

A review of length–weight relationships of fishes from freshwaters of Turkey

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Summary

This paper presents 145 length–weight relationships gathered from the literature pertaining to 30 Turkish freshwater fish species belonging to six families. The value of the slope b ranged from 2.04 for *Carassius carassius* to 3.46 for *Scardinius erythroptalmus*. The mean value of b was 2.91 (SD = 0.305), which did not differ significantly from 3.0 (t -test, $P > 0.05$). The median value of b was 2.95; 50% of the b values ranged from 2.68 to 3.14. The plot of $\log a$ vs b was used to detect outliers.

Introduction

Length–weight relationships have a number of uses such as the estimation of population biomass when the length–frequency distribution is known or for the calculation of condition indices (Pauly, 1983; Safran, 1992; Petrakis and Stergiou, 1995; Gonçalves et al., 1996; Stergiou and Moutopoulos, 2001; Morey et al., 2003). In this review, we gathered 145 length–weight relationships from the literature for 30 fish species from the Turkish insular system.

Material and methods

All length–weight relationships presented here are the product of field studies conducted during 1980–2004 in freshwaters of Turkey. For the majority of the original length–weight relationships ($W = aL^b$), length was in cm and weight in g (111 relationships out of 145; 77%), whereas for 34 (23%) relationships, length and weight were expressed in millimeter and gram. For all length–weight relationships presented here, length has been expressed in centimeter (1 cm = 10 mm).

Results and discussion

Overall, 145 length–weight relationships (Table 1) were gathered from the literature, referring to 30 fish species belonging to six families from Turkish fresh waters. Overall, 31 of the 145 length–weight relationships refer to *Cyprinus carpio* (21.38%), 10 (6.90%) to *Leuciscus cephalus*, 10 (6.90%) to *Capoeta capoeta umbla* and 13 (8.97%) to *Stizostedion lucioperca*, four of the most commercially important demersal species in Turkish fresh waters.

The value of the slope b in the plot of $\log W$ against $\log L$ ranged from 2.04 for *Carassius carassius* in Yedigöller, Upper Porsuk Basin to 3.46 for *Scardinius erythroptalmus* in Manyas Kuş Lake. The mean value of b was 2.91 (SD = 0.305), which did not differ significantly from 3.0 (t -test, $P > 0.05$). The median value of b was 2.95 and 50% of the b values ranged between 2.68 and 3.14.

Froese (2000) suggested that a plot of $\log a$ vs b for all known length–weight relationships of a species results in a linear relationship, and that this relationship can be used to identify outliers (Stergiou and Moutopoulos, 2001). We have

