

SOME BIOLOGICAL CHARACTERISTICS OF LITTLE TUNA (*EUTHYNNUS ALLETTERATUS*
RAFINESQUE, 1810) IN THE EASTERN PART OF THE TROPICAL ATLANTIC

by

V. N. Chur

SUMMARY

The paper is based on the material collected by AtlantNIRO vessels during tuna research fishing trips from 1959 to 1971. Problems of distribution and size composition are discussed. Minimal length at maturity and time of spawning are determined. Feeding patterns and commercial fishing in the East Atlantic are discussed in short.

DE CERTAINS CARACTERES BIOLOGIQUES DE LA THONINE
(*EUTHYNNUS ALLETTERATUS*, RAF. 1810) DANS LA
PARTIE ORIENTALE DE L'ATLANTIQUE TROPICAL

par

V. N. Chur

RESUME

Ce document se base sur les renseignements recueillis par les bateaux de l'Atlant-NIRO de 1959 à 1971 au cours de croisières de recherche sur les thonidés. Il traite des problèmes de répartition géographique et de composition par taille. Une définition de la taille minimum à la maturité et de l'époque de la reproduction est fournie, ainsi qu'un bref exposé des habitudes alimentaires et de la pêche commerciale dans l'Atlantique Oriental.

ALGUNAS CARACTERISTICAS BIOLOGICAS DE LA BACORETA
(*EUTHYNNUS ALLETTERATUS* RAFINESQUE, 1810) EN LA
PARTE ORIENTAL DEL ATLANTICO TROPICAL

por

V. N. Chur

RESUMEN

El documento está basado en los datos recogidos por los barcos de AtlantNIRO durante los cruceros de investigación de túnidos efectuados desde 1959 a 1971. Se tratan problemas de distribución y composición de tallas. Asimismo, se determinan las tallas mínimas en el momento de la madurez y fechas de desove. También se comenta brevemente las pautas de alimentación y la pesca comercial en el Atlántico oriental.

V.N. Chur
Kuliningrad
AtlantNIRO
USSR

ON SOME BIOLOGICAL CHARACTERISTICS OF
LITTLE TUNA (*Euthynnus alleteratus*
Rafinesque, 1810) IN THE EASTERN PART
OF TROPICAL ATLANTIC.

The present paper covers some problems on biology of little tuna of the eastern tropical Atlantic, which are of great interest for scientific workers and for commercial fishery. The paper reveals some biological aspects which may be used in further research of general character.

MATERIAL AND METHODS

Preliminary materials of research tuna expedition of AtlantNIRO, 1959-1971, were used in this article. Surveys were made in 6 areas of Eastern Atlantic.

- Area 1. Shelf and sub-shelf zone southward of Cap Blanc (July, 1964; June, 1970; 26 specimens of tuna taken).
- Area 2. Shelf and sub-shelf zone off Senegal (June-August, 1959; April, 1961, July, 1964; 121 specimens of tuna taken).
- Area 3. Open part and deep waters over the shelf edge off shore Sierra Leone (April-May, 1962; March-April, 1969; February, 1971; 250 specimens taken).
- Area 4. Deep waters over the shelf edge near Monrovia (January 1971; 23 specimens taken).

RESULTS OF OBSERVATIONS

Little tuna (*Euthynnus alleteratus*) in Eastern Atlantic is found in the area from the North sea up to the South Africa coasts, the Mediterranean included. It is most abundant in the sub-shelf zone of the eastern tropical Atlantic, where the temperature of water is 24° to 30°C.

Commercial stock prefer upwelling, especially around the warmer side of thermal front. Little tunas easily get to shoaling and in certain seasons they make up large concentrations (up to 100 m in diameter).

SIZE COMPOSITION

The length of tuna all over Atlantic fluctuated in the range of 300 to 890 mm (Table 1,2). In long-line and hand line fisheries the catches were composed of tunas of older age classes the mean length being 733 mm (area 1), 742 mm (area 2), 735 mm (area 3), while in troll catches the length averaged to 404 mm (area 1), 360 mm (area 2), 394 mm (area 2), 324 mm (area 5). Tunas from purse-seine catches are in intermediate position, they are 472 mm, 484 mm (area 3), 445 mm (area 4).

