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Distribution updates to amphibian and reptile fauna for the Republic of Macedonia

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Abstract. Macedonia, as a part of the Balkan Peninsula, ranks among the most important regions in terms of amphibian and reptile biodiversity. Thus far, 14 amphibian and 32 reptile species have been found to occur in Macedonia, but with some exceptions among reptiles, the distribution of most of taxa is poorly understood and/or records have only rarely been published. We report here records on 10 amphibian and 28 reptile taxa from 85 different localities covering most of the habitats in Macedonia. Despite the field survey was conducted during two weeks in June 2014 only, we have recorded new distribution data for 22 reptile species.

Keywords. Amphibia, Reptilia, new records, Balkan Peninsula, mapping, chorology.

Introduction

The Balkan Peninsula is considered to be a biodiversity hotspot for European biotas (Gaston and David, 1994; Džukić and Kalezić, 2004; Griffiths et al., 2004; Hewitt, 2011). However, many regions of the Balkans are still poorly evaluated in terms of basic zoological research, i.e. species distributions and their occurrence patterns. Macedonia is an inland country situated in the central part of the Balkans. The territory of Macedonia covers an area of 25,713 km^2 and includes several important geomorphological units, such as the Vardar River valley, the Helenides, the Dinaric range and the Thrace-Macedonian massif within three main biogeographic-climate regions extending in the country: Alpine, Continental and Mediterranean (Král, 2001; Reed et al., 2004; Melovski et al., 2013). For herpetofauna, this part of the Balkans has presumably served as microrefugia for some species (e.g. *Lacerta viridis* complex, Marzahn et al., 2016), as a contact zone of different evolutionary lineages of species after the Last Glacial Maximum (e.g., *Triturus* spp., Wielstra et al., 2014; *Natrix natrix*, Kindler et al., 2013) or as a presumable migration corridor for several Mediterranean elements (e.g. *Testudo graeca*, *Mediodactylus kotschyi*, *Platyceps najadum*, *Zamenis situla*; Crnobrnja-Isailović and Aleksić, 1999; Tomović et al., 2014; Sterijovski et al., 2014).

Species composition of amphibians and reptiles in the Republic of Macedonia is fairly well known (e.g. Gasc et al., 1997; Sillero et al., 2014, 2015) but the exact distribution of most of the species in the country is not very well documented. Based on present knowledge, the fauna of Macedonia includes 14 amphibian species and 32 reptile species with respect to current taxonomy (sensu Speybroeck et al., 2010).

There were some recent advances on new records published (e.g. Rot-Nikćević et al., 2001; Džukić et al., 2005, 2008; Vukov et al., 2006; Sidorovska, 2010; Žagar et al., 2013; Wielstra et al., 2014), especially for

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reptiles, where a comprehensive review has just recently been provided (Sterijovski et al., 2014). However, there are still species whose occurrence is poorly known. Therefore, we present here the results of short but extensive field study on amphibians and reptiles in the country with a distribution updates for several species.

Material and methods

A herpetological field survey conducted across the whole country was carried out during two weeks in June 2014. Altogether, 86 localities representing most regions of Macedonia (Table 1) were surveyed. We recorded the geographic coordinates (WGS84 system) and altitude of all visited localities as well as other relevant faunistic data. The distribution data of individual species or species complexes are presented in Universal Transverse Mercator (UTM) grid maps with the resolution of squares of 10×10 km (Figures 1–3). All herpetological findings were properly documented in the field and most of them were photographed (individuals and habitats).

Records were compared with data presented in summary accounts (Gasc et al., 1997; Sterijovski et al., 2014; Sillero et al., 2014, 2015) and with other works related to regional herpetofauna (Džukić et al., 2005, 2008; Vukov et al., 2006; Sidorovska, 2010; Jelić et al., 2013; Žagar et al., 2013). Species identification followed Arnold and Ovenden (2002), taxonomy and nomenclature were adopted from Speybroeck et al. (2010), considering also recent taxonomical revisions pertaining to batracho- and herpetofauna of this region (e.g. Wielstra et al., 2013; Hedges et al., 2014).

