

## **AMPHIBIAN AND REPTILE FAUNA OF SMEDEREVO MUNICIPALITY – RECAPITULATION OF 75 YEARS OF RESEARCH**

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In this paper, we present the recapitulation of the research of amphibian and reptile fauna in the Smederevo municipality. For Serbia, three amphibian species were for the first time detected in Smederevo – (*Triturus dobrogicus*, *Pelobates balcanicus* and *Pelophylax lessonae*). In the literature, occurrence of *Vipera berus* was also mentioned. Since Smederevo is an important industrial centre, many amphibian and reptile habitats were lost due to urbanization, degradation and pollution, and surface waters were especially affected. Habitat degradation probably led to the local extinction of population of the Adder. Still, increased field effort and inclusion of citizen science led to the first discoveries of *Pelobates fuscus* and *Coronella austriaca* in Smederevo, and re-confirmation of the historical entries of *Salamandra salamandra* and *Triturus dobrogicus*. The remaining species were mapped to a greater extent, and some species which were previously known from only a few records (*Lissotriton vulgaris*, *Emys orbicularis* and *Zamenis longissimus*) are now mapped in much wider area. The presence of human introduced reptile species such as *Trachemys scripta* ssp., *Mediodactylus kotschyi* and *Pogona vitticeps* is also recorded, with Kotschyi’s gecko probably being naturalized. Future research should focus on re-confirmation of the remaining

historical records (*Pelobates balcanicus*) and identifying more habitats of the rare and vulnerable species and protecting them.

**Keywords:** Amphibia, Reptilia, fauna, introduction

## INTRODUCTION

The town of Smederevo is a place of great historical importance for the Serbian batrachology and herpetology – 75 years ago, one of the first systematical studies of the Serbian fauna was published (Karaman 1948). However, the systematic research was lacking for a long time since then, with a few exceptions such as tailed amphibians (Džukić 1993) and water frogs (Krizmanić 2008). The renewed interest in the faunistics and distribution during the last 10 years was initiated by the need to publish the Red Books of Fauna of Serbia I and II (Kalezić *et al.* 2015, Tomović *et al.* 2015a). It progressively led to the growth of published data regarding amphibians and reptiles in Serbia, including Smederevo (Vukov *et al.* 2013, Tomović *et al.* 2014, 2015b; 2019, Džukić *et al.* 2015, 2016, 2017, Krizmanić *et al.* 2015, Urošević *et al.* 2015, 2016, 2018, 2019, 2020, 2021, 2022a, 2022b, 2023, Vučić *et al.* 2020). There were also a few publications which systematized research of amphibian and reptile fauna in the territory of Smederevo (Urošević 2016, 2018, 2021). The last published recapitulation by Urošević (2022) mentioned 13 amphibian species (three of which are known only as historical literature records and one a new previously unpublished entry) and 12 reptile species (one presumably extinct, two introduced species and one a new previously unpublished entry) recorded in the Smederevo municipality.

The territory of the Smederevo municipality encompasses the north of the Pomoravlje biogeographic region and the north-eastern limits of the Šumadija biogeographic region (*sensu* Marković 1970 & Stevanović 1992). From the Velika Morava plain, loess plateaus are gradually rising up to 273 *m* a.s.l. Smederevo is a lowland municipality - about 50% of the total area is below 100 *m* a.s.l. while 40% of the total area is between 100 and 200 *m* a.s.l. (Gavrilović & Miladinović 2009). Most surface waters which belong to the Velika Morava and Danube confluences are periodical, and run dry during the summer (Gavrilović & Miladinović 2009). After the construction of the “Đerdap” dam, water regime of most surface waters was drastically changed. Some streams such as Petrijevski potok and Vučački potok were regulated and turned into sewage collectors, while industrial waste from the Smederevo steelworks is spilled into river Ralja (Gavrilović

& Miladinović 2009). Parts of the Jezava waterbed were filled in during the construction of the industrial zone (Tasić 2014). Smederevo is among the least forested municipalities in Serbia, with the native forests of *Quercetum frainetto-cerris* Rud. association covering less than 3% of the total area, with villages Seone and Malo Orašje being the most forested (14.9% and 10.6% respectively), while the town zone and villages Mihajlovac and Saraorci have less than 2% of forest cover (Službeni list grada Smedereva 2023).

Smederevo has a typical continental climate, with steppe climate characteristics (Službeni list grada Smedereva 2018). Annual temperature amplitudes exceed 20°C and more than 50% of the total annual precipitation is from April to September (Gavrilović & Miladinović 2009).

Serbia has the highest amphibian diversity in its lowland parts, and Smederevo is situated just between the lowland amphibian diversity hotspots in Serbia, namely North-Western Serbia (16), Southern Banat (15) and Velika Morava valley (17) (Vukov *et al.* 2013). However, the situation in Smederevo today, with altered water regimes, surface water pollution and little forest cover is somewhat unfavourable for amphibian diversity (Urošević 2021). On the other hand, Smederevo is relatively poor in regard to reptile diversity, especially compared to the neighbouring hotspots of Belgrade (17) and Southern Banat (16) (Tomović *et al.* 2014), probably because of specific relief and vegetation (Urošević, 2018). Introduction of allochthonous reptile species is also a relatively recent phenomenon (Urošević 2016, Urošević *et al.* 2016, 2019).

The aim of this study is to provide systematization of the current knowledge of the distribution and diversity of reptiles in Smederevo, especially in regard to anthropogenic alterations of the environment and introduction of non-native species, and define priorities for the future faunistic work.

## MATERIAL AND METHODS

Data for this study was gathered from different sources. Already published data comprises 35.1% of total entries for amphibians and 45.7% for reptiles. The authors' unpublished field data comprises 64.6% of total entries for amphibians and 52.4% for reptiles. In some cases, citizen science data (from online sources such as Facebook or authors' personal communication) was used after expert verification, and it comprises 0.3% of total entries for amphibians and 1.9% of total entries for reptiles. The field surveys of 2022 and 2023 were conducted with two specific goals: 1) to systematically cover most of the Smederevo municipality territory,

locate adequate habitats and map amphibians and reptiles and 2) to specifically reconfirm historical data (20 or more years old entries) and focus on cryptic or rare and hard to find species. This included locating and surveying specific habitats such as streams surrounded by forests (for *Salamandra salamandra*), dip netting (for *Lissotriton vulgaris* and *Triturus dobrogicus*) and doing night field surveys (for targeting *Pelobates* spp.). During the field surveys, after the visual inspection of animals, their eggs or larvae, or hearing vocalization and identification according to the standard herpetological literature (Arnold & Ovenden 2002, Speybroeck *et al.* 2016), geographic coordinates were taken using SaveLocationGPS application for Android; v. 8.0 (Rayo Innovations Private Limited). All literature and field data were mapped on a terrain map with superimposed 10×10 km MGRS grid using Ozi Explorer 3.95.3b (D&L Software Pty Ltd). Graphic elements for the 25 distribution maps of amphibians and reptiles include: blue dots – literature data; red dots – new data; black cross – extinct; white dot – incidental introduction; yellow dot lines – 10×10 km MGRS grid; blue lines – rivers or canals; orange lines – main roads; grey zones – town and villages; red dash-dot-dot line – border of the Smederevo municipality. To assess the extent of occurrence (sensu IUCN) of each species in Smederevo municipality, surface of the smallest convex polygon defined by the peripheral sites of occurrence was calculated (IUCN 2001, 2012). In the case of less than three known sites of occurrence, the surface of the presumably adequate habitat surrounding the site was calculated.

Literature data are provided in Appendix 1. Field and citizen science data are provided in Appendix 2.

## RESULTS

Class **Amphibia** Linnaeus, 1758

Order **Caudata** Scopoli, 1777 or **Urodela** Duméril, 1805

Family **Salamandridae** Goldfuss, 1820

Genus *Lissotriton* Bell, 1839

1. *Lissotriton vulgaris* (Linnaeus, 1758) – Smooth Newt; mali mrmoljak

This species was noted as relatively abundant in Smederevo lowlands and hills by Karaman (1948). Later sources denote *Smederevo* as a toponym, which is probably a narrow urban zone (Džukić 1993, Džukić *et al.* 2016). Later published localities are Provalija, Šalinac village and Šalinački lug forest (Urošević 2021). The new, field data greatly expand upon the published sources. The published and new data seem to be concentrated around Danube and Velika Morava confluence (new harbour,

Godominsko polje, Lipe, Kulič and Šalinac villages) and scattered in the south and west, in the hills (Novo Naselje: Petrijevska street), Malo Orašje, Suvodol and Vrbovac villages) and along the Velika Morava valley (Mala Krsna and Lugavčina villages) (Fig. 1). Smooth newt inhabits all kinds of vegetated still or sometimes running waters – floodplains, oxbows, lakes, canals, ponds, dugouts, cattle troughs and streams. Extent of occurrence of Smooth newt in Smederevo is 279 km<sup>2</sup> or 58% of the municipality surface, which makes it a common species. It is probably present in all suitable waters.

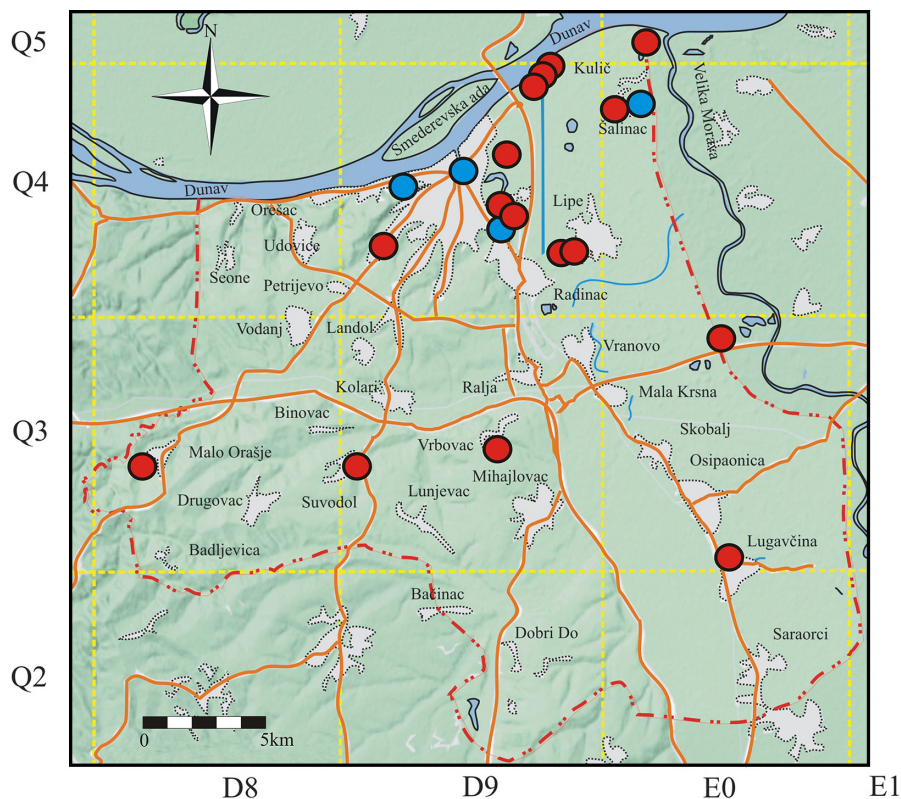


Fig. 1. – Distribution of *Lissotriton vulgaris* (Linnaeus, 1758) in Smederevo municipality.

### Genus *Salamandra* Garsault, 1764

#### 2. *Salamandra salamandra* (Linnaeus, 1758) – Fire Salamander; šareni daždevnjak

The presence of Fire salamander in Smederevo was not noted by Karaman (1948). Later, it was found on Srednje brdo, in ponds around Jezava and in Smederevo itself (Džukić 1993, Džukić *et al.* 2016).

Urošević (2021, 2022) mentions Fire salamander only as a historical entry, since the findings of the species were not repeated after 1993 and some of the mentioned localities were altered due to the urbanization. Also, repeated surveys of some potential habitats did not provide evidence on its presence. However, the increased field effort finally led to discovery of Fire salamander populations in the western parts of Smederevo municipality – villages Udoviće (unnamed stream bordering Orešac), Seone (Selište stream) and Malo Orašje (Carevac stream) (Fig. 2). There, Fire salamander inhabits a characteristic habitat of small streams running through the gullies in loess hills, surrounded by the riparian forest (alder, ash, poplar and willow). The finding of *Salamandra salamandra* in Udoviće at just 88 m a.s.l. is especially important since lowland (under 100 m a.s.l.) findings of this species in Serbia are extremely rare (less than 2%, Džukić *et al.* 2016). Extent of occurrence of Fire salamander in Smederevo is 67 km<sup>2</sup> or 14% of the municipality surface which makes it an uncommon species.

