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# Distribution and Current Status of Stone Crayfish Populations *Austropotamobius torrentium* (Decapoda: Astacidae) in Natura 2000 Protected Areas in Bulgaria

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**Abstract:** The stone crayfish *Austropotamobius torrentium* is one of the three native crayfish species occurring in Bulgaria (the other two are *Astacus astacus* and *Astacus leptodactylus*), which is protected by many European and national laws. In comparison with other European countries little is known about the population status of stone crayfish in Bulgaria. The aim of this work was to summarise newly collected data on the distribution and population status of *A. torrentium* in Natura 2000 protected areas in Bulgaria. This study was carried out from September 2011 to November 2012. During this period 994 localities in 570 different rivers and streams from 76 Natura 2000 protected areas were studied. A total of 2340 individuals were found in 112 localities from 83 rivers and streams in 30 protected areas. Stone crayfish had comparatively restricted and uneven distribution in Bulgaria and its populations were characterised by a relatively low abundance (0.002 – 0.34 ind./m<sup>2</sup>). The species was found in the range from 189 m to 1342 m a.s.l., but it was mainly located from 300 to 900 m (78.5% of all localities). There was a clear trend for the distribution of species in high mountains, where it was wider distributed in southern slopes and did not occur or was rare in northern slopes. Stone crayfish was found mainly in rivers with banks covered by beech (*Fagus sylvatica*), alder (*Alnus glutinosa*), oak (*Quercus* spp.) or sycamore (*Platanus orientalis*), and rarely in rivers with banks covered only by bushes. The species was almost completely absent in the exposed areas of the rivers and in the areas with coniferous vegetation. All our findings can be used as a basis for future monitoring of the state of stone crayfish populations and assessing the conservation status of the species in Bulgaria.

**Keywords:** Crayfish, Astacidae, *Austropotamobius torrentium*, distribution, Natura 2000, threats, conservation

## Introduction

Crayfish (Decapoda: Astacidae) are some of the largest invertebrates that play an important role in freshwater ecosystems. At present around 600 species are found worldwide, many of them in North America and Australia. Only five native crayfish species occur in Europe: noble crayfish, *Astacus astacus* (Linnaeus, 1758), narrow-clawed crayfish, *Astacus leptodactylus* Eschscholtz, 1823, thick-clawed crayfish, *Astacus pachypus* Rathke, 1837, white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet, 1858), and

stone crayfish, *Austropotamobius torrentium* (Schrank, 1803) (MACHINO, HOLDICH 2006, PÖCKL *et al.* 2006, SOUTY-GROSSET *et al.* 2006, HOLDICH *et al.* 2009). In the middle of the 19<sup>th</sup> century, as a result of the imports of non-indigenous crayfish species from North America, ‘crayfish plague’ (caused by the oomycete, *Aphanomyces astaci* Schikora, 1906) was imported in Europe. This dangerous virulent disease on crayfish was first established in Italy, in 1859. It was widespread in almost all European countries by the mid- to late 20<sup>th</sup>

century. These uncontrollable outbreaks together with the increasing human impact led to considerable decline in the stocks of the native crayfish species in most European countries. In order to relieve the huge damage and for aquacultural purposes, various non-indigenous crayfish species (NICS) were introduced in many of these countries. Of the ten NICS introduced at least nine have become established in the wild in Europe and their number varies in different countries. Western and Central European countries have the most of the introduced alien species (Netherlands – 6, England – 6, Germany – 5, France – 5, Italy – 5, Austria – 3, Spain – 3, and Switzerland – 3). Many of the Southeastern European countries, together with Andorra, Estonia, Irish Republic, Liechtenstein, Moldova and Ukraine, have not introduced any crayfish species yet (SOUTY-GROSSET *et al.* 2006, PÖCKL *et al.* 2006, HOLDICH *et al.* 2009).

Bulgaria is one of the European countries where only native species are found so far. There are three crayfish species in the country: noble crayfish, *A. astacus*, narrow-clawed crayfish, *A. leptodactylus*, and stone crayfish, *A. torrentium*. BULGURKOV (1964) reported *Astacus pachypus* Rathke, 1837, in Bulgaria but this was based only on one specimen. Subsequently, several studies were carried out in the country, but the existence of that species was not confirmed. Therefore, we consider that this species is not present in the country.

For a long period of time from the mid- to late 20<sup>th</sup> century the stone crayfish in Bulgaria was studied only a few times and these studies concerned mainly its biology and distribution in the country (BULGURKOV 1961, SUBCHEV, STANIMIROVA 1986, 1998). Since the beginning of this century the studying of *A. torrentium* has intensified and now there is more new information about its distribution and size, structure and state of different populations of the species in Bulgaria (ZAIKOV, HUBENOVA 2007, ZAIKOV *et al.* 2010, 2011, STOYNOV *et al.* 2013, TRICHKOVA *et al.* 2013). Some studies on the reproductive biology of stone crayfish in two different biotopes have been carried out, and the results are important for the future conservation measures and restocking of the species (HUBENOVA *et al.* 2010). Nevertheless, the information on the population status of *A. torrentium* in Bulgaria is still relatively limited.

The aim of this work is to summarise the newly collected data on the distribution and population status of stone crayfish in Natura 2000 protected areas in Bulgaria. All our findings can be used as a basis for future monitoring of the state of stone crayfish populations and assessing the conservation status of the species in Bulgaria.

## Material and Methods

From September 2011 till November 2012 we studied 994 localities (transects) in 570 different rivers and streams from 76 Natura 2000 protected areas in Bulgaria. The sampling sites were located in the three main water drainage basins in Bulgaria (the Danube River, Black Sea and Aegean Sea). The sampling localities are presented with the names of the rivers, geographical names, altitude and sampling dates (Appendix 1). In addition, geographical coordinates and information about the abundance of crayfish are given for the localities where the species was found (Table 1). All the localities of *A. torrentium* in the Natura 2000 network of protected areas in Bulgaria are given in Fig. 1.

Crayfish were captured using standard methods (*e.g.* MACHINO, FÜREDER 2005) – by hand searching both during the day and at night, by trapping and by electrofishing. In each locality we studied transect with length of 100 m and a width of 1 m (area of 100 m<sup>2</sup>) to establish crayfish abundance (ind./m<sup>2</sup>). Once crayfish were identified and counted, they were released back at the same places where they were caught. A list of all studied Natura 2000 protected areas and sampling localities is presented in Appendix 1.

## Results

A total of 2340 individuals of *A. torrentium* were found in 112 localities out of 83 rivers and streams from 30 protected areas (Table 1, Fig. 2). Localities belonging to the Aegean Sea basin (78) showed clear predominance over the localities belonging to the Danube River basin (26) and to the Black Sea basin (8). Most of the localities in the Aegean Sea basin where *A. torrentium* was found are in the mountains Pirin, Belasitsa, Central Balkan, Western Rhodopes, Konyavska, Osogovo and Vitosha (the Struma, Mesta and Maritsa river basins). Almost all localities in the Danube River basin are predominantly in the West and Central Balkan Mountains (the Iskar and Yantra river basins). The only localities of the species in the Black Sea basin are in the upper reaches of the Luda Kamchiya River and the Golyama Kamchiya River, and their tributaries in Kotlenska Mountain (East Balkan Mountains). Stone crayfish was found neither in the Danubian Plain, Black Sea coast, Strandzha and Sakar Mountains, nor in the Eastern and Central Rhodopes Mountains.

The most abundant populations of *A. torrentium* were established in the protected areas Rodopi-Zapadni (580 individuals; 24.8% relative abundance),

**Table 1.** List of the protected areas and localities where *A. torrentium* was recorded, and data about species abundance and frequency of occurrence

Protected areas (No/Name)	Date	Localities (No/Name)	Altitude (m a.s.l.)	Geographic coordinates	Number of specimens in transect	Abundance in the transect (ind./m <sup>2</sup> )	Total number of specimens in the area	Average abundance in the area (ind./m <sup>2</sup> )	Total number of transects examined in the area	Frequency of occurrence in the area
BG0000113 Vitosha	8.4.2012	1	1003 1026	N 42°30'01.6"; E 23°12'15.5" N 42°30'07.6"; E 23°12'13.3"	1 dead	0.01	5	0.006	8	37.5%
		2	1152 1158	N 42°30'21.4"; E 23°14'28.8" N 42°30'24.8"; E 23°14'27.3"	1 alive	0.01				
	12.4.2012	3	1057 1079	N 42°32'02.9"; E 23°21'43.8" N 42°32'00.7"; E 23°21'40.0"	3 alive	0.03				
BG0000117 Kotlenska Planina	13.10.2012	4	516 523	N 42°55'17.9"; E 26°22'51.9" N 42°55'17.8"; E 26°22'57.0"	14 alive	0.14	52	0.02	25	24%
		5	536 551	N 42°55'25.3"; E 26°21'02.8" N 42°55'28.1"; E 26°20'58.3"	6 alive	0.06				
		6	495 496	N 42°54'24.0"; E 26°16'46.0" N 42°54'21.7"; E 26°16'41.3"	18 alive	0.18				
	14.10.2012	7	419 442	N 42°57'36.0"; E 26°21'58.1" N 42°57'32.2"; E 26°21'59.4"	11 alive	0.11				
		8	448 450	N 42°57'42.7"; E 26°21'49.4" N 42°57'42.3"; E 26°21'44.3"	1 alive	0.01				
		9	354 361	N 42°57'51.0"; E 26°25'02.9" N 42°57'50.7"; E 26°25'07.3"	2 alive	0.02				
BG0000136 Reka Gorna Luda Kam- chiya	6.8.2012	10	595 597	N 42°47'49.2"; E 26°19'14.8" N 42°47'49.9"; E 26°19'19.6"	2 alive	0.02	6	0.02	4	50%
		11	407 423	N 42°47'04.6"; E 26°31'25.8" N 42°47'08.2"; E 26°31'30.1"	4 alive	0.04				

Table 1. Continued

BG0000164 Sinite Ka- mani	12.10.2012	12	Ablanovska River on the road to the village of Rakovo	450 464	N 42°42'23.7"; E 26°18'05.6" N 42°42'28.3"; E 26°18'02.5"	26 alive	0.26	64	0.08	8	62.5%
		13	River No 11981 down-stream the crossroad to the village of Sotirya	408 427	N 42°42'36.8"; E 26°23'39.1" N 42°42'41.1"; E 26°23'36.9"	14 alive	0.14				
		14	Dzhendem Dere River below the Orlovi Dupki site	455 464	N 42°43'33.2"; E 26°24'05.9" N 42°43'34.0"; E 26°24'01.3"	3 alive	0.03				
		15	River No 11972 on the road to Karandila	416 430	N 42°43'35.2"; E 26°24'52.2" N 42°43'38.9"; E 26°24'51.9"	17 alive	0.17				
		16	Ovcharitsa River below the peak Gavanite (above the village of Sotirya)	396 399	N 42°43'28.1"; E 26°24'57.0" N 42°43'29.9"; E 26°25'01.6"	4 alive	0.04				
BG0000167 Belasitsa	19.9.2011	17	The river at the village of Kljuch	512 514	N 41°21'31.7"; E 23°00'59.9" N 41°21'33.2"; E 23°01'00.0"	3 alive	0.03	38	0.08	5	100%
		18	The river at the village of Kljuch	523 533	N 41°21'31.8"; E 23°00'59.8" N 41°21'29.3"; E 23°00'58.6"	2 alive	0.02				
		19	Kameshnitsa River at the village of Kamena	534 549	N 41°21'25.5"; E 23°04'28.5" N 41°21'27.7"; E 23°04'27.8"	16 alive	0.16				
		20	Kolarevska River at the village of Kolarovo	508 528	N 41°21'29.6"; E 23°06'05.0" N 41°21'26.9"; E 23°06'04.2"	3 alive	0.03				
		21	Luda Mara River above the town of Petrich	452 464	N 41°22'01.7"; E 23°12'39.4" N 41°22'00.0"; E 23°12'38.8"	14 alive	0.14				
BG0000209 Pirin	6.8.2012	22	Sharaliiska River down-stream the Varbite site	1070 1084	N 41°43'19.6"; E 23°17'21.2" N 41°43'17.2"; E 23°17'26.9"	26 alive	0.26	26	0.01	27	3.7%
BG0000211 Tvardishka Planina	9.10.2012	23	Tineva River at the village of Boikovtzi	430 432	N 42°54'28.4"; E 26°04'41.3" N 42°54'26.5"; E 26°04'39.0"	8 alive	0.08	40	0.03	14	28.5%
		24	Novachevska River at the village of Novachevo	538 540	N 42°45'35.2"; E 26°08'51.6" N 42°45'37.2"; E 26°08'49.2"	27 alive	0.27				
		25	Malkata River at the village of Byala Palanka	486 490	N 42°46'04.3"; E 26°05'10.9" N 42°46'07.6"; E 26°05'09.5"	3 alive	0.03				
		26	Golyamata River at the village of Byala Palanka	508 517	N 42°45'47.5"; E 26°04'37.6" N 42°45'49.4"; E 26°04'34.4"	2 alive	0.02				
BG0000213 Tarnovski Visochini	1.6.2012	27	Rakovitsa River below the small reservoir at the village of Belyakovets	270 273	N 43°06'06.3"; E 25°34'00.3" N 43°06'03.4"; E 25°34'00.6"	67 alive	0.67	67	0.045	15	6.7%
BG0000224 Ograzhden- Maleshevo	19.9.2011	28	Lebnitsa River at the village of Nikudin	710 712	N 41°33'57.8"; E 23°02'40.8" N 41°33'57.3"; E 23°02'44.7"	7 alive	0.07	7	0.02	3	33%