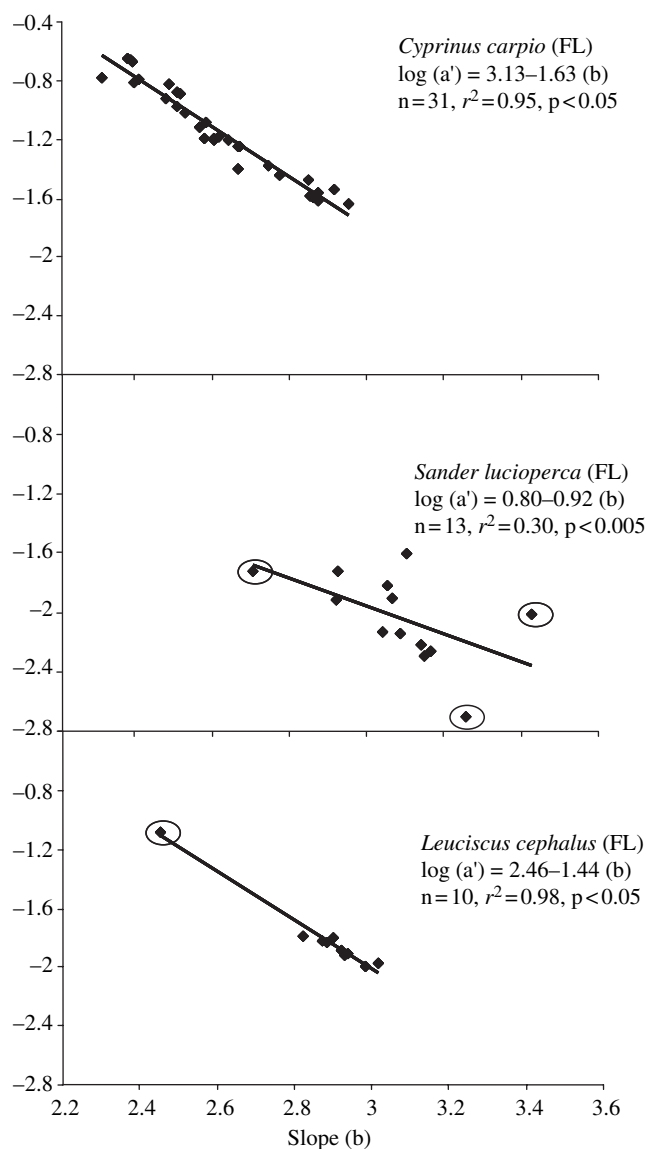


Fig. 1. Plots of $\log(a')$ vs b for all available length–weight relationships of three fish species in Turkish freshwaters. Note outliers (deviated more than one standard deviation from the regression lines) for *Sander lucioperca* (3 outliers) and *Leuciscus cephalus* (1 outlier). Outliers are marked by circular lines in the graphs; see also Table 1

Table 1
Parameters of the length-weight relationship of freshwater fishes from Turkey

