

**PRELIMINARY REPORT ON COMPOSITION OF YOUNG BLUEFIN TUNA CAUGHT
BY MOROCCAN MEDITERRANEAN TRAP IN 1994 FISHING SEASON***

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SUMMARY

Young bluefin tuna comprised of two age groups were caught by Moroccan Mediterranean trap. Principe fishing ground, in autumn, 1994. Eighty (80) individuals of the age 1 group were caught on September 20, 1994. The estimated landing weight is 454 kg; the mean fork length is 64.83 cm, and the mean body weight is 5.6711 kg. The relationship between fork length and body weight is summarized as $TW = 4.4099 \times 10^{-4} FL^{2.2675}$, where TW shows total body weight in kg and FL shows fork length in cm. A total of 5,910 age 0 individuals were caught by the same trap on October 29 and 31, respectively. The mean fork length is 39.66 cm and the mean body weight is 1.1959 kg. The landing weight of age 0 bluefin tuna is determined as 7.068 kg. The relationship between fork length and body weight is shown as $TW = 1.8739 \times 10^{-5} FL^{3.0088}$. One regression equation ($TW = 1.0106 \times 10^{-5} FL^{3.1720}$) is effective to describe the relationship between fork length and body weight of age 0 and age 1 bluefin tuna in autumn.

RESUME

Du thon rouge juvénile se composant de deux groupes d'âge a été capturé dans la madrague marocaine en Méditerranée, lieu de pêche de Principe, en automne 1994. Quatre-vingt individus d'âge 1 ont été pris le 20 septembre de la même année. Le poids estimé au débarquement est 454 kg. La longueur fourche moyenne est 64,83 cm, et le poids moyen 5,6711 kg. Le rapport entre la longueur à la fourche et le poids est résumé comme suit : $TW = 4.4099 \cdot 10^{-4} FL^{2.2675}$, où TW est le poids total en kg et FL la longueur fourche en cm. En tout, 5.910 thons d'âge 0 ont été capturés dans la même madrague les 29 et 31 octobre 1994. La longueur moyenne à la fourche est 39,66 cm, et le poids moyen 1,1959 kg. Le poids au débarquement des thons rouges d'âge 0 a été calculé être 7.068 kg. Le rapport entre la longueur fourche et le poids est indiqué comme suit : $TW = 1.8739 \cdot 10^{-5} FL^{3.0088}$. Une équation de régression, $TW = 1.0106 \cdot 10^{-5} FL^{3.1720}$, est efficace pour décrire le rapport entre la longueur fourche et le poids des thons rouges des âges 0 et 1 pendant l'automne.

INTRODUCTION

In Moroccan Mediterranean coast, two traps are located to catch tuna like fishes. From the view point of landing quantity, Principe trap is more important than another one. Principe trap is located northern part of Morocco, near the mouth of Gibraltar strait (Fig. 1), and operation of trap was started in 1988. Usually, fishing season of Principe trap is 6 months, from May to early November. Roughly saying, Bonito, Sarda sarda, are caught in July to October, Giant bluefin tuna that migrate out to Atlantic after spawned are caught in July to early August, and Melva, Auxis thazard, are fished in September to early November. It is well known by trap fishermen that young bluefin are caught in Autumn, but we have no information about size composition of that bluefin. We have chance to measure young bluefin caught in this Autumn, then we prepare preliminary report concerning only limited size and weight of that fishes.

RESUMEN

En la almadraba mediterránea de Marruecos, los atunes rojos jóvenes componían dos grupos de edad, caladero de Príncipe, en otoño de 1994. Se capturaron 80 individuos del grupo de edad 1 el 20 de septiembre de 1994. El peso estimado desembarcado es de 454 kg. La media de longitud a la horquilla es de 64,83 cm. y la media del peso del cuerpo es de 5.6711 kg. La relación entre la longitud a la horquilla y el peso del cuerpo se resume como $TW = 4.4099 \times 10^{-5} FL^{2.2675}$, donde TW muestra el peso total del cuerpo en kg y FL muestra la longitud a la horquilla en cm. En la misma almadraba se capturó un total de 5.910 individuos de grupo de edad 0 en el 29 y 31 de octubre de 1994. La longitud a la horquilla media es de 39.66 cm, y la media del peso del cuerpo de 1.1959 kg. El peso de los desembarques de atún rojo de edad 0 se determinó en 7.068 kg. La relación entre la longitud a la horquilla y el peso del cuerpo es $TW = 1.8739 \times 10^{-5} FL^{3.0088}$. Una ecuación de regresión, $TW = 1.0106 \times 10^{-5} FL^{3.1720}$, es efectiva para describir la relación entre la longitud a la horquilla y el peso del cuerpo del atún rojo de edad 0 y 1 en el otoño.