Results and discussion

A list of all recorded species is presented in Table 1. In total, we obtained 289 amphibian and reptile records of 38 species (79% of the total number of known species of Macedonia). Ten of them were amphibians and 28 reptiles, which represent 64% and 85% of all species known from Macedonia. In comparison with the results of Sterijovski et al. (2014) we have found 62 new grid records in a resolution of 10×10 UTM for 22 reptile species (Figures 2 and 3).

Below we provide a list of recorded species (arranged by taxonomic groups and families) with a number of records given in parentheses after scientific taxa name and with a short description of the species distribution in the country and a list of new sites with information on the site altitude. When appropriate, comments on the circumstances of the record and/or biological, ecological and biogeographical notes were added.

Amphibia

Salamandridae

Salamandra salamandra (Linnaeus, 1758) (N=4) (Tab. 1, Fig. 1)

Occurrence in Macedonia: According to reported chorological data (Gasc et al., 1997; Sillero et al., 2014, 2015), fire salamanders are probably widespread mostly in the mountain regions of the country.
Comments: We recorded fire salamanders at four sites; three records were made at higher altitude (887, 929, 1,680 m) and one (Treska river Gorge; Figs 4A and 5A) represented a relatively low elevation for this species in the Balkans region (319 m; cf. Jablonski et al., 2013). The latter site is situated out of the species range delineated by available chorological data (Gasc et al., 1997; Sillero et al., 2014, 2015).

Triturus sp. (N=1) (Tab. 1, Fig. 1)

Occurrence in Macedonia: From the genus *Triturus* Rafinesque, 1815, two species occur in Macedonia, *T. ivanbureschi* Arntzen & Wielstra, 2013 and *T. macedonicus* (Karaman, 1922), but accurate data on their distribution are still lacking (Wielstra et al., 2014). Both species have a contact zone of their ranges in the eastern part of the country (Wielstra et al., 2014).
Comments: We recorded several newt larvae in Dojran Lake, near Mrdaja village (153 m). Species affiliation of the specimens was not possible to confirm but so far only *T. macedonicus* was reported to occur in the vicinity of Dojran Lake (Wielstra et al., 2014).

Bombinatoridae

Bombina variegata (Linnaeus, 1758) (N=5) (Tab. 1, Fig. 1)

Occurrence in Macedonia: Probably a widespread species over the entire country (Gasc et al., 1997; Sillero et al., 2014, 2015).
Comments: We recorded yellow-bellied toads at five sites in four 10×10 km quadrates in altitudes from 303 (Treska River Gorge) to 1,601 (Baba in Galičica Mts.) metres. The record in the central part of the country (Toplica village, 677 m) is situated out of previously delineated range (Gasc et al., 1997; Sillero et al., 2014, 2015).

Pelobatidae

Pelobates syriacus Boettger, 1889 (N=2) (Tab. 1, Fig. 1)