Species	Area	Sex	Year	S	L	a	d'	b	r ²	N	Min	Max	Source
<i>Acanthalburnus microlepis</i>	Aras River	F	1996-1998	C	FL	0.0118	0.0118	3.05	-	536	-	-	Türkmen et al. (2001)
<i>A. microlepis</i>	Aras River	M	1996-1998	C	FL	0.0099	0.0099	3.10	-	569	-	-	Türkmen et al. (2001)
<i>Acanthobrama marmid</i>	Tigris River	F	1988-1990	C	FL	0.000021159	0.0054	3.40	0.943	277	8.6 ²	17.8 ²	Ünlü et al. (1994) ³
<i>A. marmid</i>	Tigris River	M	1988-1990	C	FL	0.0000037034	0.0072	3.29	0.925	151	10.4 ²	16.7 ²	Ünlü et al. (1994) ³
<i>Alburnoides bipunctatus</i>	Çoruh River	C	1995-1996	C	FL	0.0249	0.0249	2.79	-	353	7.9	15.9	Erdogan et al. (1997)
<i>A. bipunctatus</i>	Çoruh River	F	1995-1996	C	FL	0.0375	0.0375	2.62	-	197	-	-	Erdogan et al. (1997)
<i>A. bipunctatus</i>	Çoruh River	M	1995-1996	C	FL	0.0166	0.0166	2.95	-	156	-	-	Erdogan et al. (1997)
<i>Barbus capito capito</i>	Çoruh River	C	1995	AUT	FL	0.021078862	0.0211	2.80	0.965	587	6.0	29.5	Ölmez et al. (1998) ³
<i>Barbus capito pectoralis</i>	Aksu Stream	C	1997-1998	C	FL	0.0185	0.0185	2.88	0.990	364	16.4	22.5	Ikiz et al. (1998) ³
<i>Barbus lateus</i>	Asi River	C	1997-1998	C	FL	0.0145	0.0145	3.08	0.984	248	5.1	21.8	Özdilek et al. (2004)
<i>Barbus plebejus escheri</i>	Çoruh River	F	1994-1996	C	FL	0.0152	0.0152	2.91	0.941	222	-	-	Yıldırım et al. (2001) ³
<i>B. plebejus escheri</i>	Çoruh River	M	1994-1996	C	FL	0.0189	0.0189	2.84	0.922	405	-	-	Yıldırım et al. (2001) ³
<i>B. plebejus escheri</i>	Bafra-Altunkaya Dam-Lake	C	1992-1993	C	FL	0.0192	0.0192	2.85	0.953	236	19.6 ²	40.4 ²	Bircan and Ergün (1998) ³
<i>B. plebejus escheri</i>	Kara Stream	C	1990-1992	C	FL	0.0756	0.0756	2.49	-	271	9.42	20.5	Kutrup and Baysal (1994)
<i>Barbus rajanorum mystaceus</i>	Keban Dam Lake	C	-	-	TL	0.00005654	0.0066	3.07	0.929	559	13.3 ²	48.3 ²	Duman (2002) ³
<i>B. rajanorum mystaceus</i>	Keban Dam Lake	F	-	-	TL	0.00005294	0.0064	3.08	0.925	203	-	-	Duman (2002) ³
<i>B. rajanorum mystaceus</i>	Keban Dam Lake	M	-	-	TL	0.00004016	0.0054	3.13	0.901	356	-	-	Duman (2002) ³
<i>Capoeta capoeta umbra</i>	Euphrates River	C	1991-1992	C	FL	0.000011736	0.0108	2.96	0.878	536	6.7 ²	31.9 ²	Yılmaz et al. (2003) ³
<i>C. capoeta umbra</i>	Euphrates River	F	1991-1992	C	FL	0.000012209	0.0110	2.96	0.994	260	6.8 ²	29.1 ²	Yılmaz et al. (2003) ³
<i>C. capoeta umbra</i>	Euphrates River	M	1991-1992	C	FL	0.000010859	0.0104	2.98	0.990	276	6.7 ²	31.9 ²	Yılmaz et al. (2003) ³
<i>C. capoeta umbra</i>	Hazar Lake	C	2000-2001	C	TL	0.00002999	0.0047	3.20	-	101	10.8 ²	39.0 ²	Yüksel (2002)
<i>C. capoeta umbra</i>	Hazar Lake	F	2000-2001	C	TL	0.00002643	0.0042	3.20	-	53	18.7 ²	39.0 ²	Yüksel (2002)
<i>C. capoeta umbra</i>	Hazar Lake	M	2000-2001	C	TL	0.00001874	0.0034	3.26	-	48	10.8 ²	39.0 ²	Yüksel (2002)
<i>C. capoeta umbra</i>	Karakaya Dam Lake	C	1996-1997	C	FL	0.00002249	0.0179	2.90	-	100	20.0 ²	41.5 ²	Girgin et al. (1997)
