

**CONTRIBUTION TO THE FORMULATION OF A CORRELATION
LENGTH/WEIGHT ON BIOMETRIC DATA RECORDED ON TUNA (*THUNNUS
THYNNUS THYNNUS*) CAUGHT DURING THE MONTHS OF MAY/JUNE IN THE
MEDITERRANEAN SEA (TYRRHENIAN)**

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SUMMARY

*Oceanis srl, as part of the assignment of the Ministry of Agriculture and Forestry, General Directorate of Fisheries and Aquaculture, Italy, for the implementation of the national observation program for the fishing season for bluefin tuna in 2013, has carried out samplings on 435 bluefin tuna (*Thunnus thynnus*) caught in the Mediterranean during the months of May and June, obtaining biometric data on the length of the curve to the fork and the whole weight. Analysis of the data was converted into a relation size / weight expressed by the equation of the trend line: $RWT = 2*2.71828 * 10^{-5} * CFL^{2.9312}$, with a correlation coefficient $R2 = 0.9701$*

RÉSUMÉ

*Dans le cadre du contrat conclu avec le ministère italien de l'agriculture et de la sylviculture, (direction générale de la pêche et de l'aquaculture) et aux fins de la mise en œuvre du programme d'observateurs nationaux de la saison de pêche de thon rouge en 2013, Oceanis srl a procédé à l'échantillonnage de 435 thons rouges (*Thunnus thynnus*) capturés en Méditerranée en mai et juin, ce qui a permis d'obtenir des données biométriques sur la longueur courbée à la fourche et le poids vif. L'analyse des données a été convertie en relation taille-poids exprimée par l'équation de la ligne de tendance : $RWT = 2*2,71828 * 10^{-5} * CFL^{2.9312}$, avec un coefficient de corrélation $R2 = 0,9701$*

RESUMEN

*Oceanis srl, como parte de la asignación del Ministerio de Agricultura y Silvicultura, Dirección General de Pesca y Acuicultura de Italia, para la implementación del programa nacional de observadores para la temporada de pesca de atún rojo de 2013, ha muestreado en 435 atunes rojos (*Thunnus thynnus*) capturados en el Mediterráneo durante los meses de mayo y junio, obteniendo datos biométricos sobre la longitud curva a la horquilla y el peso vivo. El análisis de los datos se convirtió en una relación talla/peso, expresada por la ecuación de la línea de tendencia: $RWT = 2*2,71828 * 10^{-5} * CFL^{2.9312}$, con un coeficiente de correlación $R2 = 0,9701$*

KEYWORDS

Thunnus thynnus, Length-weight relationship, Mediterranean Sea, Trap, Long lining

1. Introduction

In compliance with the provisions of ICCAT Recommendation n. 12-07, Oceanis srl, as part of the assignment of the Ministry of Agriculture and Forestry, General Directorate of Fisheries and Aquaculture, Italy, for the implementation of the national observation program for the 2013 blue fin tuna fishing campaign, has implemented rigorous monitoring activities with the assistance of the national observers on:

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- 100% of the tugs towing the transport cages of bluefin tuna;
- 20% of active longliners (longer than 15 m);
- 100% of the cages during the harvesting operations and 100% on the fixed traps.

The use of observers, allowed for the systematic monitoring of fishing of bluefin tuna on purseiners and longliners and other related activities carried out (tuna fishing and reporting, net to cage and cage to cage transfers) for the purpose of verifying compliance with these procedures.

At the same time, this team of 37 young (national observers) qualified professionals (biologists, naturalists, ecologists, etc.), ensured the acquisition of basic skills and essential level, such as biology and ethology of the species and in particular bluefin tuna monitoring techniques, biometric recognition of fishing gear and fishing techniques, and skills of the measures for the conservation and management of the resource bluefin tuna. Under the provisions of ICCAT, a program with biometric recognition was initiated targeted towards the collection and making disposable relevant scientific data to elaborate on the length/weight ratios.

2. Material and methods

The biometric measurements were performed on specimens caught by longliners in the Tyrrhenian Sea and in the southern traps fixed in Sardinia, in the period between 15 May and 30 June 2013.

The biometric data recorded by the observers of the tugs was not used for scientific purposes.

Biometric data collected and available (length, whole weight, sex, gonadal evaluation, etc.), only the length from the curve to the fork (CFL) and the whole weight of the tuna (RWT), are being evaluated in the present paper.

