

DEPENDENCE OF THE MASS OF BIGEYE TUNA (*THUNNUS OBESUS*)  
OF THE TROPICAL PART OF THE ATLANTIC OCEAN ON THE LENGTH

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SUMMARY

The measurements of the length and mass of bigeye tuna taken in 1971-1974 made it possible to calculate a theoretical "length-mass" dependence for tunas from different areas of the tropical part of the Atlantic Ocean. The differences between the coefficients "a" and "b" were revealed for tunas caught to the north and to the south of the equator.

RESUME

Les mesures de longueur et de poids de thons obèses relevées en 1971-1974 ont permis de calculer un rapport théorique "poids-longueur" pour les thonidés de différentes régions de la zone tropicale de l'océan Atlantique. Des différences entre les coefficients "a" et "b" ont été décelées pour les thonidés capturés au nord et sud de l'équateur.

RESUMEN

Las mediciones de la talla y volumen del patudo tomadas en 1971-1974 hacen posible calcular una "talla-volumen" de dependencia teórica para túnidos de diferentes zonas de la parte tropical del Océano Atlántico. Las diferencias entre los coeficientes "a" y "b" son dadas a conocer para captura de túnidos al Norte y Sur del Ecuador.

Being aware of the scarcity of data on the biology of bigeye tuna of the Atlantic Ocean we came to a decision to report the results of our investigations of a "mass-length" dependence. The length and mass of bigeye tunas were measured in 1971-1974 on board commercial and research ships. Bigeye tunas were caught by longlines in Subareas 4 and 5 (according to ICCAT division). The length of tunas was measured from the tip of the snout to the fork of middle rays of the caudal fin (LF) to within 1 cm, and the mass was weighted to within 0.2 kg.

The "mass-length" dependence was calculated on the computer by the formula  $W = al^b$ , where W is the mass in kg, l is the length in cm and "a" and "b" are the coefficients.

In our calculations we used only four-most representative-samples for which the values of the "a" and "b" coefficients were deduced (table 1). Sample 1 was taken in the area of the Northern Trade Wind Current, sample 2 along the equator boundary and samples 3 and 4 to the south of the equator. Therefore, the areas from which the samples were obtained cover both the northern and southern parts of the tropical Atlantic.

There is a satisfactory correlation between the actual and calculated values of the mass depending on the length (table 2).

As is evident from the comparison of these values between the four samples, there exist differences between the tunas caught northward and southward of the equator (samples 3 and 4). These differences are to a certain degree indicative of the presence of various groupings of bigeye tuna in the tropical Atlantic with a division zone passing in the equator area.

Table 1

Data of the "a" and "b" coefficients calculation in the "mass-length" dependence

Samples	Sampling area	Date	Length fluctuation, cm	Number of measured sp.	"Mass-length" dependence
1	7-11°N 36-38°W	VI-VII, 1974	98-147	489	$P = 2.2606 \cdot L^{2.9885} \cdot 10^{-5}$
2	3°N-2°S 6-13°W	XI-1973 II-1974	93-162	729	$P = 1.8117 \cdot L^{3.0386} \cdot 10^{-5}$
3	2 - 7°S 2-10°W	I - III, 1972	148-182	132	$P = 1.8786 \cdot L^{2.9912} \cdot 10^{-5}$
4	0 - 4°S 9 - 4°W	XII, 1970 I, 1971	133-167	413	$P = 1.6029 \cdot L^{3.0242} \cdot 10^{-5}$

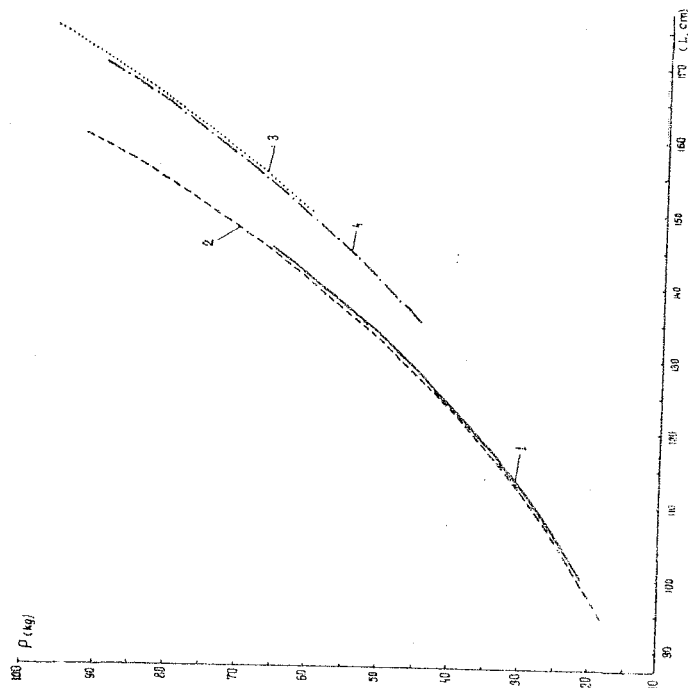


FIG. 1. A curve of "length-mass" dependence for bigeye tuna from different areas of the tropical Atlantic ( 1,2 - samples taken northward of the equator; 3,4 - samples taken southward of the equator).

Table 2

Actual and calculated values of bigeye tuna mass from the data of different samples

Mean length, cm	M a s s , k g							
	Sample 1		Sample 2		Sample 3		Sample 4	
	Actual	Calculated	Actual	Calculated	Actual	Calculated	Actual	Calculated
95	-	-	19.45	18.52				
100	20.65	21.44	19.83	21.64				
105	27.66	24.80	26.03	25.10				
110	29.33	28.50	28.84	28.91				
115	30.64	32.55	31.58	33.10				
120	38.76	36.96	38.67	37.66				
125	41.55	41.76	43.16	42.64				
130	49.19	46.95	49.76	48.04				
135	53.11	52.56	53.82	53.88			44.72	44.40
140	59.92	58.59	60.45	60.17			49.60	49.57
145	66.78	65.07	66.78	66.94			54.65	55.12
150			73.76	74.21	59.44	60.66	60.21	61.07
155			81.18	81.98	68.76	66.91	67.56	67.43
160			89.83	90.20	74.09	73.58	75.40	74.23
165					79.97	80.67	82.27	81.47
170					87.11	88.20	88.11	89.17
175					96.81	96.19		