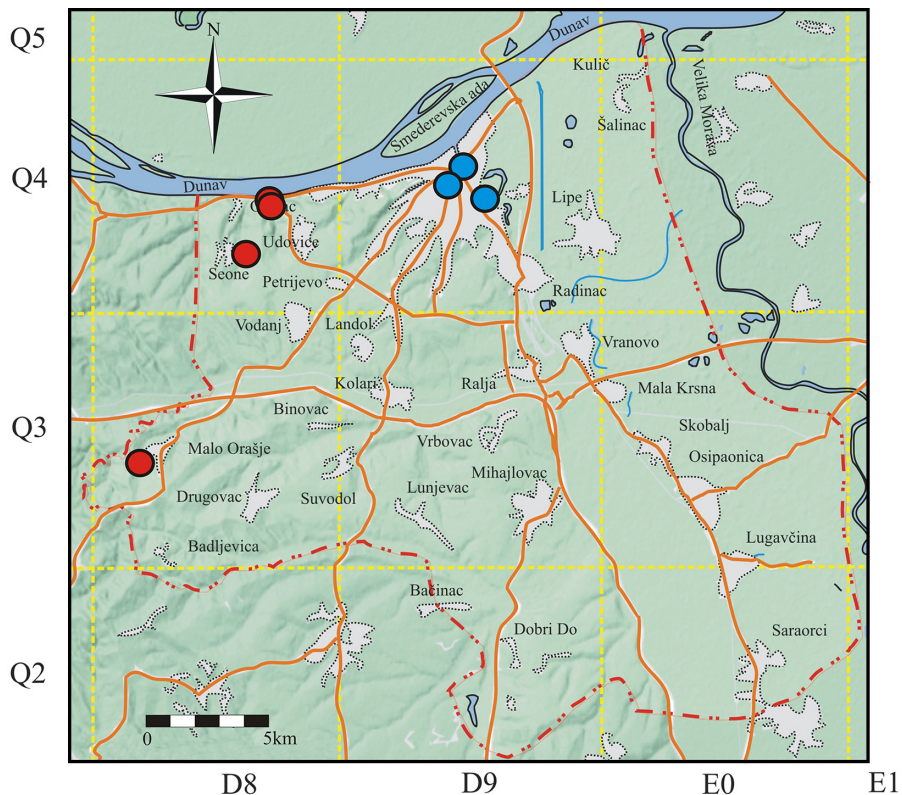


Fig. 2. – Distribution of *Salamandra salamandra* (Linnaeus, 1758) in Smederevo municipality.

Genus *Triturus* Rafinesque, 1815

3. *Triturus dobrogicus* (Kiritzescu, 1903) – Danube Crested Newt;  
podunavski veliki mrmoljak

Karaman (1948) wrote of the Danube crested newt as common in still waters, canals and swamps of the Godominsko polje field. Later published entries repeated Godominsko polje (“Godominski rit”) and also mention Smederevo fortress and “Đurđev grad” (probably “Mali Grad”, a fortress stronghold surrounded by a moat). Urošević (2021, 2022) mentions the Danube crested newt only as a historical entry. Despite increased effort, it was not reconfirmed at the published sites. However, during the new field research, Danube crested newt larvae were discovered near Kulić village, in the floodplain of Velika Morava, very close to the river mouth (Fig. 3). The habitat was a typical Pannonian wetland of alternating swamps, riparian forests and flooded meadows, under the river embankment. Extent of occurrence of Danube crested newt in Smederevo is 19 km<sup>2</sup> or 3.9% of the municipality surface which makes it a rare species.

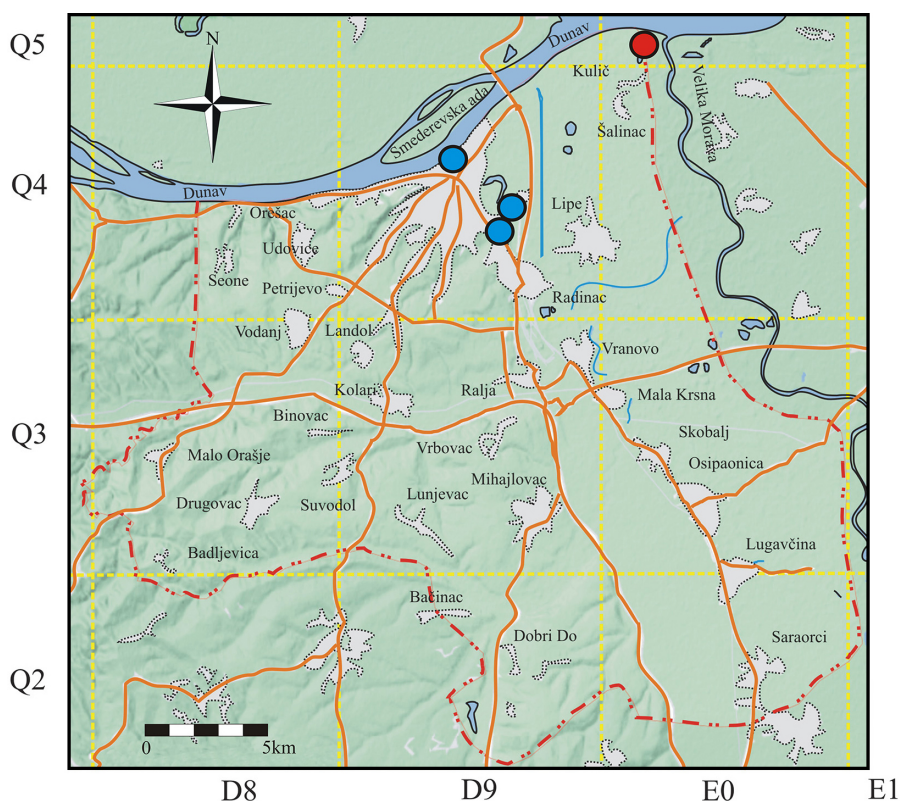


Fig. 3. – Distribution of *Triturus dobrogicus* (Kiritzescu, 1903) in Smederevo municipality.

Order **Anura** Duméril, 1805

Family **Bombinatoridae** Gray, 1825

Genus **Bombina** Oken, 1816

4. ***Bombina bombina*** (Linnaeus, 1761) – Fire-bellied Toad; crvenotrbi mukač

Fire-bellied toad is noted as a common in lowlands and occasionally present in hills, such around Udovice village (Karaman 1948). Other published entries are for Kulič vilage (Džukić *et al.* 2015), Šalinac village and Velika Morava floodplain near Kulič (Urošević 2021). New field data is concentrated around Danube (new harbour) and Velika Morava mouth, and there are also findings in Godominsko polje and Lipe village. Egg clusters very similar to this species were found in a fish pond near Drugovac village, close to the Konjska reka river and a surrounding swamp, so this locality is noted for a potential presence of the species (Fig. 4). The species inhabits shallow permanent or temporary ponds with lots of vegetation and well exposed to the Sun – swamps, flooded meadows or

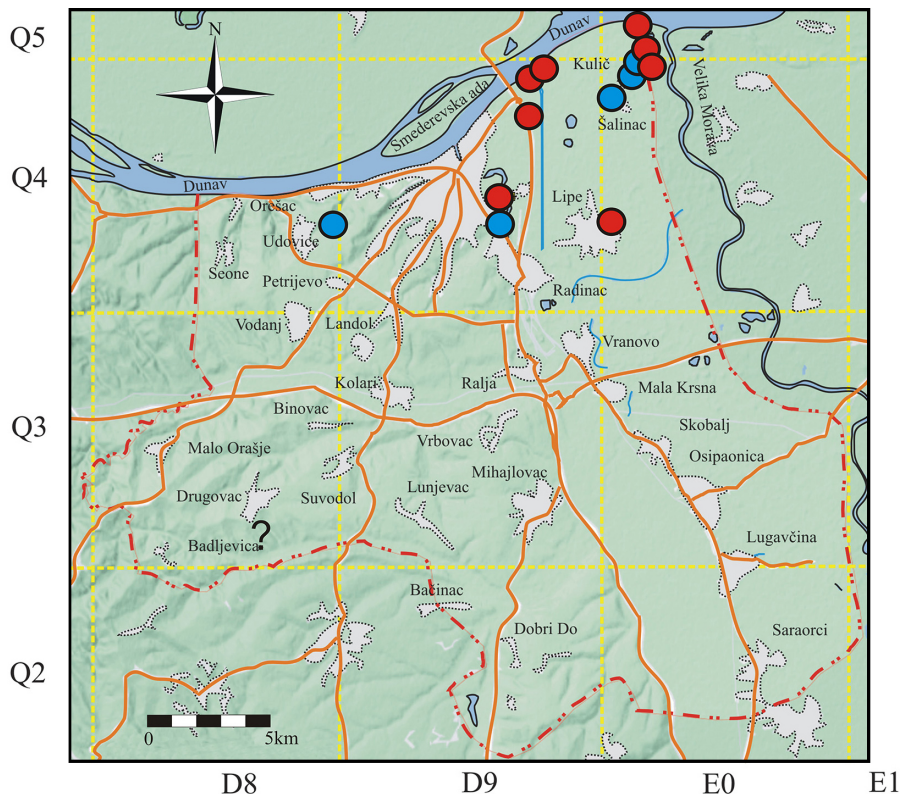


Fig. 4. – Distribution of *Bombina bombina* (Linnaeus, 1761) in Smederevo municipality.



open ponds in riparian forests. Extent of occurrence of Fire-bellied toad in Smederevo is 131 km<sup>2</sup> or 27% of the municipality surface which makes it an uncommon species.

Family **Pelobatidae** Bonaparte, 1850

Genus *Pelobates* Wagler, 1830

5. *Pelobates balcanicus* Karaman, 1928 – Balkan Spadefoot Toad;  
balkanska češnjarka

The species was for the first time in Serbia recorded in Smederevo – Karaman (1948) claimed that he frequently found tadpoles of this species in water habitats in Smederevo, and he also found an adult male on the Jezava river bank (Fig. 5). Although this finding was doubted for a time (see Džukić 1974), *P. balcanicus* was later found in more localities in plains of Danube and Velika Morava rivers which undoubtedly confirmed its presence in Serbia, and it was cited in all relevant literature regarding *Pelobates* sp. in the Balkans (Džukić 1974, Džukić *et al.* 2008). Because of no later direct reconfirmation of its presence, the Balkan spadefoot toad

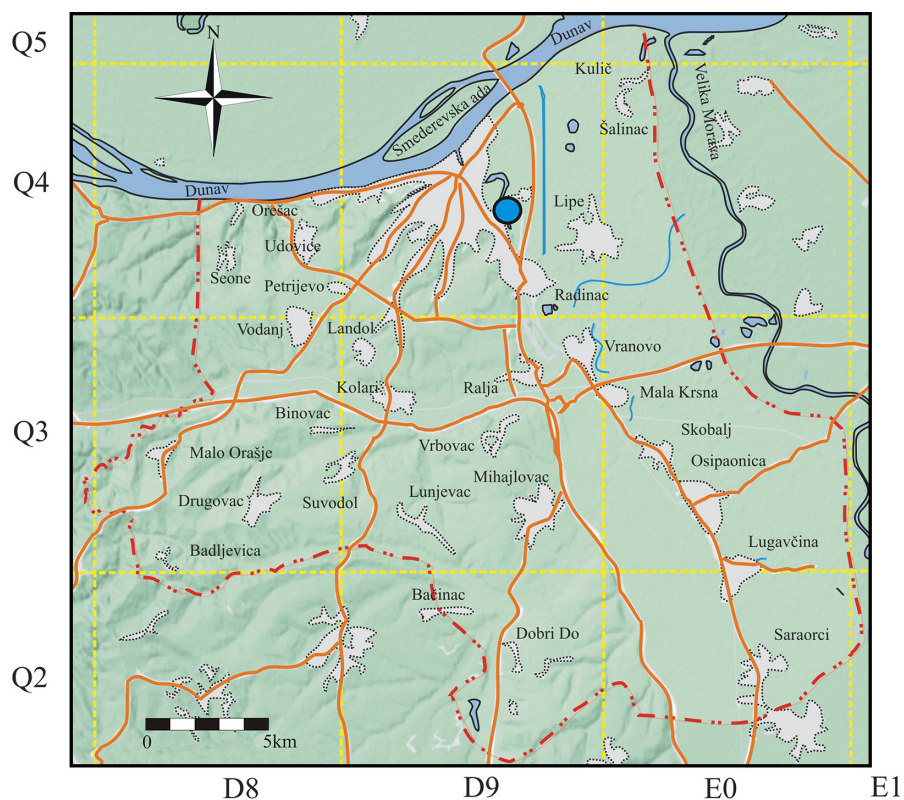


Fig. 5. – Distribution of *Pelobates balcanicus* Karaman, 1928 in Smederevo municipality.

was regarded as a historical entry (Urošević 2021, 2022). Due to its nocturnal activity and fossorial lifestyle, this species is very difficult to locate and its reconfirmation remains one of the top faunistic priorities for the Smederevo municipality. It inhabits mostly sand dunes, riparian zones of rivers and lakes and agricultural habitats, while it breeds in deep ponds with scarce vegetation which can be temporary. Potential extent of occurrence of Balkan spadefoot toad in Smederevo is 6 km<sup>2</sup> or 1.2% of the municipality surface which makes it a very rare species.