It was considered that the most significant parameter would be the CFL rather than the linear length to the fork (FL), as this type of measurement could better characterize the physiological state of the specimens when caught in pre-reproductive period and then a temporary state in morphologically altered size and weight (**Figure 1**).

Similarly, it was decided to use the data only to refer to the specimens' whole weight, in order to have weight data directly and not deducted from the use of correction factors.

3. Results

From the biometric measurements of the 435 specimens of tuna, the activities carried out by observers on fixed traps and longliners, correlation analysis of the measures of fork length (CFL) was performed and those of the whole weight (RWT), drawing a relationship report.

The minimum size of fork length measured is 101 cm, maximum 265 cm (**Figure 2**)

The minimum weight is 19.1 Kg entire recorded, the highest 320 kg (**Figure 3**).

Analysis of the data was converted into a relation size / weight expressed by the equation of the trend line:

$$RWT = 2 * 2.71828 * 10^{-5} * CFL^{2.9312}, \text{ (Table 1) with a correlation coefficient } R^2 = 0.9701 \text{ (Figure 4).}$$

In addition to the equation of the trend line real shows the equation of the linear trend line according to the fork length (FL) using the conversion factor of CFL to FL ($FL = 0.955 * CFL$) adopted by the SCRS for BFT:

$$RWT = 3E-05 * FL^{2.9341} \text{ with a correlation coefficient } R^2 = 0.9676 \text{ (Table 1), (Figure 5).}$$

4. Conclusions

In view of the significant degree of correlation found, one can safely uphold that the correlation length/weight of bluefin tuna, can be a valuable contribution to the advancement of knowledge on the population of bluefin tuna in the Mediterranean coinciding with the legal period of fishing.

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Table 1.

<i>Sp.</i>	<i>Area/ Season</i>	<i>Relationship</i>	<i>Reference</i>	<i>n.</i>	<i>CFL/FL range</i>
BFT	South Mediterranean/ May-June	$RWT=2*2,71828*10^{-5}*CFL^{2,9312}$	Cozzolino and Pignalosa	435	101-265
BFT	South Mediterranean/ May-June	$RWT=3*2,71828*10^{-5}*FL^{2,9341}$	Cozzolino and Pignalosa	435	101-265



Figure 1. Bluefin tuna with swollen abdomen and in pre-reproductive physiological condition.



Figure 2. Measurement of the length curve to the fork.



Figure 3. Operations weighing whole tuna.



Figure 4. Trend line correlation curved fork lengths/weights (weights are in kg and lengths are in cm).

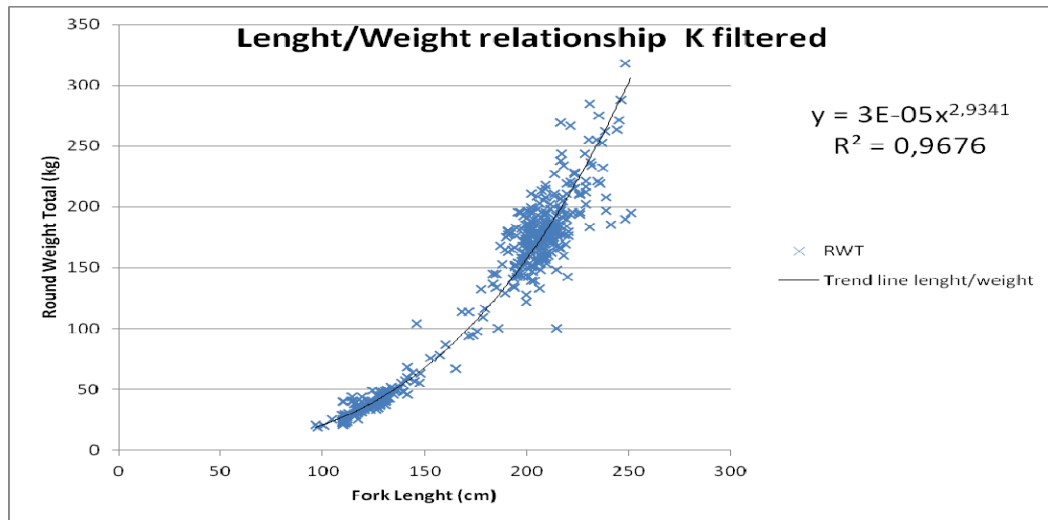


Figure 5. Trend line correlation linear fork lengths/weights (weights are in kg and lengths are in cm).