

## **Study on the Stone crayfish *Austropotamobius torrentium* (Schrank, 1803) (Crustacea: Decapoda: Astacidae) population in the Dospat Dam (Western Rhodope Mountains, Bulgaria)**

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**Abstract.** In present paper the results from a study on the Stone crayfish in the Dospat Dam were represented. During the study period a total of 551 stone crayfish were caught (328 males and 223 females) by traps. The size-weight characteristics of the population were established, as well as the determination of its relative density (CPUE), and the ratio between the males and the females.

**Key words:** Stone crayfish, population, CPUE, body size, Dospat Dam.

### **Introduction**

The distribution of Stone crayfish *Austropotamobius torrentium* (Schrank, 1803) is mainly in the Central and South-Eastern countries of the European continent. It was found in 20 European countries, including and Bulgaria. As a species that needs a special preservation measures, it was included in the Annex II of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Souty-Grosset *et al.* 2006).

The information on the Stone crayfish *A. torrentium* distribution and population status published in Bulgaria is insufficient. Data on its habitats established in different regions of Bulgaria are mentioned in the studies of Bulgurkov (1961) and Sabchev & Stanimirova (1998) which works were engaged in a research of the epibiotic Branchiobdelidae (Annelida, Oligochaeta) on the crayfish. Zaikov *et al.* (2010) conducted a research on the population of the Stone crayfish in the Sarnena River (Western Rhodope Mountains). Hubenova *et al.* (2010) investigated fecundity of its population in Dospat Dam and reported on an average of 29 pleopodal eggs per female.

In present paper the results from a study on the Stone crayfish in the Dospat Dam were represented. The size-weight characteristics of the population were established, as well as the determination of its relative density (CPUE), and the ratio between the males and the females.

### Material and methods

The Dospat Dam (Fig. 1) is one of the largest dams in the country with an area of over 2260 ha and water holding capacity of about 446 400 thousand m<sup>3</sup>. It is located on the territory of Smolyan and Pazardzhik Districts, Dospat and Velingrad Municipalities.



**Fig. 1.** Views from the collection sites at the area of the Dospat Dam during present study.

The crayfish catch was done at about 1 km away from the dam wall in the months of May, July and August with the use of crayfish traps with the following dimensions: length 34 cm, diameter 23 cm, size of the mesh eye 4 mm. Prussian carps *Carassius gibelio* (Bloch, 1782) were used for bait. The traps were set at evening and stayed in the water for 12 hours at depth to 5 m (Westman *et al.* 1999).

The relative density of the population is determined by the formula  $CPUE = \frac{\text{caught crayfish number per one night}}{\text{number of the traps}}$  (Westman *et al.* 1999).

The crayfish were separated by sex and their body weight was determined individually with a KERN 440-33 electronic scale, and the length (from the top of the rostrum to the top of the telson) with a caliper.

The crayfish of each catch-sample were divided into five weight groups: up to 10 g, 10.1 – 20 g, 20.1 – 30 g, 30.1 – 40 g, and 40.1 – 50 g. For each group the number of specimens, body weight and length and the length of the carapace (average value, standard deviation and the variation coefficient) were represented.

The hydro-chemical parameters of the water (Table 1) in the Dospat Dam - temperature (°C), dissolved oxygen (mg/l), oxygen saturation (%), pH were measured by using a transportable unit WTW 315i/SET.

### Results and discussion

The hydro-chemical parameters of the water investigated are represented in Table 1. The values were within the normal ranges for all the stone crayfish habitats studied. The dissolved oxygen amount was within the ranges of 4.4 to 7.4 mg/l, as the lowest values were recorded in July when the water temperature was at its highest level. The pH values were in the ranges of 8.5 – 7.3.

**Table 1.** The hydro-chemical indices of the water from the Dospat Dam studied.

Parameters	Data		
	15.05.09	23.07.09	24.09.09
T°C	20.2	23.6	16.5
O <sub>2</sub> , mg/l	6.8	4.4	7.4
O <sub>2</sub> , %	87.0	57.3	88.4
pH	8.5	7.4	7.3

During the study period a total of 551 Stone crayfish were caught as their number was highest in September. Data regarding the relative density (CPUE) showed an average value of 4.65 for the three catches made (Table 2). Higher relative density was recorded for the males – 2.95 versus 1.70 for the females, e.g. in the catches the male crayfish were predominant. This was expressed very clearly in May, and was probably related with the fact that in this period females, who were still carrying eggs, were not active and stayed in their burrows. As a whole from all the 551 caught crayfish, 328 were males and 223 females.