Occurrence in Macedonia: Probably a widespread low-

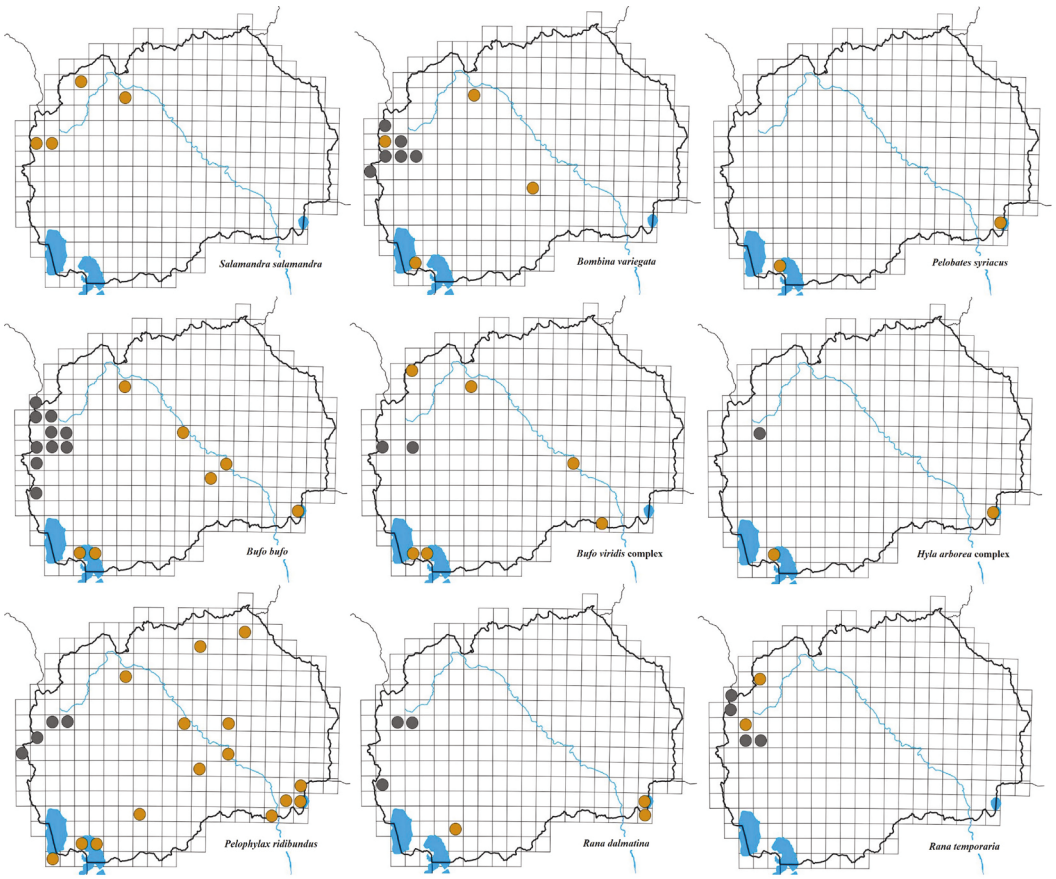

Figure 1. Maps of the distribution of amphibian species. Records are presented in the 10×10 km UTM mapping quadrates covering the territory of Macedonia. Dark orange circles – our records; grey circle – data by Sidorovska (2010). For precise site data, see Table 1.

land species, missing only from the mountain ranges in the north of the country (Gasc et al., 1997; Sillero et al., 2014, 2015). Data about the occurrence are concentrated along the Vardar River including its tributaries and near larger lakes (Dojran, Prespa and Ohrid regions; Džukić et al., 2005, 2008).

Comments: We recorded *P. syriacus* at two previously known localities (Dojran and Prespa Lakes) (Džukić et al., 2008).

Bufonidae

Bufo bufo (Linnaeus, 1758) (N=8) (Tab. 1, Fig. 1)

Occurrence in Macedonia: Widespread in the eastern and southern parts of the country (Gasc et al., 1997; Sillero et al., 2014, 2015).

Comments: We recorded *B. bufo* at eight sites in the regions of two large lakes (Dojran and Prespa Lakes) and along the Vardar River valley prevailingly on lower altitudes (120–854 m). Records near Glumovo (282 m) and Dolna Matka villages (316 m) are situated out of previously delineated range (Gasc et al., 1997; Sillero et al., 2014, 2015) of this species in Macedonia.

Bufo viridis Laurenti, 1768 complex (N=6) (Tab. 1, Fig. 1)

Occurrence in Macedonia: The distribution pattern is not yet fully known (Gasc et al., 1997; Sillero et al., 2014, 2015).

Comments: We found specimen of this species complex at six sites in Macedonia, among them record near Dolna Matka village (352 m) is situated out of previously delineated species range in this region (Gasc et al., 1997; Sillero et al., 2014, 2015). Because two species of the "*viridis*" complex probably occur in the area of Macedonia, *B. variabilis* (Pallas, 1769) in the eastern part and *B. viridis* s. str. in the western part of the country (cf. Stöck et al., 2009), exact species affiliation is not possible applying morphological identification only.