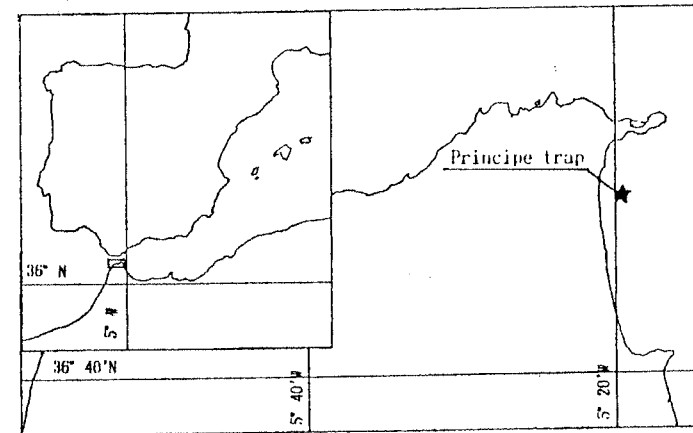


Fig. 1 Geographic explanation of Principe trap.

MATERIALS AND METHODS

We are always watching to fishes caught by trap in 1994 fishing period, in order to get samples of young bluefin tuna to make size composition clear. In 20 September, 29 and 31 October 1994, young bluefin tuna were caught by trap. We get samples from landings, and measured body length and body weight in our laboratory. Mean body length and weight are calculated, and relationship between fork length and body weight are determined.

RESULTS

1. 1 age group

In 20 September 1994, 80 young bluefin tuna were caught by trap, results of measurements of 30 samples are shown in Tab 1 and Appendix Tab.1. Mean folk length is 64.83 cm (S.D. 2.00cm), its maximum and minimum size are 70cm and 61cm respectively. Mean body weight is 5.6711kg (S.D. 0.4925kg), maximum and minimum weight are 7.048kg and 4.952kg respectively. So, landing weight of 1 age is calculated at 454kg.

Tab.1 Results of measurements of young (1 age) bluefin tuna caught by Principe trap in 20 September 1994.

	FL (cm)	TW (kg)
MEAN	64.83	5.6711
S.D.	2.00	0.4928
MAX	70.0	7.048
MIN	61.0	4.952
N	30	30

Folk length frequency distribution is shown in Fig.2 and Appendix Tab. 2.

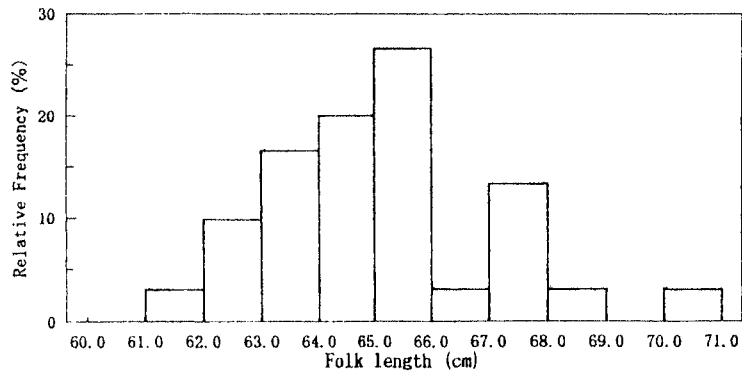


Fig. 2 Folk length frequency distribution of bluefin tuna caught by Principe trap in 20 september 1994.

Relationship between folk length and body weight are shown in Fig. 3. Regression equation of the relationship is as follows;

$$TW = 4.4099 \times 10^{-4} FL^{2.2675}, r^2 = 0.6757$$

where TW shows total body weight in kg, and FL shows folk length in cm.