<i>C. capoeta umbra</i>	Karakaya Dam Lake	F	1996-1997	C	FL	0.000171356	0.0596	2.54	-	55	20.0 ²	41.5 ²	Girgin et al. (1997)
<i>C. capoeta umbra</i>	Karakaya Dam Lake	M	1996-1997	C	FL	0.000027867	0.0199	2.85	-	45	20.4 ²	34.3 ²	Girgin et al. (1997)
<i>C. capoeta umbra</i>	Abdullharap Stream Lake	C	1993-1994	C	FL	0.013858301	0.0139	2.10	-	355	8.3	33.5	Kalkan et al. (1997)
<i>Capoeta tinca</i>	Kızıllırmak River	C	1996-1998	SP-AUT	FL	0.000039728	0.0257	2.81	-	506	7.4 ²	33.9 ²	Gül and Yılmaz (2002)
<i>C. tinca</i>	Kızıllırmak River	F	1996-1998	SP-AUT	FL	0.000063773	0.0342	2.73	-	208	-	-	Gül and Yılmaz (2002)
<i>C. tinca</i>	Kızıllırmak River	M	1996-1998	SP-AUT	FL	0.000014931	0.0145	2.99	-	208	-	-	Gül and Yılmaz (2002)
<i>Capoeta trutta</i>	Diele River	C	1985	C	FL	0.000041228	0.0255	2.79	0.974	412	-	-	Ünlü (1991) ³
<i>C. trutta</i>	Diele River	F	1985	C	FL	0.000049739	0.0285	2.76	0.976	242	9.0 ²	39.7 ²	Ünlü (1991) ³
<i>C. trutta</i>	Diele River	M	1985	C	FL	0.000027784	0.0201	2.86	0.972	170	9.1 ²	32.3 ²	Ünlü (1991) ³
<i>Carasobarbus luteus</i>	Atatürk Dam Lake	C	1995-1996	C	FL	-	-	2.86	-	312	12.4 ²	39.4 ²	Yapalak and Yüksel (1998)
<i>Carasobarbus luteus</i>	Atatürk Dam Lake	C	1996-1997	SP-SU	FL	0.012706033	0.0127	3.09	-	323	8.0	40.93	Şevik and Hartavi (1997)
<i>Carasobarbus luteus</i>	Tahtia köprü Dam Lake	C	1994-1995	C	FL	0.000163651	0.0002	2.88	-	149	11.20	30.80	Sağat and Erdem (1997)
<i>Carassius auratus</i>	Eğirdir Lake	C	1998-1999	C	FL	0.0210	0.0210	3.06	0.902	342	13.45	26.80	İzci (2004) ³
<i>Carassius carassius</i>	Yedi göller, Upper Porsuk Basin	C	1995-1996	C	SL	0.00261424	0.0026	2.04	-	112	83.47	164.83	Bulut et al. (1997)
<i>C. carassius</i>	Yedi göller, Upper Porsuk Basin	F	1995-1996	C	SL	0.001595	0.0016	2.64	-	60	80.67	165.6	Bulut et al. (1997)
<i>C. carassius</i>	Yedi göller, Upper Porsuk Basin	M	1995-1996	C	SL	0.001832	0.0018	2.61	-	52	84.17	159.33	Bulut et al. (1997)
<i>Carassius gibelio</i>	Eğirdir Lake	C	2001-2002	C	FL	0.0165	0.0165	3.15	0.998	616	9.0	33.0	Balık et al. (2004b) ³
<i>C. gibelio</i>	Eğirdir Lake	F	2001-2002	C	FL	0.0134	0.0134	3.22	0.998	287	-	-	Balık et al. (2004b) ³
<i>C. gibelio</i>	Eğirdir Lake	M	2001-2002	C	FL	0.0185	0.0185	3.11	0.996	329	-	-	Balık et al. (2004b) ³
<i>Chalcarburnus mossulensis</i>	Karasu River	F	1995-1997	C	FL	0.0073	0.0073	3.14	0.921	441	9.36	18.45	Yıldırım et al. (2003) ³
<i>C. mossulensis</i>	Karasu River	M	1995-1997	C	FL	0.0129	0.0129	2.91	0.980	409	9.48	17.97	Yıldırım et al. (2003) ³
<i>Chondrostoma nasus</i>	Isıklı Lake	C	1998-1999	C	FL	0.0201	0.0201	2.86	0.931	674	13.3	22.3	Sarı et al. (2003) ³
<i>C. nasus</i>	Isıklı Lake	F	1998-1999	C	FL	0.0199	0.0199	2.86	0.918	482	14.20	21.90	Sarı et al. (2003) ³
<i>C. nasus</i>	Isıklı Lake	M	1998-1999	C	FL	0.0214	0.0214	2.83	0.955	192	13.30	22.30	Sarı et al. (2003) ³