Table 1. Continued

BG0000261 Yazovir Koprinka	29.8.2012	29	Leshnitsa River at the village of Golyamo Dryanovo	434 437	N 42°39'56.4"; E 25°15'26.2" N 42°39'59.8"; E 25°15'23.1"	2 alive	0.02	18	0.01	18	27.8%
	10.10.2011	30	Leshnitsa River at the village of Yasenovo	457 466	N 42°40'53.3"; E 25°14'20.6" N 42°40'55.7"; E 25°14'18.2"	7 alive	0.07				
		31	Leshnitsa River at the village of Golyamo Dryanovo	434 435	N 42°40'00.0"; E 25°15'21.5" N 42°39'59.1"; E 25°15'24.4"	4 alive	0.04				
		32	River No 70245 at the village of Dunavtsi	409 412	N 42°39'20.4"; E 25°17'23.5" N 42°39'23.9"; E 25°17'24.4"	3 alive	0.03				
		33	Akdere River at the village of Dolno Sahrane	407 408	N 42°37'37.0"; E 25°13'57.0" N 42°37'39.4"; E 25°13'54.2"	2 alive	0.02				
BG0000281 Reka Belitsa	18.6.2012	34	Belitsa River in the park of the town of Kilifarevo	189 190	N 42°59'32.0"; E 25°37'03.2" N 42°59'29.1"; E 25°37'00.0"	2 alive	0.02	479	0.34	14	85.7%
		35	Belitsa River at the village of Natsovtsi	202 205	N 42°58'09.3"; E 25°37'14.7" N 42°58'06.4"; E 25°37'14.9"	2 alive	0.02				
		36	Belitsa River at Kilifarevski Monastery	218 219	N 42°57'20.6"; E 25°37'25.4" N 42°57'20.6"; E 25°37'29.4"	3 alive	0.03				
		37	Belitsa River at the village of Boyanovtsi	261 269	N 42°55'54.4"; E 25°38'07.7" N 42°55'53.3"; E 25°38'04.3"	210 alive	2.1				
		38	Belitsa River at the bridge against the village of Pozhernik	231 234	N 42°56'51.4"; E 25°37'12.6" N 42°56'53.7"; E 25°37'15.6"	15 alive	0.15				
	19.6.2012	39	Belitsa River at the village of Vaglevtsi	311 312	N 42°54'20.2"; E 25°38'57.6" N 42°54'16.0"; E 25°38'55.5"	12 alive	0.12				
		40	Belitsa River at the mill downstream the village of Vaglevtsi	314 318	N 42°53'55.6"; E 25°39'03.7" N 42°53'52.6"; E 25°39'04.7"	44 alive	0.44				
		41	Belitsa River at the village of Voinezha	335 343	N 42°53'03.6"; E 25°38'58.8" N 42°52'59.3"; E 25°38'57.8"	27 alive	0.27				
42		Belitsa River at the village of Voneshta Voda	359 360	N 42°52'13.5"; E 25°38'12.4" N 42°52'11.5"; E 25°38'09.0"	38 alive	0.38					
43		Belitsa River at the village of Belitsa	394 395	N 42°51'17.0"; E 25°35'13.7" N 42°51'15.7"; E 25°35'11.0"	41 alive	0.41					
44		Belitsa River at the village of Kisjovtsi	374 375	N 42°51'10.2"; E 25°37'06.4" N 42°51'09.7"; E 25°37'02.5"	53 alive	0.53					
45		Raikovska River at the village of Raikovo	397 399	N 42°50'24.9"; E 25°38'09.0" N 42°50'22.9"; E 25°38'09.2"	32 alive	0.32					

Table 1. Continued

BG0000298 Konyavska Planina	10.5.2012	46	Lyava River above the village of Gorna Koznitsa	717 718	N 42°20'10.7"; E 22°54'07.4" N 42°20'12.4"; E 22°54'06.0"	7 alive	0.07	13	0.007	18	16.7%
		47	Madzharitsa River at the village of Dragomirovo	825 828	N 42°23'26.9"; E 22°51'13.3" N 42°23'25.0"; E 22°51'12.1"	2 alive	0.02				
		48	Orlachka River at the village of Uglyartsi	710 711	N 42°24'24.7"; E 22°52'27.9" N 42°24'23.3"; E 22°52'28.7"	4 alive	0.04				
BG0000308 Verila	8.8.2012	49	Dzhubrena River at the beginning of the area	800 811	N 42°19'31.1"; E 23°19'03.8" N 42°19'34.7"; E 23°19'04.5"	2 alive	0.02	5	0.05	10	20%
		50	Dzhubrena River at the village of Klisura	872 881	N 42°19'58.5"; E 23°20'17.7" N 42°19'58.9"; E 23°20'21.6"	3 alive	0.03				
BG0000366 Kresna- Ilindentsi	15.3.2012	51	Dyavolska River at the village of Oshtava	618 626	N 41°47'18.3"; E 23°13'28.2" N 41°47'22.2"; E 23°13'29.5"	1 alive	0.01	5	0.004	13	30.8%
		52	Stara River below the village of Gorna Breznitsa	432 439	N 41°44'21.6"; E 23°06'43.3" N 41°44'21.0"; E 23°06'40.1"	1 alive	0.01				
	16.3.2012	53	Vlahinska River at the village of Vlahi	471 474	N 41°44'16.1"; E 23°13'37.0" N 41°44'17.5"; E 23°13'34.2"	1 alive	0.01				
		54	Shashka River upstream the village of Ilindentsi	404 407	N 41°39'02.2"; E 23°14'54.1" N 41°39'02.4"; E 23°14'57.0"	2 alive	0.02				
BG0000399 Balgarka	24.9.2011	55	Sivyak River upstream the Etara district (town of Gabrovo)	496 504	N 42°47'56.1"; E 25°21'26.7" N 42°47'58.0"; E 25°21'24.8"	2 alive	0.02	5	0.17	3	100%
		56	Belilska River at the village of Stomanetsite	594 597	N 42°47'58.6"; E 25°17'14.3" N 42°47'58.3"; E 25°17'11.2"	2 alive	0.02				
		57	Plachkovska River upstream the village of Radevtsi	593 601	N 42°47'55.2"; E 25°29'56.9" N 42°47'52.1"; E 25°29'56.3"	1 alive	0.01				
BG0000429 Reka Stryama	30.8.2012	58	Stryama River at the village of Slatina	479 481	N 42°41'26.4"; E 24°34'08.7" N 42°41'27.8"; E 24°34'02.7"	24 alive	0.24	37	0.04	9	44%
		59	Stryama River at the village of Bogdan	391 395	N 42°39'00.1"; E 24°39'52.1" N 42°39'03.6"; E 24°39'48.0"	8 alive	0.08				
		60	Stryama River at the village of Karavelovo	366 368	N 42°37'45.3"; E 24°41'18.0" N 42°37'49.5"; E 24°41'16.2"	3 alive	0.03				
		61	Stryama River at the village of Voinyagovo	323 323	N 42°35'07.7"; E 24°45'31.9" N 42°35'10.2"; E 24°45'28.0"	2 dead	0.02				

Table 1. Continued

BG0000494 Tsentralen Balkan	4.7.2012	62	Dzhafar Dere River upstream the village of Karnare	821 830	N 42°43'38.1"; E 24°38'15.6" N 42°43'42.1"; E 24°38'18.7"	6 alive	0.06	158	0,08	20	15%
		63	Byala River in the middle of the ecotrail upstream the town of Kalofer	603 616	N 42°39'41.0"; E 24°57'29.0" N 42°39'41.4"; E 24°57'26.4"	88 alive	0.88				
		64	Byala River at the beginning of the ecotrail upstream the town of Kalofer	580 581	N 42°39'29.8"; E 24°57'42.2" N 42°39'32.2"; E 24°57'39.2"	64 alive	0.64				
BG0001011 Osogovska planina	6.6.2012	65	Manastirska River at the village of Novo Selo	902 908	N 42°10'37.8"; E 22°40'53.7" N 42°10'34.0"; E 22°40'56.4"	3 alive	0.03	17	0.006	29	13.8%
	7.5.2012	66	Novoselska River at the village of Novo Selo	855 864	N 42°11'29.8"; E 22°40'45.5" N 42°11'27.4"; E 22°40'44.9"	4 alive	0.04				
		67	Novoselska River upstream the village of Slokoshtitsa	731 738	N 42°13'09.5"; E 22°41'28.2" N 42°13'11.8"; E 22°41'29.0"	4 alive	0.04				
	8.5.2012	68	Rechitsa Rivet at the bridge to the village of Tishanovo	644 645	N 42°06'26.0"; E 22°50'15.4" N 42°06'27.3"; E 22°50'14.7"	6 alive	0.06				
BG0001017 Karvav Kamak	15.9.2012	69	Metohiiska River at the village of Metohiya	946 956	N 42°33'55.6"; E 22°30'13.9" N 42°33'56.2"; E 22°30'10.1"	2 alive	0.02	5	0.004	14	14.3%
		70	Prosiya (Treklyanska) River at the village of Dalga Luka	854 857	N 42°38'39.7"; E 22°32'55.8" N 42°38'41.5"; E 22°32'52.5"	3 alive	0.03				
BG0001021 Reka Mesta	21.3.2012	71	Kamenitsa River upstream its confluence with the Mesta River	614 614	N 41°42'53.9"; E 23°41'32.6" N 41°42'52.4"; E 23°41'35.2"	5 alive	0.05	17	0.01	17	23.5%
		72	Kostenska River upstream its confluence with the Mesta River	587 587	N 41°41'15.9"; E 23°42'38.6" N 41°41'18.3"; E 23°42'39.4"	6 alive	0.06				
	22.3.2012	73	Gradinishka River upstream the village of Filipovo	723 725	N 41°45'54.5"; E 23°41'41.7" N 41°45'54.5"; E 23°41'44.5"	3 alive	0.03				
		74	Osikovitsa River upstream its confluence with the Mesta River	712 717	N 41°48'53.1"; E 23°37'24.2" N 41°48'51.6"; E 23°37'22.3"	3 alive	0.03				



Table 1. Continued

BG0001022 Oranovski Prolom- Leshko	5.6.2012	75	Debochishka River at the village of Debochitsa	931 941	N 41°51'58.6"; E 22°57'04.7" N 41°51'55.9"; E 22°57'03.7"	2 alive + 1 dead	0.03	3	0.002	18	5.6%
BG0001023 Rupite- Strumeshnitsa	17.3.2012	76	Kameshnitsa River at the village of Kamena	304 309	N 41°22'33.0"; E 23°04'12.9" N 41°22'30.6"; E 23°04'12.4"	1 alive	0.01	6	0.002	25	12%
		77	The river at the village of Kljuch	346 356	N 41°22'17.6"; E 23°01'24.1" N 41°22'15.8"; E 23°01'22.2"	2 alive	0.02				
		78	Svigjovitsa River at the village of Gabrene	348 356	N 41°22'12.8"; E 22°59'05.0" N 41°22'09.4"; E 22°59'05.6"	3 alive	0.03				
BG0001028 Sreden Pirin- Alibotush	2.6.2012	79	The spring of the Petrovska River	633 637	N 41°24'58.3"; E 23°33'00.4" N 41°24'56.1"; E 23°33'03.1"	18 alive	0.18	24	0.01	23	13%
		80	Burovitsa River at the village of Paril	767 771	N 41°26'13.3"; E 23°41'28.2" N 41°26'10.9"; E 23°41'25.9"	2 alive + 1 dead	0.03				
		81	Petrovska River in the Sveta Troitsa locality upstream the village of Petrovo	495 497	N 41°25'39.5"; E 23°31'32.3" N 41°25'40.5"; E 23°31'36.0"	3 alive	0.03				
BG0001030 Rodopi- Zapadni	26.7.2012	82	Vacha River downstream the village of Grohotno	753 754	N 41°42'04.7"; E 24°24'02.2" N 41°42'01.2"; E 24°23'59.2"	200 alive + 100 dead	3.0	580	0.26	22	31.8%
		27.7.2012	83	Eshekchidere River upstream the village of Borino	1144 1153	N 41°40'05.6"; E 24°16'06.1" N 41°40'08.6"; E 24°16'03.3"	100 alive + 20 dead	1.2			
	84		Sarnena River upstream the the village of Zmeitsa	1251 1258	N 41°40'28.8"; E 24°12'08.0" N 41°40'31.4"; E 24°12'07.7"	100 alive + 10 dead	1.1				
	85		Kochooludere River, a left tributary of the Sarnena River	1314 1342	N 41°41'28.3"; E 24°11'39.3" N 41°41'24.1"; E 24°11'35.0"	1 alive	0.01				
	86		A left tributary of the Sarnena River between the villages of Barutin and Chavdar	1118 1121	N 41°36'24.4"; E 24°11'56.7" N 41°36'21.1"; E 24°11'59.8"	15 alive + 6 dead	0.21				
	28.7.2012	87	Dospat River at the village of Pobit Kamak	1255 1260	N 41°48'59.6"; E 23°54'06.9" N 41°49'00.5"; E 23°54'02.3"	25 alive + 2 dead	0.27				
88		A left tributary of the Dospat River to the village of Pobit Kamak	1277 1287	N 41°49'01.9"; E 23°54'48.6" N 41°49'04.7"; E 23°54'53.0"	1 dead	0.01					
BG0001040 Zapadna Stara Planina i Predbalkan	21.10.2012	89	Nishava River upstream the village of Gintsi	1145 1152	N 43°05'55.8"; E 23°06'10.2" N 43°06'00.0"; E 23°06'11.1"	4 alive	0.04	14	0.006	25	8%
	22.10.2012	90	Nishava River upstream the town of Godech	733 736	N 43°01'46.5"; E 23°04'05.5" N 43°01'47.7"; E 23°04'48.9"	10 alive	0.1				

Table 1. Continued

BG0001042 Iskarski Prolom- Rzhana	20.9.2011	91	Gabrovnitsa River downstream the village of Osenov Lag	764 767	N 42°58'45.7"; E 23°30'54.4" N 42°58'47.7"; E 23°30'51.9"	18 alive	0.18	41	0.1	4	75%
		92	Gabrovnitsa River at the crossroad to the village of Brezov Dol	711 718	N 42°59'00.1"; E 23°29'51.7" N 42°58'58.6"; E 23°29'54.6"	12 alive	0.12				
		93	Gabrovnitsa River against the Pehchena Liska	588 598	N 43°00'16.1"; E 23°28'26.1" N 43°00'14.7"; E 23°28'29.9"	11 alive	0.11				
BG0001043 Etropole- Bailovo	10.7.2012	94	Kalugeritsa River at the career downstream the village of Smoltsko	600 607	N 42°39'17.2"; E 23°54'37.6" N 42°39'16.8"; E 23°54'31.7"	28 alive	0.28	97	0.1	10	60%
		95	Kalugeritsa River up- stream the crossroad to the village of Kamenitsa	714 727	N 42°38'31.5"; E 23°52'37.0" N 42°38'27.9"; E 23°52'33.9"	11 alive	0.11				
		96	Kalugeritsa River on the road to the village of Kamenitsa	778 792	N 42°37'27.2"; E 23°52'33.0" N 42°37'24.8"; E 23°52'35.3"	25 alive	0.25				
	97	Ravna River upstream the village of Golyama Rakovitsa	643 643	N 42°37'23.7"; E 23°48'49.4" N 42°37'21.1"; E 23°48'52.0"	2 alive	0.02					
	11.7.2012	98	Bunovska River upstream the village of Bunovo	729 735	N 42°43'12.9"; E 23°55'48.9" N 42°43'17.1"; E 23°55'49.4"	1 alive	0.01				
99	Bunovska River upstream the falls	800 813	N 42°44'01.1"; E 23°55'47.2" N 42°44'05.2"; E 23°55'45.0"	4 alive + 26 dead	0.30						
BG0001386 Yadenitsa	18.9.2011	100	Yadenitsa River up- stream the inflow of the Yundolska River	1119 1120	N 42°06'03.4"; E 23°53'26.6" N 42°06'04.2"; E 23°53'29.5"	5 alive	0.05	5	0.007	7	14.3%
BG0001389 Sredna Gora	7.7.2012	101	Elenska River upstream the village of Dushantsi	725 725	N 42°42'20.4"; E 24°13'46.9" N 42°42'24.7"; E 24°13'45.8"	14 alive	0.14	325	0.15	21	28.6%
		102	Topolnitsa River down- stream the dam of Dushantsi Reservoir	721 722	N 42°41'32.6"; E 24°16'44.9" N 42°41'34.6"; E 24°16'48.3"	275 alive	2.75				
	8.7.2012	103	Strelchanska Luda Yana River upstream the town of Strelcha	519 533	N 42°31'26.0"; E 24°19'31.8" N 42°31'22.4"; E 24°19'28.8"	4 alive	0.04				
		104	Topolnitsa River upstream the town of Koprivshtitsa	1008 1017	N 42°36'29.9"; E 24°22'31.3" N 42°36'27.5"; E 24°22'30.1"	6 alive	0.06				
		105	Kriva River upstream the town of Koprivshtitsa	1022 1027	N 42°37'00.0"; E 24°23'01.9" N 42°36'59.2"; E 24°23'06.7"	24 alive	0.24				
		106	Topolnitsa River at the confluence with the Kriva River	1017 1018	N 42°37'11.4"; E 24°22'26.2" N 42°37'08.7"; E 24°22'27.6"	2 alive	0.02				

