

## Length-Weight Relationships of Thirteen Flatfishes (Pisces: Pleuronectiformes) from Saroz Bay (North Aegean Sea, Turkey)

Ugur Özekinci, Özgür Cengiz, Ali Ismen, Ugur Altinagaç and Adnan Ayaz  
Department of Fishing and Processing Technologies, Faculty of Fisheries,  
Çanakkale Onsekiz Mart University, Çanakkale, Turkey

**Abstract:** In this study, length-weight relationships of 13 flatfish species, belonging to the families of Bothidae, Citharidae, Cynoglossidae, Scophthalmidae and Soleidae, from Saroz Bay (North Aegean sea, Turkey) were presented.

**Key words:** Flatfishes, pleuronectiformes, length-weight relationship, Saroz Bay, North Aegean sea

### INTRODUCTION

Length-Weight Relationships (LWR) are useful for fisheries assessment and fisheries biology applications, prevalently to estimate the weight from length for each specie and to estimate the biomass from length frequency distributions (Anderson and Gutreuter, 1983) to convert growth in length equations for prediction of weight at age (Pauly, 1993) to compare fish populations from different habitats (Petrakis and Stergiou, 1995; Gonçalves *et al.*, 1997).

Previous studies carried out length-weight relationships for many fish species, but these relationships may change temporarily and/or spatially and therefore, these studies should be regularly updated for each population separately (Ismen *et al.*, 2007). In this study, the parameters of length-weight relationships are reported for 13 flatfish species belonging to the families of Bothidae, Citharidae, Cynoglossidae, Scophthalmidae and Soleidae.

### MATERIALS AND METHODS

Samples were collected at depths ranging from 5-500 m in Saroz Bay, North Aegean sea from September 2006-2008 using a commercial bottom trawl net with 44 mm cod end mesh size.

Fish were identified based on Nielsen (1986) and scientific names for each species were checked with the Fishbase (Froese and Pauly, 2009). Fish were measured to the nearest cm (total length) and weighed to the nearest g. Length-weight relationships were calculated, separately, according to species.

The relationships between the length and weight of a fish were calculated by the least-squares method applied to the log transformed data for male and females combined as:

$$\log W = \log a + b \log L$$

where:

- W = The body weight of the fish  
L = Total length  
a = The intercept of the regression curve  
b = The regression coefficient

### RESULTS AND DISCUSSION

Totally 4329 individuals of 13 species belonging to 5 families were measured. The length distributions of the individuals caught for each species are shown in Fig. 1.

All sample sizes, minimum and maximum lengths and weights, parameters a and b of the length-weight

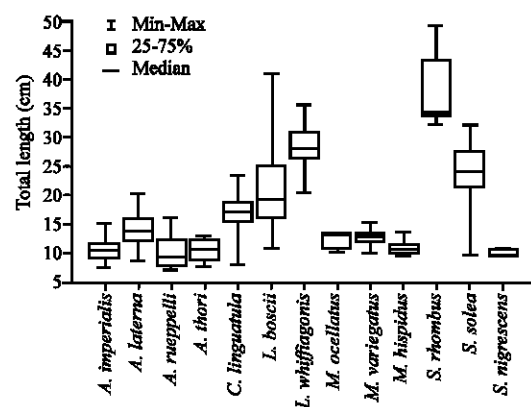


Fig. 1: Length distributions of the individuals caught for each species

Table 1: Length weight relationships of 13 flatfish in Saroz Bay

Family	Species	N	Length (cm)		Weight (g)		Regression parameters			
			Min.	Max.	Min.	Max.	a	b	SE (b)	r <sup>2</sup>
Bothidae	<i>Arnoglossus imperialis</i> <sup>2</sup>	36	7.6	15.2	3.00	28.64	0.0039	3.2973	0.1403	0.9420
	<i>Arnoglossus laterna</i> <sup>4</sup>	57	8.8	20.2	4.31	62.42	0.0046	3.1831	0.0555	0.9835
	<i>Arnoglossus thori</i> <sup>4</sup>	15	8.0	13.1	3.84	23.80	0.0026	3.5647	0.1922	0.9636
	<i>Arnoglossus rueppelli</i> <sup>2</sup>	13	7.5	16.2	3.00	33.00	0.0081	2.9164	0.2010	0.9503
Citharidae	<i>Citharus linguatula</i> <sup>4</sup>	1755	8.2	23.5	4.02	102.42	0.0061	3.0744	0.0139	0.9653
Cynoglossidae	<i>Symphurus nigrescens</i> <sup>4</sup>	7	9.8	10.9	10.09	14.02	0.0075	3.1518	0.4395	0.9114
Scophthalmidae	<i>Lepidorhombus whiffiagonis</i> <sup>2</sup>	12	20.2	35.7	90.98	363.18	0.0726	2.3264	0.2301	0.9109
	<i>Scophthalmus rhombus</i> <sup>3</sup>	10	32.0	48.9	472.08	1928.06	0.0029	3.4171	0.1589	0.9830
	<i>Lepidorhombus boscii</i> <sup>4</sup>	2242	10.9	40.8	9.88	679.18	0.0039	3.2540	0.0072	0.9892
	<i>Microchirus ocellatus</i> <sup>4</sup>	8	10.3	13.7	18.81	42.43	0.0326	2.7289	0.1809	0.9743
Soleidae	<i>Microchirus variegatus</i> <sup>4</sup>	29	10.1	15.5	12.20	39.40	0.0162	2.8724	0.1787	0.9054
	<i>Monochirus hispidus</i> <sup>1</sup>	15	9.7	13.7	14.40	32.01	0.0565	2.4304	0.1750	0.9369
	<i>Solea solea</i> <sup>4</sup>	130	10.0	32.0	9.24	330.00	0.0192	2.7304	0.0462	0.9646

N: sample size; Min: Minimum; Max: Maximum; a and b: Intercept and slope of length weight relationships; SE (b): Standard Error of slope b; confidence limits; r<sup>2</sup>: Coefficient of determination; Notes (1) first LWR reference for the species (2) first LWR reference for Turkish waters (3) first LWR reference for North Aegean sea (4) updated LWR reference for species (Froese and Pauly, 2009)

relationships, 95% confidence intervals of b, the coefficient of determination (r<sup>2</sup>) and notes are presented for each species in Table 1. All species length-weight relationships were highly significant (Table 1; p<0.05).

According to Tesch (1971) the value of the parameter b varies between 2 and 4. In this study, the b values ranged from 2.3264 for *Lepidorhombus whiffiagonis* to 3.5647 for *Arnoglossus thori*. The median value of b was 3.1497.

There are many studies on the length-weight relationships of the different flatfish populations both in Turkish waters and in other localities but to the best of our knowledge, no prior information on LWR parameters is currently available for *Monochirus hispidus* in Fishbase (Froese and Pauly, 2009). Also, this study presents LWR parameters for the first time for *Arnoglossus imperialis*, *Arnoglossus rueppelli* and *Lepidorhombus whiffiagonis* in Turkish waters (Froese and Pauly, 2009).

## CONCLUSION

It is hope that the results obtained from this study will contribute to the knowledge on flatfish population in the region and assist to fisheries scientists for the future studies because the data were sampled from a relatively undisturbed area.

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