Table 1
(Continued)

Species	Area	Sex	Year	S	L	a	d'	b	r ²	N	Min	Max	Source
<i>Chondrostoma regium</i>	Atatürk Dam Lake	F	1986–1988	C	FL	0.000003843	0.0061	3.20	0.918	422	13.0 ²	29.7 ²	Oymak (2000) ³
<i>C. regium</i>	Atatürk Dam Lake	M	1986–1988	C	FL	0.000002392	0.0045	3.28	0.944	303	16.8 ²	30.5 ²	Oymak (2000) ³
<i>C. regium</i>	Atatürk Dam Lake	C	1986–1988	C	FL	0.000003006	0.0052	3.24	0.927	725	13.0 ²	30.5 ²	Oymak (2000) ³
<i>C. regium</i>	Euphrates River waters	C	1988–1989	C	FL	0.009604615	0.0096	3.04	–	161	–	–	Sevik (1998)
<i>Clarias lazera</i>	Sakarya river	F	–	C	–	0.007	0.007	2.99	0.922	51	–	–	Korkmaz (2003)
<i>C. lazera</i>	Sakarya river	M	–	C	–	0.0104	0.0104	2.85	0.914	59	–	–	Korkmaz (2003)
<i>Cyprinus carpio</i>	Göhlisar Lake	C	1994	C	FL	0.0252	0.0252	2.87	–	693	10.5	49.4	Alp and Balık (2000)
<i>C. carpio</i>	Göhlisar Lake	F	1994	C	FL	0.0258	0.0258	2.87	–	369	10.5	49.4	Alp and Balık (2000)
<i>C. carpio</i>	Göhlisar Lake	M	1994	C	FL	0.0243	0.0243	2.89	–	324	10.5	46.0	Alp and Balık (2000)
<i>C. carpio</i>	Bendimah Stream	C	1994–1996	C	FL	0.0338	0.0338	2.86	0.996	46	9.6	61.3	Cetinkaya et al. (1995–99) ³
<i>C. carpio</i>	Karasu Stream	C	1994–1996	C	FL	0.0287	0.0287	2.93	0.990	182	7.0	55.8	Cetinkaya et al. (1995–99) ³
<i>C. carpio</i>	Dolutaş-Degirmingöl Pont	C	1994–1996	C	FL	0.0229	0.0229	2.97	0.994	212	6.0	48.2	Cetinkaya et al. (1995–99) ³
<i>C. carpio</i>	Dönerdere Pont	C	1994–1996	C	FL	0.0277	0.0277	2.89	0.988	288	6.0	32.4	Cetinkaya et al. (1995–99) ³
<i>C. carpio</i>	Hirfanlı Dam Lake	C	1974	C	FL	0.09585	0.0959	2.53	–	1545	8.0	69.0	Karabatak (1994a)
<i>C. carpio</i>	Hirfanlı Dam Lake	F	1974	C	FL	0.0830	0.0830	2.59	–	–	–	–	Karabatak (1994a)
<i>C. carpio</i>	Hirfanlı Dam Lake	M	1974	C	FL	0.15450	0.1545	2.40	–	–	–	–	Karabatak (1994a)
<i>C. carpio</i>	Hirfanlı Dam Lake	C	1975	C	FL	0.05700	0.0570	2.67	–	815	13.0	70.0	Karabatak (1994a)
<i>C. carpio</i>	Hirfanlı Dam Lake	F	1975	C	FL	0.04243	0.0424	2.75	–	–	–	–	Karabatak (1994a)
<i>C. carpio</i>	Hirfanlı Dam Lake	M	1975	C	FL	0.06264	0.0626	2.65	–	–	–	–	Karabatak (1994a)
<i>C. carpio</i>	Mamasın Dam Lake	C	1980–1981	C	FL	0.21630	0.2163	2.38	–	268	10.0	64.0	Ikiz (1998)
<i>C. carpio</i>	Mamasın Dam Lake	C	1980–1981	F	FL	0.22382	0.2234	2.37	–	129	11.0	64.0	Ikiz (1998)
<i>C. carpio</i>	Mamasın Dam Lake	C	1980–1981	M	FL	0.21352	0.2134	2.39	–	139	10.0	50.0	Ikiz (1998)
<i>C. carpio</i>	Tödürge Lake	C	1985–1986	C	FL	0.15062	0.1506	2.49	–	610	9.5	42.8	Erdem (1988)
<i>C. carpio</i>	Tödürge Lake	F	1985–1986	C	FL	0.12986	0.1299	2.52	–	326	10.0	41.5	Erdem (1988)
<i>C. carpio</i>	Tödürge Lake	M	1985–1986	C	FL	0.16407	0.1641	2.31	–	284	9.5	42.8	Erdem (1988)
<i>C. carpio</i>	Beşşehir Lake	F	1981	C	FL	0.11934	0.1193	2.48	–	399	–	–	Erdem (1984a)
<i>C. carpio</i>	Beşşehir Lake	F	1981	C	FL	0.06619	0.0662	2.62	–	212	–	–	Erdem (1984a)
<i>C. carpio</i>	Beşşehir Lake	M	1981	C	FL	0.16359	0.1636	2.41	–	187	–	–	Erdem (1984a)
<i>C. carpio</i>	Eğirdir Lake	C	1971–1981	C	FL	0.076640794	0.0766	2.57	–	717	8.0	69.0	Erdem (1983)
<i>C. carpio</i>	Beşşehir Lake	C	1971–1981	C	FL	0.105477541	0.1055	2.51	–	698	8.0	73.0	Erdem (1983)
<i>C. carpio</i>	Çavuşçu Lake	C	1971–1981	C	FL	0.064402095	0.0644	2.61	–	776	8.5	64.0	Erdem (1983)
<i>C. carpio</i>	Apa Dam Lake	F	1981	C	FL	0.03986	0.0399	2.67	–	123	13.4	59.16	Erdem (1984b)
<i>C. carpio</i>	Apa Dam Lake	M	1981	C	FL	0.0642	0.0642	2.58	–	119	15.50	56.41	Erdem (1984b)
<i>C. carpio</i>	Eber Lake	C	1987	SP	FL	0.06313	0.0631	2.61	–	451	–	–	Erdem (1982)
<i>C. carpio</i>	Eber Lake	F	1987	SP	FL	0.13395	0.1340	2.51	–	233	–	–	Erdem (1982)
<i>C. carpio</i>	Eber Lake	M	1987	SP	FL	0.03619	0.0362	2.78	–	218	–	–	Erdem (1982)
<i>C. carpio</i>	Akşehir Lake	F	1978	SP	FL	0.05652322	0.0565	2.68	–	150	30.0	66.0	Erdem (1980)
<i>Esox lucius</i>	Kesikköprü Dam Lake	C	1995–1996	C	FL	0.035702612	0.0357	2.69	0.996	100	–	–	Altındag et al. (1999) ³
<i>E. lucius</i>	Kesikköprü Dam Lake	F	1995–1996	C	FL	0.00259956	0.0026	3.36	0.996	45	–	–	Altındag et al. (1999) ³
<i>E. lucius</i>	Kesikköprü Dam Lake	M	1995–1996	C	FL	0.006200118	0.0062	3.10	0.992	55	–	–	Altındag et al. (1999) ³
<i>E. lucius</i>	Bafra Lake	C	1985–1986	C	SL	0.00755	0.0076	3.18	–	284	17.43	38.29	Aral and Büyükhacıoğlu (1987)
<i>E. lucius</i>	Bafra Lake	F	1985–1986	C	SL	0.00448	0.0045	3.33	–	111	17.83	37.98	Aral and Büyükhacıoğlu (1987)
<i>E. lucius</i>	Bafra Lake	M	1985–1986	C	SL	0.00333	0.0033	3.43	–	173	17.23	38.57	Aral and Büyükhacıoğlu (1987)
<i>E. lucius</i>	İşıklı Lake	C	1998–1999	C	FL	0.002229	0.0022	3.39	0.922	166	19.1	41.6	Ilhan and Balık (2003) ³
<i>E. lucius</i>	İşıklı Lake	F	1998–1999	C	FL	0.003385	0.0034	3.27	0.904	69	20.5	41.6	Ilhan and Balık (2003) ³
<i>E. lucius</i>	İşıklı Lake	M	1998–1999	C	FL	0.001812	0.0018	3.45	0.925	97	19.1	37.3	Ilhan and Balık (2003) ³
<i>Gambusia affinis</i>	Dalaman	C	1998–1999	C	TL	0.008346415	0.0083	3.27	0.965	682	1.7	5.5	Öztürk and İkiz (2004) ³
<i>G. affinis</i>	Dalaman	F	1998–1999	C	TL	0.009508237	0.0095	3.24	0.971	488	–	–	Öztürk and İkiz (2004) ³