6. *Pelobates fuscus* (Laurenti, 1768) – Common Spadefoot Toad; obična češnjarka

Although regarded as potentially present in Smederevo (Vukov *et al.* 2013, Urošević 2021), the Common spadefoot toad was not previously recorded. The first finding of this species was noted in 2022 (Urošević 2022) during a night survey of a Danube embankment near the new harbour. Later findings are from Šalinačka mrtvađa pond and the Velika Morava embankment close to the river mouth (Fig. 6). Common spadefoot

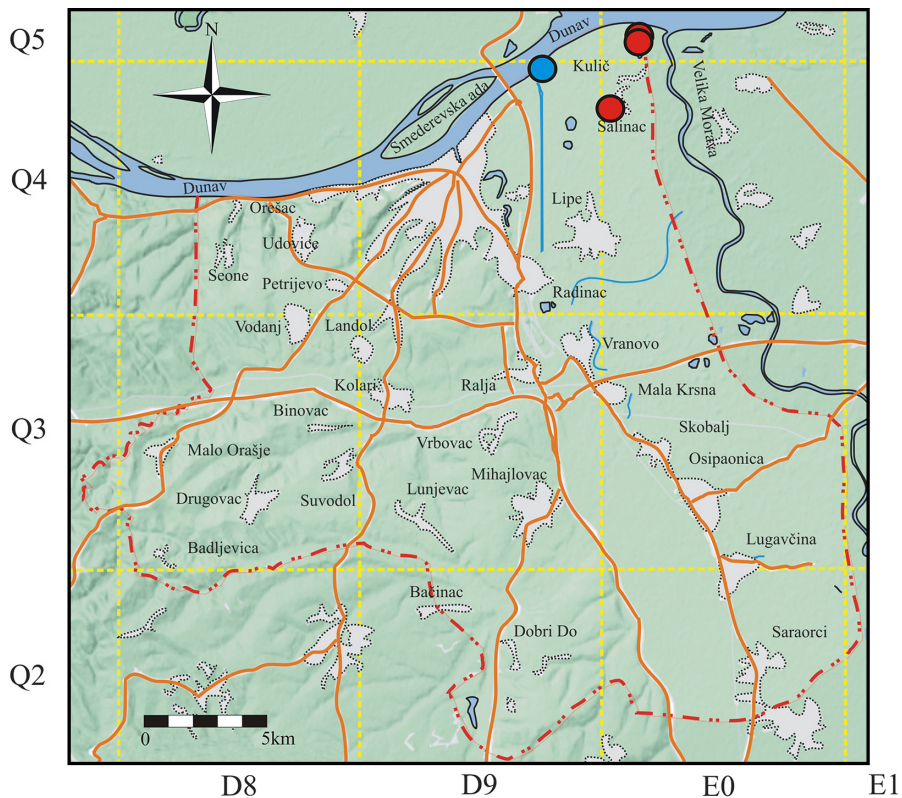


Fig. 6. – Distribution of *Pelobates fuscus* (Laurenti, 1768) in Smederevo municipality.

is also fossorial and exclusively nocturnal except during the mating season, which makes it very difficult to detect. It is a lowland species which inhabits open habitats with loose soils and it was found on sandy river embankments or in permanent, vegetated ponds in which it breeds. Extent of occurrence of Common spadefoot toad in Smederevo is 7 km<sup>2</sup> or 1.5% of the municipality surface which makes it a very rare species.

Family **Bufo***idae* Gray, 1825

Genus *Bufo* Garsault, 1764

7. *Bufo bufo* (Linnaeus, 1758) – Common Toad; obična krastača

The Common toad was noted as a common species in Smederevo, but not as numerous as the Green toad (Karaman 1948). Further published entries are mostly for the town zone (Pionirski park, Plavinac, Provalija, Zlatno brdo, Šalinački put) and for the Vučak village (Urošević 2021). New field data include Kovačićevo settlement, Jugovo, Orešac, Udovice, Seone, Lipe, Vodanj and Dobri Do villages as well as the Velika Morava embankment near the river mouth (Fig. 7). It usually occurs in habitats with at least some tree cover, close to the deep ponds, lakes or canals well

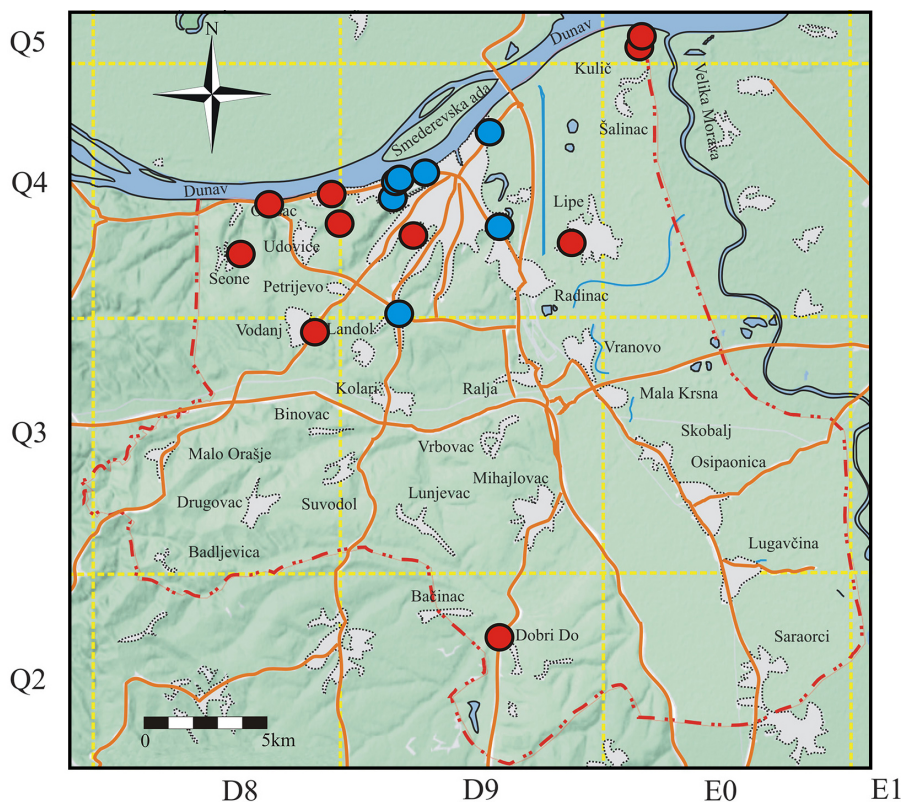


Fig. 7. – Distribution of *Bufo bufo* (Linnaeus, 1758) in Smederevo municipality.

exposed to the Sun, in which it breeds. In Smederevo, slightly more than 50% of findings are from above 100 m a.s.l. Extent of occurrence of Common toad in Smederevo is 180 km<sup>2</sup> or 37% of the municipality surface which makes it an uncommon species.

Genus *Bufotes* Rafinesque, 1815

8. *Bufotes viridis* (Laurenti, 1768) – Green Toad, zelena krastača

The Green toad was noted as very common in Smederevo, especially in the fields or on the banks (Karaman 1948). Published data are numerous for the city zone (Donji grad, bus station, Godominsko polje, Mali Krivak, Marina, Šalinački put, Smederevo fortress, Danube quay at Veslački klub, Zlatno brdo). It was also documented for the villages Dobri Do, Kulić, Orešac and Vučak (Urošević 2021). New field data are new harbour, Kovačićevo settlement, villages Vodanj, Malo Orašje, Ralja, Vranovo, Lipe and Šalinac and Velika Morava embankment near the river mouth (Fig. 8). It is usually present in open habitats with low, herbaceous vegetation, also in human habitation including very urbanized ones – it is one of the rare

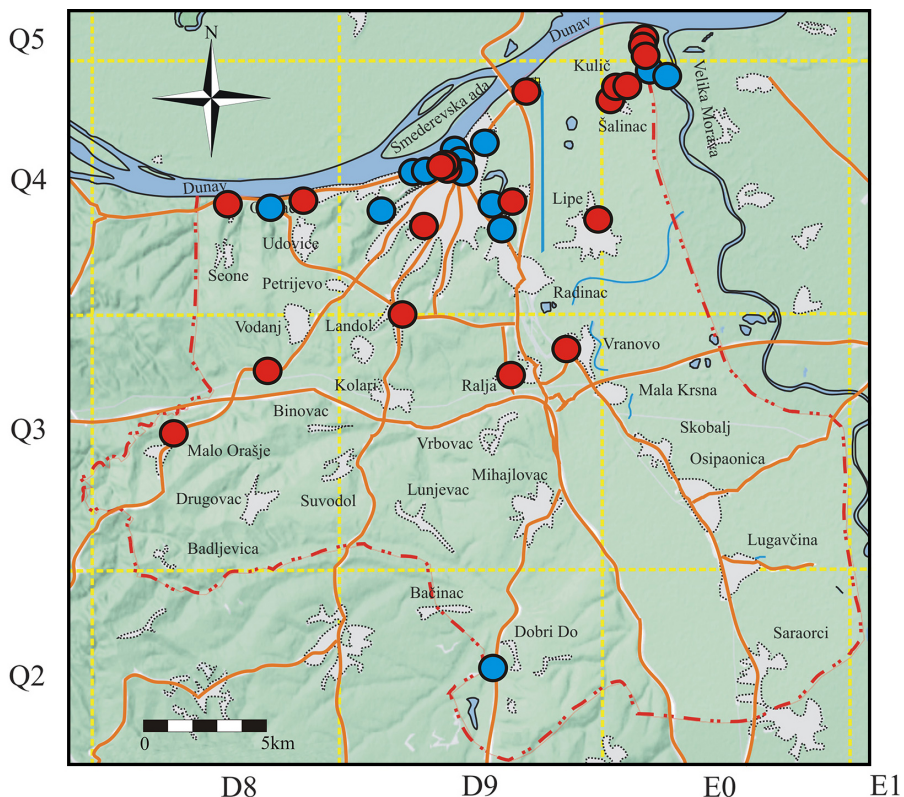


Fig. 8. – Distribution of *Bufotes viridis* (Laurenti, 1768) in Smederevo municipality.

amphibians that can frequently be encountered in the town centre. It breeds in a wide variety of shallow surface waters including very small ephemeral ponds. Extent of occurrence of Green toad in Smederevo is 275 km<sup>2</sup> or 57% of the municipality surface which makes it a common species.

Family **Hylidae** Rafinesque, 1815

Genus *Hyla* Laurenti, 1768

9. *Hyla arborea* (Linnaeus, 1758) – Common Tree Frog; gatalinka

According to Karaman (1948), Common tree frog is widespread in the lowlands, usually found in shallow water around swamps. It was also found at Provalija (Džukić *et al.* 2015), Godominsko polje, Šalinački put, Zlatno brdo and villages Vučak and Kulić (Urošević 2021), also Vučak plant nursery and a canal near the new harbour (Urošević *et al.* 2022a). New field data are the new harbour (Danube embankment), Godominski rit, Mala Krsna gravel pits, Lipe, Šalinac, Saraorci and Dobri Do villages and Vlaški Do lake (Fig. 9). It is usually found in densely vegetated habitats well exposed to the Sun – forest edges, hedgerows, meadows, river and canal

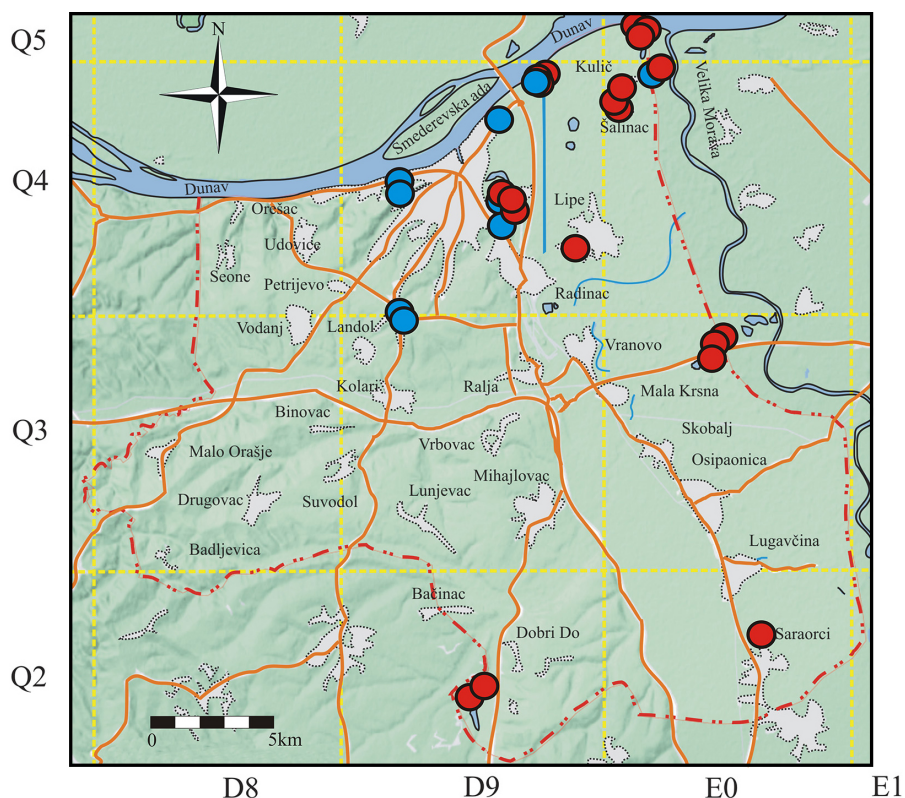


Fig. 9. – Distribution of *Hyla arborea* (Linnaeus, 1758) in Smederevo municipality.

embankments and reed beds, and it breeds in stagnant, well vegetated waters. Extent of occurrence of Common tree frog in Smederevo is 282 km<sup>2</sup> or 58% of the municipality surface which makes it a common species.

