

*Short note*

## *Amphibian and Reptile Diversity in Protected Site “Reka Veselina” - Current State and Prospects for Future Conservation*

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**Abstract.** “Reka Veselina” is a protected site in the Veliko Tarnovo region and although it was declared in 2012, until now there were no specific data on the state of animal diversity within the area. Herpetological field surveys were conducted for a total of 10 days in the period April-May 2019. A total of 12 amphibian and reptile species were registered. All species except one are protected by national law and three (*Emys orbicularis*, *Triturus ivanbureschi*, *Bombina variegata*) are also included in the NATURA 2000 network. Species distribution was uneven along the river, highlighting the importance of including diverse habitats even in protected areas of small size. Results indicate that the protected site offers optimal conditions for most of the registered species and could serve as a blueprint for successful management of similar-sized wetlands.

**Key words:** habitats, herpetofauna, management, species, wetland.

Establishment of protected areas is a key strategy in biodiversity conservation (Vale et al., 2018), but at the same time, it is primarily driven by available opportunities rather than scientific knowledge (Baldi et al., 2017). In this regard, it is very important to study biodiversity on a local scale in order to provide the best possible management options.

Currently there are 569 protected sites in Bulgaria, most of which are of medium or small size (ExEA, 2020). Faunistic data for most of them is lacking, which hinders the establishment of adequate management plans. In particular, there is a distinct lack of published studies on the herpetological fauna for the territory of “Reka Veselina” protected site and the surrounding region. A single published record could be found in

Annex 3 of a review paper on the distribution and ecological requirements of native species of freshwater turtles (Kornilev et al., 2017). The authors indicate exact geographical coordinates for the presence of the species European pond turtle (*Emys orbicularis*) in the Zlatarishka River, within the town of Zlataritsa, situated 5km northeast of “Reka Veselina” protected site.

The aim of this study was to establish a comprehensive list of amphibian and reptile species that occur within the protected site, and relate species abundance to habitat diversity, so results could be used as guidelines in future research and management plans for wetland protected areas.

The protected site of “Reka Veselina”, named after the eponymous river, is located near the villages of Kapinovo and Mindia, in

the region of Veliko Tarnovo. It is established in 2012 for the protection of a number of plant and animal species and has a total area of 986 ha, with elevation varying between 100 and 120 m. a.s.l. The average tidal current of the river is 2.4 m<sup>3</sup>/s, with clearly defined spring floods from March to June and summer and autumn low water levels from July to October. Along the river there are one town (Zlataritsa) and nine villages.

Because of the lack of published data on amphibians and reptiles, the publicly available data from the SmartBirds mobile application system for wildlife mapping (SmartBirds, 2019) was reviewed using the geolocation search option, with a point in the centre of "Reka Veselina" and a 5km radius. In this way, the following species of amphibians and reptiles were identified in a 10x10km square: Marsh frog (*Pelophylax ridibundus*), Agile frog (*Rana dalmatina*), tree frog (*Hyla arborea* complex), green toad (*Bufo viridis* complex), common toad (*Bufo bufo*), common spadefoot (*Pelobates fuscus*), European green lizard (*Lacerta viridis*), Eastern slowworm (*Anguis colchica*), Grass snake (*Natrix natrix*), Aesculapian snake (*Zamenis longissimus*), Common wall lizard (*Podarcis muralis*). Although none of the points with exact geographical coordinates for these species fall within the boundaries of the studied protected site, the presence of some of them is possible due to the existence of suitable habitats within the area and/or in its immediate vicinity. When interpreting the data from SmartBirds, it should be noted that after the recent taxonomic changes of the species *Hyla arborea*, the new species Oriental tree frog (*Hyla orientalis*) was established based on genetic traits (Dufresnes et al., 2015), and is widespread in most of the country, incl. in the study site. As there is still no evidence of morphological differences between the two species and it is virtually impossible to recognize them from each other by external features, they are not separated in the mobile application.

Field surveys were carried for a total of ten days in April and May 2019. The

distribution of amphibians and reptiles was estimated on the basis of presence-absence, using exact geographical coordinates for each registered individual. The relative density of amphibians was recorded by transects with direct observations of animals and by means of non-lethal funnel traps (Sutherland, 2000). Fifteen traps (size 25x25x40 cm) were set up in the evening in preselected suitable locations and checked the next morning. After species identification, all captured individuals were released immediately at the site of capture. Reptile density was recorded by 500 m long and 2.5 m wide transects (Sutherland, 2000).

During the field surveys, a total of 80 separate observations of amphibians and reptiles were registered, and four species of amphibians and six species of reptiles were established. Additional two amphibian species were established in close proximity (<2 km) to the borders of the protected site, increasing the total number of identified species in the field surveys to 12 (Table 1).

The most abundant species by far was the Marsh frog, with a total of 303 registered adult individuals (235 in April and 68 in May), followed by the European pond turtle with 38 (37 in April and 1 in May). While the Marsh frog was uniformly distributed throughout the site, the European pond turtles were concentrated in a mid-sized marsh in the western part. The marsh had an approximate surface area of 1.28 acres and was overgrown with bulrush (*Typha* sp.); it was not connected to the river but was still a permanent water body, presumably fed by underground sources. In April, the marsh also yielded a significant number of Smooth newts (15 females, 16 males; average of 2.07 newts per trap), as well as 5 Buresch's crested newts (2 females, 3 males; average of 0.33 newts per trap). Both Smooth (5 females, 6 males) and Buresch's newts (a single male) were also registered at the eastern part of the protected site, in a shallow flooded meadow near the river. The European green lizard was registered on 28 occasions (20 in April, 8 in May) near grassy strips and shrubland along the river. The other species were registered

more rarely near the river or in puddles on dirt roads: Dice snake – 3 (2 in April, 1 in May), Grass snake – 2 (1 in April, 1 in May), Eastern slowworm – 2 (both in May), Oriental tree frog (1 calling adult in April, 20 larvae in May),

Common wall lizard 1 (in May). A single larva of the Fire salamander and an adult Yellow-bellied toad were observed in small streams leading to the river, to the South and West, respectively.