Table 1
(Continued)

Species	Area	Sex	Year	S	L	a	d'	b	r ²	N	Min	Max	Source
<i>G. affinis</i>	Dalaman	M	1998-1999	C	TL	0.007281115	0.0073	3.35	0.894	194	-	-	Öztürk and İkiz (2004) ³
<i>G. affinis</i>	Ortaca	C	1998-1999	C	TL	0.009602846	0.0096	3.27	0.949	639	1.3	5.8	Öztürk and İkiz (2004) ³
<i>G. affinis</i>	Ortaca	F	1998-1999	C	TL	0.009236341	0.0092	3.30	0.975	450	-	-	Öztürk and İkiz (2004) ³
<i>G. affinis</i>	Ortaca	M	1998-1999	C	TL	0.014962356	0.0150	2.67	0.661	189	-	-	Öztürk and İkiz (2004) ³
<i>G. affinis</i>	Akgöl	F	1998-1999	C	TL	0.00086	0.0086	3.27	0.977	705	1.3	5.5	Öztürk and İkiz (2003) ³
<i>G. affinis</i>	Akgöl	C	1998-1999	C	TL	0.0091	0.0091	3.23	0.982	574	1.3	5.5	Öztürk and İkiz (2003) ³
<i>G. affinis</i>	Akgöl	M	1998-1999	C	TL	0.0100	0.0100	3.01	0.855	131	1.5	3.3	Öztürk and İkiz (2003) ³
<i>Leuciscus cephalus</i>	Karakaya Dam Lake	F	1995-1996	C	FL	0.013	0.013	3.03	-	-	-	-	Kalkan et al. (2005)
<i>L. cephalus</i>	Karakaya Dam Lake	M	1995-1996	C	FL	0.0824	0.0824	2.49	-	-	5.3 ²	28.7 ²	Kalkan et al. (2005)
<i>L. cephalus</i>	TödürgelLake	F	1994	C	FL	0.0101	0.0101	3.10	-	460	5.4 ²	23.3 ²	Unver and Tanyolac (1999)
<i>L. cephalus</i>	TödürgelLake	M	1994	C	FL	0.0121	0.0121	3.04	-	214	6.9 ²	30.9 ²	Unver and Tanyolac (1999)
<i>L. cephalus</i>	Kirmir Stream	C	1993-1994	C	FL	0.000019952	0.0162	2.91	-	427	8.5 ²	26.8 ²	Solak et al. (1995)
<i>L. cephalus</i>	Müceledi Stream	C	1986-1987	C	FL	0.000015346	0.0147	2.98	-	1305	8.5 ²	26.8 ²	Oztas and Solak (1988)
<i>L. cephalus</i>	Müceledi Stream	F	1986-1987	C	FL	0.000016368	0.0152	2.97	-	588	8.5 ²	26.8 ²	Oztas and Solak (1988)
<i>L. cephalus</i>	Müceledi Stream	M	1986-1987	C	FL	0.000011015	0.0122	3.04	-	717	8.6 ²	24.8 ²	Oztas and Solak (1988)
<i>L. cephalus</i>	Akşehir Lake	F	1992-1993	SU-AUT	FL	0.010471285	0.0105	3.14	-	-	13.0	44.0	Altundag (1996)
<i>L. cephalus</i>	Akşehir Lake	M	1992-1993	SU-AUT	FL	0.01581248	0.0158	3.00	-	-	15.0	31.0	Altundag (1996)
<i>Leuciscus cephalus orientalis</i>	Aras River	F	1995-1997	C	FL	0.0093	0.0093	3.14	0.986	558	8.67	27.5	Türkmen et al. (1999) ³
<i>L. cephalus orientalis</i>	Aras River	M	1995-1997	C	FL	0.099	0.099	3.11	0.964	533	8.92	24.1	Türkmen et al. (1999) ³
<i>Leuciscus lepidus</i>	Beşşehir Lake	C	1984	C	FL	0.3864	0.3864	2.19	-	284	-	-	Erdem and Erdem (1985)
<i>L. lepidus</i>	Beşşehir Lake	F	1984	C	FL	0.4844	0.4844	2.40	-	151	-	-	Erdem and Erdem (1985)
<i>L. lepidus</i>	Beşşehir Lake	M	1984	C	FL	0.1562	0.1562	2.09	-	133	-	-	Erdem and Erdem (1985)
<i>Salmo trutta magrostroma</i>	Tekederesi	M	1997	SP-SU	FL	0.0340	0.0340	2.59	-	54	9.0	24.1	Yüksel and Kocaman (1998)
<i>Sander lucioperca</i>	Eğirdir Lake	F	2001-2002	C	FL	0.0072	0.0072	3.09	0.972	-	-	-	Balik et al. (2004a) ³