Analysis of data shows that in the areas of Cap Blanc and off Senegal (area 1 and 2) little tuna population consists mainly of 30-50 cm and 70-75 cm specimens. We never came across the intermediate group of tuna 50-70 cm long in these areas, but representatives of this group were caught in great numbers off Sierra-Leone (area 3).

Weight and size correlation is expressed by a simple equation $W=bL^3$, where W is weight in kg, L - length in m, and b - coefficient. The results obtained show that coefficient "b" increases toward the equator (Table 3).

Sex has some influence on tuna sizes. These differences are most clearly seen in older groups, where males are 13-15 mm larger as compared to females (Table 3).

BREEDING

Minimum sizes of mature little tuna of Sierra Leone area were determined. Minimum length of mature males was 440 mm, and that of females was 428. As for sex composition, in areas of Cap Blanc, Senegal, Sierra Leone and Mourovia males were predominant during the surveys, which shows that in these areas a spawning stock was exploited. (Table 4).

Data on maturity stages of gonads of little tuna confirm this suggestion (Table 5).

Thus, the spawning of Cap Blanc tuna till take place in June - July. In Senegal area the spawning is more prolonged, therefore it will last from January till May culminating in March-April. In the area of Monrovia the spawning is expected in February - March.

FEEDING

Feeding diet of little tuna, judging by the stomach contents was rather varied and considered of Crustacea (Isopoda, Decapoda, Stomatopoda, Anomura), Sepia sp., Loligo sp., fishes and fry (Clupeidae, Scombridae, Thunnidae, Mullidae, Carangidae, Sparidae and Priacanthidae). Analysis of food character of different tuna groups caught around the shelf (by trolls), near the borders of the shelf (by long line and hand line) and over the shelf edge (by purse-seine) revealed a kind of regularity in changing of feeding diet by distinguished groups of tuna.

- 1 group : Small tunas of 30-40 cm, feeding heavily on crustacean, shrimps, squids, and on fry of some sparidae; and groundfish.
- 2 group: Tunas of mean length of 40-60 cm feeding mainly on fry of some species, which inhabit the waters over the shelf edge (*Upeneus prayensis*, *Priacanthus* sp.), and on larvae of crustacean.
- 3 group: Tunas of 60-85 cm, feeding on typically pelagic species (*Sardinella* sp., *Trachurus trachurus*, *Scomber* sp.), and besides on groundfish and their fry (*Pagellus* sp., *Mullus* sp.,).

As a whole little tuna should be considered a pelagic species feeding on organisms, which inhabit the upper layers of water either constantly, or for some period.

FISHERY

There is no specialised fishery of little tuna in the Soviet Union. Some results obtained during scientific expeditions are given in Table 7. It should be noted that none of the expeditions carried out a special purse-seine fishing for little tuna and this species never dominated in the catches.

Thus, there are no sufficient data to predetermine the size of concentrations of little tuna in the area under investigation, although they must be great in our opinion.

Table I. SIZE COMPOSITION OF LITTLE TUNA

Length AF	Area I		Area 2		Area 3			Area 4	Area 5	Total
	VII, 1964	VI, 1970	IV, 1961	VI-VIII, 1959	II, 1971	III-IV, 1969	IV-V, 1962	I, 1971	I, 1965	
I	2	3	4	5	6	7	8	9	10	11
30									1	1
31									1	1
32									4	4
33	3								1	4
34	1								-	1
35									2	2
36										-
37										-
38			4							4
39	2		19							21
40	1		19							20
41	1		18			1		1		21
42	1		5			1	1	-		8
43	1					2	1	6		10
44	-				2	14		5		21
45	2				2	17		3		24
46	1				4	40		3		48
47	2				3	38		3		46
48					4	46		1		51
49					-	21		1		22
50					3	11				14
51					2	1				3
52					3	4				7
53					1	2				3
54					-	3				3
55					-	1				1
56					2					2
66										
67		1								1
68		-								-
69		-								-
70		-		1						1
71		2		1						3
72		-		-						-
73		2		3						5
74		1		3						4
75		3		11			2			16
76		1		11			2			14
77		1		11			-			12
78				4			-			4
79				1			-			1
80				1			3			4
81				1			-			1
82				-			-			1
83				1			-			1
84				-			-			-
85				-			1			1
86				1			-			1
Total	15	11	65	50	26	202	11	23	9	412