Family **Ranidae** Batsch, 1796

Genus *Pelophylax* Fitzinger, 1843

10. *Pelophylax* kl. *esculentus* (Linnaeus, 1758) – Edible Frog;  
zelená žaba

Karaman (1948) noted that the Edible frog is not that common in Smederevo – he found it in the Jezava river upstream from the town and it tends to be rarer than the Pool frog and Marsh frog in the lowlands, while it becomes more abundant in the hills (as in Provalija). It was also recorded in Šalinac village, with other two water frogs (Krizmanić 2008, Džukić *et al.* 2015). More published entries are for the Smederevo fortress (moat and Danube bank), Marina, Jugovo, Godomin (Godominsko polje, canals, Jezava oxbow and Lipske livade), Ribarsko naselje, Šalinački put, Železara canal, Kulić village (Velika Morava oxbow and floodplains), Kolari

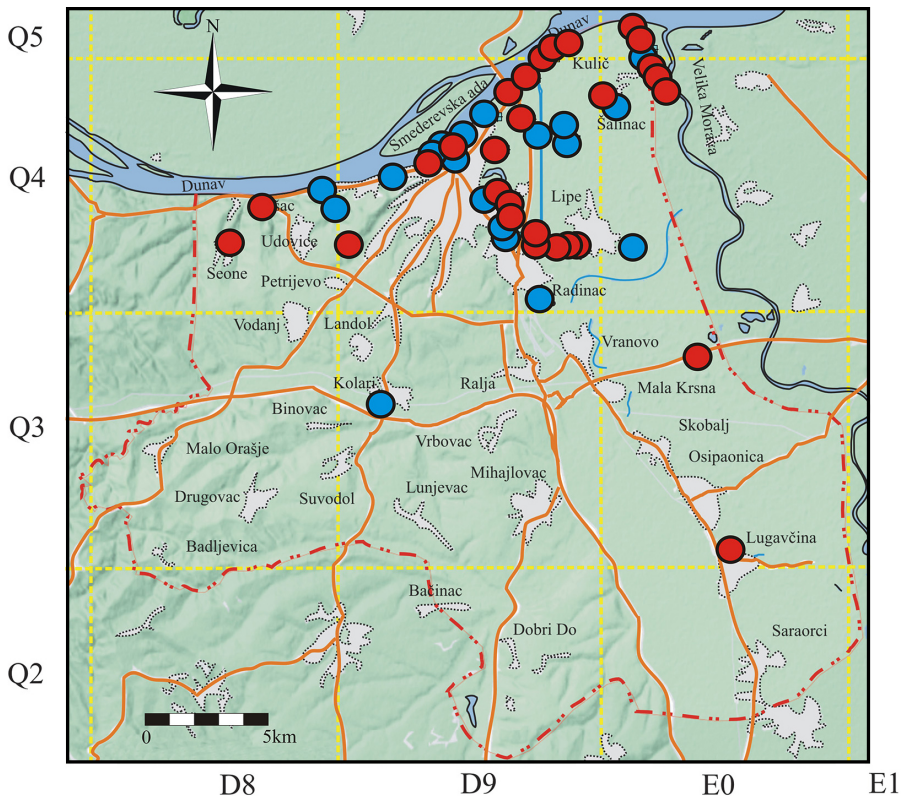


Fig. 10. – Distribution of *Pelophylax* kl. *esculentus* (Linnaeus, 1758) in Smederevo municipality.

village, Udovice village, Šalinački bageri lakes, Radinački bageri lakes and Lipski bageri lakes (Urošević 2021). New field data are for new harbour, Zlatno brdo hill, Orešac, Lipe and Lugavčina villages and Mala Krsna gravel pits (Fig. 10). It is usually found in a wide array of aquatic habitats – rivers, canals, lakes and ponds, sometimes even in small temporary ponds. Extent of occurrence of Edible frog in Smederevo is 233 km<sup>2</sup> or 48% of the municipality surface which makes it an uncommon species.

#### 11 *Pelophylax lessonae* (Camerano, 1882) – Pool Frog; mala zelena žaba

Pool frog was denoted as common in Godominsko polje and lowlands in general, but never around the running water (Karaman 1948). Together with other two water frog species, it was collected in Šalinac village (Krizmanić 2008, Džukić *et al.* 2015). Literature entries also mention Marina, Plavinac, Šalinačko lake, canals between Šalinac and Kulič villages and Velika Morava floodplain near Kulič village (Urošević 2021). There are new field data for the new harbour, Jezava oxbow and Seone

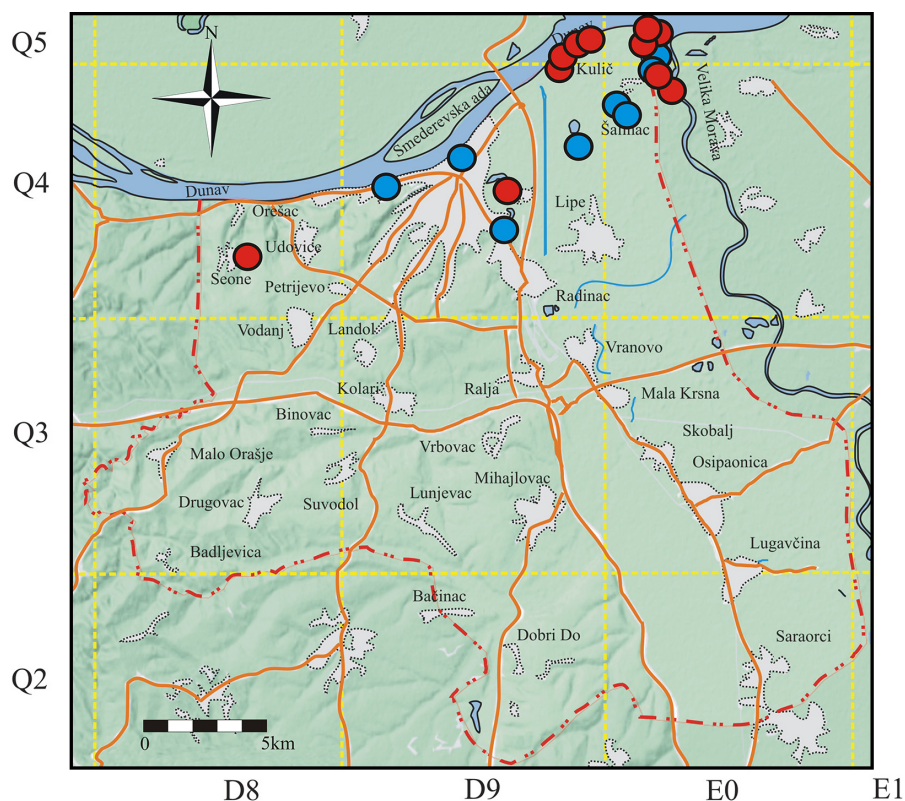


Fig. 11. – Distribution of *Pelophylax lessonae* (Camerano, 1882) in Smederevo municipality.

village (Fig. 11). It usually inhabits small stagnant waters such as ponds, ditches, canals, wheel ruts, and periodically flooded meadows and riparian forests. It tends to be the most terrestrial of the water frogs and is often found on land. Extent of occurrence of Pool frog in Smederevo is 46 km<sup>2</sup> or 9.5% of the municipality surface which makes it a rare species.

12 *Pelophylax ridibundus* (Pallas, 1771) – Marsh Frog; velika zelena žaba

Karaman (1948) mentions Marsh frog as common around running water, Jezava and related streams, and rare on the Danube bank and in the hills. It was recorded in Šalinac village together with other two *Pelophylax* species (Krizmanić 2008, Džukić *et al.* 2015). Literature also mentions Marina, Godominsko polje, Železara canal, Jezava oxbow near Lipske livade, Jugovo, Kulić village, Badrika river near Lipe village, Mihajlovac, Šalinački bageri, Radinački bageri and Lipski bageri lakes (Urošević 2021). New field data are Kovačićevo settlement, Orešac, Seone, Vodanj, Malo Orašje, Drugovac, Badljevića, Suvodol, Vrbovac, Dobri Do, Saraorci and

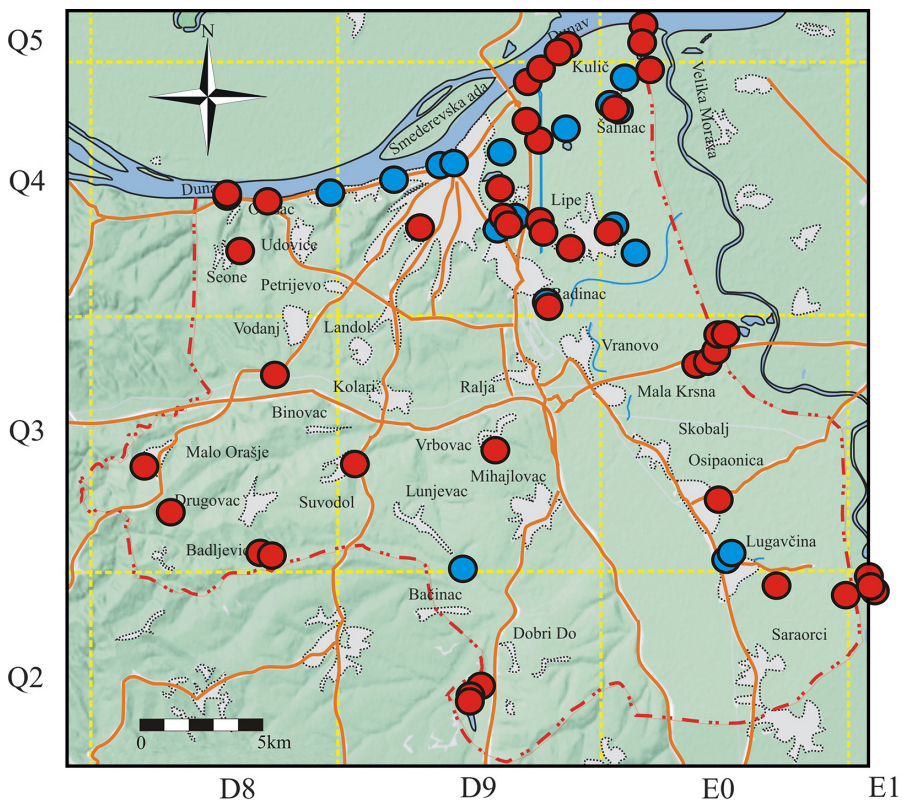


Fig. 12 – Distribution of *Pelophylax ridibundus* (Pallas, 1771) in Smederevo municipality.



Osipaonica villages, Mala Krsna gravel pits and Vlaški Do lake (Fig. 12). Marsh frog prefers large water surfaces such as rivers, lakes and deep ponds but it can also be found in marshes, canals, small ponds, ditches and streams. Extent of occurrence of Marsh frog in Smederevo is 484 km<sup>2</sup> or 100% of the municipality surface which makes it a very common species.

Genus *Rana* Linnaeus, 1758

13. *Rana dalmatina* Fitzinger in Bonaparte, 1838 – Agile Frog; šumska žaba

Agile frog is mentioned as scarce but widespread in wet meadows and around swamps in Godominsko polje (Karaman 1948). Urošević *et al.* (2018) provide Plavinac, Provalija, Jugovo and Orešac as localities. Later published localities are Godomin, Kolar i and Vučak villages and Šalinačko and Lipski bageri lakes (Urošević 2021). New field data are Kovačićevo settlement, new harbour, Seone, Malo Orašje, Badljevic a, Drugovac, Vrbovac, Mihajlovac, Dobri Do, Kulič, Šalinac, Lipe, Skobalj and Lugavčina villages, Mala Krsna gravel pits and Vlaški Do lake (Fig. 13). It

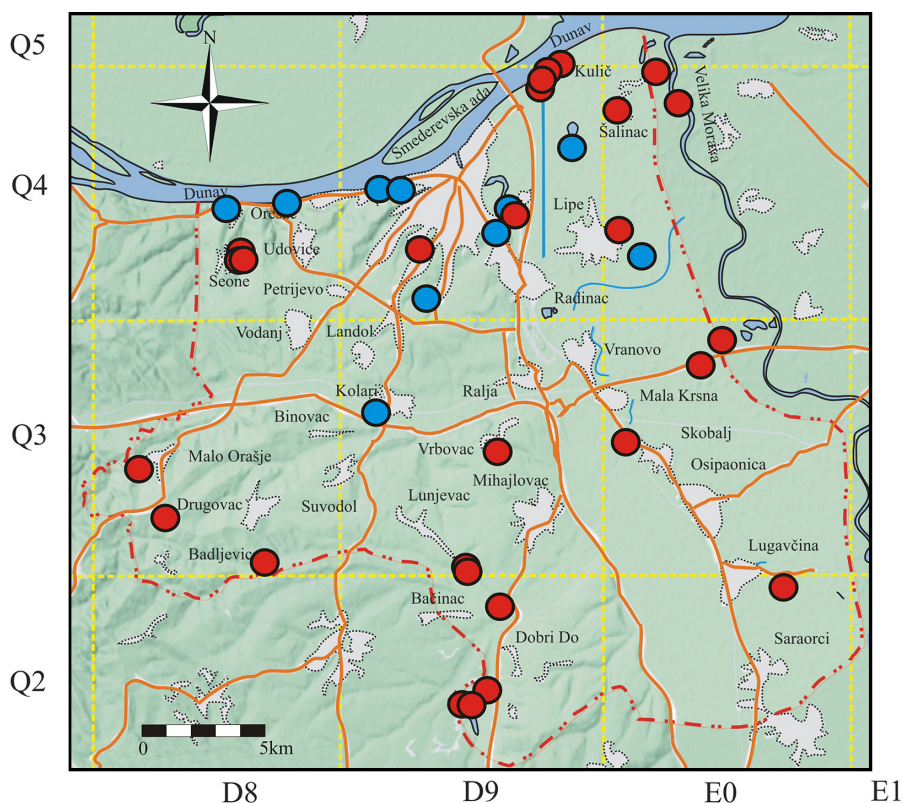


Fig. 13 – Distribution of *Rana dalmatina* Fitzinger in Bonaparte, 1838 in Smederevo municipality.

usually inhabits broadleaf forests and adjacent meadows but also thickets. Outside of the breeding season it can be found in fairly dry habitats. It breeds in a wide array of surface waters, often ephemeral or quite shallow – ditches, ponds, flooded forests and meadows, cattle thoughts, wheel ruts, quiet parts of rivers and streams. It is usually not very numerous and most often encountered in early spring. Extent of occurrence of Agile frog in Smederevo is 438 km<sup>2</sup> or 91% of the municipality surface which makes it a very common species.