Hylidae

Hyla arborea (Linnaeus, 1758) complex (N=2) (Tab. 1, Fig. 1)

Occurrence in Macedonia: The current distribution knowledge is limited to eastern and southern parts of the country (Sillero et al., 2014, 2015).
Comments: We recorded this species at two sites (Nikolić village, Stenje village) near large lakes (Dojran Lake and Prespa Lake). *Hyla arborea* s. str. occurs in Macedonia; however, the occurrence of *H. orientalis* Bedriaga, 1890, in the eastern part of the country could not be excluded (cf. Stöck et al., 2012; Gvoždík et al., 2015). The distribution status of the latter species is generally not well known.

Ranidae

Pelophylax ridibundus (Pallas, 1771) (N=17) (Tab. 1, Fig. 1)

Occurrence in Macedonia: The marsh frog is widespread in different types of water habitats throughout the whole country (Gasc et al., 1997; Sillero et al., 2014, 2015), similarly as in neighbouring countries (cf. Haxhiu, 1994; Krizmanić, 2008; Vukov et al., 2013).
Comments: Our observations (altogether 17 site records) together with several exactly located records available from Macedonia (Sidorovska, 2010) considerably supplemented the pattern of distribution of this species previously delineated in 50×50 km quadrates only (Gasc et al., 1997; Sillero et al., 2014, 2015).

Rana dalmatina Fitzinger, 1838 (N=4) (Tab. 1, Fig. 1)

Occurrence in Macedonia: The occurrence of the agile frog in Macedonia is limited to the mountainous regions on the eastern and western country borders (Gasc et al., 1997; Sillero et al., 2014, 2015). The lack of occurrence data from the central part of the country could be due to the low level of surveillance since the species is commonly widespread in neighbouring countries from sea level to 1,500 metres (Albania, Bulgaria, Greece, and Serbia: Haxhiu, 1994; Valakos et al., 2008; Jablonski, 2011; Stojanov et al., 2011; Vukov et al., 2013).
Comments: We recorded this species at four sites in two regions, Dojran and Mrdaja villages near Dojran Lake and near Magarevo village in Pelister Mts. Latter records were made at altitudes of 1,286 and 1,626 metres, that are relatively high compared with the altitude data from Albania or Bulgaria (Haxhiu, 1994; Stojanov et al., 2011).

Rana temporaria Linnaeus, 1758 (N=2) (Tab. 1, Fig. 1)

Occurrence in Macedonia: Precise data from Macedonia are missing; the species is reported to occur in northern mountain regions only (Gasc et al., 1997; Sillero et al., 2014, 2015).
Comments: We reported this species at two already known sites (Šar Planina Mt., Popovac Šapka, 2,241 m; Vrben village, 1,289 m) in the western part of the country, where the species was recently reported as common by Sidorovska (2010).

Reptilia

Testudinidae

Testudo graeca Linneaus, 1758 (N=7) (Tab. 1, Fig. 2)

Occurrence in Macedonia: A widespread species found all over the country, with fewer records from the southern parts (Sterijovski et al. 2014). Records from the western part of the country should be considered carefully due to the species range limit; records in neighbouring Albania were considered doubtful (Haxhiu, 1998; Haxhiu and Oruçi, 2001; Buskirk et al., 2001; Jablonski, 2011).
New records: Krivolak village (155 m), Kurija village (167 m), Raec River gorge (211 m) (Fig. 4B).
Comments: We made altogether seven observations of this species in the south-eastern region; new records considerably supplement the pattern of known species range in the south-eastern region of the country.

