

A STUDY OF SOME BIOLOGICAL ASPECTS OF THE FISHING OF BLACKFIN TUNA (*THUNNUS ATLANTICUS*, LESSON)
IN THE STATE OF RIO GRANDE DO NORTE BRAZIL

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INTRODUCTION

Off the coast of Rio Grande do Norte the season for blackfin tuna is during the last quarter of the year.

The fishing of this species is traditional, and is intensified during the season from Macau to Baía Formosa-RN, the biggest production being in the Baía Formosa (Latitude $6^{\circ}22'3''S$, Longitude $35^{\circ}00'W$) situated near the state of Paraíba (Magalhães, 1939; Cascardo, 1957a, 1957b; Paiva and Costa 1963).

From 1969 to 1977 the production of blackfin tuna landed in the state of Rio Grande do Norte varied greatly (Table 1). Supposedly due to the following factors: The difference in the number of fishing boats operating during season, mainly in the Baía Formosa area, and the prolonged winters which occur some years. The methods of fishing are obsolete and therefore the results do not reach a higher level.

It should be pointed out that other species of tuniodes are landed, but the greatest part of the catch is blackfin tuna (Cruz, 1964).

The object of this study is to show the results of artisanal fishing in the Baía Formosa, the calculation were made on board R/V DIADORIM in relation to length-weight.

MATERIAL AND METHOD

1 - The data used to determine the relative density was obtained from the landings in the area of Baía Formosa during the last quarter of 1977. During these landings the weight of the blackfin tuna was registered as was the number of voyages (days at sea) per fishing boat.

The fishing is done by sailing boats of 7-9 meters in length and they operate 12 to 16 miles from the coast, using only a trolling line of 140 meters with a hook at the end of the line.

2 - To calculate the curve length-weight data was collected on board the R/V DIADORIM operating on the continental shelf, banks and oceanic islands off state of Rio Grande do Norte with surface multiple line trolling (map 1).

To obtain the relation between fork length (cm) and whole weight (kg) 543 species were studied during the year 1977, 330 males and 213 females, representing 60,8% and 39,2% respectively.

Using a wooden pequimeter with a precision of 0,1 cm for measuring fork length and the results were grouped into classes of 1 cm interval, while the weight (kg) were verified using a dynamometer with precision of 50 grammes. For each class the average weight was calculated (table 3).

The method of minimum quadrados (regression linear) was used to obtain the mathematical expression of the curve which relates these two biological parameters. The mathematical expression is the following:

$$W = a \times L^b$$

onde,
 W = Whole weight (kg)
 L = Fork length (cm)
 a e b = constants

Like that the converted logarithm ($\ln W = \ln a + b \times \ln L$) resulted in a linear relation and the parameters a and b were calculated by this regression.

DISCUSSION AND CONCLUSION

1 - Relative density

This study only takes into consideration the data from Baía Formosa during the last quarter of 1977 due to the fact that the greatest concentration of blackfin tuna in this area is during this period.

It was observed that the number of sailing boats that fished in the Baía Formosa during the last quarter of 1977, didn't very much (table 2) however the number of voyages (days sea) and the average of voyages per boat show a higher concentration of the effort during the month of October and after this it decreases un-

til of December (table 2), differing a little from the results found in the work of Cruz and Paiva, 1965.

In relation to the catch (kg) and the catch per voyage, the same didn't occur, the maximum was reached in November (Table 2).

Cruz, 1964 found the medium relative density for blackfin tuna of 39,4 kg/voyage (guttled fish), while in this study the index reached was 39,93 kg/voyage (guttled fish).

2 - Weight-length relation

The fork length of blackfin tuna varied from 36.5 to 81.5 cm, with a medium length of 62.8 cm, for males and 37.5 to 71.5, with a medium length of 58.0 cm, for females, while the whole weight noted (kg) was between 0.5 and 10.0 kg, with a medium weight of 4.6 kg (table 3).

With these data established the relation between fork length (cm) and whole weight (kg):

$$\text{Males - } W = 1,238 \times 10^{-8} L^{3.107}$$
$$r = 1,00$$

$$\text{Females - } W = 7,541 \times 10^{-9} L^{3.222}$$
$$r = 0,93$$

$$\text{Males + Females - } W = 1,184 \times 10^{-8} L^{3.116}$$
$$r = 0,99$$

The weights observed as well as the calculated weights, per class of 1 cm interval, are presented in table 3 and figures 1 and 2.

Nomura & Cruz, 1967 had already calculated a length-weight curve of the species being studied for males and females together, while in the referred work we took into consideration the separation of the sexes.

3 - Frequency of length

A relative frequency of distribution of blackfin tuna during the year 1977 shows that the classes mostly caught were from 57,5 and 72,5 cm, for males, and 62,5 cm, for females (Figure 3).