Class **Reptilia** Laurenti, 1768

Order **Testudines** Linnaeus, 1758

Family **Emydidae** Rafinesque, 1815

Genus **Emys** Duméril, 1805

1. **Emys orbicularis** (Linnaeus, 1758) – European Pond Terrapin;  
barska kornjača

According to Karaman (1948), the European pond terrapin can be found in all swamps of the Godominsko polje, but it is not numerous. It is also documented for Smederevo fortress, Marina and canals in Godomin-

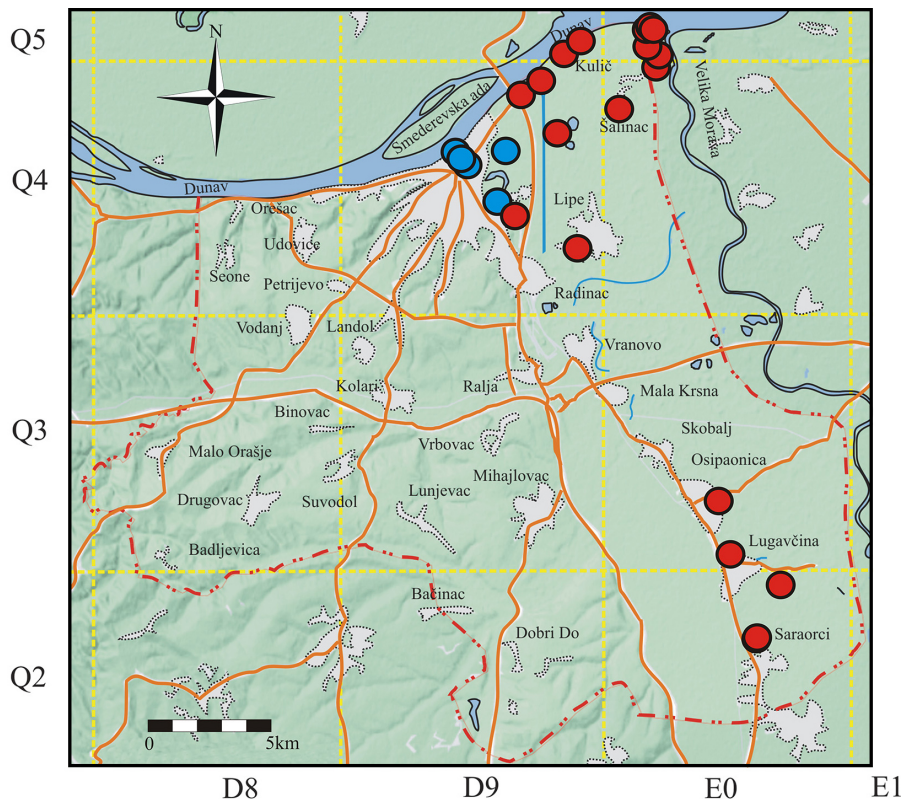


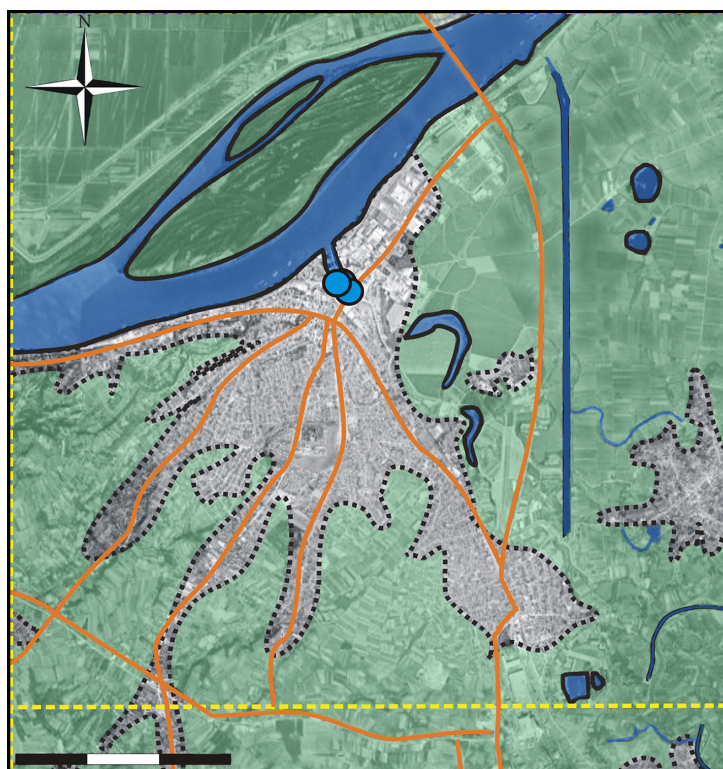
Fig. 14 – Distribution of *Emys orbicularis* (Linnaeus, 1758) in Smederevo municipality.

sko polje (Krizmanić *et al.* 2015, Urošević 2018). New field findings are more numerous and widespread, but still exclusive to lowlands – new harbour (canals and Danube embankment), villages Kulič (along the Velika Morava embankment), Saraorci, Lipe, Šalinac, Lugavčina and Osipaonica (Fig. 14). This species is often found scarcely in small stagnant waters, often under anthropogenic influence (concrete embankments) and polluted with litter or communal waste. The exceptions are habitats along Velika Morava – a complex of swamps, flooded meadows and poplar and willow forests. There, the species was observed in larger numbers, and nests were often found on sandy parts of the embankment. Extent of occurrence of European pond terrapin in Smederevo is 133 km<sup>2</sup> or 28% of the municipality surface which makes it an uncommon species.

Genus *Trachemys* Agassiz, 1857

2. *Trachemys scripta* ssp. *elegans* (Wied-Neuwied, 1839) – Pond Slider, Red-eared Slider; crvenouha kornjača

*Trachemys scripta* is native for the central and eastern parts of the United States of America (Arnold & Ovenden 2002). As a popular pet, its



1  
Fig. 15– Distribution of *Trachemys scripta* ssp. *elegans* (Wied-Neuwied, 1839) in Smederevo municipality.

subspecies, the Red-eared slider (*Trachemys scripta elegans*) has been introduced in water habitats throughout the world and is regarded as an invasive species (Scalera 2006). The presence and spread of this species in Serbia were confirmed in multiple localities, together with proofs of reproduction (Lazarević *et al.* 2012, Đorđević & Anđelković 2015, Urošević *et al.* 2016, 2019). In Smederevo, both Red-eared slider and its related subspecies, Yellow-bellied slider, were detected in the Marina (Urošević 2018, Urošević *et al.* 2019) (Fig. 15). It likely resulted from the release or escape of pet animals. Although *Trachemys scripta* ssp. were not detected in other water bodies in Smederevo, and their reproduction was not documented, further release of pet animals should be actively discouraged, and general public should be educated about the invasive species and environmental damage they can cause. Trade and import of Red-eared slider and all related subspecies is prohibited (“Official Gazette of the Republic of Serbia” no. 99/2009).

Order **Squamata** Oppel, 1811

Family **Gekkonidae** Oppel, 1811

Genus *Mediodactylus* Szczerbak & Golubev, 1977

3. *Mediodactylus kotschy* (Steindachner, 1870) – Kotschy’s Bent-toed Gecko; Kočijev gekon

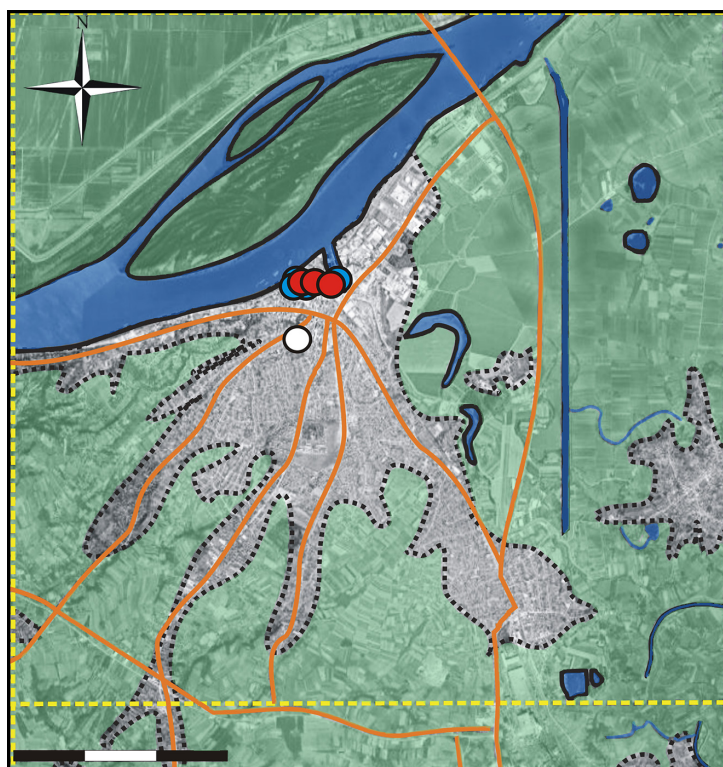
For Serbia, Kotschy’s gecko is considered native in Prizren, Metohija (Ajtić & Tomović 2001) and most recently discovered populations are treated as introduced, including the population in Smederevo (Ajtić 2009, Tomović *et al.* 2014, Urošević 2016, 2018, Urošević *et al.* 2016, 2021). Until now, the Kotschy’s gecko was in Smederevo observed only in the Smederevo fortress and its immediate surroundings (Fig. 16). According to the pholidosis data, the animals in Smederevo population belong to the *Mediodactylus kotschy* *bibroni* subspecies (Urošević *et al.* 2023) which inhabits central, southern and western parts of the continental Balkan (Biserkov *et al.* 2007, Ajtić 2014) and it geographically matches with the *M. kotschy* *sensu stricto* according to the latest taxonomic revision (Kotsakiozi *et al.* 2018). DNA samples from the animals in Smederevo population were also collected for the future phylogenetic analysis (not included in this study). Kotschy’s geckos were observed in Smederevo fortress every year since 2009, with proofs of reproduction (presence of juvenile and subadult animals, Urošević 2016) and it can be treated as a naturalized species.

Family **Agamidae** Gray, 1827

Genus *Pogona* Storr, 1982

4. *Pogona vitticeps* Ahl, 1927 – Central Bearded Dragon; bradata agama

The Central bearded dragon is a medium-sized semiariboreal lizard that inhabits arid and semi-arid habitats in central and southern parts of the Australian continent (Cogger 1992). Although it is very popular species in pet trade, there is no evidence that Central bearded dragons can establish feral populations outside of their native range and they are not listed as an invasive species (GISP 2011). The only risk assessment so far treats Central bearded dragon as a species of moderate risk for Tasmania (DPIPWE 2011). One individual of this species was photographed by a citizen (Lj. Simić) in a yard close to the “Sveti Luka” hospital (Fig. 16). It is probably an escaped or released pet. The risk of population establishment of this species adapted to arid sub-tropical climate in a temperate climate area is very low and this case can be treated as an incidental introduction.



1 3 km  
Fig. 16 – Distribution of *Mediodactylus kotschy* (Steindachner, 1870) (blue and red dots) and *Pogona vitticeps* Ahl, 1927 (white dot) in Smederevo municipality.

Family **Lacertidae** Batsch, 1788Genus *Lacerta* Linnaeus, 17585. *Lacerta viridis* (Laurenti, 1768) – Eastern Green Lizard; zelembać

Karaman (1948) mentioned Eastern green lizard as relatively scarce, and present only in the hills. Still, it is much more widespread – literature mentioned parts of Donji grad, Jugovo, Kulič on the Velika Morava embankment, Šalinački lug forest and surroundings of the Vučak village (Urošević *et al.* 2015), Velika Morava bank south of Kulič, Godomin village and Godominsko polje, Zlatno Brdo, Stara Železara, Srednje brdo hill (above “Sveti Luka” hospital) and Orešac, but it seems to be absent from Smederevo fortress and densely populated parts of town (Urošević 2018). More new field data are Godomin (Lipske livade and Jezava oxbow), Jugovo (Gvozdenglav hill), New harbour, Provalija, Zlatno brdo (Zapis and Pavlovica peak), Carina, villages Mala Krsna (around gravel pits), Badljeвица, Malo Orašje, Seone, Dobri Do (Mezul and Čiče), Drugovac, Kolari, Lipe, Lugavčina, Mihajlovac, Osipaonica, Radinac, Šalinac, Saraorci, Skobalj, Suvodol, Udovice, Vodanj, Vrbovac and Vučak,

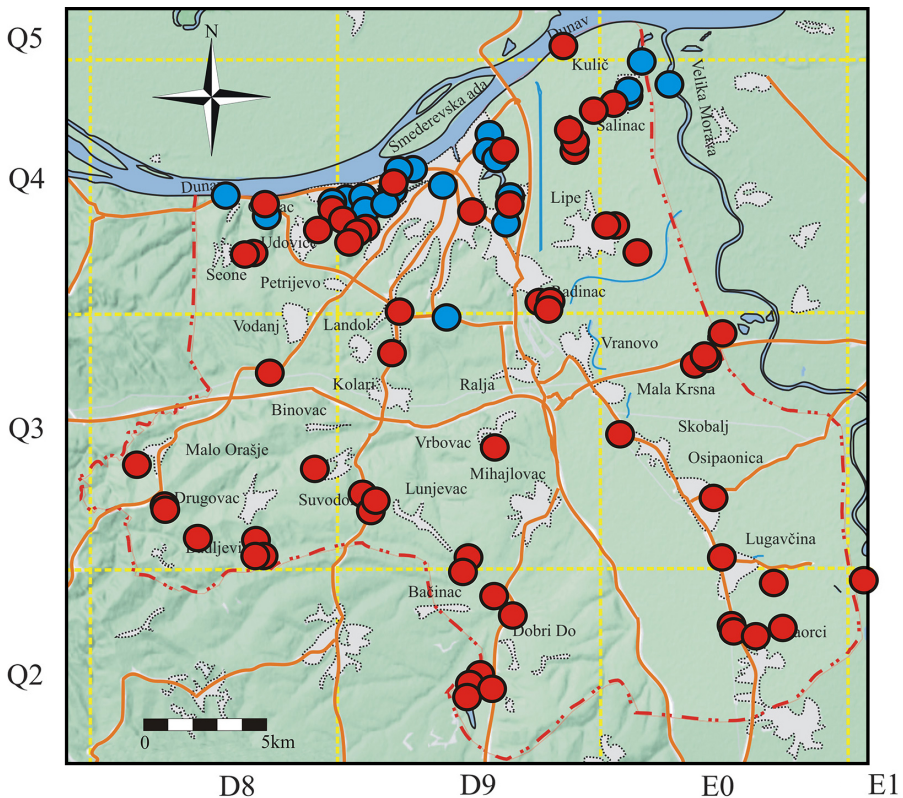


Fig. 17 – Distribution of *Lacerta viridis* (Laurenti, 1768) in Smederevo municipality.