Table 1. Continued

BG0001493 Tsentralen Balkan-Bufer	26.8.2012	107	River No 49283 at the village of Cherni Vit	506 513	N 42°52'27.2"; E 24°12'25.5" N 42°52'27.4"; E 24°12'28.4"	23 alive	0.23	191	0.06	29	20.7%
		108	Vasiljovska River upstream the village of Vasiljovo	517 524	N 42°52'52.0"; E 24°20'29.5" N 42°52'52.0"; E 24°20'33.5"	6 alive	0.06				
	28.8.2012	109	Kavakla Dere River at the village of Hristo Danovo	553 560	N 42°43'56.3"; E 24°35'39.4" N 42°43'53.0"; E 24°35'41.4"	19 alive	0.19				
		110	Damla Dere River downstream the village of Hristo Danovo	535 541	N 42°43'32.3"; E 24°35'08.0" N 42°43'36.8"; E 24°35'04.4"	56 alive	0.56				
		111	Byalata River upstream the town of Kalofer	465 475	N 42°36'35.5"; E 24°57'04.7" N 42°36'39.8"; E 24°57'05.0"	39 alive	0.39				
		112	Tundzha River upstream the town of Kalofer	446 456	N 42°37'39.9"; E 24°57'58.4" N 42°37'43.5"; E 24°58'00.4"	48 alive	0.48				

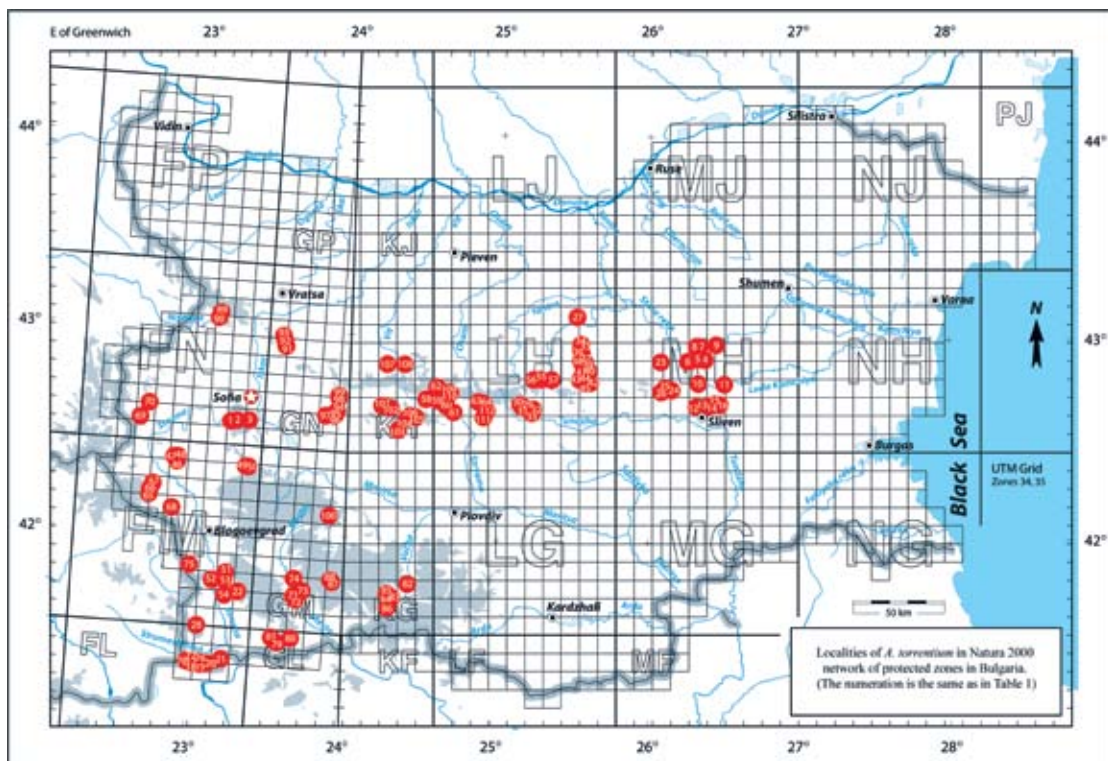


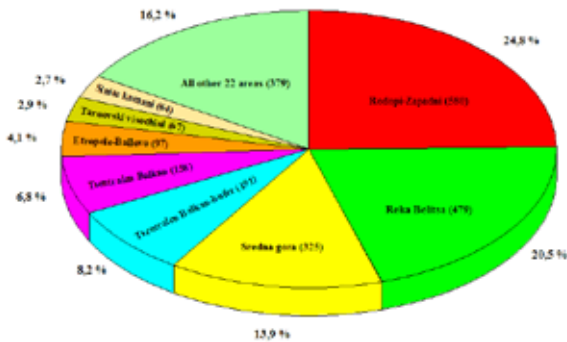
Fig. 1. Localities of *A. torrentium* in Natura 2000 protected areas in Bulgaria (the numeration is the same as in Table 1)

Reka Belitsa (479; 20.5%), Sredna Gora (325; 13.9%), Tsentralen Balkan-Bufer (191; 8.2%) and Tsentralen Balkan (158; 6.8%). In our study, 74.2% of all established individuals were found in the above five areas (Fig. 3). Some of the studied areas were characterised by lower number of individuals (relative abundance), but with many localities of the spe-

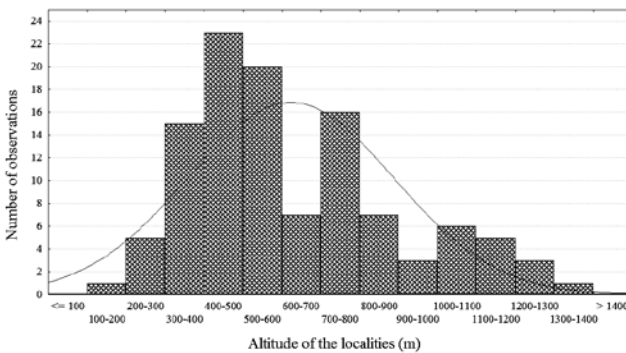
cies: Etropole-Bailovo (97 individuals; 6 localities), Sinite Kamani (64; 5), Kotlenska Planina (52; 6) and Belasitsa (38; 5). The lowest number of individuals and localities of *A. torrentium* was recorded in the areas Oranovski Prolom-Leshko (3; 1), Yadenitsa (5; 1), Ograzhden-Maleshevo (7; 1), Karvav Kamak (5; 2) and Verila (5; 2) (Table 1, Fig. 3).



**Fig. 2.** A-H. *A. torrentium*: A-B – common view of individuals from Kotlenska Planina (A) and Central Balkan-Buffer (B); C-D – ventral view of a male from Reka Stryama (C) and a female with eggs from Osogovo (D); E-F – dorsal view of individuals from Sredna Gora (E) and Sinite Kamani (F), showing the smooth carapace, triangle rostrum and short acumen; G-H – view of chelae in specimens from Kotlenska Planina (G) and Reka Stryama (H), showing the big granulation on chelae surface



**Fig. 3.** Number of individuals and relative abundance of *A. torrentium* in Natura 2000 protected areas in Bulgaria



**Fig. 4.** Vertical distribution of *A. torrentium* in Natura 2000 protected areas in Bulgaria

The data on the average abundance of *A. torrentium* in the studied protected areas (ind./m<sup>2</sup>) also showed that Reka Belitsa (0.34 ind./m<sup>2</sup>), Rhodopi-Zapadni (0.26 ind./m<sup>2</sup>) and Sredna Gora (0.15 ind./m<sup>2</sup>) were characterised by the highest population density. The data on the frequency of occurrence of *A. torrentium* differed in some way. The majority of the areas, where the species had a high abundance and was a permanent component of the freshwater communities, was distinguished by high values of this parameter (e.g. Reka Belitsa – 85.7%, Iskarski Prolom-Rzhana – 75%, Sinite Kamani – 62.5%, Etropole-Bailovo – 60%). This was also valid for some areas where the species had no high population density, but was established in all studied transects (e.g. Balgarka – 100% and Belasitsa – 100%). However, in some areas where *A. torrentium* was found of a high abundance, its frequency of occurrence was relatively low, suggesting an uneven distribution of the species in these areas (e.g. Rhodopi-Zapadni – 31.8%, Sredna Gora – 28.6% and Tsentralen Balkan-Bufer – 20.7%). The protected areas Pirin (3.7%), Oranovski Prolom-Leshko (5.6%), Tarnovski Visochini (6.7%) and Zapadna Stara Planina i Predbalkan (8%) were characterised by the lowest frequency of occurrence of the stone crayfish.

The present study revealed that *A. torrentium* was recorded at altitudes in the range from 189 m a.s.l. (the Belitsa River at the town of Kilifarevo, Predbalkan) to 1342 m a.s.l. (the Kochooludere River, left tributary of the Sarnena River, Western Rhodopes). The species was most often found at sites with an altitude of 300 to 900 m a.s.l. (78.5% of all localities), and more rarely below 200 m (5.4%) and above 1200 m a.s.l. (3.6%) (Fig. 4).

## Discussion

In our research *A. torrentium* was recorded in a comparatively large number of Natura 2000 protected areas: 30 out of 76 studied areas (39.5%). At the same time, the species was represented by a relatively small number of individuals (a total of 2340). The species was present in only 112 out of 994 studied localities (11.3%) and 83 out of 570 studied rivers and streams (14.6%). In spite of the detailed studies in many habitats previously designated as suitable for the species, it was not found in them. The data show that stone crayfish has a comparatively restricted and uneven distribution in Bulgaria and its populations are characterised by a relatively low abundance (0.002 – 0.34 ind./m<sup>2</sup>). PEHLIVANOV, BISERKOV (2010) reported a similar trend of the restricted distribution of *A. torrentium*, in comparison with the mid- to late 20<sup>th</sup> century. They summarised data from more than 150 locations surveyed in 2009-2010, 70 of which were identified as very suitable for the species, according to the preliminary data. These authors reported that in 48 out of 70 localities suitable for the species, it is not present anymore.

The present study demonstrates some patterns in the distribution of *A. torrentium* according to some habitat characteristics. One of these patterns is the spread of the stone crayfish, depending on the altitude of the habitat. The species was found in the range from 189 m to 1342 m a.s.l., but predominantly occupied habitats located from 300 to 900 m (78.5% of all localities). A proof for the dependence of the species distribution on the altitude is the fact that in several rivers that were investigated in a series of sections situated between 400 and 1800 m, the species was found with a high population density in sections from 400 to 900 m, with single individuals in sections from 900 to 1300 m, and it was entirely absent in the upper reaches of the rivers (e.g. the Byala River, Kavakla Dere River, Damla Dere River, Blagoevgradska Bistritsa River, Beli Iskar River). Our data about the lower limit of distribution of *A. torrentium* correspond to those previously given for Bulgaria (200-300 m, BULGURKOV

1961, and 100-200 m, SUBCHEV, STANIMIROVA 1998), as well as for other European countries: 180 m in Bavaria, Germany (BOHL 1988); 240 m in the Czech Republic (VLACH *et al.* 2009); and 300 m in Austria (MACHINO, FÜREDER 1998). In regard to the upper limit of distribution of the species, the altitude we recorded (1342 m) is relatively lower compared to earlier studies of BULGURKOV (1961) and SUBCHEV, STANIMIROVA (1998) (1700 and 1600 m, respectively). A lower disposition of the upper limit of distribution of *A. torrentium* is also found in many other countries: 640 m in the Czech Republic (VLACH *et al.* 2009), 810 m in Slovenia (MACHINO 1997), 820 m in Germany (BOHL 1988), and 1400 m in Austria (MACHINO, FÜREDER 1998).

Furthermore, our results show that in high mountains the distribution of *A. torrentium* depends on the exposure of sites. There is a clear trend for wider distribution of the species in south-facing sites of the high mountains (*e.g.* Rila, Pirin, Central Balkan, Osogovo, and Vitosha), while in north-facing sites it does not occur or is very rare. Unlike the high mountains, such a feature of the species distribution is not observed in the lower mountains (*e.g.* Sredna Gora, Konyavska Planina, Kotlenska Planina), where *A. torrentium* has comparatively even distribution in all slopes of those mountains. The characteristics observed in the high mountains can be explained by the fact that their northern slopes are pretty dark and the rivers, supplied by melting snow and alpine lakes throughout the most of the year, have a relatively lower water temperature compared with the rivers of southern sunny slopes.

It was found that the most suitable habitats for *A. torrentium* are small rivers and streams, with a low flow rates and width less than 3 m, situated in not very steep slopes covered with deciduous forests. The species rarely occurred in larger rivers (width 6-10 m) with relatively faster flow (*e.g.* the Belitsa River in Central Balkan and the Novoselska River in Osogovo). The stone crayfish was found most often in rivers which banks were covered with beech (*Fagus sylvatica*), alder (*Alnus glutinosa*) and rarely with oak (*Quercus* spp.) or sycamore (*Platanus orientalis*). The species was very rare in habitats with river banks covered only by bushes, and nearly absent in the exposed parts of the rivers and in areas with coniferous vegetation. *A. torrentium* was also looked for in a number of stagnant waterbodies, but not found in them. However, it should be noted that stone crayfish, though very rarely, could occur in stagnant waterbodies (MACHINO, FÜREDER 1998, ZAIKOV *et al.* 2011).

In some of the largest protected areas, where

many potential habitats of *A. torrentium* were studied (Pirin – 27, Rila – 27, Rilski Manastir – 31), the species was found in only one locality (the Sharaliiska River in Pirin at 1070-1084 m). Most likely, the reasons for the low prevalence of the species in these areas is that they cover mostly high mountains (usually above 1500 m) and most of the rivers in these places pass through steep slopes and have a relatively fast flow. Owing to melting snow and heavy rains in spring the rivers become very turbulent and this is a major obstacle for the maintenance of permanent populations of stone crayfish in them.

*A. torrentium* was found together with the noble crayfish, *A. astacus* in two sites (the Belitsa River at the town of Kilifarevo and Golyama Kamchiya River at the village of Ticha). In one locality (the Gorna Luda Kamchiya River), all three indigenous crayfish species for Bulgaria (*A. torrentium*, *A. astacus* and *A. leptodactylus*) were found together. Such coexistence of *A. torrentium* with other crayfish is not typical of the species and is rarely observed (SINT *et al.* 2006, KOUTRAKIS *et al.* 2007, FÜREDER *et al.* 2007, VLACH *et al.* 2009, STOYNOV *et al.* 2013, TRICHKOVA *et al.* 2013).

#### Conservation status and threats

The stone crayfish *A. torrentium* is a subject of special conservation measures in all European countries where it occurs. It is listed in Annex II of the EU Habitats Directive (92/43/EEC) as “species of community interest whose conservation requires the designation of Special Areas of Conservation” (SACs). The species is also listed under Appendix III of the Bern Convention and Annex V of the Directive 2006/105/EEC and included as ‘Data Deficient’ in IUCN Red List. In Bulgaria it is additionally protected by the Bulgarian legislation – the Biological Diversity Act (2002) and the Law of Fisheries and Aquaculture (2001), which prohibits the species capture, transportation and trade throughout the year.

