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SUPPLEMENTARY MATERIAL

Extended spawning in brown trout (*Salmo trutta*) populations from the Southern Iberian Peninsula: the role of climate variability

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Growth equations for the studied brown trout populations

The growth equations for brown trout (*Salmo trutta* L.) populations were calculated using surveys data collected from 2005 to 2013. The sampling sites were distributed in the nine sub-basins in the distribution area of the species in the region (Fig. S1 and Tab. S1). Surveys were made by electrofishing, using three successive passes without replacement and with constant effort (DeLury, 1947). Fish were placed into holding boxes to be measured (furcal length, L_F, to an accuracy of ±1 mm) and weighed (to an accuracy of ±0.01 g). Finally, the fish were recovered and were returned back to the sampled section.

For each sub-basin, the growth equation was obtained (Tab. S2) using von Bertalanffy's method (1938), complemented by the combined study of the frequency distribution of lengths in the sample (Petersen, 1981) and scalimetry (Pauly and Caddy, 1985; Steinmetz and Müller, 1991; Hining and West, 2000).

Tab. S1. Sampling sites in the study area.

Basin	Sub-basin	River/Reach*	Code Sampling site	Coordinates	
				UTM X	*UTM Y*
Guadalquivir	Almijara	Alhama	81	414498	4088169
		Alhama	82	414684	4087523
		Alhama	83	413988	4091434
		Alhama	84	414151	4088661
		Alhama	85	414903	4090028
		Alhama	86	412676	4092325
		Cacín	91	425668	4085989
		Cacín (11)	92	423419	4088808
		Cacín (11)	93	423312	4083608
		Añales	94	421396	4087349
		Cacín	96	418628	4098320
		Cacín	97	418608	4101439
	Genil	Dílar (12)	105	450541	4102247
		Genil (6)	114	465214	4110044
		Genil (6)	115	463264	4111387
		Maitena	121	466963	4113015
		Maitena	122	464618	4112816
		Monachil (7)	132	453368	4109287
	Guadalquivir I	Aguasmulas (1)	211	517726	4211633
		Aguasmulas (1)	212	516094	4211778
		Ayo. Valdeazores	231	515714	4200750
		Borosa	241	512612	4206109
		Borosa	242	513204	4206322
		Borosa	243	516254	4204488
		Borosa	244	515143	4204913
		Borosa	245	512911	4206841
		Guadalquivir I	253	505474	4194778
		Guadalquivir I	255	506258	4199069
		Guadalquivir I	261	508158	4202950
	Guadalquivir II	Aguascebas Grande	221	503687	4215813
		Guadalquivir II	262	511043	4226794
		Guadalquivir II	263	509669	4226626
		Guadalquivir II	264	502804	4220679
		Guadalquivir II	265	497956	4216410
		Guadalimar	271	533749	4250891
	Guadiana Menor I	Fardes	311	462269	4129150
		Fardes	312	471394	4128096
		Alhama de Lugros (3)	461	477961	4116224
		Alhorí (4)	401	482425	4111683
		Alcázar (5)	391	483630	4110575
		Bco. del Barrio	411	488168	4109578
	Guadiana Menor II	Castril (2)	301	521286	4191944
		Castril (2)	302	519965	4189046
		Guadalentín	323	510486	4191428
		Guadalentín	324	506417	4191227
		Guadalentín	326	508701	4188639
		Guadalentín	327	508764	4188609

Basin	Sub-basin	River/Reach*	Code Sampling site	Coordinates	
				UTM X	*UTM Y*
		Guardal	331	529022	4193388
		Guardal	332	529570	4192921
South Mediterranean	Eastern Sierra Nevada	Andarax (9)	62	509601	4099225
		Andarax (9)	63	509711	4097438
		Andarax (9)	64	509981	4096994
		Bayárcal (8)	11	498324	4103668
		Bayárcal (8)	13	499893	4099610
		Mecina	31	486769	4093919
		Paterna	41	504957	4098742
	Guadalfeo	Bérchules	151	482081	4099328
		Bérchules	152	483650	4099986
		Bérchules	153	483582	4092905
		Lanjarón	161	459112	4090279
		Poqueira	171	469044	4094273
		Poqueira	172	467797	4089401
		Torrente	181	454444	4093948
		Torrente	182	453134	4093631
		Trevélez (10)	192	477088	4095939
		Trevélez (10)	193	476596	4094765
		Chico de Soportújar	291	463712	4091657
Segura	Segura	Madera	351	533734	4234833
		Madera	352	533469	4228249
		Madera	354	534457	4226694
		Segura	361	544057	4231363
		Segura	362	530002	4220543
		Segura	363	530826	4221279
		Segura	366	538011	4224890
		Segura	367	538572	4225846
		Tus	372	543136	4245630
		Tus	373	544191	4245905
		Zumeta	383	541203	4217322
		Zumeta	384	545718	4223207
		Zumeta	385	546275	4224062
		Zumeta	386	548588	4228730

*Numbers in brackets refer to the rivers where spawning was studied (see Fig. 1. and Tab. 1).