Lunjevačka šuma forest and Vlaški Do lake (Fig. 17). Eastern green lizard is found in a wide variety of vegetated habitats, often close to the water, including forest edges, thickets, loess profiles, overgrown embankments and agricultural habitats such as field edges, orchards and vineyards. Some habitat features such as loess profiles, stone walls and tree stumps are often used for basking. Extent of occurrence of Eastern green lizard in Smederevo is 484 km<sup>2</sup> or 100% of the municipality surface which makes it a very common species.

Genus *Podarcis* Wagler, 1830

6. *Podarcis muralis* (Laurenti, 1768) – Common Wall Lizard; zidni gušter

Common wall lizard was noted as especially abundant on the Smederevo fortress walls, and occasionally on the hills surrounding the town (Karaman 1948). It is documented for Donji grad, Jugovo, Kulić village and Šalinački lug forest (Urošević *et al.* 2015) and Vranovo village (Džukić *et al.* 2017). It was also detected on the Srednje brdo hill (above “Sveti Luka” hospital), at Smederevo football stadium, in Godomin,

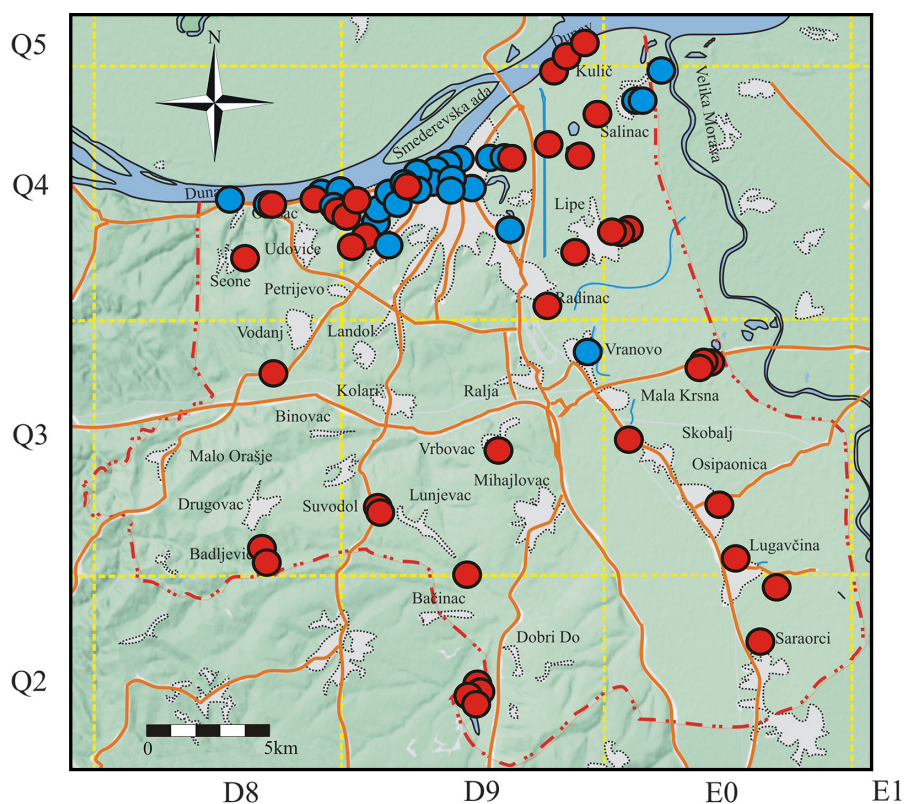


Fig. 18. – Distribution of *Podarcis muralis* (Laurenti, 1768) in Smederevo municipality.

Godominsko polje, Majdan, Zlatno brdo, Petrijevski put, along the Danube bank and in Orešac (Urošević 2018). There are more new field data for Jugovo (Danube bank and Gvozdenglav hill), Provalija, new harbour and Zlatno brdo (Zapis and Pavlovica peak), villages Mala Krsna (gravel pits), Seone, Dobri Do (Mezul and Čiče), Drugovac, Lipe, Lugavčina, Mihajlovac, Orešac, Osipaonica, Radinac, Šalinac, Saraorci, Skobalj, Udovice, Vodanj, Vrbovac, Lunjevačka šuma forest, Vlaški do and Šalinački bageri lakes (Fig. 18). Common wall lizard is a habitat generalist, its distribution usually coincides with *Lacerta viridis*. However, it tends to be more common in human made habitats, where it is the most abundant reptile species, and scarcer in agricultural or very humid and overgrown habitats. Extent of occurrence of Common wall lizard in Smederevo is 420 km<sup>2</sup> or 87% of the municipality surface which makes it a common species.

Family **Anguidae** Gray, 1825

Genus *Anguis* Linnaeus, 1758

7. *Anguis fragilis* complex – Slow Worm; slepić

The Serbian territory is inhabited by two Slow worm species, *Anguis fragilis* Linnaeus, 1758 and *Anguis colchica*, Nordmann, 1840 (Urošević et

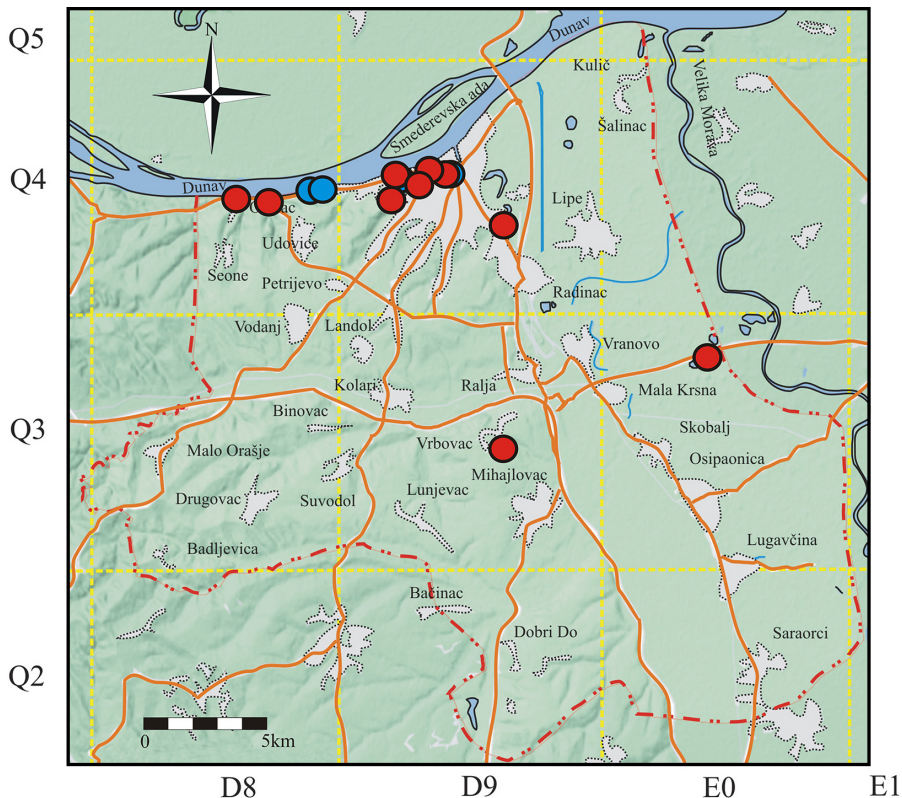


Fig. 19. – Distribution of *Anguis fragilis* (complex) in Smederevo municipality.



al. 2022b), and their distribution is still insufficiently known, with many sampling gaps and a wide potential hybrid zone, treated as “*incertae sedis*” (Jablonski *et al.* 2016, 2021, Urošević *et al.* 2020). It was noted as present in Smederevo as a contour map, without georeferenced localities (Tomović *et al.* 2014) and later documented for Majdan, Stara Železara, Smederevo football stadium, Zlatno Brdo, Jugovo, Orešac and Godomin (Urošević 2018, Urošević *et al.* 2020). New field findings are for Vrbovac and Mala Krsna (Tri Topole lake) villages (Fig. 19). Slow worm inhabits vegetated and somewhat humid places. It is often cryptic and found by flipping objects, rarely active on surface. Extent of occurrence of Slow worm in Smederevo is 92 km<sup>2</sup> or 19% of the municipality surface which makes it an uncommon species.

Family **Colubridae** Oppel, 1811

Genus *Coronella* Laurenti, 1768

8. *Coronella austriaca* Laurenti, 1768 – Smooth Snake; smukulja

Smooth snake was noted as only potentially present in Smederevo (Tomović *et al.* 2014). The first finding of Smooth snake in Smederevo was

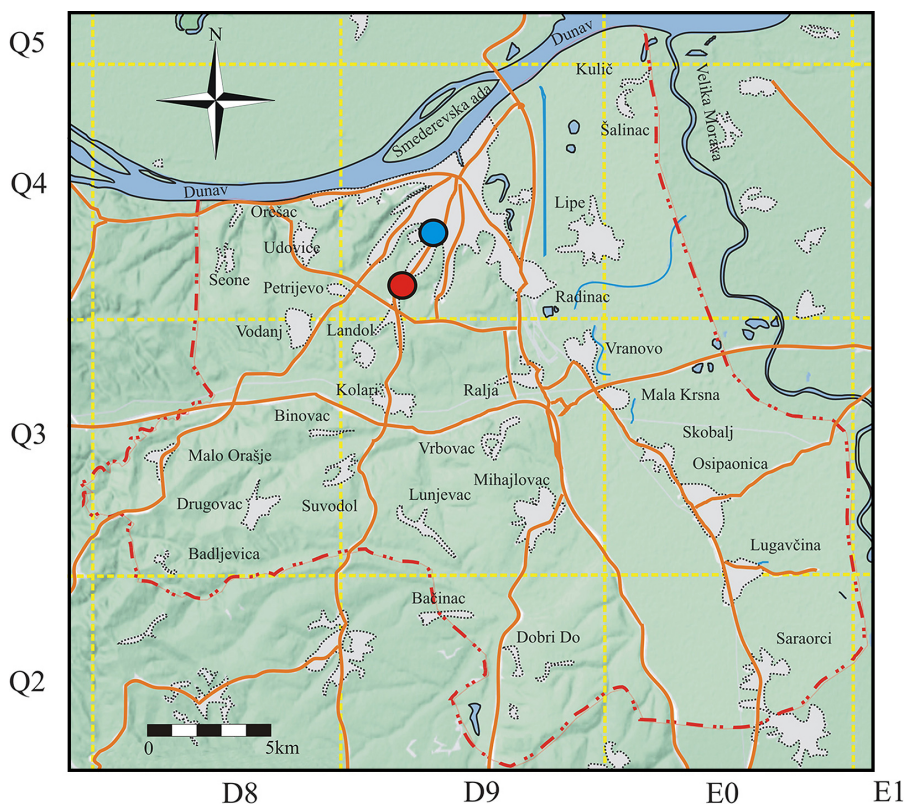


Fig. 20 – Distribution of *Coronella austriaca* Laurenti, 1768 in Smederevo municipality.

documented in 2022 (Urošević). It was a citizen observation (Ž. and V. Petrović) of a dead individual in a house yard, in Kovačićevo settlement close to the Novo Groblje graveyard (Fig. 20). The repeated surveys of the locality (and other potentially suitable localities in Smederevo) did not provide conclusive proofs of the presence of the population of this species. The second finding of a smooth snake in Smederevo was also a citizen observation (M. Simović) of a juvenile individual in a house yard, in Landol village (Kolarski put), 5 km from the town center and 2.3 km from the first finding. Smooth snake usually inhabits rocky or sandy areas on hilly terrain, close to forests and tends to be cryptic, active on overcast weather and usually found under objects (Speybroeck *et al.* 2016). Extent of occurrence of Smooth snake in Smederevo is 3.3 km<sup>2</sup> or 0.7% of the municipality surface which, together with only two entries, makes it an extremely rare species. Perceived lack of this species in Smederevo is likely a combination of low population densities, mostly inadequate habitat and its cryptic nature. The species is known to be difficult to detect and can be easily overlooked, with hundreds of fieldwork hours being needed to detect one individual for some populations (Crnobrnja-Isailović *et al.* 2009). Future field efforts should be concentrated on the potentially adequate habitats during the peak activity season.