The main threats to crayfish populations in Natura 2000 protected areas in Bulgaria, which were identified during our study, are: water pollution by industrial waste and domestic sewage; changes in the hydrological regime of rivers through construction of hydro facilities; water abstraction for drinking and irrigation; illegal capture and use for consumption; and competition with *Potamon ibericum*. Our study does not report findings of any alien (American or Australian) crayfish species, but the occurrence of such species is not excluded in the country at anytime, as some of them are already quite common in neighboring countries (in Serbia and Romania – *Orconectes limosus* and in Greece – *Pacifastacus leniusculus*) (PÖCKL *et al.* 2006,

KOUTRAKIS *et al.* 2007, HOLDRICH *et al.* 2009). In the future the introduced crayfish species may become a major threat to native *A. torrentium*, because they are very aggressive and can replace the stone crayfish in its habitats. Furthermore, the introduced species are resistant to the virulent disease commonly known as crayfish plague (caused by the oomycete *Aphanomyces astaci*), but might be its vectors and so they threaten even more the populations of *A. torrentium* on coming into contact with them (DIÉGUEZ-URIBEONDO, SÖDERHÄLL 1993, SÖDERHÄLL, CERENIUS

1999). The threats identified by us, as well as the possible occurrence of some new threats, require efforts to their elimination and prevention in the future. Our results can be a basis for further monitoring of the state of stone crayfish populations and assessing the conservation status of the species in Bulgaria.

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#### **Appendix 1.** List of all studied Natura 2000 protected areas and sampling localities.

**BG0000113 Vitosha** (8 transects): 08.04.2012 – Struma River (3 transects) – at the inflow of the Ribni dol River below the village Chuipetlovo, 1095-1102 m, at the inflow of the stream coming from the area Maroshki Koshari, 1152-1158 m and above the village Chuipetlovo, 1402-1437 m; Byalata voda River – right tributary of the Struma River above the village Bosnek, 1003-1026 m; Shiroki dol River – right tributary of the Struma River above the village Bosnek, 1015-1035 m; Stream coming from the area Maroshki Koshari – left tributary of the Struma River, 1161-1179 m; Zheleznishka River (2 transects) – above the village Zheleznitsa, 1045-1066 m (07.04.2012), 1057-1079 m (12.04.2012).

**BG0000117 Kotlenska Planina** (24 transects): 13.10.2012 – Kotlenska River at the town of Kotel, 536-543 m; River № 55626 below the peak Bobe, 516-523 m; River № 1315178.5 at the crossroad to the village Streltsi, 536-551 m; Kjachukdere River near the village Kipilovo, 495-496 m; Boazdere River at the village Kipilovo, 443-447 m; Karadere River at the village Kipilovo, 407-409 m; Byalata voda River below the village Ptichari, 381-381 m; Karadere River at the village Borintsi, 368-368 m; Neikovska River above the village Neikovo, 529-530 m; Drageshnishka River below the village Neikovo, 465-468 m; Studenets River at the crossroad to the village Zheravna, 439-442 m; Kobilishka River before it inflow into the Kotlenska River, 379-380 m; 14.10.2012 – Kotlenska River at the crossroad to the village Medven, 436-438 m; Neikovska River before it inflow into the Kotlenska River, 372-373 m; Luda Kamchiya River at the village Gradets, 372-373 m; Medvenska River at the village Medven, 394-397 m; River № 55617 at the village Ticha, 379-387 m; Chiflikdere River before it inflow into the Golyama Kamchiya River, 419-442 m; Golyama Kamchiya River (2 transects) – above the inflow of the Chiflikdere River, 448-450 m and above the village Ticha, 354-361 m; Luanarsko dere River above the village Filaretovo, 347-352 m; Kayadere River at the village Yablanovo, 312-313 m; River № 55429 at the village Kraigortsi, 406-413 m; Kalvandere River at the village Kraigortsi, 388-397 m.

**BG0000136 Reka Gorna Luda Kamchiya** (4 transects, 06.08.2012): Gorna Luda Kamchiya River – at the village Rakovo, 595-597 m, at the village Gradets, 407-423 m, at the village Dubovitsa, 327-327 m, below the village Velislav, 268-273 m.

**BG0000164 Sinite Kamani** (8 transects, 12.10.2012): Ablanovska River on the road to the village Rakovo, 450-464 m; Manastirska River in the area Selishteto, 383-389 m; River № 32972 at the lower lift station, 387-398 m; River № 11981 after the crossroad to the village Sotirya, 408-427 m; River № 1679014.0 north of the village Sotirya, 465-489; Dzhendem dere River below the area Orlovi dupki, 455-464 m; River № 11972 on the road to Karandila, 416-430 m; Ovcharitsa River below the peak Gavanite (above the village Sotirya), 396-399 m.

**BG0000165 Lozenska Planina** (8 transects): 04.04.2012 – Brazhdenska bara, 794-811 m; stream between Brazhdenska bara and Radilichka bara, 809-831 m; Radilichka bara, 850-872 m; Sakoshka bara, 820-827 m; 05.04.2012 – Dimovska bara, 806-830 m; stream below Ibrov kladenets, 861-903 m; stream from BChK hut to Ibrov kladenets, 890-901 m; stream from BChK hut to Garkina cheshma, 841-860 m.

**BG0000166 Vrachanski Balkan** (6 transects): 05.11.2011 – Byala River above the village Gorna Bela Rechka, 812-834 m; Zlatitsa River above the village Zverino, 292-299 m; 06.11.2011 – Cherna River (2 transects) – below the village Gorno Orizovo, 275-282 m, upper watershed, 474-474 m; Leva River (2 transects) – spring at Parshevitsa, 1210-1224 m, above the village Zlorigrad, 624-631 m.

**BG0000167 Belasitsa** (5 transects, 19.09.2011): the River at the village Kljuch (2 transects) – 512-514 m, 523-533 m; Kameshnitsa River at the village Kamena, 534-549 m; Kolarevska River at the village Kolarovo, 508-528 m; Luda mara River above the town of Petrich, 452-464 m.

**BG0000192 Reka Tundzha 1** (14 transects): Tundzha River (12 transects), 21.06.2012 – below the village Gabarevo, 420-430 m, at the village Pavel Banya, 407-407 m, between the town of Kazanlak and village Buzovgrad, 343-345 m, at the village Rozovo, 335-336 m; 22.06.2012 – below the village Tulovo, 313-314 m, before the village Zimnitsa, 295-296 m, at the village Banya, 221-226 m, before the village Binkos, 198-202 m, before the village Zlati voivoda, 180-183 m, against the village Zlati voivoda, 174-174 m, at the village Samuilovo, 156-158 m, at the village Veselinovo, 133-135 m; Tazha River at the village Tazha, 509-512 m (21.06.2012); right tributary of the Tundzha River below the village Tulovo, 314-318 m (22.06.2012).

**BG0000209 Pirin** (27 transects): 02.08.2012 – Bezbozhka River at the hut Bezbog, 2211-2226 m; River № 8178 on the trail to the Popovo Lake, 2362-2375 m; Retizhe River below the Popovo Lake, 2125-2132 m; River № 8179 in sheep-sheds above the Retizhe River, 2221-2227 m; 03.08.2012 – Ikrishtka River at the bridge in the area Todorova ornitsa, 1567-1592 m; Bunderitsa River below the hut Bunderitsa, 1776-1789 m; River № 12753 below the crossroad to the hut Demyanitsa, 1235-1236; Demyanitsa River (2 transects) – at the Resting house N. Vaptsarov, 1206-1220 m and above the town of Bansko, 1090-1098 m; Bela River above the hydropower in the area Betalovoto, 1272-1281 m; 04.08.2012 – Krainata (Keljova) River (2 transects) – before it inflow into the

Srednata River, 1448-1452 m and below the hut Pirin, 1532-1555 m; Srednata (Bashmandrenska) River (2 transects) – at the hut Pirin, 1598-1611 m and in the area Trite reki, 1505-1512 m; Tretata (Demirkapijska) River before it inflow into the Srednata River, 1550-1557 m; 05.08.2012 – Bashliitsa River (2 transects) – above the area Popina luka, 1400-1421 m and before the inflow of the Mozgovitsa River, 1571-1575 m; Mozgovitsa River above the overflow, 1638-1650 m; Konska River at the bridge Bashliitsa, 1605-1612 m; Sarchaliitsa River above the villa zone of the Popina luka, 1466-1498 m; Begovitsa River on the trail to the hut Begovitsa, 1433-1444 m; 06.08.2012 – Shariitsa River after the area Varbite, 1070-1084 m; Sinanishka River at the bridge after the cave, 1287-1304 m; Vlahinska River at the bridge after the cave, 1263-1272 m; River № 19940, a tributary of the Vlahinska River, 1253-1281 m; Razkolska River below the area Razkola, 1234-1246 m; River № 269221.9, left tributary of the Vlahinska River at the area Burovan, 1177-1186 m.

**BG0000211 Tvardishka Planina** (14 transects): 08.10.2012 – River № 55321 at the village Konstantin, 414-417 m; Stara River (Lefedzha) at the village Maysko, 391-392 m; Tineva River at it inflow into the Lefedzha River, 389-390 m; River № 55315 at the crossroad to the village Lesiche, 384-385 m; 09.10.2012 – Kostelska River at the village Chakali, 317-321 m; Kamenitsa River at the village Palitsi, 409-411 m; Tineva River at the village Boikovtsi, 430-432 m; Kechidere River between the villages Izgrev and Bojevtsi, 451-451 m; River № 53392 – left tributary of the Ortadere River below the village Bojevtsi, 485-487 m; Ortadere River below the village Bojevtsi, 499-502 m; Belenska River at the village Byala, 453-454 m; Novachevska River at the village Novachevo, 538-540 m; Malkata River at the village Byala palanka 486-490 m; Golyamata River at the village Byala palanka, 508-517 m.

**BG0000213 Tarnovski Visochini** (15 transects): 01.06.2012 – Rakovitsa River (4 transects) – at the village Samovodene, 132-135 m, about 3 km above the ville Samovodene, 173-175 m, below the village Belyakovets, 195-196 m, below the small reservoir at the village Belyakovets, 270-273 m; River № 57726, left tributary of the Yantra River (2 transects) – before it inflow into the Yantra River, 122-140 m and below the village Belyakovets, 317-322 m; River № 57510 before it inflow into the River Yantra, 142-154 m; small reservoir on the Rakovitsa River at the village Belyakovets, 282-283 m; 02.06.2012 – River № 65604 (2 transects) – at the village Debelets, 177-181 m and before the town of Veliko Tarnovo, 155-160 m; River № 50263 at the village Malki chiflik, 259-265 m; River № 57430 (2 transects) – above the Tsarevets hill (Veliko Tarnovo), 143-152 m and at the complex “Ksilofor”, 241-248 m; River № 57432 above the industrial zone of V. Tarnovo, 162-188 m; River № 57431, right tributary below the complex “Ksilofor”, 197-215 m.

**BG0000214 Dryanovski Manastir** (7 transects, 21.06.2012): Dryanovska River (5 transects) – at the Dryanovski monastery, 280-285 m, at the village Tsareva livada, 317-317 m, at the crossroad to the village Kumanite, 337-344 m, at the railway station of the village Stainovtsi, 404-406 m, below the town of Tryavna, 428-430 m; River № 50774 before it flows into the Dryanovska River, 350-360 m; River № 700864.7 against the railway station of the village Stainovtsi, 414-415 m.

**BG0000220 Dolna Mesta** (15 transects): Matnitsa River (4 transects) – below the village Petrelik, 475-481 m (20.03.2012), 486-487 m (01.08.2012), before it flows into the Mesta River, 460-461 m (01.08.2012), before GKPP Ilinden, 532-535 m (01.08.2012); Domuzdere River, 528-529 m (20.03.2012); River № 11132, 573-577 m (20.03.2012); River № 11130, 595-596 m (20.03.2012); River № 11128 before the village Teplen, 714-721 m (20.03.2012); Teplensko dere River (2 transects) – 702-706 m, 704-715 m (20.03.2012); Beslenski dol at the village Beslen, 710-716 m (20.03.2012); Satovchanska Bistritsa River between the villages Ablanitsa and Bogolin (2 transects) – 541-544 m (20.03.2012), 562-566 m (01.08.2012); Fargovska River before it flows into the Satovchanska Bistritsa River, 572-577 m (01.08.2012); Mesta River at the inflows of the Matnitsa River, 455-455 m (01.08.2012).

**BG0000224 Ograzhden-Maleshevo** (3 transects, 19.09.2011): Lebnitsa River (2 transects) – above the village Lebnitsa, 110-122 m, at the village Nikudin, 710-712 m; Ribnik River at the village Ribnik, 101-108 m.

**BG0000240 Studenets** (23 transects): 17.09.2012 – Vit River (3 transects) – above the village Uglen, 168-170 m, below the village Uglen, 159-161 m, at the village Bezhanovo, 143-141 m; Kamenka River (2 transects) – at the villages Bezhanovo, 152-152 m and Dragana, 200-202 m; Barata River at the village Barkach, 159-159 m; Katunetska River (2 transects) – at the villages Katunets, 202-203 m and Kalenik, 217-223 m; 18.09.2012 – Vit River (4 transects) – at the villages Sadovets, 109-109 m, Krushovitsa, 93-94 m, Gradina, 80-80 m and Disevitsa, 65-65 m; Ladov dol River at the village Petarnitsa, 145-149 m; Chernyalka River (2 transects) – at the villages Kurtozhabene, 108-108 m and Turmene, 79-81 m; 19.09.2012 – Tuchenitsa River (3 transects) – below the village Tuchenitsa, 208-209 m, above the village Tuchenitsa, 218-218 m and in the Park Kailaka, 187-192 m; Parchovitsa River at the village Gortalovo, 173-173 m; Chernyalka River (3 transects) – at the hut Kapchuka, 141-144 m, at the village Ralevo, 208-208 m and at the village Laskar, 227-227 m; Barata River at the village Beglezh, 233-235 m.

**BG0000254 Besaparski Vazvishenia** (21 transects): Aikansko dere (4 transects) – at the career above the village Kapitan Dimitriev, 305-317 m (08.10.2011), 350-353 m (05.04.2012), at the village Kapitan Dimitriev, 293-297 m (08.10.2011), 323-326 m (05.04.2012); Stara (Peshterska) River (10 transects) – at the bridge before the village Byaga, 278-278 (05.04.2012), before the village Byaga, 274-275 m (05.04.2012), at the village Byaga, 271-275 m (09.10.2011), 274-275 m (05.04.2012), between the villages Byaga and Isparihovo, 229-229 m (09.10.2011), 235-236 m (06.04.2012), at the village Isparihovo, 223-223 m (06.04.2012), below the Village Isparihovo, 225-225 m (09.10.2011), 224-226 m (06.04.2012), before the town of Krichim, 228-229 (06.04.2012); Left tributary of the Stara (Peshterska) River below the chapel, 288-290 m (05.04.2012); stream south of the peak Hisara, 271-278 m (06.04.2012); small reservoir south of the peak Hisara, 271-278 m (06.04.2012); stream north of the peak Hisara, 354-371 m (06.04.2012); right tributary of the Djurkoviva River below the village Kapitan Dimitriev, 319-320 m (08.10.2011); left tributary of the Aikansko dere above the village Kapitan Dimitriev, 336-342 m (09.10.2011); right tributary of the Djurkoviva River below the Djurkovitsa Lake, 338-340 m (09.10.2011).