Testudo hermanni Gmelin, 1789 (N=20) (Tab. 1, Fig. 2)

Occurrence in Macedonia: A widespread and relatively abundant species, absent in the highest mountains (Ljubisavljević et al., 2014; Sterijovski et al., 2014).
New records: Gevgelija near Vardar River (58 m), Gjavato village (58 m), Gorni Disan village (406 m), Kosel village (770 m), Pretor village (854 m), Tikveš Lake (290 m), Vataša village (350 m), Vataša village (Luda Mara river) (401 m).
Comments: Hermann's tortoise seems to be a common

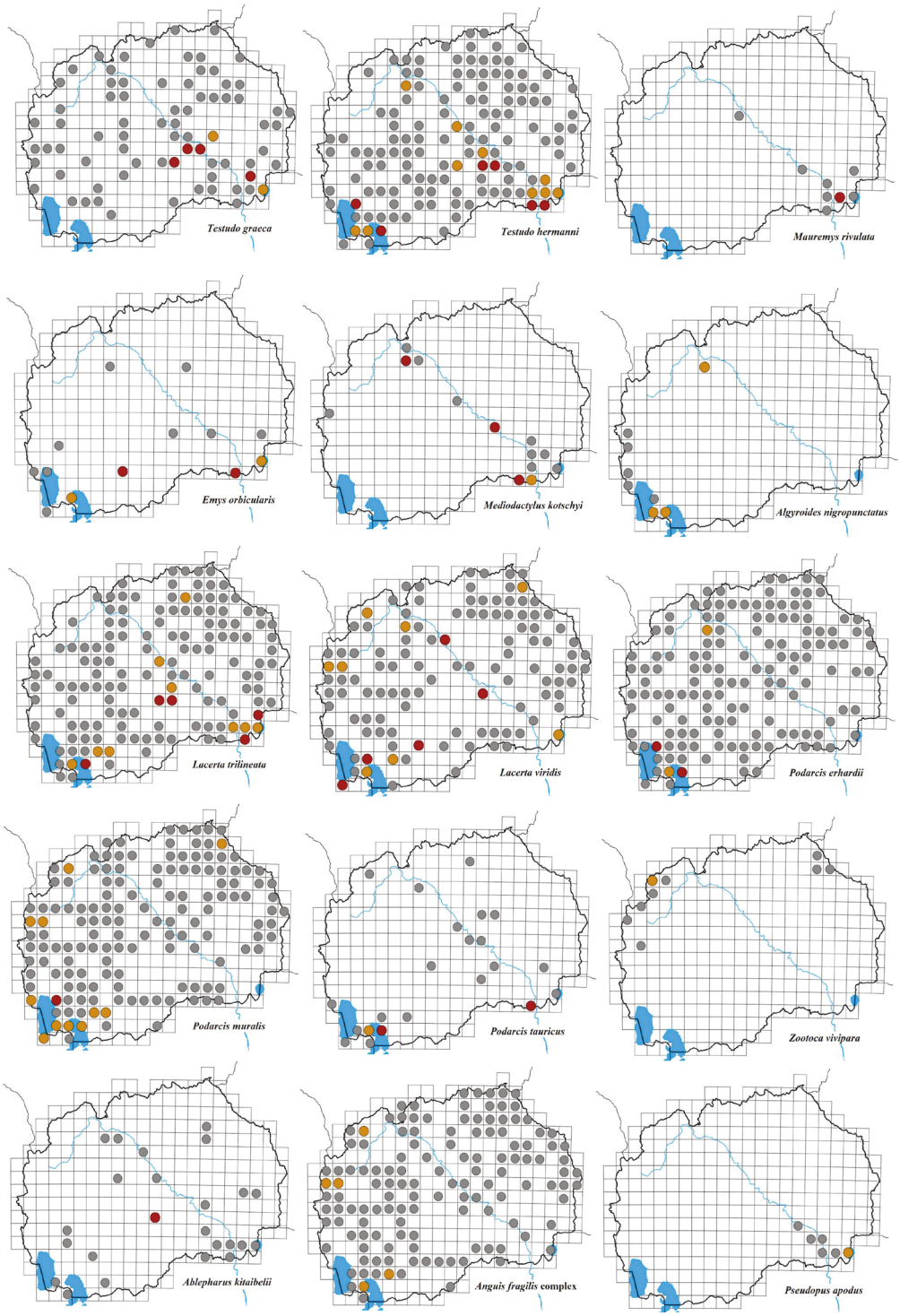

Figure 2. Maps of the distribution of reptile species with new records. Records are presented in 10×10 km UTM mapping quadrates covering the territory of Macedonia and comparing with previously known species distribution patterns (grey colour; sensu Sidorovska, 2010; Žagar et al., 2013; Sterijovski et al., 2014). Dark orange circles – records re-confirmed occurrence in quadrates by new records of this study; red circles – new occupied quadrates based on our new records. For precise site data, see Table 1.

species in the country; we made twenty observations covering the range provided by Sterijovski et al. (2014). At four sites we recorded syntopic occurrence of *T. hermanni* and *T. graeca*: Dedeli village, Kurija village, Nikolić village and Pretor village.

Geoemydidae

Mauremys rivulata (Valenciennes, 1833) (N=1) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The Balkan terrapin is probably a very rare species in Macedonia, where only a few records are known from across the Vardar River valley and in the surroundings of Dojran Lake (cf. Sterijovski et al., 2014).
New record: Dedeli village (205 m).
Comments: We observed one killed adult female (Fig. 4C) ca. 1.6 km south of Dedeli village. This finding, together with records from Dojran Lake from 2010 (Žagar et al., 2013) confirm the contemporary occurrence of this rare species in this region.

Emydidae

Emys orbicularis (Linnaeus, 1758) (N=3) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The range of the European pond turtle in Macedonia is represented by scarce data dispersed almost all over the country where species occurrence is limited to suitable water habitats and laying sites (Sterijovski et al., 2014).
New records: Gevgelija near Vardar River (58 m), Radobor village (588 m).
Comments: Sterijovski et al. (2014) reported this species for eleven UTM squares. We recorded it at three sites, two of which could be considered as new.

Gekkonidae