**Table 2.** Catch Per Unit Effort (CPUE) calculated from the Stone crayfish studied in Dospat Dam.

Date	CPUE total	CPUE male	CPUE female
15.05.2009	5.41	4.41	1.00
23.07.2009	2.40	1.40	1.00
24.09.2009	6.14	3.04	3.10
Total:	4.65	2.95	1.70

The average weight of crayfish up to 10 g is equal for both females and males – 8.39 g, as the female crayfish are with higher length 65.17 mm against 62.92 mm for the males (Table 3). With the increasing body weight, the trend that the weight of males was higher, and the body length was lower than those of the females was clearly visible from the results. The possible main reason was that the males had better developed claws, which reflects on their body weight. In the last group – crayfish with weight from 40.1 to 50.0 g, only males (n=24) were caught in the traps.

The largest percent of crayfish caught were those with weight from 10.1 to 20.0 g (41%). The second biggest group was this one in the range of 20.1 – 30.0 g (31%). The smallest group was represented by crayfish with body weight from 40.1 to 50.0 g (4%), as there were no females.

**Table 3.** Size-weight structure of Stone crayfish population estimated from the samples taken in the Dospat Dam. Legend: TL=total length; CL=carapace length; BW=body weight.

Weight group, g	Parameter	Male				Female				Total			
		n	TL, mm	CL, mm	BW, g	n	TL, mm	CL, mm	BW, g	n	TL, mm	CL, mm	BW, g
up to 10.0	x		62.92	30.25	8.39		65.17	30.85	8.39		64.66	30.72	8.39
	SD	12	3.40	1.86	1.17	41	4.66	1.88	1.10	53	4.48	1.87	1.10
	Cv%		5.40	6.16	13.95		7.16	6.09	13.08		6.93	6.10	13.14
from 10.1 to 20.0	x		73.17	36.07	15.33		76.52	36.64	14.52		75.24	36.42	14.82
	SD	86	4.74	2.65	3.01	139	4.89	2.54	2.87	225	5.09	2.59	2.95
	Cv%		6.48	7.35	19.66		6.39	6.94	19.74		6.77	7.12	19.87
from 20.1 to 30.0	x		82.72	40.93	24.41		86.57	41.43	22.48		83.58	41.04	23.98
	SD	129	3.37	1.84	2.89	37	4.21	1.92	2.16	166	3.91	1.86	2.86
	Cv%		4.08	4.49	11.86		4.87	4.64	9.61		4.68	4.54	11.92
from 30.1 to 40.0	x		90.38	44.74	34.03		96.67	46.67	32.56		90.83	44.88	33.92
	SD	77	3.17	2.20	2.97	6	5.50	2.42	2.69	83	3.72	2.26	2.96
	Cv%		3.51	4.92	8.72		5.69	5.19	8.25		4.10	5.04	8.71
from 40.1 to 50.0	x		95.63	47.96	44.02		-	-	-		95.63	47.96	44.02
	SD	24	2.46	1.33	2.84	-	-	-	-	24	2.46	1.33	2.84
	Cv%		2.58	2.78	6.46		-	-	-		2.58	2.78	6.46
total	x		82.23	40.67	25.14		76.64	36.64	15.20		79.97	39.04	21.11
	SD	328	8.81	4.68	9.43	223	8.60	4.26	5.66	551	9.14	4.93	9.47
	Cv%		10.71	11.50	37.51		11.22	11.62	37.27		11.43	12.62	44.85

### Conclusion

The population of Stone crayfish in the Dospat Dam is with relatively high density (CPUE 4.65), as crayfish with body weight from 10.1 to 20.0 g were predominant. The percentage of this group was 41% of the total number of crayfish caught; while the smallest share (4%) was for the group 40.1 – 50.0 g. Males had larger body weight (25.14 g) in comparison to this one of the females (15.20 g).

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