**BG0000261 Yazovir Koprinka** (14 transects): Leshnitsa River (6 transects) – at the village Yasenovo, 474-478 m (10.10.2011), 494-496 m (29.08.2012), at the village Golyamo Dryanovo, 434-435 m (10.10.2011), 434-437 m (29.8.2012), at the bridge on road to the village Shipka, 442-444 m (10.10.2011), 459-460 m (29.08.2012); Gabrovnitsa River at the village Asen, 482-484 m (29.08.2012); River № 70245 at the village Dunavtsi, 409-412 m (10.10.2011), 408-409 m (29.08.2012); stream at the village Dunavtsi, 409-412 m (10.10.2011), 395-396 m (10.10.2011); Akdere River (3 transects) – at the village Dolno Sahrane, 407-408 m (10.10.2011), 405-406 m (29.08.2012), at the village Gorno Sahrane, 446-447 m (29.08.2012).

**BG0000263 Skalsko** (3 transects, 24.09.2011): River № 701680.1 above the village Skalsko, 429-434 m; River № 702185.4 between



the villages Yantra and Lovni dol, 331-331 m; River № 731225.3 between the villages Yantra and Lovni dol, 334-351 m.

**BG0000275 Yazovir Stamboliyski** (13 transects): Krapets River (3 transects) – below the village Gradishte, 227-229 m (07.09.2011), at it flows into the Stamboliyski Reservoir, 176-176 m (08.09.2011), 190-191 m (06.10.2012); Rositsa River before the town of Sevlievo, 182-183 m (08.09.2011), 191-192 m (06.10.2012); Magara River at it flows into the Stamboliyski Reservoir, 184-191 m (07.09.2011), 193-193 m (05.10.2012); River № 47756 before the village Gorsko Kosovo, 241-245 m (05.10.2012); River № 540890 at the village Gradishte, 339-342 (06.10.2012); River № 68053 at the village Debeltsovo, 314-325 m (06.10.2012); River № 44332 below the village Kormyansko, 196-197 m (06.10.2012); River № 49147 between the villages Mladen and Krushevo, 360-365 m (06.10.2012); River № 47736 below the village Mladen, 321-324 m (06.10.2012).

**BG0000279 Stara Reka** (13 transects): Stara River (11 transects) 05.06.2012 – at the bridge in the village Bregovitsa, 67-68 m, at the bridge below the village Cheshma, 05-107 m, at the crossroad to the village Temenuga, 82-86 m, above the village Kesarevo (2 transects), 73-74 m and 71-72 m, at the bridge in the village Kesarevo, 74-75 m, at the inflow of the Zlatarishka River, 65-72 m; 06.06.2012 – at the village Stevrek, 301-301 m, above the village Stevrek, 316-317 m, at the crossroad to the village Ravno pole, 329-330 m, at the inflow of the Armutlukdere River, 334-337 m; Armutlukdere River (2 transects, 06.06.2012) – below the village Cherna voda, 389-395 m, before it flows into the Stara River, 362-365 m.

**BG0000280 Zlatarishka Reka** (12 transects): Zlatarishka River, 07.06.2012 – at railway station Elena, 262-263 m, between the town of Elena and town of Zlataritsa (6 transects), 231-232 m, 202-206 m, 177-181 m, 152-155 m, 138-138 m and 136-137 m; 08.06.2012 – above the town of Zlataritsa, 104-106 m, in the town of Zlataritsa, 96-97 m, at the bridge to the village Rodina, 80-82 m, below the village Gorsko novo selo, 72-74 m, at the bridge in the village Dzhuljunitsa, 68-71 m.

**BG0000281 Reka Belitsa** (14 transects): Belitsa River (13 transects), 18.06.2012 – above the village Debelets, 153-154 m, at the bridge to the village Plakovo, 171-176 m, in the park of the town Kilifarevo, 189-190 m, at the village Natsovtsi, 202-205 m, at the Kilifarevski monastery, 218-219 m, at the village Boyanovtsi, 261-269 m, at the bridge against the village Pozhernik, 231-234 m; 19.06.2012 – at the village Vaglevtsi, 311-312 m, at the mill after the village Vaglevtsi, 314-318 m, at the village Voinezha, 335-343 m, at the village Voneshta voda, 359-360 m, at the village Belitsa, 394-395 m, at the village Kisjovtsi, 374-375 m; Raikovska River at the village Raikovtsi, 397-399 m (19.6.2012).

**BG0000282 Dryanovska Reka** (7 transects, 20.06.2012): Dryanovska River – at the village Debelets, 148-149 m, at the motel Veselo selo, 149-149 m, at the village Sokolovo, 185-188 m, at the village Zaya, 211-214 m, at the village Gančovets, 221-222 m, below the town of Dryanovo, 222-225 m, at the town of Dryanovo, 229-231 m.

**BG0000294 Karshalevo** (16 transects): Dragovishtitsa River (4 transects) – at the village Dolno Uino, 617-618 m (06.05.2012), 609-609 m (28.05.2012), at the village Goranovtsi, 583-586 m (06.05.2012), at the village Dragovishtitsa, 525-525 m (06.05.2012); Bistritsa River (3 transects) – at the village Mazarachevo, 602-603 m (06.05.2012), 595-595 m (28.05.2012), at the village Garlyano, 860-865 m (06.05.2012); Uinenshtitsa River at it flows into the Dragovishtitsa River, 630-632 m (06.05.2012); Lebnitsa River at the village Dolno Selo, 806-809 m (06.05.2012), 801-804 m (28.05.2012); Kopriva River at the village Bobeshino, 814-817 m (06.05.2012); left tributary of the Bistritsa River at the village Tserovitsa, 960-978 m (28.05.2012); Lebintsi River at the village Mozarachevo, 656-670 m (28.05.2012); Golemi dol River at it inflow into the Dragovishtitsa River, 583-589 m (28.05.2012); left tributary of the Dragovishtitsa River at the village Goranovtsi, 556-561 m (28.05.2012); right tributary of the Dragovishtitsa River at the village Dragovishtitsa, 531-533 (28.05.2012).

**BG0000295 Dolni Koriten** (8 transects): River № 11044 (5 transects) – below the village Dolni Koriten, 847-849 m (06.05.2012), 859-864 m (27.10.2012); above the village Gorno Uino, 718-721 (06.05.2012), 722-726 m (06.05.2012), 700-704 m (27.05.2012); River № 11045 (2 transects) – 869-876 m (06.05.2012), 875-880 m (27.05.2012); Left tributary of the Uinenshtitsa River, 813-815 m (27.05.2012).

**BG0000298 Konyavska Planina** (18 transects): Koznichka (Lyava) River above the village Gorna Koznitsa, 717-718 m (10.5.2012), 748-756 m (30.05.2012); left tributary of the Koznichka River, 788-810 m (30.05.2012); Madzharitsa River at the village Dragomirovo, 825-828 m (10.5.2012), 843-846 m (29.05.2012); Orlachka River at the village Uglyartsi, 710-711 m (10.5.2012), 753-764 m (29.05.2012); right tributary of the Orlachka River above the village Uglyartsi, 791-794 m (29.05.2012); right tributary of the Orlachka River below the village Uglyartsi, 722-729 m (29.05.2012); left tributary of the Babinska River at the village Golyama Fucha, 684-694 m (10.05.2012), 698-704 (30.05.2012); Malkata River at the village Malka Fucha, 720-728 m (10.05.2012), 728-735 m (30.05.2012); Klisurata River at the village Tsarvyanene, 783-787 m (10.05.2012); stream at the village Tovalichevo, 748-764 m (30.05.2012); right tributary of the Gabreshvska River at the village Gorno Gabreshvo, 722-730 m (30.05.2012); stream at the village Klaparovtsi, 1203-1218 m (29.05.2012); Klisurska River at the village Klisurski hancheta, 691-692 m (29.05.2012).

**BG0000304 Golak** (17 transects): Maritsa River (5 transects) – at the town of Belovo, 332-336 m (28.10.2012), below the village Momina klisura, 334-337 m (04.09.2012), at the crossroad to the Belmeken Reservoir, 401-404 m (04.09.2012), below the village Gabrovitsa, 412-415 m (04.09.2012), at the village Gabrovitsa, 438-443 m (28.10.2012); Rakovitsa River before it inflow into the Maritsa River (2 transects) – 344-349 m (04.09.2012), 339-342 m (28.10.2012); Paloshtitsa River above the village Momina klisura (2 transects) – 375-381 m (04.09.2012), 371-377 m (28.10.2012); Kriva River at it inflow into the Maritsa River (2 transects) – 408-411 m (04.09.2012), 399-403 m (28.10.2012); Gabrovitsa River at the village Gabrovitsa, 438-442 m (04.09.2012); Sherkovovo dere River on the road to the village Gjola, 577-578 m (04.09.2012); Soluderventska River above the village Momin prohod (2 transects) – 583-591 m (04.09.2012) and 610-624 m (28.10.2012); Dalbochitsa River below the village Gabrovitsa, 416-424 m (28.10.2012); Yavoritsa River at the village Dolno varshilo, 555-560 m (28.10.2012).

**BG0000308 Verila** (10 transects): stream NE from the village Lisets (Bukaprelapski prohod), 1157-1166 m (10.04.2012); Dzhubrena River (4 transects) – at the beginning of the area (from Saparevo), 795-801 m (10.04.2012), 800-811 m (8.8.2012), before the village Klisura, 902-910 m (10.04.2012), 872-881 m (8.8.2012); Shiroki dol River, near the village Belchin (2 transects) – 921-923 m (10.04.2012), 938-940 m (08.08.2012); right tributary of the Palakariya River between Shiroki dol and Turski dol, 929-933 m (10.04.2012); Turski dol River, 941-944 m (08.08.2012); Klisura River against the village Alino, 955-960 m (08.08.2012).

**BG0000313 Ruy** (10 transects): Erma River (4 transects) – between town Trun and village Lomnitsa, 697-699 m (03.05.2012), 681-684 m (24.05.2012), at the gorge, 676-678 m (03.05.2012), 674-679 m (24.05.2012); Yablanitsa River at the village Bankya, 637-642

- m (03.05.2012), 655-663 m (24.05.2012); Pravka River (3 transects) – at the village Filipovtsi, 755-758 m (03.05.2012), at the village Velinovo, 831-832 m (03.05.2012), 818-821 m (24.05.2012); Kusa River above the village Lomnitsa, 739-740 m (24.05.2012).
- BG0000314 Rebro** (3 transects, 03.05.2012): Krivonoska River (2 transects) – at the village Rebro, 870-873 m, at the middle of the protected area, 903-906 m; left tributary of the Krivonoska River below the chapel, 953-971 m.
- BG0000322 Dragoman** (5 transects, 25.09.2012): southeastern coast of the Aldomirovsko swamp, 656-660 m; northern coast of the Dragomansko swamp, 706-706 m; stream at the village Rayanovtsi, 810-815 m; stream at the village Malo Malovo, 821-825 m; stream after the village Vasilovtsi, 850-854 m.
- BG0000366 Kresna-Ilindentsi** (13 transects): 15.03.2012 – Struma River (3 transects) – at the Kresnensko hanche, 188-206 m, at the crossroad to the village Oshtava, 197-211 m, before the village Kresna, 186-186 m; Dyavolska River at the village Oshtava, 618-626 m; Stara River (2 transects) – above the village Gorna Breznitsa, 432-439 m, before it flows into the Struma River, 276-277 m; Divilska River at it flows into the Struma River, 223-243 m; 16.03.2012 – Vlahinska River at the village Vlaha, 471-474 m; Budilska River at the village Slivnitsa, 218-220 m; Kamenitsa River at the village Kamenitsa, 222-223 m; Shashka River (3 transects) – above the village Ilindentsi, 391-395 m, 404-407 m, 435-443 m.
- BG0000372 Tsigansko Gradishte** (6 transects, 25.07.2012): Alamovska River at the village Alamovtsi, 601-605 m; Erma River at the village Erma reka, 697-714 m; River № 1863133.3 at the village Mazryan, 918-938 m; River № 1863241.5 at the village Mazryan, 860-863 m; Iskrat River above the village Plovdivtsi, 909-910 m; River № 1866904.9 between the villages Koritata and Mochure, 1000-1004 m.
- BG0000374 Bebresh** (10 transects): Malki Iskar River (3 transects) – at the village Kalugerovo, 224-230 m (23.09.2011), after the flows of the Bebresh River, 204-205 m (23.09.2011), at the village Karash, 168-168 m (12.05.2012); Bebresh River (5 transects) – before it flows into the Malki Iskar River, 208-220 m (23.09.2011), below the village Chukata, 222-223 m (23.09.2011), at the village Bozhenitsa, 271-272 m (12.05.2011), at the village Pantelei, 300-302 m (12.05.2012), between the villages Novachene and Bozhenitsa, 297-299 m (12.05.2012); left tributary of the Bebresh River above the village Bozhenitsa, 303-303 m (12.05.2012); right tributary of the Bebresh River at the fortress Urvich, 408-411 m (12.05.2012).
- BG0000399 Balgarka** (3 transects, 24.09.2011): Sivyak River above the quarter Etara (Gabrovo), 496-504 m; Belilska River at the village Stomanetsite, 594-597 m; Plachkovska River above the village Radevtsi, 593-601 m.
- BG0000426 Reka Luda Yana** (10 transects, 03.09.2012): Luda Yana River (9 transects) – at the villages Ognyanovo, 208-209 m, Malo Konare, 211-213 m, Pishtigovo, 223-224 m, Chernogorovo, 237-238 m, Rosen, 262-263 m, Tsar Asen, 295-296 m, Svoboda, 326-327 m, Popintsi, 344-344 m, Buta, 393-393 m; Mechenska River at the village Banya, 428-429 m.
- BG0000429 Reka Stryama** (9 transects, 30.08.2012): Stryama River (8 transects) – at the village Slatina, 479-481 m, at the village Bogdan, 391-395 m, at the village Karavelovo, 366-368 m, at the village Voynyagovo, 323-323 m, at the town of Banya, 289-290 m, at the village Dolna Mahala, 230-231 m, at the village Ruzhevo Konare, 204-206 m, at the village Manole, 152-153 m; Gatladere River below the village Karavelovo, 364-364 m.
- BG0000436 Reka Mechka** (12 transects): 20.07.2012 – River № 1472656.1 above the village Lenovo, 310-311 m; River № 1472641.8 below the village Novakovo, 343-345 m; River № 1622345.9 above the village Iskra, 330-332 m; River № 1622964.0 at the village Lenovo, 270-273 m; River № 1622958.5 below the village Lenovo, 250-254 m; Mechka River (5 transects) – below the village Lenovo, 236-238 m, 21.07.2012 – below the village Poroina, 159-164 m, above the town of Parvomay, 142-151 m, at the town of Parvomay, 138-140 m, before it flows into the Maritsa River, 122-122 m; River № 1623181.6 above the village Poroina, 190-191 m; River № 1623181.3 above the village Poroina, 189-192 m.
- BG0000438 Reka Chinardere** (7 transects, 19.07.2012): Chinardere River – at the village Topolovo, 411-413 m, below the village Topolovo, 390-393 m, above the village Lenovo, 361-362 m, at the village Novi Izvor, 277-277 m and 270-282 m, at the village Dalbok Izvor, 192-196 m, below the village Poroina, 171-173 m.
- BG0000494 Tsentralen Balkan** (20 transects): 02.07.2012 – Cherni Vit River (2 transects) – above and below the base of the reserve Boitin, 854-876 m and 800-807 m; Ravna River before it flows into the Kostina River, 923-939 m; Kostina River below the inflow of the Ravna River, 937-948 m; Zavodna River on the road to the Vezhen hut, 737-747 m; Rogacheva River at the Haidushka pesen hut, 874-880 m; 03.07.2012 – Cherni Osam River (2 transects) – in the reserve Steneto above the village Neshkovtsi, 734-737 m and above the inflow of the River № 63635, 856-863 m; River № 63635 before it flows into the Cherni Osam River, 854-915 m; Krivnishka River below the hut Pleven (2 transects) – 999-1011 m and 965-974 m; River № 67277 left tributary of the Krivnishka River, 992-1003 m; 04.07.2012 – Dzhabar dere River above the village Kamare, 821-830 m; Stara River above the town of Karlovo, 543-558 m; Byala River (3 transects) – at the end (608-615 m), in the middle (578-583 m) and at the beginning (580-581 m) of the ecotrail above the village Kalofer; 05.07.2012 – Manastirska River above the town of Sopot, 761-766 m; Kavakla dere River above the village Hristo Danovo, 846-854 m; Damla dere River above the village Hristo Danovo, 780-785 m.
- BG0000495 Rila** (27 transects): 06.09.2012 – Otovishka River at the hut Otovitsa, 1451-1471 m; Dupnishka Bistritsa above the village Bistritsa, 900-900 m; Dzherman River at the hut Lovna, 1579-1599 m; Skakavitsa River at the hut Pionerska, 1544-1558 m; 07.09.2012 – Beli Iskar River at the ecotrail, 1207-1211 m; Levi Iskar River above the village Mala Tsarkva, 1438-1453 m; Bela voda River at the hut Vada, 1462-1470 m; Pravi Iskar River above the hut Vada, 1458-1468 m; Studena voda River before it inflow into the Pravi Iskar River, 1412-1422 m; Urdina River before it inflow into the Pravi Iskar River, 1347-1353 m; Cherni Iskar River after the inflow of the Urdina River, 1339-1362 m; Maljovitsa River above the tourist complex Maljovitsa, 1739-1749 m; 08.09.2012 – Maritsa River below the hut Maritsa, 1370-1403 m; Ibar River above the village Raduil, 1215-1229 m; Bistritsa River above the village Dolna Banya, 976-993 m; Kostenska River above the waterfall at the village Kostenets, 979-989 m; 09.09.2012 – Golyama Banenska River below the hut Granchar, 1975-1986 m; Ropalitsa River at the kanton Ropalitsa, 1794-1802 m; Yanchova River at the bridge on the road to the Belmeken, 1896-1909 m; Bela Mesta River (Dzhenem dere) below the road to the Belmeken, 1850-1863 m; Grancharska River below the hut Granchar, 1756-1771 m; 10.09.2012 – Vapata River below Semkovo, 1448-1464 m; Belishka River (2 transects) – 3 km before Semkovo, 1316-1323 m and in the beginning of the zone, 1072-1082 m; Blagoevgradska Bistritsa River in the Reserve Parangalitsa, 1410-1430 m; Parangalitsa River below the hut Makedoniya, 1609-1620 m; Zloto dere River in the Reserve Parangalitsa, 1503-1507 m.