Mediodactylus kotschyi (Steindachner, 1870) (N=6) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The species range in Macedonia is limited to the Vardar River valley (Sterijovski et al., 2014; Sillero et al., 2014, 2015). Outside this region only one observation was reported, from the western part of the country (Debar; Sidorovska, 2010).
New records: Krivolak village (120 m), Dolna Matka village (309 m), Novo Konsko village (Konska reka river) (198 m), Pepelište village (126 m) (Fig. 4D).
Comments: Our records at six sites supported the general occurrence pattern (e.g. Sterijovski et al., 2014), with the new record as the northernmost site at Dolna Matka village.

Lacertidae

Algyroides nigropunctatus (Duméril and Bibron, 1839) (N=3) (Tab. 1, Fig. 2)

Occurrence in Macedonia: A rare species with a southern distribution limit between Ohrid and the Prespa Lakes region and with a possibly isolated population recorded in the Treska River valley (Sterijovski et al., 2014).
Comments: We recorded this species in relatively high abundance (tens of individuals) at three already known sites (Dolna Matka village, Trpejca village, north of Stenje village).

Lacerta trilineata Bedriaga, 1886 (N=18) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The species is among the most common representatives of Macedonian reptilian fauna and is widespread all over the country (Sterijovski et al., 2014).
New records: Asamati village (878 m), Gjavato village (58 m), Nikolić village (288 m), Raec River gorge (211 m), Toplica village (577 m, 677 m).
Comments: We made observations at 18 different sites in various parts of Macedonia which corresponded with the previous view on the species distribution. Records from new quadrates supplemented the species distribution mainly in the southern part of the country.

Lacerta viridis (Laurenti, 1768) complex (N=15) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The green lizard is a common, abundant and widespread species in Macedonia (Sterijovski et al., 2014).
New records: Gorno Perovo vilage (859 m), Kastiljo (Pčinja River) (274 m), Nikolić village (160 m, 199 m), Radobor village (580 m), Sveti Naum (695 m).
Comments: We documented this species at 21 sites throughout the country; five new records contributed to new data for five UTM quadrates. The species is locally abundant; we observed tens of individuals in several sites (Kurija village, Dolna Matka village, Nikolić village, Radobor village, Stenje village).

