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Notes on the herpetofauna in the northwestern foothills of the Pirin Mountains, south-western Bulgaria

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Abstract. Bulgaria's herpetofauna has been studied for more than a century. Yet, little information is available on the herpetofauna in the northwestern foothills of the Pirin Mts. Here we present information about eight amphibian and ten reptile species that occur in the area. One of the amphibian species, *Bufotes viridis*, had not been found until the present study. Road traffic was identified as the biggest threat to the populations of some species.

Key words: Balkan Peninsula, reptiles, amphibians.

Introduction

To our knowledge, little information has been published on the herpetofauna in the northwestern foothills of the Pirin Mts. (Pulev *et al.* 2015; Grozdanov *et al.* 2016; Pulev *et al.* 2019; Popgeorgiev *et al.* 2025). Grozdanov *et al.* (2016) provided more details, registering seven amphibian and ten reptile species and providing information on their distribution, specific ecological characteristics, and identified threats.

Our study aimed to supplement the information about the herpetofauna in the northwestern foothills of the Pirin Mts.

Material and Methods

The main study area is situated near Rakitna Village at 700–800 m a.s.l. Some adjacent areas were also examined (Fig. 1). The study was conducted from 2021 to 2024, and the area was visited 107 times. The species were searched for in suitable habitats – various water bodies, oak forests, grassy areas, stony places, etc. Additionally, the local roads were monitored for animals killed by vehicles.

Results and Discussion

We registered eight amphibian and ten reptile species. Our results confirm the presence of all seven amphibian species documented by Grozdanov *et al.* (2016) and add one more species – *Bufotes viridis* (Laurenti, 1768). Further, our findings confirm the presence of all ten reptile species mentioned by Grozdanov *et al.* (2016).

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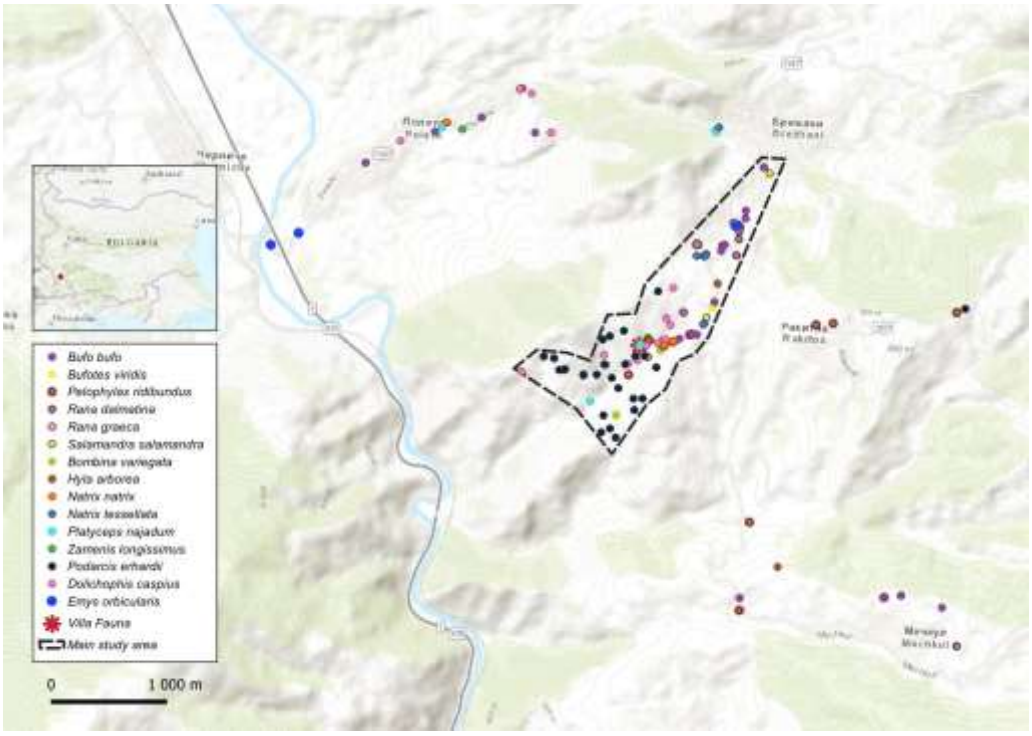

Fig. 1. Study area and localities of the amphibian and reptile species found. Note that for the sake of clarity, the localities of *T. hermanni*, *T. graeca*, and *L. viridis* are not shown. The three species are widespread in the area.

Our main findings and observations are presented below.

***Salamandra salamandra* (Linnaeus, 1758):** Nine individuals were registered, three of which were found road-killed and the remaining were larvae found in small water bodies, where some coexisted with *Bombina variegata* (Linnaeus, 1758).

***Bombina variegata* (Linnaeus, 1758):** Three hundred and forty-one individuals were recorded, most of which were concentrated in several water bodies. Up to 50 individuals were counted at the same time in the same water body. Our results indicate that the species may coexist with *Pelophylax ridibundus* (Pallas, 1771). The activity period of *B. variegata* possibly begins in March, as the first individuals were observed on 4 March 2024, and ends in November when the last active individuals were recorded.