**BG0000496 Rilski Manastir** (31 transects): 11.09.2012 – Kalin River before it inflow into the Rilska River, 826-845 m; Rilska River (2 transects) – above the village Pastra, 834-835 m, at the Rila Monastery, 1149-1149 m; Drushlyavitsa River above the Rila Monastery, 1199-1221 m; Kalugerski dol River at the Rila Monastery, 1142-1168 m; Pavlov dol River below the Rila Monastery, 1117-1157 m; Cheresha River at the inflow of the Iliina River, 1049-1068 m; 12.09.2012 – Manastirska River (2 transects) – above the Rila Monastery, 1161-1163 m and 2 km above the Kirilova Polyana, 1685-1692 m; Gyolska River below the Chernoto gyoche Lake, 1728-1756 m; Dzhendema River below the Dzhendema Lake, 1839-1880 m; Kriva River below the Cherni Gyoche Lake, 1928-1933 m; River № 21647 against the Smradlivoto Lake, 2004-2029 m; River № 16574 below the Smradlivoto Lake, 2002-2006 m; 13.09.2012 – Iliina River (4 transects) – before it inflow into the Rilska River, 1015-1026 m, below the peak Baba, 1475-1487 m, above the inflow of the Radovichka River, 1329-1347 m, above the inflow of the Tamnoto dere River, 1165-1168 m; 5 left tributaries of the Iliina River before its inflow into the Iliina River – Kravarskoto dere River, 1068-1082 m, Kodzhakeritsa River, 441-1458m, Radovichka River, 1346-1355 m, Sospadere River, 1292-1310 m, Gramadlivitsa River, 1242-1250 m; 2 right tributaries of the Iliina River before its inflow into the Iliina River – Dyadoiljovo dere River, 1483-1514 m and Babino dere River, 1368-1391 m; 14.09.2012 – River № 14974 below the peak Kupena (Reservoir Kalin), 1590-1621 m; Kamenitsa River before it inflow into the River №14974, 1232-1249 m; Malka Lomnitsa River before in inflow into the Golyama Lomnitsa River, 1111-1124 m; Golyama Lomnitsa River above the inflow of the Malka Lomnitsa River, 1108-1123 m; Sheremena River against the tourist complex Eleshnitsa, 1001-1024 m; Eleshnitsa River above the tourist complex Eleshnitsa, 1009-1019 m.

**BG0000498 Vidbol** (9 transects): 16.10.2012 – Vidbol River at the villages Sratsimirovo, 117-127 m, Bozhuritsa, 65-68 m, Dunavtsi, 39-43 m, at it inflow into the Danube River, 33-39 m; 17.10.2012 – Vidbol River at the villages Podgore, 260-261 m, Tsar Shishmanovo, 234-234 m, Tolovitsa 178-179 m, Makresh, 142-143 m, Valchek, 127-126 m.

**BG0000503 Reka Lom** (4 transects, 04.09.2011): Lom River at the village Belo pole, 148-151 m, at the village Vasilovtsi, 67-70 m, at the village Traikovo, 39-47 m and at the town of Lom, 28-31 m.

**BG0000578 Reka Maritsa** (8 transects, 02.09.2012): Maritsa River at the cities Svilengrad, 53-54 m, Lyubimets, 57-60 m, village Rogozinovo, 66-67 m, Simeonovgrad, 76-77 m, Dimitrovgrad, 94-95 m, Parvomay, 119-120 m, Plovdiv, 152-153 m and Pazardzhik, 189-189 m.

**BG0000593 Bilernitsite** (2 transects, 21.09.2011): Botunya River above the village Botunya, 195-197 m and 205-206 m.

**BG0000594 Bozhia Most – Ponora** (1 transect, 21.09.2011): River from the cave Ponora, 277-280 m.

**BG0000609 Reka Rositsa** (11 transects): 07.10.2012 – Rositsa River (7 transects) – at the villages Gorsko Kosovo, 140-141 m, Krasno Gradishte, 132-134 m, Rositsa, 115-116 m, Byala Cherkva, 107-109 m, Byala Cherkva-Stambolovo, 100-101 m, Stambolovo, 95-96 m and Lesicheri, 82-83 m; 08.10.2012 – Rositsa River (4 transects) – at the villages Dichin, 71-72 m, Vodolei, 65-66 m, Resen, 57-60 m and Nikopolis ad Istrum, 55-58 m.

**BG0000610 Reka Yantra** (22 transects): Yantra River (22 transects), 15.06.2012 – at the railway station Byala, 23-25 m, at it inflow into the Danube, 20-20 m, at the bridge between the villages Novgrad and Krivina, 23-24 m, at the rope bridge in the village Belyanovo, 20-21 m, at the bridge in the village Beltsov, 20-22 m, at the village Tsenovo, 25-26 m, between the villages Tsenovo and Bregovitsa, 26-26 m, between the village Stargel and town of Byala, 30-31 m; 16.06.2012 – at the village Polsko Kosovo, 34-35 m, at the bridge between the villages Polski Trambesh and Karantsi, 30-35 m, at the bridge between the villages Petko Karavelovo and Strelets, 42-42 m, at the village Draganovo, 48-49 m, between the villages Gorski Dolen Trambesh and Varbitsa, 56-56 m, at the bridge before the village Varbitsa, 59-59 m, between the town of Dolna Oryahovitsa and town of Gorna Oryahovitsa, 77-77 m, at the bridge between the town of Gorna Oryahovitsa and village Parvomaitsi, 90-90 m; 17.06.2012 – between the villages Ledenik and Shemshevo, 159-161 m, at the village Pushevo, 181-182 m, at the bridge above the village Chukovo, 248-249 m, at the village Yantra, 286-287 m, at the village Skalsko, 264-264 m, at the bridge in the borough Cholakovtsi, town of Veliko Tarnovo, 134-135 m.

**BG0000612 Reka Blyagornitsa** (7 transects, 11.10.2012): Blyagornitsa River (6 transects) – below the Town of Tvarditsa, 337-343 m, above the village Orizari, 316-319 m, below the village Sborishte, 259-262 m, at the area Beglishki livadi, 242-242 m, at the area Malkiya Karzhelak, 230-231 m, at the village Chumerna, 222-223 m; River № 2346430.9 before it inflow into the Reservoir Metrakuk, 327-332 m.

**BG0000615 Devetashko Plato** (9 transects): 04.10.2012 – Osam River (4 transects) – at the village Smochan, 123-125 m, at the crossroad to the village Presyaka, 146-152 m, at the crossroad to the village Devetaki, 107-108 m, above the village Aleksandrovo, 104-106 m; Gostinka River at the village Smochan, 124-125 m; River № 43073 at the crossroad to the village Presyaka, 158-158 m; 05.10.2012 – Osam River at the village Yoglav, 81-92 m; River № 43074 between the villages Yoglav and Tepava, 177-187 m; River № 47949 at the village Krushuna, 124-124 m.

**BG0000616 Mikre** (11 transects): 02.10.2012 – Varteshnitsa River at the village Stefanovo, 483-497 m; River № 47679 at the village Malinovo, 458-462 m; Osam River at the village Balgarene, 246-251 m; 03.10.2012 – Osam River (5 transects) – at the town of Lovech, 177-180 m, at the village Slivek, 197-197 m, at the village Kazachevo, 207-208 m, 2 km below the road Sofia-Varna, 215-216 m, at the village Leshnitsa, 278-280 m; Driplya River at the village Golets, 309-313 m; Laga River at the village Mikre, 368-368 m; Suhata River at the village Lomets, 292-293 m.

**BG0000617 Reka Palakaria** (8 transects): Palakaria River (6 transects), 11.04.2012 – before the crossroad to the village Belchin, 908-910 m, between the villages Belchin and Relyovo, 908-910 m, at the village Relyovo, 904-906 m, after the village Relyovo, 882-883 m; 12.04.2012 – at the village Kovachevtsi, 944-945 m, at the village Popovyane, 927-929 m; a tributary of the Palakaria River below the village Yarlovo, 986-988 m; a tributary of the Palakaria River against the village Alino, 928-932 m.

**BG0000618 Vidima** (11 transects): Vidima River , 01.10.2012 – before it inflow into the Rositsa River, 198-201 m, at the crossroad to the village Sennik, 215-216 m, at the village Gradnitsa, 241-244 m, at the crossroad to the village Damyanovo, 246-246 m, at the village Berievo, 270-271 m, below the village Debnevo, 286-288 m, at the village Debnevo, 309-311 m, at the village Rekata, 356-356 m; 02.10.2012 – at the villages Velchevo, 390-398 m, Skandaloto, 436-438m and Zlievtsi, 470-470 m.

**BG0001011 Osogovska Planina** (29 transects): Novoselska River (3 transects) – at the village Novo selo, 855-864 m (7.5.2012), above the village Slokoshtitsa, 731-738 m (7.5.2012), 697-701 m (06.06.2012); Manastirska River (2 transects) – at the village Omichane, 1061-1073 m (07.05.2012), at the village Dvete reki, 902-908 m (6.6.2012); Rechitsa River (4 transects) – at the village

Tsarvaritsa, 716-716 m (08.05.2012), 708-712 m (07.06.2012), at the bridge to the village Tishanovo, 644-645 m (8.5.2012), at the village Vaksevo, 575-575 m (08.05.2012); Eleshnitsa River (4 transects) – below the village Sazhdenik, 1201-1219 m (07.05.2012), above the bridge Chekanets, 975-979 m (06.06.2012), at the bridge to the village Smolichano, 575-575 m (08.05.2012), at the village Chetirtsi, 467-470 m (08.05.2012); left tributary of the Eleshnitsa River below the village Sazhdenik, 1126-1130 m (07.05.2012); Cherna River above the bridge Chekanets, 1032-1032 m (07.05.2012), 1029-1030 m (06.06.2012); Skokova River at the village Dvete reki, 925-927 m (07.05.2012); Kamenitsa River at the village Kamenishka skakavitsa, 1057-1067 m (07.05.2012); Vetreńska River at the village Vetren, 780-783 m (08.05.2012), 776-788 m (07.06.2012); Tishanska River below the village Tishanovo, 652-653 m (08.05.2012), 684-692 m (07.06.2012); Eremiiska River at the village Eremiya, 510-511 m (08.05.2012); left tributary of the Novoselska River at the village Novo selo, 852-858 m (06.06.2012); Dobra River at the village Peltetsite, 986-997 m (06.06.2012); Bistritsa River above the village Garlyano, 1141-1152 m (06.06.2012); right tributary of the Eleshnitsa River at the village Stradalovo, 659-665 m (07.06.2012); Grashitsa River at the village Pelatikovo, 669-672 m (07.06.2012); left tributary of the Grashitsa River at the village Pelatikovo, 666-671 m (07.06.2012).

**BG0001012 Zemen** (28 transects): Struma River (8 transects) – below the dam of the Lobosh Reservoir, 606-609 m (27.10.2012); at the village Jablyano, 595-596 m (05.05.2012), 601-603 m (25.05.2012); at the village Razhdavitsa, 503-503 m (05.05.2012), 495-496 m (27.10.2012); at the village Kopilovtsi, 471-473 m (05.05.2012), 475-476 m (26.05.2012); at the village Dvorishte, 466-468 m (26.05.2012); Treklyanska River (5 transects) – at the village Kosovo, 798-798 m (26.05.2012); at the village Treklyano, 736-739 m (05.05.2012), 744-747 m (25.05.2012), 758-759 m (27.10.2012); at the village Gabreshvetsi, 723-725 m (25.05.2012); Gabreshvska River at the village Gabreshvetsi, 705-707 m (27.10.2012); Divlyanska River at the village Kalotintsi, 604-606 m (25.05.2012), 636-639 m (27.10.2012); Bazovishka River at it flows into the Treklyanska River, 756-758 m (27.10.2012); Vranjastenska River at it flows into the Struma River, 592-595 m (05.05.2012), 593-602 m (25.05.2012), 594-597 m (27.10.2012); Penkjojska River at the village Penkjojski, 739-742 m (05.05.2012), 682-682 m (27.10.2012); Rayanska River before the village Rayantsi, 640-641 m (05.05.2012), 649-651 m (27.10.2012); Blateshnishka River at the village Blateshnitsa, 674-678 m (05.05.2012); left tributary of the Blateshnishka River at the village Blateshnitsa, 759-760 m (26.05.2012); Shegava River (2 transects) – at the village Garbino, 541-546 m (26.05.2012), at the village Razhdavitsa, 504-507 m (26.05.2012).