Podarcis erhardii (Bedriaga, 1876) (N=5) (Tab. 1, Fig. 2)

Occurrence in Macedonia: Erhard's wall lizard is

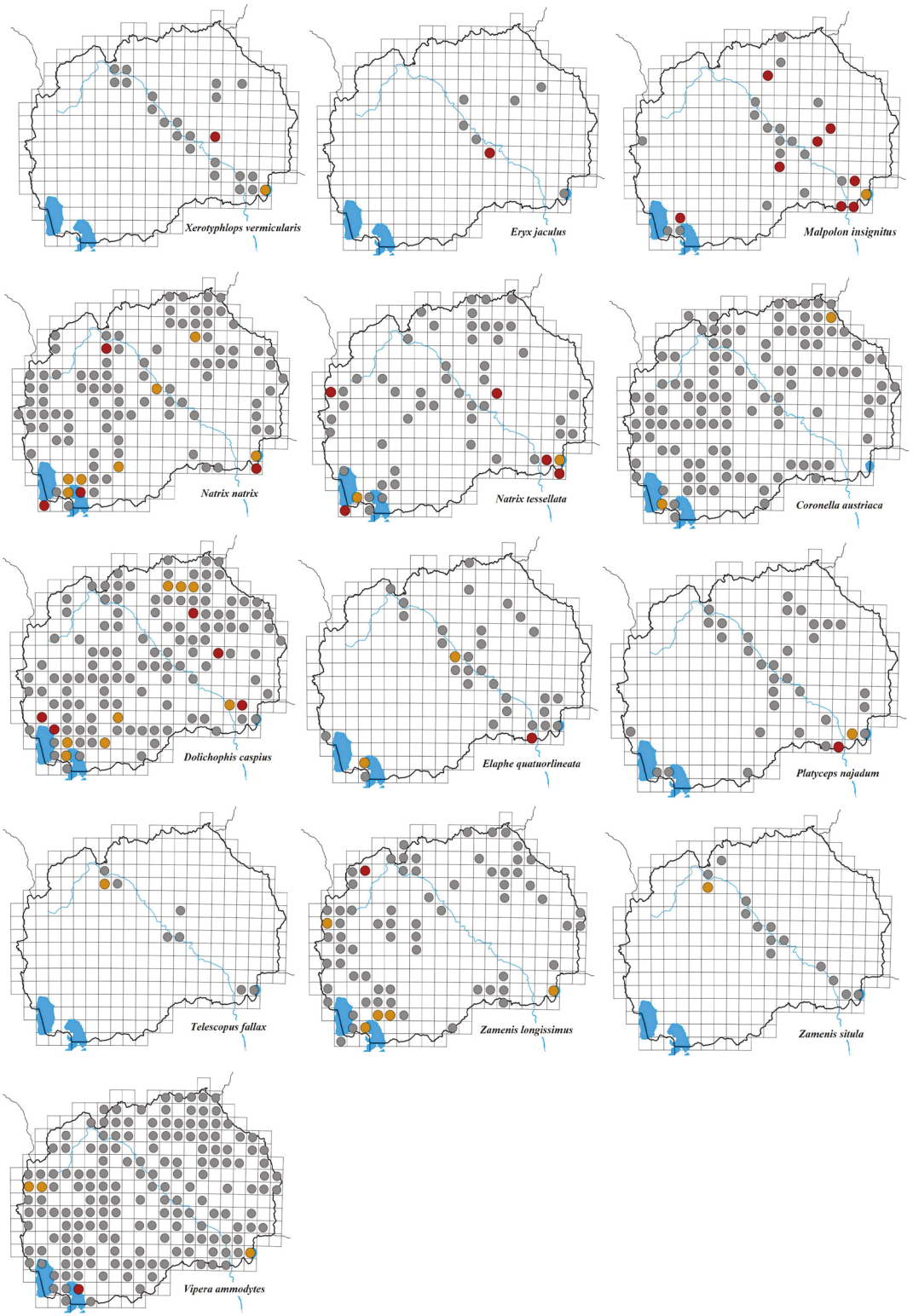

Figure 3. Maps of the distribution of reptile species with new records. See the legend to Figure 2 for more details.