#### Genus *Dolichophis* Gistel, 1868

##### 9. *Dolichophis caspius* (Gmelin, 1789) – Caspian Whip Snake; stepski smuk

Karaman (1948) documented a few individuals of Caspian whip snake for the Godominsko polje field, around bushes, and also killed on the roads. Later literature entries mention Smederevo Fortress, Donji Grad, Plavinac, Šalinac (Železara canal) and Mala Krsna villages (Tomović *et al.* 2015b). There are also more published findings for Godomin, Godominsko polje, Zlatno brdo, Jugovo and Petrijevski put (Urošević 2018). New field and citizen data also Sindikalni park, are Jugovo (Gvozdenglav hill), Kovin bridge, new harbour (on Danube embankment), Plavinac, Provalija, Orešac (at Sastavak stream), villages Ralja, Šalinac, Udovice and Vranovo (Fig. 21). Caspian whip snake inhabits open, well-exposed habitats such as thickets, meadows, fields, forest edges, loess profiles and ruins. It can be very abundant close to Danube and around the town but becomes scarcer to the south. Extent of occurrence of Caspian whipsnake in Smederevo is 102 km<sup>2</sup> or 21% of the municipality surface which makes it an uncommon species.

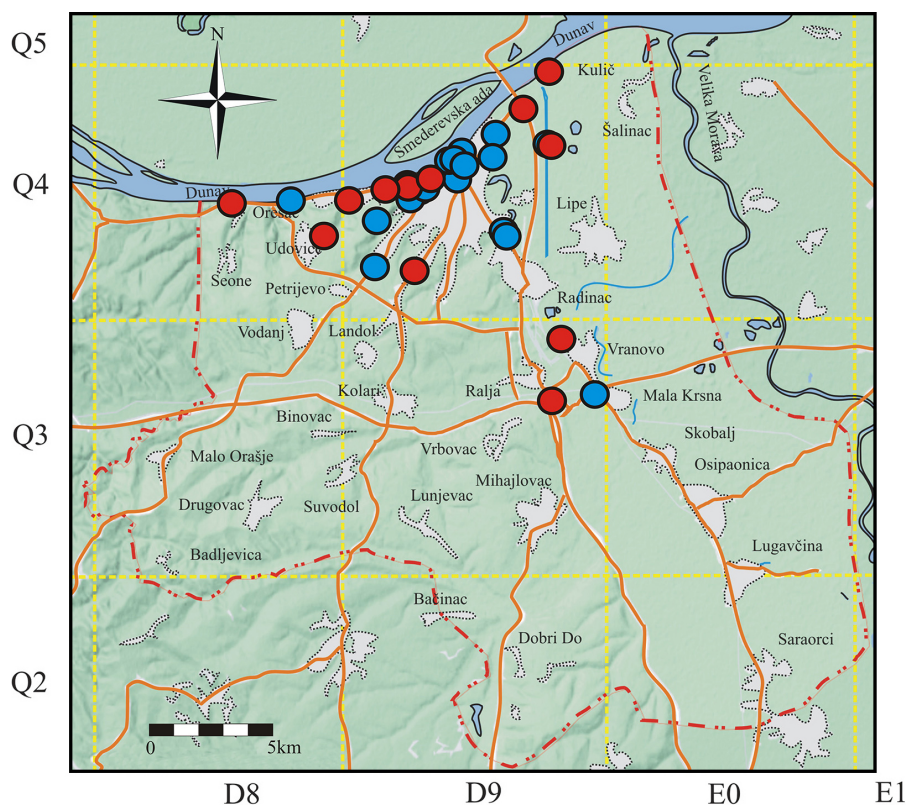


Fig. 21. – Distribution of *Dolichophis caspius* (Gmelin, 1789) in Smederevo municipality.

Genus *Zamenis* Wagler, 1830

10. *Zamenis longissimus* (Laurenti, 1768) – Aesculapian Snake; eskulapov smuk

Presence of Aesculapian snake in Smederevo was given as a contour map (Tomović *et al.* 2014) and published as georeferenced for Orešac (Džukić *et al.* 2017, Urošević 2018). There are more new field and citizen data for Jugovo (Swimming pools and Đurđevi vajati), Orešac (Sastavak stream), villages Vučak, Drugovac and Seone (Fig. 22). Generally, Aesculapian snake was detected only in the western parts of the municipality. It inhabits well vegetated, forested habitats, either oak forest (as in Seone), plant nursery (Vučak) or riparian forests around Danube (Orešac and Jugovo) and Konjska reka river (Drugovac). It is probably more widespread, at least in more forested habitats close to water, but it seems to be much scarcer than the Caspian whip snake and only recently more distribution data were gathered. Extent of occurrence of Aesculapian snake in Smederevo is 58 km<sup>2</sup> or 12% of the municipality surface which makes it a highly uncommon species.

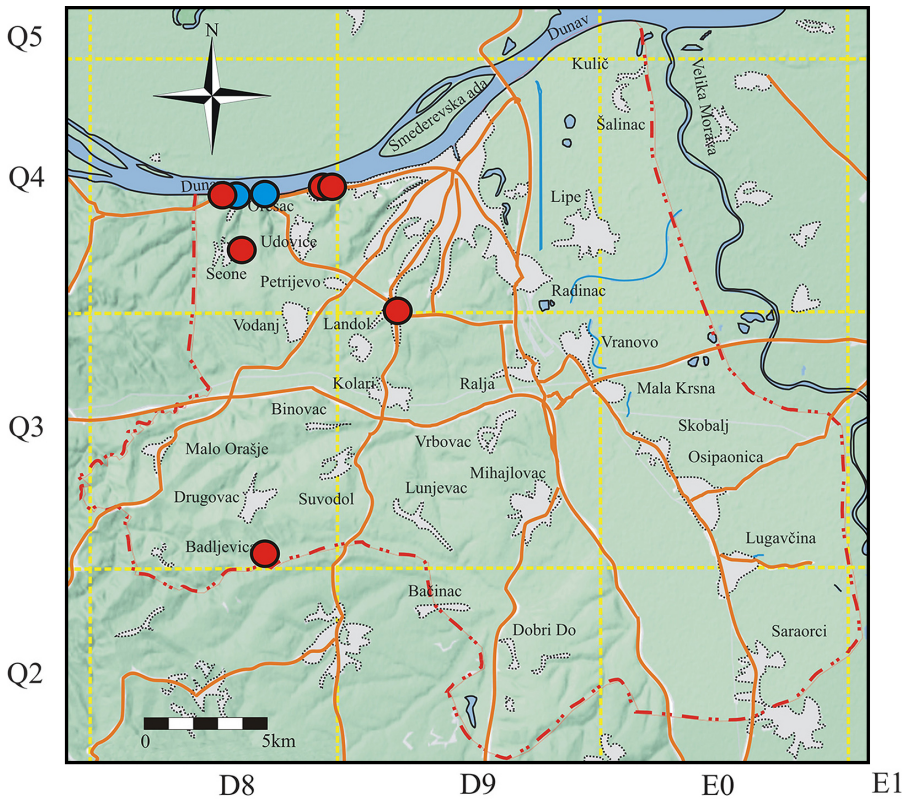


Fig. 22. – Distribution of *Zamenis longissimus* Laurenti, 1768 in Smederevo municipality.

Family **Natricidae** Bonaparte, 1840

Genus *Natrix* Laurenti, 1768

11. *Natrix natrix* (Linnaeus, 1758) – Grass Snake; belouška

Grass snake is noted as common on the Danube bank and in swamps (Karaman 1948). It was also documented for Smederevo fortress, Jugovo and Kulić village (Tomović *et al.* 2015b, Džukić *et al.* 2017), Donji grad (Danube bank near Veslački klub), Marina and Vučak village (Urošević, 2018). New field and citizen data are Godomin (Jezava oxbow near Lipske Livade), HBIS Steelworks facilities, new harbour (Danube embankment), villages Drugovac, Kulić (Velika Morava embankment and floodplain), Lipe, Lugavčina and Saraorci (Fig. 23). It inhabits all kinds of wetlands – river banks, canals, swamps and ponds, occasionally it can be found far from water. Extent of occurrence of Grass snake in Smederevo is 358 km<sup>2</sup> or 74% of the municipality surface which makes it a common species.

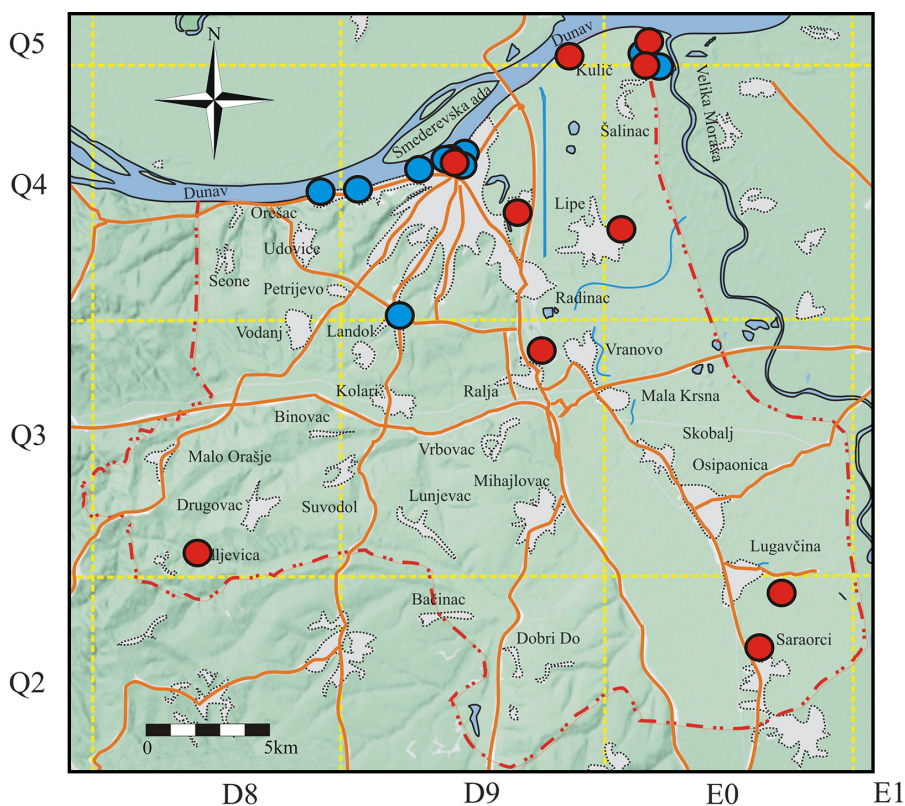


Fig. 23. – Distribution of *Natrix natrix* (Linnaeus, 1758) in Smederevo municipality.

## 12. *Natrix tessellata* (Laurenti, 1768) – Dice Snake; ribarica

Karaman (1948) denotes Dice snake as rarer than Grass snake and related only to running water – Danube and Jezava. Later published data mention town centre, Smederevo fortress, Jugovo and Plavinac (Tomović *et al.* 2015b, Džukić *et al.* 2017), Donji Grad (Danube bank near Veslački klub), Marina, Godominsko polje (canal) and Velika Morava bank near Kulić village (Urošević 2018). New field data are for Smederevo fortress, Marina, Jugovo, Provalija, Orešac and villages Drugovac (Konjska reka river), Radinac (Radinački bageri lakes) and Saraorci (Velika Morava bank) (Fig. 24). Dice snake is most commonly found near running water, especially Danube, and can also show preference towards larger, deeper water bodies such as lakes. It is very abundant in places and is probably the most commonly encountered snake in Smederevo (Urošević 2018). Extent of occurrence of Dice snake in Smederevo is 355 km<sup>2</sup> or 73% of the municipality surface which makes it a common species.

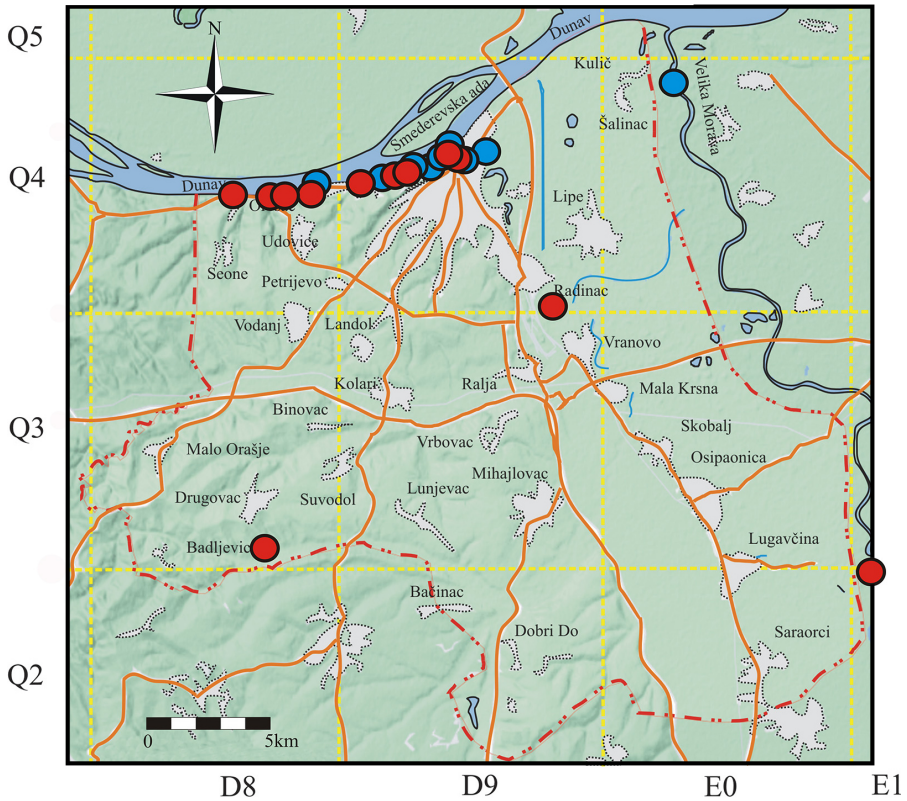


Fig. 24. – Distribution of (*Natrix tessellata* Laurenti, 1768) in Smederevo municipality.