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TABELA 1 - Production de Tuna (Family - THUNIDAE) landed in the state of Rio Grande do Norte, Brazil, in the period ' de 1969 a 1977.

A N O	P R O D U Ç Ã O (Kg)
1969	53.222
1970	52.147
1971	74.832
1972	295.083
1973	296.044
1974	193.651
1975	123.728
1976	90.398
1977	204.122

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TABELA 2 - Data of catch and esforço of blackfin tuna (Thunnus atlanticus, Lesson) collected en Baía Formosa - Rio Grande do Norte Brazil, in the last quarter of 1977.

PERIODO	Number of boat	Number of voyages	Average of voyages per boat	Catch (Kg)	Catch (Kg) per voyages
OCTOBER	70	917	13,10	22.184	24,19
NOVEMBER	69	780	11,30	42.807	54,88
DECEMBER	65	518	7,96	23.464	45,30
T O T A L	204	2.215	10,85	88.455	39,93

Figura 1 - Fork length (cm) - whole weight (kg) relationship of Trachurus atlanticus (Lacepede) from northeastern Brazil, separated per sexo.

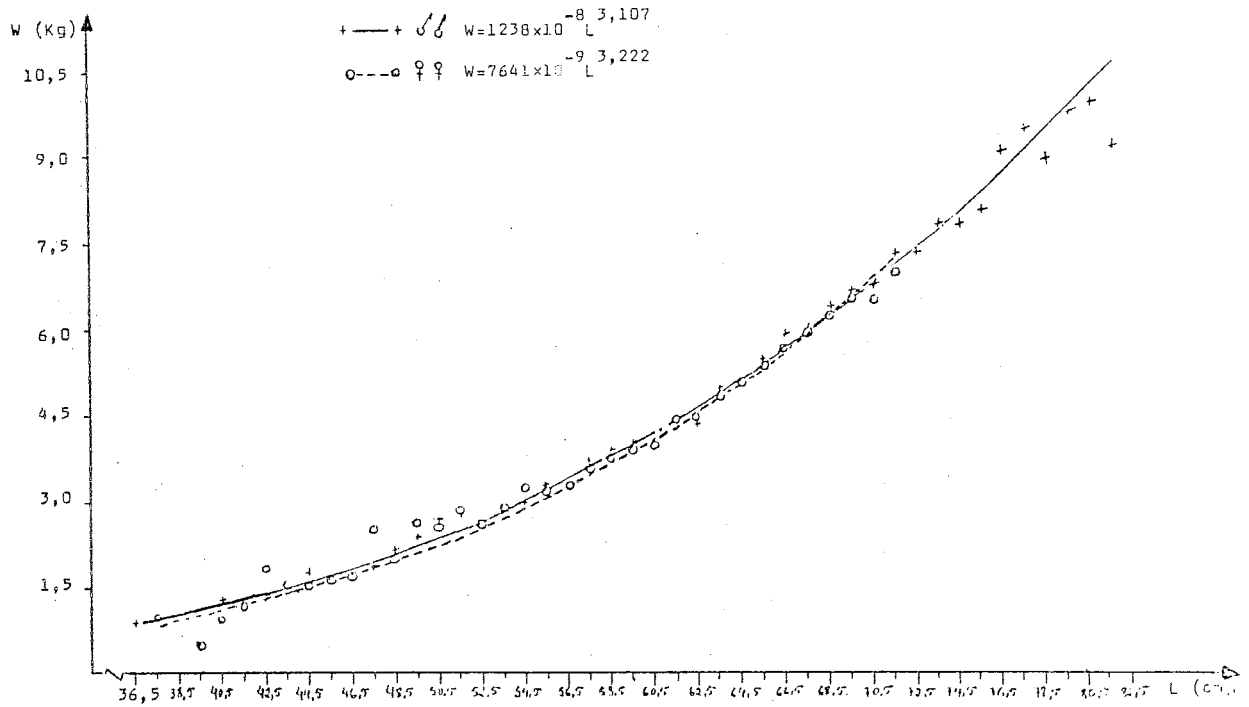
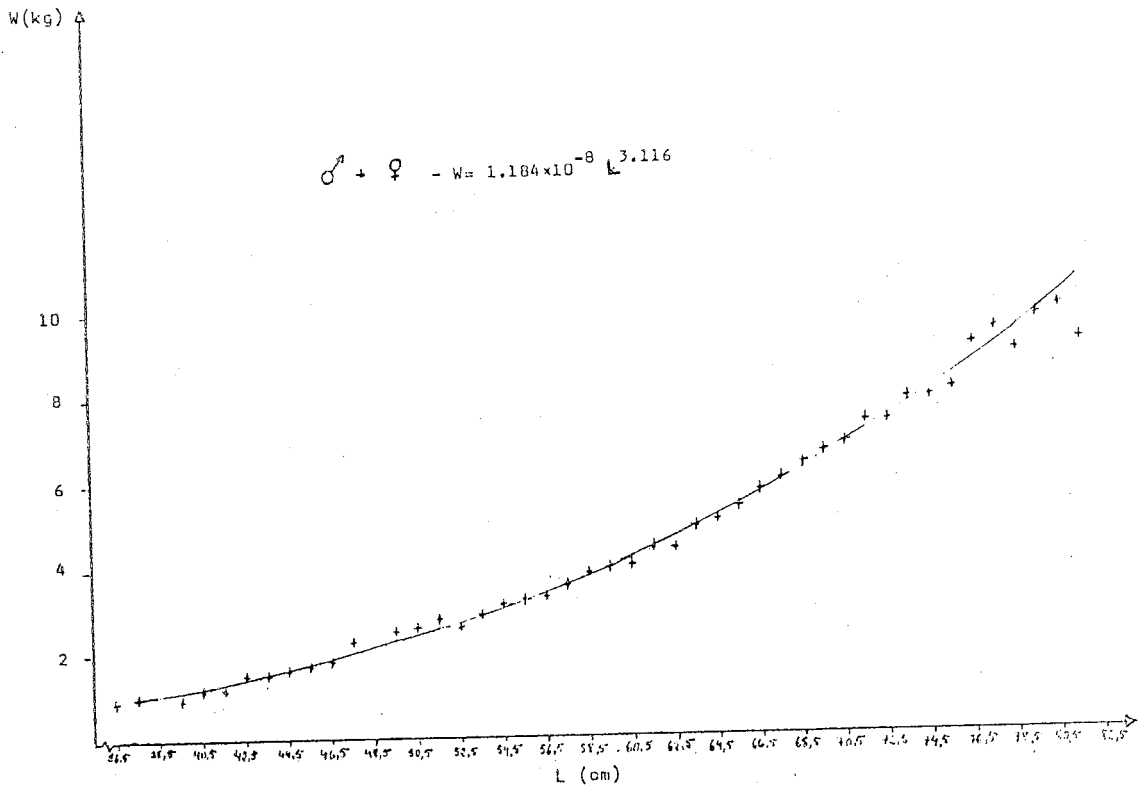


