latus	5.4	70.0	0.030	2.9	89	0.97
	Trachinotus carolinus	3.8	19.0	0.031	3.0	19	0.96
	Trachinotus falcatus	4.0	59.0	0.042	2.9	172	0.95
	Trachinotus goodei	10.8	20.8	0.034	2.9	46	0.98
Lutjanidae	*Lutjanus analis*	9.2	61.0	0.067	2.6	29	0.89
	Lutjanus apodus	7.5	28.5	0.017	3.2	33	0.97
	Lutjanus griseus	6.5	46.0	0.033	2.9	125	0.98
	Lutjanus mahogoni	22.8	35.0	0.009	3.3	11	0.98
	Lutjanus jocu	10.2	42.0	0.048	2.8	10	0.99
	Lutjanus synagris	7.6	51.8	0.030	3.0	21	0.97
	Ocyurus chrysurus	9.9	34.0	0.022	3.0	47	0.89
Haemulidae	*Anisotremus virginicus*	14.5	23.0	0.047	2.9	21	0.96
	Haemulon chrysargyreum	11.5	16.0	0.042	2.8	11	0.93
	Haemulon flavolineatum	4.3	19.8	0.025	3.0	231	0.87
	Haemulon parra	7.0	31.0	0.037	2.9	42	0.99
	Haemulon plumieri	13.0	29.5	0.031	3.0	112	0.91
	Haemulon sciurus	11.0	27.6	0.082	2.6	72	0.73
	Haemulon striatum	11.8	15.0	0.278	2.1	13	0.62
Sparidae	*Archosargus rhomboidalis*	4.6	8.0	0.068	2.4	10	0.63
	Calamus bajonado	20.5	42.0	0.100	2.7	17	0.83
	Calamus calamus	12.6	37.3	0.066	2.8	14	0.90
Mullidae	*Mulloidichthys martinicus*	12.3	29.0	0.022	3.0	10	0.98
Pomacanthidae	*Pomacanthus arcuatus*	7.8	25.0	0.366	2.3	16	0.72
Kyphosidae	*Kyphosus sectatrix*	9.0	38.0	0.107	2.6	38	0.91
Labridae	*Halichoeres bivittatus*	9.0	14.5	0.012	3.2	10	0.92
	Lachnolaimus maximus	18.0	46.0	0.049	2.9	31	0.94
Scaridae	*Scarus coeruleus*	13.0	38.5	0.028	3.0	27	0.97
	Scarus guacamaia	20.0	43.0	0.014	3.2	10	0.98
	Scarus iseri	9.2	17.5	0.016	3.2	31	0.94

Table 1. (continued)

		Standard Length range (cm)					
Family	**Species**	**min**	**max**	**a**	**b**	**n**	**r^2**
Acanthuridae	*Acanthurus bahianus*	12.0	20.6	0.078	2.8	14	0.98
	Acanthurus chirurgus	10.0	23.0	0.154	2.6	42	0.76
	Acanthurus coeruleus	3.7	31.5	0.091	2.8	31	0.96
Sphyraenidae	*Sphyraena barracuda*	8.2	92.0	0.006	3.1	38	0.92
Scombridae	*Scomberomorus regalis*	42.7	64.0	0.185	2.2	34	0.72

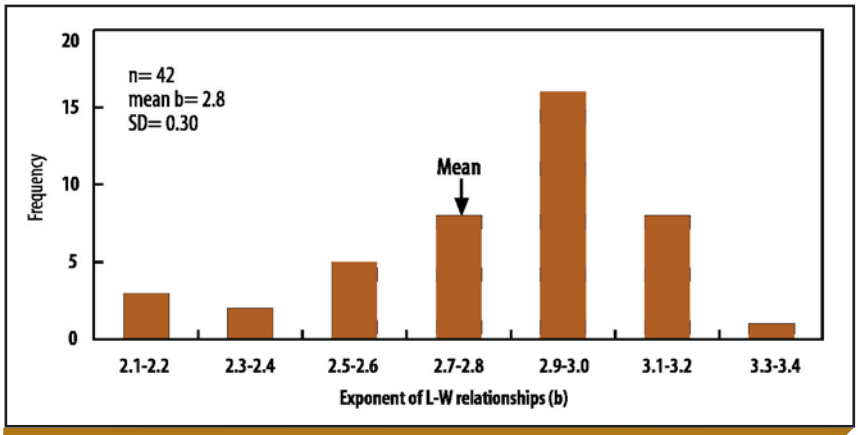

Fig. 2. Frequency distribution of b values for the 42 species of coral reef fishes in the Alacran Reef, Mexico. n=number of species, SD=standard deviation of the mean

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References

García, C.B., J.O. Duarte, N. Sandoval, D. von Schiller, G. Melo and P. Navajas. 1998. Length-weight relationships of demersal fishes from the Gulf of Salamanca, Colombia. Naga, ICLARM Q. 21(3):30-32.

Duarte, L.O., C.B. García, N. Sandoval, D. von Schiller, G. Melo and P. Navajas. 1999. Length-weight relationships of demersal fishes from the Gulf of Salamanca, Colombia. Naga, ICLARM Q. 22(1): 34-36.

Claro, M.R. and J.P. García-Arteaga. 1994. Crecimiento. p. 321-402. ***In*** R. Claro (ed.) Ecología de los peces marinos de Cuba. CIQRO. México. 525 p.

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