**BG0001013 Skrino** (18 transects): Struma River (7 transects) – at the village Nevestino, 452-453 m (09.05.2012), at the village Chetirtsi, 441-444 (09.05.2012), at the village Pastuh, 425-427 m (09.05.2012), 422-430 m (08.06.2012), at the village Dobrovo, 386-388 m (09.05.2012), at the village Boboshevo, 374-375 m (09.05.2012), at the village Mursalevo, 369-371 m (09.06.2012); Kopriven River (3 transects) – at the village Tsarvishte, 460-463 m (09.05.2012), 434-436 m (09.06.2012), at the village Dragodan, 538-541 m (09.06.2012); left tributary of the Kopriven River at the village Frolosh, 602-608 m (09.06.2012); left tributary of the Kopriven River at the village Tsarvishte, 506-509 m (09.06.2012); Glidski dol River, 428-432 m (09.05.2012), 435-443 m (09.06.2012); left tributary of the Struma River at the village Vukovo, 488-500 m (08.06.2012); left tributary of the Struma River at the village Marvodol, 436-442 m (08.06.2012); Koznichka River at the village Marvodol, 551-555 m (08.06.2012);

**BG0001014 Karlukovo** (6 transects, 22.09.2011): Iskar River (4 transects) – at the village Chomakovtsi, 79-85 m, at the town of Cherven Bryag, 90-92 m, at the village Reselets, 101-105 m, at the village Karlukovo, 120-122 m; Zlatna Panega River (2 transects) – at the village Radomirtsi, 114-117 m (22.09.2011), at the town of Lukovit, 153-154 m.

**BG0001017 Karvav Kamak** (14 transects): Treklyanska River at the village Kosovo, 787-788 m (04.05.2012); Prosiya (Treklyanska) River (3 transects) – at the village Dalga luka, 831-837 m (04.05.2012), 854-857 m (15.9.2012), at the village Dolna Melna, 901-901 m (04.05.2012); Melanshtitsa River (2 transects) – below the village Gorna Melna, 981-983 m (04.05.2012), at the village Dolna Melna, 922-933 m (15.09.2012); Palomshitsa River at the village Dolna Melna, 933-934 m (15.09.2012); left tributary of Treklyanska River at the village Kosovo, 797-801 m (15.09.2012); Bazovichka River at the village Bazovitsa, 870-873 m (15.09.2012); Chachkovitsa River at the village Stoichovtsi, 854-862 m (04.05.2012); Cheshliiska River at the village Dragoichinovtsi, 1115-1122 m (04.05.2012), 1104-1120 m (15.09.2012); Metohiiska River at the village Metohiya, 946-956 m (15.9.2012); left tributary of the Metohiiska River before village Metohiya, 986-997 m (15.09.2012);

**BG0001021 Reka Mesta** (17 transects): 21.03.2012 – Tufcha River (2 transects) – above the village Banichan, 554-555 m, below the village Breznitsa, 660-662 m; Marevska River below the village Kornitsa, 612-618 m; Mesta River between the villages Gospodintsi and Bukovo, 568-571 m; Kamenitsa River above it flows into the Mesta River, 614-614 m; Kostenska River (2 transects) – above the village Breznitsa, 865-870 m, above it inflow into the Mesta River, 587-587 m; right tributary of the Mesta River against the village Bukovo, 587-590 m; 22.03.2012 – Osikovska River at the village Gospodintsi, 390-419 m; Bukovsko dere River below the village Bukovo, 508-538 m; Kremenska River above the Kremenski hanove, 617-620 m; Retizhe River above the village Mesta, 663-666 m; Kremeshnitsa River at it flows into the Retizhe River, 670-674 m; Gradinishka River above the village Filipovo, 723-725 m; Gostunsko dere River below the village Gostun, 713-719 m; Osikovitsa River above it flows into the Mesta River, 712-717 m; Bezbozhka River below the village Dobrinishte, 702-704 m.

**BG0001022 Oranovski Prolom-Leshko** (18 transects): Stara River above the village Zheleznitsa (2 transects) – 341-347 m (04.06.2012), 327-328 m (07.08.2012); left tributary of the Struma River at the Dolno Tserovska neighborhood, 341-349 m (04.06.2012); left tributary of the Struma River at the village Tserovo, 579-585 m (04.06.2012); second left tributary of the Struma River at the village Tserovo, 554-563 m (04.06.2012); third left tributary of the Struma River below the village Tserovo, 357-374 m (04.06.2012); Leshtinska River (3 transects) – at the village Obel, 754-769 m (04.06.2012), at the village Leshko, 580-587 m (05.06.2012), 584-586 m (07.08.2012); left tributary of the Leshtinska River at the village Zlatkovtsi, 886-891 m (07.08.2012); right tributary of the Leshtinska River below the village Gorno Leshko, 611-619 m (07.08.2012); Gabrovska River above the village Gabrovo, 680-684 m (07.08.2012); right tributary of the Gabrovska River at the village Padesh, 659-664 m (05.06.2012); right tributary of the Gabrovska River at the village Gabrovo, 670-674 m (05.06.2012); right tributary of the Gabrovska River below the village Gabrovo, 663-674 m (05.06.2012); Debochishka River at the village Debochitsa, 931-941 m (5.6.2012); Popovska River at the village Marchovtsi, 506-512 m (05.06.2012); Struma River at the Dolno Tserovska neighborhood, 309-309 m (07.08.2012).

**BG0001023 Rupite-Strumeshnitsa** (25 transects): Kameshnitsa River at the village Kamena, 304-309 m (17.3.2012); The River at the village Kljuch (2 transects) – 346-356 m, 392-398 m (17.3.2012); Svigiovitsa River at the village Gabrene, 348-356 m (17.3.2012);

Strumeshnitsa River (8 transects) – at the GKPP Zlatarevo, 195-196 m (17.03.2012), between the GKPP and the village Strumeshnitsa, 186-189 m (17.03.2012), at the village Strumeshnitsa, 179-181 m (17.03.2012), below the village Drenovitsa, 160-163 m (17.03.2012), before the village Parvomai, 136-139 m (17.03.2012), after the village Parvomai, 109-111 m (18.03.2012), at the village Muletarovo, 94-94 m (18.03.2012); at the village Mitino, 89-90 m (19.03.2012); Kolarevska River below the village Kolarovo, 301-308 m (17.03.2012); Struma River (3 transects) – at the village Ribnik, 90-96 m (18.03.2012), below the village Topolnitsa, 82-82 m (19.03.2012), at the village Chuchuligovo, 84-84 m (18.03.2012); Potoka River (2 transects) – at the village Hotovo, 167-170 m (18.03.2012), at the village Chuchuligovo, 107-109 m (19.03.2012); 3 left tributaries of the Potoka River at the village Hotovo (3 transects) – 167-170 m, 167-174 m, 190-191 m (18.03.2012); Sklavska River at the village Novo Delchevo, 126-130 m (18.03.2012); Melnishka River (2 transects) – below the village Novo Konomladi, 126-127 m (18.03.2012), at the village Kromidovo, 189-189 m (19.03.2012); Topolnitsa River at the village Topolnitsa, 91-93 m (19.03.2012).

**BG0001028 Sreden Pirin-Alibotush** (23 transects): 31.05.2012 – river at the village Musomishta, 621-633 m; Matnitsa River above the village Ilinden, 600-601 m; left tributary of the Matnitsa River above the village Ilinden, 635-640 m; Burovitsa River at the village Paril, 767-771 m; stream at the village Nova Lovcha, 727-728 m; river at the village Gaitaninovo, 677-681 m; Selskata River at the village Laki, 653-654 m; 01.06.2012 – left tributary of the Dobrotinska River above the village Dobrotino, 1035-1069 m; left tributary of the Dobrotinska River above the village Dobrotino, 1057-1108 m; Chereshnitsa River at the village Chereshnitsa, 312-329 m; Kalimanska River at the village Kalimantsi, 205-207 m; left tributary of the Pirinska Bistritsa River at the village Katuntsi, 171-177 m; 02.06.2012 – Petrovska River (3 transects) – spring of the river, 633-637 m, in the area “Sveta Troitsa” before the village Petrovo, 495-497 m, at the village Piperitsa, 189-200 m; a tributary of the Petrovska River at the village Petrovo, 508-513 m; Pirinska Bistritsa River at the village Katuntsi, 152-171 m; 03.06.2012 – Shemnitsa River at the village Kashina, 617-626 m; Sugarevska River (3 transects) – at the village Karlanovo, 542-571 m, at the village Sugarevo, 841-862 m, between Karlanovo and Melnik, 473-476 m; left tributary of the Dolenska River below the village Dolena, 799-813 m; Melnishka River above the village Lozenitsa, 295-299 m.

**BG0001030 Rodopi-Zapadni** (22 transects): 26.07.2012 – Sivinska River at the village Lipets, 834-844 m; Arda River at the village Smilyan, 825-838 m; Cherna River at the village Mugla, 1132-1132 m; Shirokolashka River below the village Slivovo, 941-941 m; Karauldere River before it inflow into the Shirokolashka River, 917-925 m; Vacha River below the village Grohotno, 753-754 m; Trigradaska River at the village Gjovren, 861-864 m; Buinovska River between the villages Buinovo and Yagodina, 1079-1084 m; 27.07.2012 – Eshekhidera River above the village Borino, 1144-1153 m; Murvadska River at the village Zmeitsa, 1239-1239 m; Sarnena River above the village Zmeitsa, 1251-1258 m; Kochooludera River, left tributary of the Sarnena reka River, 1314-1342 m; River № 1760407.1 before it inflow into the Kochooludera River, 1345-1345 m; Left tributary of the Sarnena reka River between the villages Barutin and Chavdar, 1118-1121 m; River № 1758646.6 before it inflow into the Dospat River, 1059-1060 m; Dospat River (2 transects) – below the village Barutin, 1072-1076 m; 28.07.2012 – at the village Pobit kamak, 1255-1260 m; Left tributary of the Dospat River at the village Pobit kamak, 1277-1287 m; Katrandzhidera River above the Shiroka Polyana Reservoir, 1424-1434 m; Neshterovo dere River at the DGS Beglika, 1519-1520 m; Beglishka River at the DGS Beglika, 1504-1507 m; Stara River below the village Rakitovo, 1024-1024 m.

**BG0001031 Rodopi-Sredni** (41 transects): Sushitsa River at the village Mostovo (2 transects, 22.07.2012) – 822-826 m and 798-801 m; River № 1474347.2, right tributary of the Sushitsa River above the village Mostovo, 824-834 m (22.07.2012); Yailadere River below the village Komuniga (2 transects) – 487-498 m (22.07.2012) and 465-476 m (01.11.2012); Sarayardere River at the Borovitsa Reservoir, 429-430 m (22.07.2012); Borovitsa River below the Borovitsa Reservoir (2 transects) – 424-425 m (22.07.2012) and 403-407 m (01.11.2012); Chepelarska River (5 transects) – above the town of Asenovgrad, 285-326 m (22.07.2012), below the Asenova krepost, 196-196 m (31.10.2012), at the village Bachkovo, 318-318 m (23.07.2012), below the village Narechen, 495-496 m (23.07.2012), at the village Hvoina, 667-669 m (31.10.2012); Rekata River below the village Kosovo, 622-649 m (31.10.2012); Todorova River above the village Pavelsko, 745-757 m (31.10.2012); Bukov dol River below the village Yugovo, 702-714 m (23.07.2012); left tributary of the Yugovska River above the village Yugovo, 670-681 m (23.07.2012); Yugovska River before the inflow of the Belitsa River, 626-627 m (23.07.2012); Belitsa River (3 transects) – at the crossroad to the village Borovo, 625-626 m (31.10.2012), below the village Belitsa, 631-644 m (23.07.2012) and 688-697 m (31.10.2012); Krushovskata River below the village Krushovo (2 transects) – 907-911 m (23.07.2012), 897-905 m (31.10.2012); Manastirskata River (2 transects) – above the village Krushovo, 938-943 m (23.07.2012), below the village Lakavitsa, 703-703 m (31.10.2012); Dryanovskata River against the village Stokite, 723-742 m (23.07.2012) and 737-741 m (31.10.2012); Djurkovskata River (2 transects) – above the village Djurkovo, 1115-1131 m (23.07.2012), below the village Djurkovo, 758-761 m (31.10.2012); Davidkovska River at the village Davidkovo, 864-873 m (24.07.2012); River № 1845633.5 at the village Davidkovo, 899-905 m (24.07.2012); left tributary of the Davidkovska River at the village Kirkovo, 1078-1089 m (24.07.2012); Gloginsko dere River at the village Kirkovo, 912-913 m (24.07.2012); right tributary of the Gloginsko dere River at the village Kirkovo, 915-923 m (24.07.2012); Sushitsa River at the village Dolnoslav, 348-354 m (01.11.2012); Chinardere River above the village Topolovo, 471-475 m (01.11.2012); Erikladere River between the villages Karamantsi and Boyan Botevo, 289-290 m (01.11.2012); Velichka River at the village Karamantsi, 277-277 m (01.11.2012); Banska River at the village Mineralni bani, 243-246 m (01.11.2012); Bukovska River at the village Susam, 238-238 m (01.11.2012); Gornoizvorska River at the village Gorski Izvor, 177-178 m (01.11.2012).

**BG0001032 Rodopi-Iztochni** (14 transects): 31.08.2012 – Gyurgen dere River before it inflow into the Ivailovgrad Reservoir, 121-123 m; Ivailovgrad Reservoir, 122-123 m; Baluk dere River below the village Huhla, 173-178 m; 01.09.2012 – Armira River at the village Svirachi, 176-176 m; Luda River at the village Siv Kladenets, 63-63 m; Hambar Dere River at the village Byal gradets, 56-57 m; Byala River (2 transects) – at the village Meden Buk, 116-116 m, at the village Gugutka, 183-183 m; Arpadere River before the village Gugutka, 193-195 m; Dermendere River at the village Byal gradets, 192-193 m; Krumovitsa River (2 transects) – at the village Rogach, 223-223 m and at the crossroad to the village Moryantsi, 166-167 m; Dyushyundere River at the village Dzhanka, 175-176 m; Arda River at the village Madzharovo, 129-130 m.

**BG0001033 Brestovitsa** (8 transects): 14.07.2012 – Tamrashka River above the village Parvenets (2 transects) – 244-264 m and 256-256 m; Bardashka River at the village Hrabrino, 325-332 m; small stream coming from the area Studeniya kladenets at the village Markovo, 297-297 m; 15.07.2012 – river above the village Brestovitsa, 361-367 m; second river above the village Brestovitsa,

357-364 m; river at the village Leshtensko, 618-620 m; River № 1324551.7 at the town of Perushtitsa, 380-395 m.