***Bufo bufo* (Linnaeus, 1758)**: Eighty-two individuals were registered (almost half of them were found dead on a road). *Bufo bufo* was among the amphibian species whose activity period began early in the year, as breeding pairs were observed in late February. The earliest observation of egg-laying was on 25 February 2021. Similar early observations of egg-laying were reported by Grozdanov *et al.* (2016). We recorded winter activity – a freshly road-killed individual was found on 7 January 2024.

***Bufotes viridis* (Laurenti, 1768):** Only two road-killed individuals were found, which suggests that *B. viridis* is rare in the area.

***Hyla arborea* (Linnaeus, 1758):** Eighteen individuals were registered in or near aquatic habitats during the breeding season. The species was sometimes observed inhabiting the same water body with *Rana dalmatina* Fitzinger *in* Bonaparte, 1838 and *P. ridibundus*.

***Rana dalmatina* Fitzinger *in* Bonaparte, 1838:** Twenty-eight individuals were recorded, but about half of them were road-killed. Grozdanov *et al.* (2016) also reported road-killed individuals, which suggests that road traffic is the most serious threat to the species. The activity period and breeding season of *R. dalmatina* possibly start earlier than

those of the other amphibian species. This is because the earliest record of egg-laying (19 February 2024) in our study was of *R. dalmatina*.

***Rana graeca* Boulenger, 1891:** Only six individuals were found in a stream. Other authors (Grozdanov *et al.* 2016) have also suggested that the species is rare in the area.

***Pelophylax ridibundus* (Pallas, 1771):** Ninety-one individuals were registered, all of which were observed in or near aquatic environments. The activity period of *P. ridibundus* possibly begins in early or mid-March. The earliest observation of breeding pairs was on 6 March 2023. We found several individuals that were active during winter in or close to water bodies. The observations occurred on 2 December 2022, 16 December 2022, 1 December 2023, and 14 December 2023.

***Emys orbicularis* (Linnaeus, 1758):** Only five individuals were registered, three of which were observed in a pond, and two were found killed on a road. The species is thus relatively rare, which can also be concluded from the results of Grozdanov *et al.* (2016).

***Testudo hermanni* Gmelin, 1789 and *T. graeca* Linnaeus, 1758:** *Testudo hermanni* was much more abundant than *T. graeca*. For detailed information on the populations of the two species in the area, see Mitrevichin *et al.* (2023a, b).

***Lacerta viridis* (Laurenti, 1768):** *Lacerta viridis* is probably the most widespread and abundant species. It was registered mainly in open places covered with herbaceous plants and scattered bushes. The activity period of the species possibly starts around mid-March since the earliest activity was observed on 14 March 2023. In autumn, juveniles appeared to be more commonly encountered than adults. We often observed individuals of *L. viridis* and *Podarcis erhardii* (Bedriaga, 1876) that were basking in close proximity. Thus, the two species were not aggressive toward one another. Road-killed individuals were often found, which indicates that traffic is likely the most serious threat to the species.

***Podarcis erhardii* (Bedriaga, 1876):** Three hundred and twenty individuals were registered, but they were concentrated mainly in suitable habitats such as dirt roads and stony places. Grozdanov *et al.* (2016) mentioned that the species can be observed in the area during winter. Our findings support this statement, as active individuals were often recorded in winter: 7 January 2022, 27 December 2022, 3 January 2023, 5 January 2023, 13 February 2023, 12 December 2023, 14 December 2023, 19 December 2023, and 28 December 2023. The lowest air temperature at which the species was observed was 4°C.

***Dolichophis caspius* (Gmelin, 1789):** Twenty individuals were found, thus indicating that *D. caspius* was probably the most numerous and widespread snake species. The species inhabited forest, grass, and shrub habitats. Several individuals were found killed on a road, and traffic may be considered the main threat to the species.

***Platyceps najadum* (Eichwald, 1831):** Eight individuals were registered, seven of which were found dead on a road. The species was thus comparatively rare, and traffic is possibly the biggest threat to its population.

***Zamenis longissimus* (Laurenti, 1768):** Only a single adult individual was observed, but another study (Grozdanov *et al.* 2016) suggests that the species may not be as rare as our findings indicate.

***Natrix natrix* (Linnaeus, 1758):** Ten individuals were registered mainly in water bodies, where some juveniles occasionally preyed on tadpoles of *B. variegata*.

***Natrix tessellata* (Laurenti, 1768):** Only four road-killed animals were found, which would seem to indicate that the species is less distributed and abundant than most reptile species.

Bufo bufo, *T. hermanni*, *T. graeca*, *L. viridis*, and *P. erhardii* were likely the most widespread species. In addition, *B. bufo*, *P. ridibundus*, *T. hermanni*, *L. viridis*, *P. erhardii*, and *B. variegata* were probably the most abundant. In contrast, *Z. longissimus*, *B. viridis*, *N. tessellata*, *E. orbicularis*, and *R. graeca* were poorly represented. Road traffic was identified as the biggest threat to the herpetofauna. We recommend that studies addressing the herpetofauna in the northwestern part of the Pirin Mts. should be given priority due to the overall lack of research in this part of the country.

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