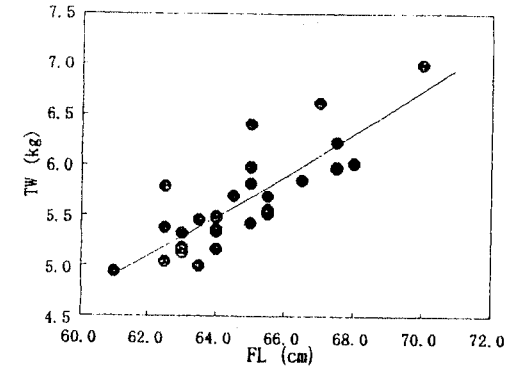


Fig. 3 Relationship between folk length and total weight of young (1 age) bluefin tuna caught by Principe trap in 20 september 1994.

$$TW = 4.4099 \times 10^{-4} * FL^{2.2675}$$

2. 0 age group

In 29 and 31 October 1994, 5 480 and 430 young bluefin tuna were caught respectively by trap, total individuals number is 5 910. 40 samples from landing in 29 Oct. were measured in our laboratory. Results of measurements are summarized in Tab.2 and Appendix Tab.3. Mean folk length is 39.66cm (S.D. 2.09cm), its maximum and minimum size are 45.2cm and 36.5cm respectively. Mean body weight is 1.1959kg (S.D. 0.2057kg), maximum and minimum weights are 1.831kg and 0.872kg respectively. Total landing weight of 0 age bluefin tuna is determined 7 068kg.

Tab.2 Results of measurements of young (0 age) bluefin tuna caught by Principe trap in 29 October 1994.

	FL (cm)	TW (kg)
MEAN	39.66	1.1959
S.D.	2.09	0.2057
MAX	45.2	1.831
MIN	36.5	0.872
N	40	40

Folk length frequency distribution is shown in Fig.4 and Appendix Tab. 4.

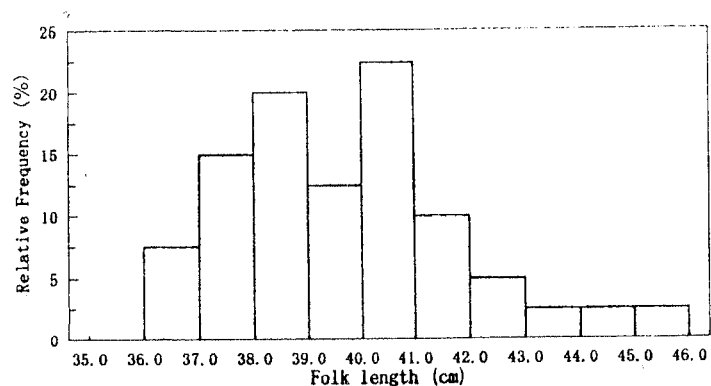


Fig. 4 Folk length frequency distribution of bluefin tuna caught by Principe trap in 29 october 1994.

Relationship between folk length and body weight are shown in Fig. 5 and regression equation is as follows;

$$TW = 1.8379 \times 10^{-5} FL^{3.0088}, r^2 = 0.9079$$

where TW shows total body weight in kg and FL shows folk length in cm.

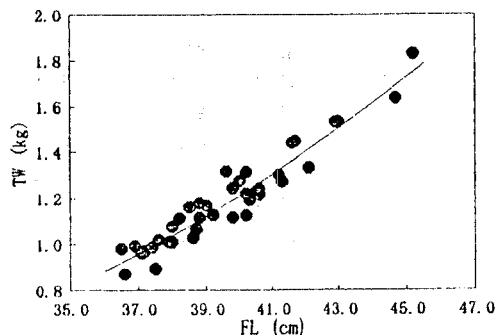


Fig. 5 Relationship between folk length and total weight of young (0 age) bluefin tuna caught by Principe trap in 29 october 1994.

$$TW = 1.8379 \times 10^{-5} * FL^{3.0088}$$

3. Relationship between folk length and body weight

Relationship between folk length and body weight of 0 and 1 age groups are shown in Fig. 3 and 5. Apparently, these two regression equations are different each other. In order to exclude the influence of different body length range, mixed data of 0 and 1 age samples are analysed. Result is shown in Fig. 6. Regression equation is

$$TW = 1.0106 \times 10^{-5} FL^{3.1720}, r^2 = 0.9956$$

where FL means folk length in cm and TW shows total body weight in kg. Determination coefficient is very high, then it is clear that relationship between folk length and body weight in 0 age and 1 age bluefin tuna are not different each other in Autumn, September to October.

