

LENGTH, WEIGHT AND AGE CONVERSION TABLES
FOR ATLANTIC TUNAS

by

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SUMMARY

The Southwest Fisheries Center, La Jolla, California, frequently receives requests for information on size and age of Atlantic tunas. To meet such requests, tables of relative lengths, weights and ages of tunas were prepared by the Center for limited distribution. The International Commission for the Conservation of Atlantic Tunas (ICCAT, 1973) established minimum size regulations which indicated that the tables may be useful to a wider audience. The equations, parameter values used in the equations, and the tables generated by the equations are presented and discussed in this paper.

RESUME

Le "Southwest Fisheries Center" de La Jolla, Californie, reçoit fréquemment des demandes d'information sur la taille et l'âge des thonidés atlantiques. Des tableaux de données relatives de longueur, poids et âge ont été élaborés par le centre pour répondre à ces demandes, et sont destinés à une diffusion limitée. La Commission Internationale pour la Conservation des Thonidés de l'Atlantique (ICCAT, 1973) a établi des réglementations de taille minimum, d'où l'intérêt de donner une diffusion plus ample à ces tableaux. Le présent document traite des équations utilisées, ainsi que des valeurs paramétriques employées dans ces équations et des tableaux qui en découlent.

RESUMEN

La "Southwest Fisheries Center", La Jolla, California, recibe con frecuencia solicitudes de información sobre talla y edad de los túnidos del Atlántico. Con el fin de proveer esta información, el Centro preparó unas tablas con las tallas, pesos y edades relativas de los túnidos, para una distribución limitada. La Comisión Internacional para la Conservación del Atún Atlántico (ICCAT, 1973) estableció unas regulaciones de tallas mínimas, para que las tablas pudieran ser útiles a una mayor audiencia. Las ecuaciones, los valores paramétricos empleados en las ecuaciones, y las tablas resultantes son presentados y discutidos en este documento.

Tables 2 - 5 reproduced in Data Record Vol. 7.

Tableaux 2 à 5 reproduits dans le Vol. 7 du Recueil de Données.

Cuadros 2 a 5 reproducidos en la Vol. 7 de la Colección de Datos Estadísticos.

Procedure

Average weight for a given length was calculated from the length-weight relation,

$$W = \alpha L^\beta$$

where W is the weight in kilograms, L is the fork length in centimeters and α and β are empirically determined constants.

Average age for a given length was calculated from the von Bertalanffy growth equation,

$$L_t = L_\infty [1 - e^{-K(t-t_0)}] \quad \text{or} \quad t = t_0 - \frac{\ln[1 - L_t/L_\infty]}{K}$$

where L_t is the length in centimeters at time t in years, L_∞ is the asymptotic length, K is the rate at which the asymptote is attained and t_0 is the theoretical age in years when $L_t = 0$.

Estimates of parameters for the length-weight and growth equations in this study are shown in Table 1. They are from several sources which were selected by using three criteria: 1) that the sample size was large, 2) that the range of fish sizes was wide, and 3) that the study was the latest available (for this work 1969-1974, Table 1). All estimates of parameters except those for growth of skipjack, are for tunas from the Atlantic Ocean. Published parameter estimates of growth for skipjack from the Atlantic Ocean (Batts, 1972) were not used because they would not fit the extrapolations considered here. Instead, the more reasonable estimates for skipjack from the Pacific Ocean were used.

Results and Limitations

Tables 2-5 show the relationship between fork length, round (ungutted) weight and age of yellowfin, skipjack, bluefin and albacore tunas. The results have four limitations as follows: First, the parameter estimates were from published sources (Table 1). In some cases, the estimates were based on few samples from specific regions of the Atlantic. If there are significant regional differences in length-weight or growth, the tables may be inappropriate. Second, the parameter estimates were based on data averaged over several seasons and year classes. The average estimates may not be appropriate for specific year classes (Le Guen and Sakagawa, 1973) or during specific seasons (Rodríguez-Roda, 1964). The third limitation involved extrapolation and interpolation of weight and age estimates from the equations. In some cases this may have resulted in the application of parameter estimates beyond the constraints of the data from which they were derived, e.g., range of sizes (Table 1). Finally, estimates of growth of skipjack were based on information from the Pacific Ocean and not the Atlantic Ocean. If there is significant difference in growth of skipjack between the Atlantic and the Pacific, then the estimated age for a given length in Table 3 is erroneous.

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Literature Cited

Table 1. Estimates of length-weight and growth parameters. Length is fork length in centimeters, K and t_0 are in years.

Batts, Billy S. 1972. Age and growth of the skipjack tuna, *Katsuwonus pelamis* (Linnaeus), in the North Carolina waters. Chesapeake Science, 13: 237-244.

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Joseph, J. and T.P. Calkins. 1969. Population dynamics of the skipjack tuna (*Katsuwonus pelamis*) of the eastern Pacific Ocean. Inter-Amer. Trop. Tuna Comm. Bull. 13: 7-80.

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Lenarz, W. 1974. Length-weight relations for five eastern tropical Atlantic scombrids. Fish. Bull., U.S. 72: 848-851.

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Species	Equation	Parameter	Estimate	Size range (cm)	Area	Source
Yellowfin	length-weight	α	2.1804×10^{-5}	40.0-170.0	West Africa	Lenarz(1974)
	growth	β	2.96989			
L_{∞}		194.8				
K		0.42				
Skipjack	length-weight	α	5.611×10^{-6}	36.0-64.0	West Africa	Lenarz(1974)
	growth	β	3.31497			
L_{∞}		88.1				
K		431				
Bluefin	length-weight	α	3.17×10^{-5}	35.0-270.0	Northwestern Atlantic	Sakagawa and Coan(MS) ¹
	growth	β	2.9044			
L_{∞}		447.88				
K		.053				
Albacore	length-weight	α	6.303×10^{-6}	44.0-112.0	Northern Atlantic	Beardsley(1971)
	growth	β	3.2825			
L_{∞}		140.0				
K		.141				
		t_0	-1.63	44.0-112.0	Northern Atlantic	Beardsley(1971)

¹ Sakagawa, G.T. and A.L. Coan. 1973. A review of some aspects of the bluefin tuna (*Thunnus thynnus thynnus*) fisheries of the Atlantic Ocean. Unpublished Manuscript, National Marine Fisheries Service, Southwest Fisheries Center, La Jolla, California, 92038.