**Table 1.** Registered species during field surveys and their conservation status. \* - registered outside of the protected site; BA – Biodiversity Act (2002), 92/43 – EC Habitats Directive (1992), BC – Bern convention on the conservation of European wildlife and natural habitats (1982), IUCN – International Union for Conservation of Nature (2020).

Species	BA	92/43	BC	IUCN
*Fire salamander <i>Salamandra salamandra</i> (Linnaeus, 1758)	III	-	III	LC
Smooth newt <i>Lissotriton vulgaris</i> (Linnaeus, 1758)	III	-	III	LC
Buresch's crested newt <i>Triturus ivanbureschi</i> Arntzen & Wielstra, 2013	II, III	II, IV	II	N/A
* Yellow-bellied toad <i>Bombina variegata</i> (Linnaeus, 1758)	II, III	II, IV	II	LC
Oriental tree frog <i>Hyla orientalis</i> Bedriaga, 1890	III	IV	II	N/A
Marsh frog <i>Pelophylax ridibundus</i> (Pallas, 1771)	IV	V	III	LC
European pond turtle <i>Emys orbicularis</i> (Linnaeus, 1758)	II, III	II, IV	II	NT
Eastern slowworm <i>Anguis colchica</i> (Nordmann, 1840)	III	-	III	N/A
European green lizard <i>Lacerta viridis</i> (Laurenti, 1768)	III	IV	II	LC
Common wall lizard <i>Podarcis muralis</i> (Laurenti, 1768)	III	IV	II	LC
Grass snake <i>Natrix natrix</i> (Linnaeus, 1758)		-	III	LC
Dice snake <i>Natrix tessellata</i> (Laurenti, 1768)	III	IV	II	LC

Most of the identified species are protected under Annex III of the Bulgarian Biodiversity Act (10 species) and/or under Annex IV of the EU Habitats Directive (7 species). All species are protected under the Bern Convention (7 of them are listed in Annex II, i.e., strictly protected). Species that fall simultaneously in Annexes II and III of the Bulgarian Biodiversity Act, Annexes II and IV of the Habitats Directive, and Annex II of the Bern Convention, could be accepted as species with the highest conservation status. These include the Buresch's crested newt (*T. ivanbureschi*), the Yellow-bellied toad (*B. variegata*) and the European pond turtle (*E. orbicularis*), which is also Near-threatened under IUCN. All of the above-mentioned species were established for the first time in the area with exact geographical coordinates. The species Fire salamander (*S. salamandra*), Smooth newt (*L. vulgaris*), Buresch's crested newt (*T. ivanbureschi*) and

Dice snake (*N. tessellata*) were established for the first time in the region.

Most of the territory of "Reka Veselina" was covered during the field surveys, and visited habitats were in very good condition. The only recorded negative anthropogenic impact was low-level household waste pollution, mainly along the borders of the protected site; however, the degree of pollution was too low to present a threat to amphibian and reptile populations.

Joppa & Pfaff (2009) highlight the need of a more context-specific approach when planning the location and the size of protected areas. In recent decades, most protected areas have been created on the basis of consistent scientific data, rather than historic reasons, and are usually planned with regards to high biodiversity and presence of species of high conservation importance within their borders.

Results obtained during the field surveys highlight the benefit of including marshes, floodplains and other types of wetlands in protected areas specifically established alongside rivers. The large marsh in the western part of the site offers optimal habitat conditions for two species of high conservation importance, which would not have been present otherwise (or would be present in much lower numbers) – the European pond turtle and the Buresch's crested newt. The European pond turtle occurs in rivers and ponds across Bulgaria up to around 1100 m a.s.l., inhabiting a large variety of water bodies, but with the highest numbers always associated with stagnant ponds overgrown with reed and bulrush (Stojanov et al., 2011). The Buresch's crested newt inhabits stagnant water bodies and their surroundings, and is absent from ponds with predatory fish (Stojanov et al., 2011) – in this regard, conditions provided by the habitats in the western and eastern parts of the "Reka Veselina" protected site present an excellent environment for the development of this species. Although the third species of conservation importance – the Yellow bellied toad – was not registered in the protected site, the diverse habitats within its borders (flowing and standing water, puddles, flooded areas) provide suitable habitats. These diverse habitats also ensured the presence of the other registered amphibian and reptile species, all of which contribute towards a healthy ecosystem.

Some modelling studies on the planning and management of protected areas (e.g., Loyola et al., 2013) have pointed out that these areas will become less effective in maintaining species representation under changing climatic conditions. In addition, areas created for the protection of specific environments or species generally tend to be small (Marinero et al., 2012). For these reasons, when a new protected area is declared, it is important to include as many and as diverse habitats as possible, even if the size of the area is relatively small. When planning future conservation activities, a

careful integrative species-specific approach should be adopted, as sometimes seemingly beneficial activities could lead to habitat deterioration (e.g., raising water level to benefit a protected fish species from the main river could result in predatory fish appearing in the adjacent marshes, driving the newts away).

**Acknowledgements.** This scientific research was made possible with the financial support of WWF Bulgaria under the Project "Living Danube Rivers" No: 40001337.

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Received: 07.02.2020  
Accepted: 18.03.2020