Family **Viperidae** Oppel, 1811

Genus *Vipera* Garsault, 1764

13. *Vipera berus* (Linnaeus, 1758) – Adder; šarka

Karaman (1948) noted only one finding of the Adder in Smederevo, without a precise locality – “near one swamp”, probably near the Velika Morava mouth (Tomović *et al.* 2019) (Fig. 25). Since there were no later findings of Adder, it is presumably locally extinct because of combination of habitat alteration, agriculture, urbanization and other anthropogenic pressures, similar as populations from Avala and Kosmaj mountains (Crnobrnja-Isailović *et al.* 2012, Tomović *et al.* 2014, 2015a). Unless potentially re-discovered, the Adder should be treated as locally extinct in Smederevo.

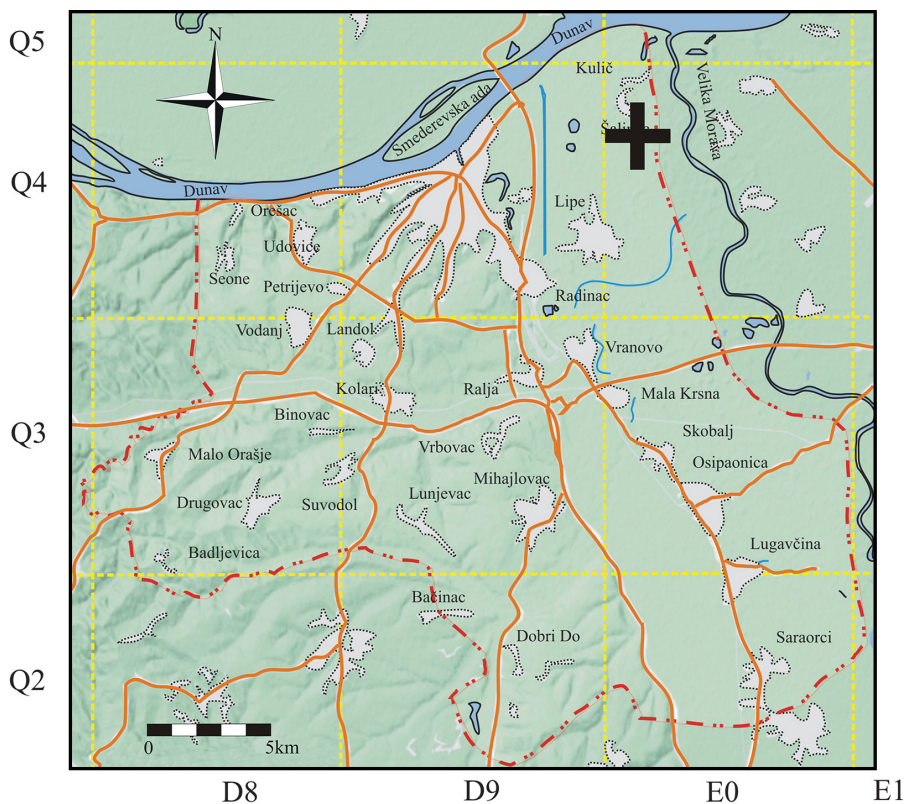


Fig. 25. – Distribution of *Vipera berus* (Linnaeus, 1758) in Smederevo municipality.

## DISCUSSION

The Serbian territory is inhabited by 22 amphibian and 26 reptile species (Urošević *et al.* 2022b). Of these, territory of Smederevo is inhabited by 13 amphibian species (12 recently confirmed and one historical) and 10 autochthonous reptile species (one considered extinct) plus three introduced species (one of them invasive). Two species (*Triturus dobrogicus* and *Emys orbicularis*) are considered near threatened by the global IUCN criteria, seven species are considered threatened according to the national (IUCN or DELH) criteria, 18 species are listed on Annexes of the Habitat directive, 24 on appendices of Bern convention and 21 are protected or strictly protected on the national level (Table 1). As previously noted, all amphibian chorotypes (according to Vigna Talianti *et al.* 1999) present in Serbia (Vukov *et al.* 2013) are also present in Smederevo (Urošević 2021) (Table 1), so Smederevo can be considered diverse in

Table 1. – The list of amphibian and reptile species of Smederevo municipality, with local status (native, introduced or extinct), international and national conservation status, protection legislative and chorotypes. DELH – distribution, ecology and life history. National protection status is given according to the Official Gazette of the Republic of Serbia, No. 5/2010.

Species	Status in Smederevo	Global IUCN category	National IUCN category	National DELH category	Habitats Directive	Bern Convention	National protection status	Chorotype
<i>Lissotriton vulgaris</i>	Native, confirmed	LC	LC	LC	-	Appendix III	Strictly protected	European
<i>Salamandra salamandra</i>	Native, confirmed	LC	LC	LC	-	Appendix III	Strictly protected	South-European
<i>Triturus dobrogicus</i>	Native, confirmed	NT	NT	VU	Annex II	Appendix II	Strictly protected	Central-European
<i>Bombina bombina</i>	Native, confirmed	LC	LC	LC	Annex II, IV	Appendix II	Strictly protected	Central-European
<i>Pelobates balcanicus</i>	Native, historical	NE	VU	CR	Annex IV	Appendix II	Strictly protected	Turano-Mediterranean
<i>Pelobates fuscus</i>	Native, confirmed	LC	DD	CR	Annex IV	Appendix II	Strictly protected	Central-European
<i>Bufo bufo</i>	Native, confirmed	LC	LC	LC	-	Appendix III	Strictly protected	Europeo-Mediterranean
<i>Bufo viridis</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	Strictly protected	Turano-European
<i>Hyla arborea</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	Strictly protected	Turano-European
<i>Pelophylax kl. esculentus</i>	Native, confirmed	LC	LC	LC	Annex V	Appendix III	Protected	Central-European
<i>Pelophylax lessonae</i>	Native, confirmed	LC	DD	VU	Annex IV	Appendix III	Protected	Central-European
<i>Pelophylax ridibundus</i>	Native, confirmed	LC	LC	LC	Annex V	Appendix III	Protected	Turano-European
<i>Rana dalmatina</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	Strictly protected	South-European
<i>Emys orbicularis</i>	Native, confirmed	NT	DD	LC	Annex II, IV	Appendix II	Strictly protected	Turano-European-Mediterranean
<i>Trachemys scripta</i>	Introduced, invasive	LC	-	-	-	-	-	-
<i>Mediodactylus kotschyi</i>	Introduced	LC	CR	EN	Annex IV	Appendix II	Strictly protected	East-Mediterranean
<i>Pogona vitticeps</i>	Introduced, incidental	LC	-	-	-	-	-	-
<i>Lacerta viridis</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	-	South-European
<i>Podarcis muralis</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	-	South-European
<i>Anguis fragilis</i>	Native, confirmed	LC	LC	LC	-	Appendix III	-	European
<i>Coronella austriaca</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	Strictly protected	European
<i>Dolichophis caspius</i>	Native, confirmed	LC	DD	VU	Annex IV	Appendix III	Strictly protected	East-Mediterranean
<i>Zamenis longissimus</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	Strictly protected	South-European
<i>Natrix natrix</i>	Native, confirmed	LC	LC	LC	-	Appendix III	Strictly protected	C.-European-Mediterranean
<i>Natrix tessellata</i>	Native, confirmed	LC	LC	LC	Annex IV	Appendix II	Strictly protected	Turano-European
<i>Vipera berus</i>	Extinct	LC	VU	VU	-	Appendix III	Strictly protected	Euro-Siberian



regard to batrachofauna. Dominant amphibian chorotype in Smederevo is Central-European (5) followed by Turano-European (3) and South-European (2) chorotypes. The geographic position of Smederevo at the edge of Pannonian plain, where ecoregions of Pannonian steppes and Balkan mixed forests intergrade probably led to the mixture of faunal elements from north, east and south.

Reptiles are represented by six chorotypes (Table 1), with dominant South-European (3), East-Mediterranean (2) and European (2) (Table 1). In contrast to the Southern and South-Eastern Serbia which are considered a major Serbian biodiversity hotspot for reptiles (Tomović *et al.* 2022), the herpetofauna of Smederevo is relatively nondescript, with only exception being the presence of a Caspian whipsnake (*Dolichophis caspius*) which reaches parts of its distribution limit in Serbia (Tomović *et al.* 2015b).

For the amphibian fauna, the most diverse is UTM quadrate DQ 94, which harbours 13 of 13 confirmed amphibian species – which is likely due to the most historical entries being documented there, but also because it's the UTM that covers the city itself and it was the most explored part of the municipality. The next largest number of species is documented in UTM quadrates EQ 04 (9) and EQ 05 (10) which correspond with the Morava river mouth – an area exceptionally rich in relatively intact wetlands. The UTM quadrate DQ 84 harbours 8 species and can still be regarded species-rich. Generally, the amphibian diversity tends to be concentrated along the Danube bank and around the Velika Morava mouth and associated wetlands. However, the perceived lack of species in some UTM quadrates (DQ 95, EQ 02, EQ 12) more likely represents lack of systematic research in those areas (Figure 9 A). The diversity of reptiles (introduced species excluded) is also greatest in the DQ 94 UTM quadrate with 9 species, and the second most species-rich spot is DQ 84 quadrate, likely because of forested habitats and the vicinity of Danube. Again, perceived lack of species in some UTMs (DQ 92, EQ 05 and EQ 12) is possibly caused by the lack of dedicated research in those areas (Figure 9 B).

Additional amphibian species that can still be expected in suitable habitats in Smederevo municipality, especially along its southern and western borders in suitable water bodies on higher altitudes are the Balkan crested newt (*Triturus ivanbureschi* Strauch, 1870) and Yellow-bellied toad (*Bombina variegata* Linnaeus, 1758) (Vukov *et al.* 2013, Urošević 2021). Additional reptile species that can be expected are the Hermann's tortoise (*Testudo hermanni* Gmelin, 1789) and Snake-eyed skink (*Ablepharus kitaibelii* Bibron & Bory, 1833) (Tomović *et al.* 2014, Urošević 2018). However, the potential findings of the Hermann's tortoise would more likely be released or escaped pets than animals from native populations (Ljubisavljević *et al.* 2013, Urošević 2018). The Snake-eyed skink is



usually found in dry, vegetated habitats with herbaceous vegetation, bushes or forest edges, usually on south-eastern hill slopes (Ljubisavljević *et al.* 2015) and it could be expected in similar habitats on the southern and western borders of the Smederevo municipality.

The increased fieldwork effort during the last years resulted in confirmation of two previously undetected species for the Smederevo fauna, re-confirmation of two historical entries and more detailed mapping of all amphibian and reptile species, with increased detection of animals previously known only from a handful of localities (such as *Lissotriton vulgaris*, *Emys orbicularis* and *Zamenis longissimus*). Future research should be focused on the less explored parts of the municipality, reconfirmation of the remaining historical entries and discovering more localities of the rare and endangered taxa. The research should also document and monitor the increasing threats to the amphibian and reptile fauna such as industrial pollution, urbanization, climate change and introduced invasive species.

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## ФАУНА ВОДОЗЕМАЦА И ГМИЗАВАЦА ОПШТИНЕ СМЕДЕРЕВО – РЕКАПИТУЛАЦИЈА 75 ГОДИНА ИСТРАЖИВАЊА

АЛЕКСАНДАР УРОШЕВИЋ, ГОРДАНА ПАУНОВИЋ

### РЕЗИМЕ

У овом раду, приказујемо рекапитулацију истраживања фауне водоземаца и гмизаваца на подручју општине Смедерево. За подручје Србије, у Смедереву су 1948. године први пут детектоване три врсте водоземаца – подунавски велики мрмољак (*Triturus dobrogicus*), балканска чешњарка (*Pelobates balcanicus*) и мала зелена жаба (*Pelophylax lessonae*). У литератури се такође спомиње и присуство шарке (*Vipera berus*). Пошто је Смедерево важан индустријски центар, многа станишта водоземаца и гмизаваца су изгубљена због урбанизације, деградације и загађења, при чему су површинске воде биле нарочито погођене. Деградација станишта је вероватно довела до локалног изумирања шарке. Ипак, интензиван теренски рад и укључење грађана у науку довели су до открића обичне чешњарке (*Pelobates fuscus*) и смукуље (*Coronella austriaca*) у Смедереву и потврђивања присуства шареног даждевњака (*Salamandra salamandra*) и подунавског великог мрмољка. Преостале врсте су мапиране у много већој мери него раније, а неке врсте чије присуство је било познато само на малом броју локалитета – мали мрмољак (*Lissotriton vulgaris*), барска кор-



њача (*Emys orbicularis*) и Ескулапов смук (*Zamenis longissimus*) су сада много више заступљене. Детектовано је и присуство антропогено интродукованих гмизаваца – црвеноухе / жутоухе корњаче (*Trachemys scripta* ssp.), Кочијевог гекона (*Mediodactylus kotschyi*) и брадате агаме (*Pogona vitticeps*), при чему је Кочијев геко највероватније натурализован. Будућа истраживања требало би усредсредити на поновно потврђивање историјских налаза (балканске чешњарке), идентификацију и заштиту станишта ретких и угрожених врста.