<i>S. lucioperca</i>	Eğirdir Lake	M	2001-2002	C	FL	0.0055	0.0055	3.17	0.922	-	-	-	Balik et al. (2004a) ³
<i>S. lucioperca</i>	Eğirdir Lake	C	2001-2002	C	FL	0.0060	0.0060	3.15	0.974	705	16.0	47.0	Balik et al. (2004a) ³
<i>S. lucioperca</i>	Hirfanlı Dam Lake	C	1996-1997	C	FL	0.00001049	0.0123	3.07	-	326	10.5 ²	52.9 ²	Ablak and Yılmaz (2004)
<i>S. lucioperca</i>	Hirfanlı Dam Lake	F	1996-1997	C	FL	0.00001316	0.0151	3.06	-	161	15.0 ²	52.9 ²	Ablak and Yılmaz (2004)
<i>S. lucioperca</i>	Hirfanlı Dam Lake	M	1996-1997	C	FL	0.00001909	0.0246	3.11	-	165	10.5 ²	50.3 ²	Ablak and Yılmaz (2004)
<i>Stizostedion lucioperca</i>	Eğirdir Lake	C	1999	C	FL	0.00742	0.0074	3.04	0.995	672	-	-	Becer and İkiz (1999) ³
<i>S. lucioperca</i>	Eğirdir Lake	F	1999	C	FL	0.00509	0.0051	3.16	0.98	328	20.0	56.0	Becer and İkiz (1999) ³
<i>S. lucioperca</i>	Eğirdir Lake	M	1999	C	FL	0.00971	0.0097	3.44	0.996	344	18.8	58.5	Becer and İkiz (1999) ³
<i>S. lucioperca</i>	Hirfanlı Dam-Lake	C	1988	WI-SP	FL	0.01197	0.0120	2.92	-	191	18.7	56.0	Atar and Atay (1998)
<i>S. lucioperca</i>	Hirfanlı Dam-Lake	F	1988	WI-SP	FL	0.019098	0.0191	2.70	-	76	24.8	56.0	Atar and Atay (1998)
<i>S. lucioperca</i>	Hirfanlı Dam-Lake	M	1988	WI-SP	FL	0.019098	0.0191	2.93	-	79	25.5	50.0	Atar and Atay (1998)
<i>S. lucioperca</i>	Beşşehir Lake	C	1984	C	FL	0.001975558	0.0020	3.27	-	243	20.5	65.50	Erdem et al. (1985)
<i>Scardinius erythrophthalmus</i>	Manyas Kuş Lake	C	1987-1988	C	FL	0.006549	0.0065	3.46	0.994	-	3.6	17.4	Balik et al. (1997) ³
<i>Silurus triostegus</i>	Atatürk Dam Lake	C	1996-1998	C	SL	0.000013356	0.0114	2.93	0.948	623	14.2 ²	92.0 ²	Oymak et al. (2001) ³
<i>S. triostegus</i>	Atatürk Dam Lake	F	1996-1998	C	SL	0.000011399	0.0104	2.96	0.961	301	42.0 ²	99.0 ²	Oymak et al. (2001) ³
<i>S. triostegus</i>	Atatürk Dam Lake	M	1996-1998	C	SL	0.000017579	0.0134	2.88	0.937	322	19.9 ²	81.0 ²	Oymak et al. (2001) ³
<i>Tinca tinca</i>	Bayındır Dam Lake	C	1999-2000	C	FL	0.009317512	0.0093	3.17	0.971	100	15.2	34.0	Altundag et al. (2002)
<i>T. tinca</i>	Bayındır Dam Lake	F	1999-2000	C	FL	0.012184283	0.0122	3.08	0.966	49	15.2	33.2	Altundag et al. (2002)
<i>T. tinca</i>	Bayındır Dam Lake	M	1999-2000	C	FL	0.007809082	0.0078	3.22	0.961	51	15.0	34.0	Altundag et al. (2002)
<i>T. tinca</i>	Kesikköprü Dam Lake	C	1995-1996	C	FL	0.009240596	0.0092	3.17	0.951	105	15.0	40.0	Altundag et al. (1998) ³
<i>T. tinca</i>	Kesikköprü Dam Lake	F	1995-1996	C	FL	0.000117084	0.0001	3.25	0.964	54	16.0	38.0	Altundag et al. (1998) ³
<i>T. tinca</i>	Kesikköprü Dam Lake	M	1995-1996	C	FL	0.005896577	0.0059	3.04	0.941	51	15.0	40.0	Altundag et al. (1998) ³
<i>T. tinca</i>	Mogan Lake	C	1986	C	TL	0.053712219	0.0537	2.30	0.968	179	25.0	38.0	Karabatak (1994a) ³