Tab. S2. Parameters of Von Bertalanffy's growth equations for the nine sub-basins inhabited by brown trout in Andalusia.

Sub-basin	t_0	L∞	K	n	MSE
Almijara	-0.176	61.935	0.167	108	1.83
Genil	-0.205	107.253	0.083	524	1.64
Guadalfeo	-0.197	77.325	0.119	2074	2.51
Guadalquivir I	-0,126	45,62	0.32	204	2.03
Guadalquivir II	-0.121	42.224	0.359	597	2.16
Guadiana Menor I	-0.182	81.2	0.123	176	1.84
Guadiana Menor II	-0.157	40.154	0.292	729	1.43
Segura	-0.157	40.154	0.292	729	1.43
Eastern Sierra Nevada	-0.145	64.657	0.194	392	1.90

Age = t_0 – [Ln (1 - (L_F / L∞)) / K]; t_0, age at which the organisms would have had zero size; L_F, Fork length; L∞, asymptotic length at which growth is zero; K, growth rate; n, number of trout used to calculate the growth equation; MSE, mean squared error for size calculated for the equation. Time units in years and length units in centimetres.

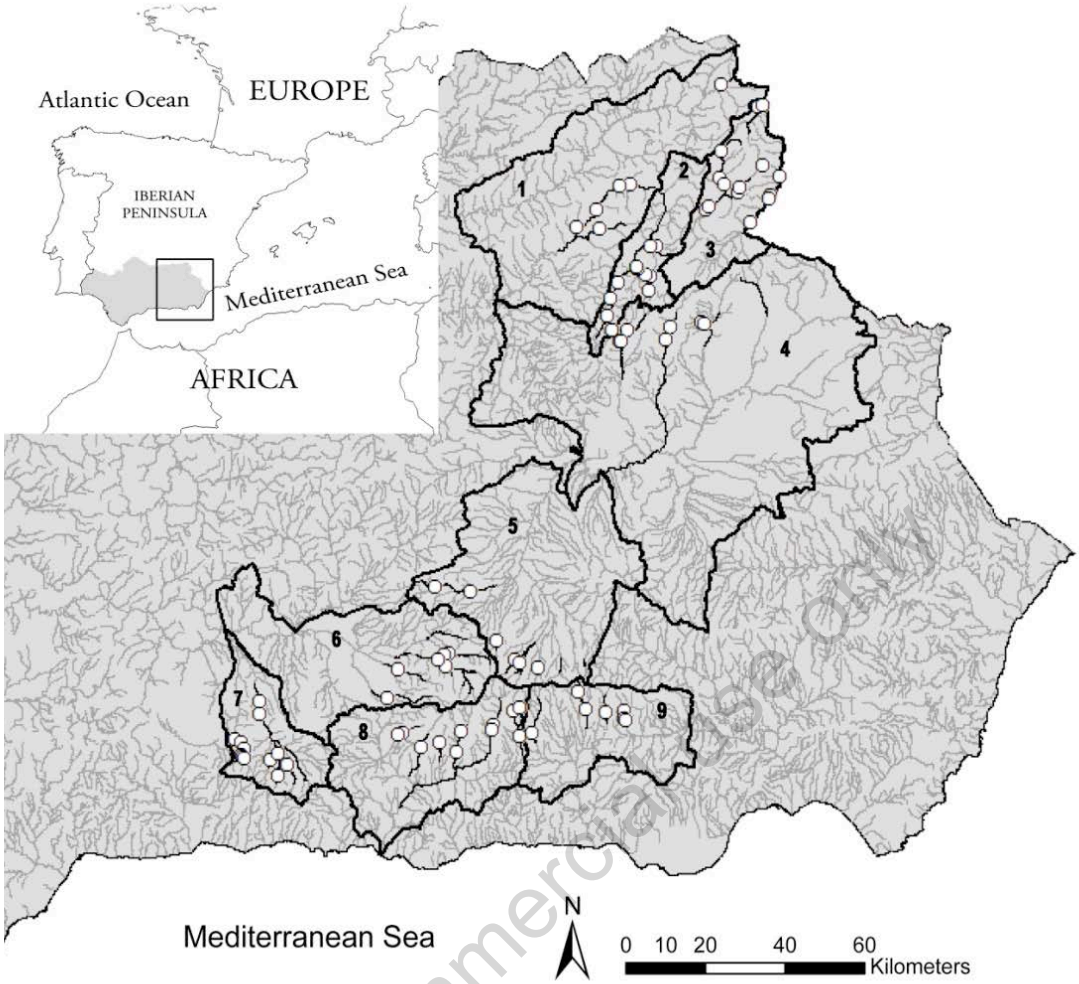

Fig. S1. Fluvial network (gray lines), rivers inhabited by *Salmo trutta* (thin black lines) and locations of the sub-basins in the study area (thick black lines): Guadalquivir II (1), Guadalquivir I (2), Segura (3), Guadiana Menor II (4), Guadiana Menor I (5), Genil (6), Almijara (7), Guadalfeo (8), and Eastern Sierra Nevada (9).

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