TABELA 3 - Data on fork length (cm), number of fish examined, observed whole weight (kg), calculated whole weight (kg), separated per sex, and catch with surface multiple line trolling in state of Rio Grande do Norte - Brazil

Fork Length (cm)	M A L E S		F E M A L E S	
	Number of fish sampling (n)	Observed whole weight (kg)	Number of fish sampling (n)	Calculated whole weight (kg)
36,5	1	0,90	1	0,86
37,5	-	-	-	-
38,5	2	1,10	1	1,13
39,5	1	1,30	1	1,22
40,5	-	-	-	-
41,5	3	1,37	1	1,42
42,5	1	1,50	2	1,52
43,5	1	1,60	3	1,64
44,5	2	1,70	1	1,75
46,5	4	1,78	2	1,88
47,5	2	1,90	3	2,00
48,5	5	2,16	5	2,14
49,5	3	2,43	4	2,28
50,5	5	2,74	10	2,43
51,5	7	2,80	8	2,58
52,5	5	2,72	9	2,74
53,5	6	2,96	7	2,90
54,5	8	3,07	8	3,07
55,5	7	3,31	12	3,25
56,5	21	3,36	15	3,44
57,5	19	3,71	9	3,63
58,5	14	3,93	11	3,77
59,5	12	4,07	8	3,86
60,5	16	4,04	8	4,01
61,5	8	4,40	14	4,47
62,5	15	4,41	19	4,44
63,5	9	4,97	13	4,92
64,5	12	5,12	13	4,94
65,5	7	5,47	10	5,11
66,5	7	5,96	12	5,36
67,5	13	6,05	5	5,71
68,5	17	6,48	5	5,99
69,5	17	6,70	4	6,00
70,5	26	6,87	2	6,27
71,5	15	7,37	4	6,54
72,5	14	7,39	2	6,84
73,5	14	7,99	1	7,15
74,5	4	7,88	-	7,46
75,5	5	8,14	-	7,79
76,5	2	9,15	-	8,12
77,5	5	9,50	-	8,46
78,5	2	9,00	-	8,82
79,5	1	9,80	-	9,18
80,5	1	10,00	-	9,55
81,5	1	9,20	-	9,93
	330	-	219	10,33
				10,73

Figura 2 - Fork length (cm) whole weight (kg) relationship of Thunnus atlanticus (Lesson) from northeastern Brazil, for males and females together.



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Figura 3.- Frequency of fork length of Thunnus atlanticus (Lesson), catch during the year of 1977 from R/V DIADORIM, separated per sexes