Table 1
(Continued)

Species	Area	Sex	Year	S	L	a	a'	b	r ²	N	Min	Max	Source
<i>T. tinca</i>	Mogan Lake	F	1986	C	TL	0.040134235	0.0401	2.23	0.972	88	25.0	38.0	Karabatak (1994b) ³
<i>T. tinca</i>	Mogan Lake	M	1986	C	TL	0.0015733674	0.0016	2.60	0.962	91	25.0	36.0	Karabatak (1994b) ³

¹Questionable records = deviated > 2 SD from the regression line between log (a') and b.

²Length-weight relationship reported in millimeter and gram.

³r converted into r².

Sex (M, male; F, female; U, unidentified); year, year of sampling; S, sampling season (AUT, autumn; WI, winter; SP, spring; SU, summer; C, all season combined); L, type of length (TL, total length; FL, fork length; SL, standard length); a, the intercept of the relationship provided by source; a', intercept transferred to centimeter, gram provided by the source; b, the slope of the relationship; r², coefficient of determination; n, number of specimens; min and max are minimum and maximum lengths in sample (cm). Species are listed in alphabetical order.

applied this method to three species with 10 or more length-weight relationships (Fig. 1). This method led to the detection of outliers, where the respective point deviated more than one standard deviations from the regression line. These length-weight relationships are marked as 'questionable' in Table 1.

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