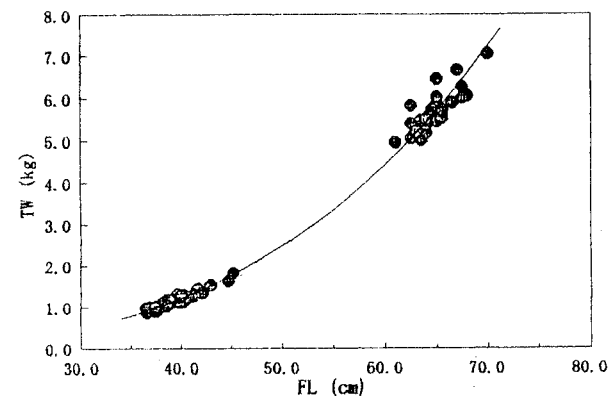


Fig. 6 Relationship between folk length and total weight of young bluefin tuna caught by Principe trap in 20 september (1 age) and 29 october (0 age) 1994.

$$TW = 1.0106 \times 10^{-5} * FL^{3.1720} \quad r^2 = 0.9956$$

Appendix tab. 1 Data of measurements of young (1 age) bluefin tuna caught by Principe trap in 20 september 1994.

No.	TW (kg)	FL (cm)	No.	TW (kg)	FL (cm)
1	5.517	64.0	16	6.011	67.5
2	5.142	63.0	17	5.051	62.5
3	5.583	65.5	18	5.178	64.0
4	5.379	64.0	19	5.478	63.5
5	5.341	63.0	20	5.885	66.5
6	5.821	62.5	21	5.447	65.0
7	5.848	65.0	22	5.357	64.0
8	6.258	67.5	23	6.658	67.0
9	6.052	68.0	24	5.192	63.0
10	5.401	62.5	25	5.540	65.5
11	5.012	63.5	26	5.726	64.5
12	6.443	65.0	27	5.497	64.0
13	5.578	65.5	28	5.721	65.5
14	6.004	67.5	29	6.014	65.0
15	7.048	70.0	30	4.952	61.0

Appendix tab. 2 Folk length frequency distribution of young (1 age) bluefin tuna caught by Principe trap in 20 september 1994.

class of folk length (cm)	class median (cm)	Frequency	
		IND.	(%)
60.0 ≤ < 61.0	60.5	0	0.0
61.0	61.5	1	3.3
62.0	62.5	3	10.0
63.0	63.5	5	16.7
64.0	64.5	6	20.0
65.0	65.5	8	26.7
66.0	66.5	1	3.3
67.0	67.5	4	13.3
68.0	68.5	1	3.3
69.0	69.5	0	0.0
70.0	70.5	1	3.3
71.0 ≤ < 72.0	71.5	0	0.0
		30	100.0

Appendix tab. 3 Data of measurements of young (0 age) bluefin tuna caught by Principe trap in 29 october 1994.

No.	TW (kg)	TL (cm)	FL (cm)	No.	TW (kg)	TL (cm)	FL (cm)
1	1.451	46.2	41.7	21	1.219	44.4	40.6
2	1.162	42.3	38.5	22	1.128	42.6	39.2
3	1.114	42.5	38.2	23	1.304	44.0	41.2
4	1.442	45.8	41.6	24	1.012	40.8	37.9
5	1.067	41.4	38.7	25	0.974	40.7	37.2
6	1.318	43.3	39.6	26	0.872	39.9	36.6
7	1.192	43.7	40.3	27	0.964	40.5	37.1
8	0.994	39.6	36.9	28	0.896	40.2	37.5
9	1.078	40.6	38.0	29	0.982	40.0	36.5
10	1.831	48.0	45.2	30	1.638	48.4	44.7
11	1.335	44.9	42.1	31	1.275	44.5	41.3
12	1.536	46.8	43.0	32	1.118	43.0	39.8
13	1.127	44.0	40.2	33	1.244	44.2	40.6
14	1.020	40.8	37.6	34	1.011	41.5	38.0
15	1.315	43.8	40.2	35	1.245	43.2	39.8
16	1.225	44.3	40.5	36	1.171	42.8	39.0
17	1.117	42.0	38.8	37	1.180	42.5	38.8
18	1.228	43.8	40.5	38	0.989	41.0	37.4
19	1.222	43.7	40.2	39	1.278	43.8	40.0
20	1.534	47.0	42.9	40	1.029	42.5	38.6

Appendix tab. 4 Folk length frequency distribution of young (0 age) bluefin tuna caught by Principe trap in 29 october 1994.

class of folk length (cm)	class median (cm)	Frequency	
		IND.	(%)
35.0 ≤ < 36.0	35.5	0	0.0
36.0	36.5	3	7.5
37.0	37.5	6	15.0
38.0	38.5	8	20.0
39.0	39.5	5	12.5
40.0	40.5	9	22.5
41.0	41.5	4	10.0
42.0	42.5	2	5.0
43.0	43.5	1	2.5
44.0	44.5	1	2.5
45.0	45.5	1	2.5
46.0 ≤ < 47.0	46.5	0	0.0
		40	100.0