Table 2

SIZE OF LITTLE TUNA

Area	Gear	Period	Size range	Mean length	Number of specimens
Area 1	hand line	VII, 1964	330-470	404	15
	hand line	VI, 1970	670-770	733	11
Area 2	trolls	IV, 1961	380-420	394	65
	trolls	VII, 1964	330-420	360	6
	hand line	VI-VIII, 1959	700-825	742	50
Area 3	purse-seine	III-IV, 1969	410-550	472	200
	purse-seine	II, 1971	440-560	484	26
	long line	IV-V, 1962	420-890	735	12
Area 4	purse-seine	I, 1971	414-440	445	23
Area 5	trawl	I, 1965	300-350	324	9
Area 6	trolls	I, 1964	-	320	2
	trolls	X, 1965	420-520	460	3

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Table 3

MEAN COEFFICIENT "B" VALUES FOR SOME AREAS OF EASTERN ATLANTIC

Area	coeff "B"	Size range	Number of specimens
area southward of Dacar	14.9	690-830	49
Kasamans river mouth	15.6	380-420	65
Area 3 Sierra Leone	17.4	410-580	310

Table 4

MEAN LENGTH OF LITTLE TUNA ACCORDING TO SEX

Area	Sex	Mean length (mm)	Difference (mm)	No. of specimens
Area 2	males	401	01	32
	females	400		27
Area 3	males	476	05	137
	females	471		85
Area 4	males	448	06	18
	females	442		5
Area 2	males	760	13	31
	females	747		21
Area 1	males	740	15	7
	females	725		2

Table 5

SEX COMPOSITION OF LITTLE TUNA

Area	Period	males/females	Sex ratio (males to females)
Area 1	VI, 1970	7/4	1.75
Area 2	VII-VIII, 1959	96/80	1.20
	IV, 1961	32/27	1.18
Area 3	I-II, 1971	29/30	0.97
	III-IV, 1969	138/87	1.58
	IV-V, 1962	5/7	0.71
Area 4	I, 1971	18/5	3.60

Table 6.

MATURITY OF LITTLE TUNA GONADS (%%)

Area	Period	Maturity grades					No. of specimens
		II	III	IV	V	VI	
Area 1	VI, 1970	-	36.4	54.5	91.1	-	11
	VII, 1964	86.6	-	13.4	-	-	15
Area 2	IV, 1961	71.2	16.9	1.7	1.7	8.5	59
	VII, 1959	2.0	10.0	-	6.0	82.0	50
Area 3	I-II, 1971	-	6.8	79.6	13.6	-	59
	III-IV, 1969	-	2.2	56.7	40.2	0.9	222
	IV-V, 1962	8.3	33.3	41.7	16.7	-	12
Area 4	Æ, 1971	-	4.2	95.8	-	-	23

Table 7

CATCHES OF LITTLE TUNA PER FISHING DAY

Area	Period	Gear	No of fishing days	Catch per fishing day	Total catch
Area 2	VII,1959	hand line	14	3.2	45.0
Area 3	III,1969	purse-seine	14	0.8	10.8
	IV, 1969	purse-seine	21	0.9	19.8
	I, 1971	purse-seine	7	0.3	2.1
	II, 1971	purse-seine	19	0.8	14.3
	III,1971	purse-seine	20	0.7	14.7
	IV, 1971	purse-seine	10	0.8	7.8