**BG0001036 Balgarski Izvor** (4 transects, 23.09.2011): Vit River (2 transects) – at the villages Dermantsi, 190-191 m and Toros, 220-222 m; Kalnik River (2 transects) – below the village Balgarski izvor, 269-270 m and above the village Balgarski izvor, 272-275 m.

**BG0001039 Popintsi**: (8 transects, 09.07.2012) River № 28376 at the village Malo Krushevo, 338-342 m; Kalavashtitsa River at the village Malo Krushevo, 332-336 m; small reservoir at the village Malo Krushevo, 353-354 m; Krasnovska River at the village Krasnovo, 366-366 m; Strelchanska Luda Yana before it flows into the Luda Yana River, 329-330 m; Banska Luda Yana River at the village Popintsi, 381-382 m; Mechenska River at the village Banyia, 462-464 m; Gergitsevo River at the village Banyia, 462-463 m.

**BG0001040 Zapadna Stara Planina i Predbalkan** (25 transects): 18.10.2012 – Chuprenska River (2 transects) – below the catchment, 884-896 m and above the village Chuprene, 534-536 m; Manastirska River above the village Chuprene, 508-509 m; Lom River (3 transects) – above the village Gorni lom, 511-520 m, above the village Sredogriv, 307-311 m, at the village Falkovets, 219-219 m; 19.10.2012 – Salashka River (2 transects) – at the village Salash, 554-556 m and below the village Granichak, 343-345 m; Stakevska River (3 transects) – in the area Byalata voda, 783-801 m, above the village Stakevtsi, 619-619 m, above the crossroad to the village Krachimir, 445-465 m; 20.10.2012 – Ogosta River (2 transects) – below the village Prevala, 413-415 m and at the bridge before the village Gavril Genova, 223-223 m; Dalgodelska Ogosta (2 transects) – above the village Dulgi Del, 505-507 m and in the area Uleite above the village Govezhda, 347-354 m; Chiprovska River (2 transects) – above the village Martinovo, 872-881 m and below the crossroad to the Chiprovski monastery, 292-326 m; 21.10.2012 – Botunya River above the town of Varshets, 662-698 m; Rakovitsa River above the village Spanchevtsi, 528-536 m; Nishava River above the village Gintsi, 1145-1152 m; Iskretska River at the crossroad above the village Buchin prohod, 668-669 m; 22.10.2012 – Nishava River (3 transects) – at the village Berende Izvor, 509-540 m, at the village Tuden, 643-644 m, above the town Godech, 733-736 m; Visochitsa River at the village Gubesh, 997-997 m.

**BG0001042 Iskarski Prolom-Rzhana** (4 transects, 20.09.2011): Gabrovnitsa River (4 transects) – below the village Osenov lag, 764-767 m, at the crossroad to the village Brezov dol, 711-718 m, against the Pehchena liska, 588-598 m, above the village Gabrovnitsa, 398-399 m.

**BG0001043 Etropole-Bailovo** (10 transects): 10.07.2012 – Kalugeritsa River (3 transects – at the career after the village Smolsko, 600-607 m, before the crossroad to the village Kamenitsa, 714-727 m, on the road to the village Kamenitsa, 778-792 m; Stari Iskar River above the village Golyama Rakovitsa, 673-677 m; Ravna River before the village Golyama Rakovitsa, 643-643 m; 11.07.2012 – Bunovska River (2 transects) – above the village Bunovo, 729-735 m, before the falls, 800-813 m; Buchkovska River along the trail to hut Chavdar, 853-866 m; Makotsevska River (2 transects) – at the villages Dolno Kamartsi, 692-693 m and Makotsevo, 651-651 m.

**BG0001307 Plana** (7 transects): Iskar River (3 transects) – above the village Kokalyane, 609-610 m (06.04.2012), in the area of Urvich prolom, 636-647 m (06.04.2012), at Devil's Bridge, 658-662 m (06.04.2012); Planshtitsa River (2 transects) – at the inflow into the Iskar River (Below "Zlatnata Ribka"), 684-688 m (06.04.2012), at the inflow of the tributary at satellite station, 1109-1113 m (07.04.2012); left tributary of the Planshtitsa River at satellite station below the village Plana, 1115-1122 m (07.04.2012); left tributary of the Planshtitsa River at the village Plana, 1158-1163 m (07.04.2012).

**BG0001386 Yadenitsa** (7 transects, 18.09.2011): Chepinska River (4 transects) – above the village Varvara, 258-263 m, below the area Ravno Bore, 371-392 m, at the kanton Milevi skali, 505-511, above the village Draginovo, 716-723 m; Yadenitsa River (3 transects) – after the inflow of the Yundolska River, 1119-1120 m, against peak Sultanka, 1001-1017 m, before the flows of the Sultansko dere River, 889-917 m.

**BG0001389 Sredna Gora** (21 transects): 06.07.2012 – Topolnitsa River (3 transects) – at the village Petrich, 474-476 m, at the bridge to the village Zamuhovo, 463-464 m, before the village Poibrene, 423-425 m; Gugov dol River above the village Petrich, 512-516 m; Shaljoivitsa River before the village Oborishte, 539-550 m; Panova River after the monument of Oborishte, 740-742 m; 07.07.2012 – Topolnitsa River (3 transects) – below the town of Pirdop, 612-621 m, after the dam of the Reservoir Dushantsi, 721-722 m, after the town of Koprivshitsa, 973-975 m; Stara River before the hut P. Demirev, 1073-1099 m; River № 30039 after the Panagyurski koloni, 1086-1122 m; Medetska River below the mines, 829-832 m; Pirdopska River below the town of Pirdop, 595-597 m; Elenska River before the village Dushantsi, 725-725 m; Topolnitsa River (2 transects) – before the town of Koprivshitsa, 1008-1017 m, at the inflow of the Kriva River, 1017-1018 m; Strelchanska Luda Yana River above the town of Strelcha, 519-533 m; Kriva River before the town of Koprivshitsa, 1022-1027 m; Mededere River in the upper river, 1050-1056 m; stream from the peak Bunaya, 1067-1082 m; Zliya dol River above the town of Strelcha, 896-905 m.

**BG0001493 Tsentralen Balkan-Bufer** (29 transects): 26.08.2012 – Cherni Vit River above the village Cherni vit, 527-527 m; Svin-skata River at the crossroad to the area Divchovoto, 580-581 m; River № 49283 at the village Cherni Vit, 506-513 m; River № 49260 below the village Cherni Vit, 476-477 m; Beli Vit River at the village Ribaritsa, 484-484 m; Vasiljovska River before the village Vasiljovo, 517-524 m; Brezovska River below the village Brezovo, 540-547 m; River № 49616 below the village Gorunovo, 582-587 m; 27.08.2012 – Kostina River at the village Ribaritsa, 579-582 m; Zavodna River above the village Ribaritsa, 661-662 m; Stara Ribaritsa River at the tourist complex, 718-721 m; Deboshnitsa River above the inflow of the Chernata River, 718-719 m; Chernata River before it inflow into the Deboshnitsa River, 696-699 m; Merski dol River above the village Ribaritsa, 618-623 m; Kamenska River above the village Kirchevo, 459-460 m; Kalnik River below the Sopot Reservoir, 335-340 m; Lesidrenska River above the village Lesidren, 468-474 m; Suhata River above the village Borima, 506-507 m; 28.08.2012 – Beli Osam River at the village Chiflik, 658-662 m; Zelenska River at the village Beli Osam, 585-591 m; Kavakla dere River at the village Hristo Danovo, 553-560 m; Damla dere River below the village Hristo Danovo, 535-541 m; Taushan dere River above the village Anevo, 654-670 m; Byalata River before the town of Kalofer, 465-475 m; Tundzha River above the town of Kalofer, 646-656 m; left tributary of the Tuzha River above the hydropower Tuzha, 550-553 m; Tuzha River at the hydropower Tuzha, 548-548 m; 29.08.2012 – Gabrovnitsa River at the village Skobelevo, 527-529 m; Eninska River above the village Enina, 495-497 m.

## References

- BOHL E. 1988. Comparative studies on crayfish brooks in Bavaria (*Astacus astacus* L., *Austropotamobius torrentium* Sehr.). – In: GOELDLIN DE TIEFENAU P. (Hrsg.): Freshwater Crayfish 9. Seventh International Symposium of Astacology, Lausanne, Switzerland 3-5 August 1987, Musée Zoologique Cantonal, Lausanne, 287-294.
- BULGURKOV K. 1961. Systematik, Biologie und Zoogeographische Verbreitung der Süßwasserkrebse der Familien Astacidae und Potamonidae in Bulgarien. – *Bulletin de l'Institut de Zoologie et Musée*, **10**: 165-192. (In Bulgarian, Russian and German summaries).
- BULGURKOV K. 1964. *Astacus pachypus* Rathke – A new species of crayfish for the Bulgarian Fauna. – *Proceedings of Fishery Institute Varna*, **5**: 45-47. (In Bulgarian, Russian and German summaries).
- DIÉGUEZ-URIBEONDO J., K. SÖDERHÄLL 1993. *Procambarus clarkii* Girard as a vector for the crayfish plague fungus, *Aphanomyces astaci* Schikora. – *Aquaculture and Fisheries Management*, **24**: 761-765.
- FÜREDER L., D. SINT, J. LEITER and A. DECLARA 2007. Crayfish and aquatic conservation: Species protection programs on indigenous crayfish in Tyrol (Austria and Italy) – In: FÜREDER L. & Tiroler Landesregierung (Eds.): Riverine Landscapes. Restoration-Flood protection-Conservation. – Proceedings of the International LIFE-Symposium, Reutte-Breitenwang. Natur in Tirol, **13**: 123-146.
- HOLDICH D. M., J. D. REYNOLDS, C. SOUTY-GROSSET and P. J. SIBLEY 2009. A review of the ever increasing threat to European crayfish from non-indigenous crayfish species. – *Knowledge and Management of Aquatic Ecosystems*, **394-395** (11): 1-46.
- HUBENOVA T., P. VASILEVA and A. ZAIKOV 2010. Fecundity of stone crayfish *Austropotamobius torrentium* from two different populations in Bulgaria. – *Bulgarian Journal of Agricultural Sciences*, **16** (3): 387-393.
- KOUTRAKIS E., C. PERDIKARIS, Y. MACHINO, G. SAVVIDIS and N. MARGARIS 2007. Distribution, recent mortalities and conservation measures of crayfish in Hellenic fresh waters. – *Bulletin Français de la Pêche et de la Pisciculture*, **385**: 25-44.
- MACHINO Y. 1997. Crayfish of the upper Soca and upper Sava rivers, Slovenia. – *Bulletin Français de la Pêche et de la Pisciculture*, **347**: 721-729.
- MACHINO Y., L. FÜREDER 1998. Der Steinkrebs *Austropotamobius torrentium* (Schrank, 1803) im Haldensee (Tirol, Österreich) und weitere Nachweise von Flußkrebse in hochgelegenen Gewässern. – *Ber. Naturwiss.-Med. Verein Innsbruck*, **85**: 223-229.
- MACHINO Y., D. M. HOLDICH 2006. Distribution of crayfish in Europe and adjoining countries: updates and comments. – *Freshwater Crayfish*, **15**: 292-323.
- MACHINO Y., L. FÜREDER 2005. How to find a stone crayfish *Austropotamobius torrentium* (Schrank, 1803): a biogeographic study in Europe. – *Bulletin Français de la Pêche et de la Pisciculture*, **376-377**: 507-517.
- PEHLIVANOV L., V. BISERKOV 2010. Development of the national ecological network Natura 2000, stage 2009. BAS: 1-6. (In Bulgarian).
- PÖCKL D., M. HOLDICH and J. PENNERSTORFER 2006. Identifying native and alien crayfish species in Europe. European Project CRAYNET, Guglar Cross Media, Melk, Austria, 47 p.
- SINT D., J. DALLA VIA and L. FÜREDER 2006. The genus *Austropotamobius* in the Ausserfern region (Tyrol, Austria) with an overlap in the distribution of *A. torrentium* and *A. pallipes* populations. In European crayfish as heritage species – linking research and management strategies to conservation and socio-economic development. CRAYNET, Vol 4. GHERARDI, F., C. SOUTY-GROSSET (Eds). – *Bulletin Français de la Pêche et de la Pisciculture*, **380-381**: 1029-1040.
- SÖDERHÄLL K., L. CERENIUS 1999. The crayfish plague fungus: history and recent advances. – *Freshwater Crayfish*, **12**: 11-35.
- SOUTY-GROSSET C., D. M. HOLDICH, P. Y. NOËL, J. D. REYNOLDS and P. HAFFNER (Eds.) 2006. Atlas of Crayfish in Europe. Muséum national d'Histoire naturelle, Paris, 188 pp.
- STOYNOV E., D. PARVANOV and A. GROZDANOV 2013. Distribution of crayfish and crabs in the upper reaches of the Kamchiya River, Bulgaria. – *Bulgarian Journal of Agricultural Science*, **19** (2): 250-254.
- SUBCHEV M., L. STANIMIROVA 1986. The epibiont on crayfishes *Hystricosoma chappuisi* Michaelsen, 1926 (Oligochaeta, Aeolosomatidae) – new species for Bulgarian fauna. – *Acta zoologica bulgarica*, **32**: 66-68. (In Bulgarian, Russian and English summaries).
- SUBCHEV M., L. STANIMIROVA 1998. Distribution of freshwater crayfishes (Crustacea: Astacidae) and the epibionts of the genus *Branchiobdella* (Annelida: Branchiobdellae), *Hystricosoma chappuisi* Michaelsen, 1926 (Annelida: Oligochaeta) and *Nitocrella divaricata* (Crustacea: Copepoda) in Bulgaria. – *Historia Naturalis bulgarica*, **9**: 5-18. (In Bulgarian, English summary).
- TRICHKOVA T., I. BOTEV, Z. HUBENOV, L. KENDEROV, M. TODOROV, D. KOZUHAROV, C. DELTSHEV and L. FÜREDER 2013. Freshwater crayfish (Decapoda: Astacidae) distribution and conservation in Bulgaria. – *Freshwater Crayfish*, **19** (2): 243-248.
- VLACH P., L. HULEC and D. FISCHER 2009. Recent distribution, population densities and ecological requirements of the stone crayfish (*Austropotamobius torrentium*) in the Czech Republic. – *Knowledge and Management of Aquatic Ecosystems*, **394-395**: 1-13.
- ZAIKOV A., T. HUBENOVA 2007. Status of freshwater crayfish in Bulgaria. – *Transactions of III International Conference "Fishery"*, 1-2 February 2007, Belgrad, 242-245.
- ZAIKOV A., T. HUBENOVA, I. ILIEV, P. VASILEVA and I. PISKOV 2010. Investigation on stone crayfish *Austropotamobius torrentium* (Schrank, 1803) population in River Sarnena (Western Rhodope Mountains, Bulgaria). – *ZooNotes*, **10**: 1-4. (In Bulgarian, English summary).
- ZAIKOV A., T. HUBENOVA, I. ILIEV, P. VASILEVA and I. PISKOV 2011. Study on the stone crayfish *Austropotamobius torrentium* (Schrank, 1803) (Crustacea: Decapoda: Astacidae) population in the Dospat Dam (Western Rhodope Mountains, Bulgaria). – *ZooNotes*, **18**: 1-5.

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