a common and locally abundant species in Macedonia (Sterijovski et al., 2014).
New records: Kosel village (777 m), Pretor village (854 m).
Comments: We recorded this species at five sites only, with two localities situated in new UTM quadrates. The species was found at some sites in abundant (more than ten observed individuals) populations (Pretor village, Dolna Matka village).

Podarcis muralis (Laurenti, 1768) (N=18) (Tab. 1, Fig. 2)

Occurrence in Macedonia: As with the previous species, the common wall lizard is widespread and found locally abundant in Macedonia (Sterijovski et al., 2014).
New records: Kosel village (770 m), Ohrid (old town) (729 m).
Comments: We recorded 18 sites in 12 quadrates, which confirm the common occurrence of this species in Macedonia.

Podarcis tauricus (Pallas, 1814) (N=4) (Tab. 1, Fig. 2)

Occurrence in Macedonia: Records of the Balkan wall lizard are dispersed throughout the central and south-western parts of the country (Sterijovski et al., 2014).
New records: Gevgelija near the Vardar River (58 m), Pretor village (854 m).
Comments: We recorded this lizard at four sites within three quadrates, two of them being new. Abundant populations were observed, e.g. near Stenje village, where the species occurred in synthopy with two other taxa (Fig. 4E).

Zootoca vivipara (Lichtenstein, 1823) (N=1) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The viviparous lizard represents a Euro-Siberian faunal element with a range limited to the highest mountains in the northern and north-western parts of Macedonia (Sterijovski et al., 2014).
Comments: We recorded this species at an only site (Popova Šapka) in already known area at high elevation (2,057 and 2,157 metres) at the Šar Planina Mt.

Scincidae

Ablepharus kitaibelii Bibron and Bory de Saint-Vincent, 1833 (N=1) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The scarcity of snake-eyed skink distribution in Macedonia (Sterijovski et al., 2014) was recently supplemented by one record from 2010 reported from the Dojran Lake region (Žagar et al., 2013).
New record: Trojaci village (549 m).
Comments: Our observation in Trojaci village from central Macedonia represents a new site outside the previously delineated range (Fig. 4F and 5C).

Anguidae

Anguis fragilis Linnaeus, 1758 complex (N=5) (Tab. 1, Fig. 2)

Occurrence in Macedonia: Two species of slow worms occur in Macedonia (Jablonski et al., 2016) where are they considered as common (Sterijovski et al., 2014).
Comments: In total, we found this taxon on five sites in the western part of the country at altitudes of 920–1,630 meters within the previously known range. Based on external morphology inspection only, these records could not be assigned to any of two species of slow worms, *Anguis fragilis* Linnaeus, 1758 s. str. and *A. graeca* Bedriaga, 1881, which occur in this part of Macedonia (Jablonski et al., 2016). However, according to the distribution pattern presented by Jablonski et al. (2016) we can expect that both recorded localities in SW Macedonia (Magarevo and Stenje villages) inhabits *A. graeca*.

Pseudopus apodus (Pallas, 1775) (N=2) (Tab. 1, Fig. 2)

Occurrence in Macedonia: The glass lizard has a very limited range in Macedonia, with confirmed occurrence in the southern part of the Vardar River valley, including the region of Dojran Lake only, where it was confirmed from at beginning of the herpetological research in the country (Doflein, 1921) as well as recently (Sterijovski et al., 2014).
Comments: We only re-confirmed the occurrence of this species at two known sites in the vicinity of Dojran Lake (Nikolić village, Nov Dojran).

Typhlopidae

Xerotyphlops vermicularis (Merrem, 1820) (N=2) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The range of the worm snake in Macedonia is limited to the Vardar River valley and isolated occurrences in the north-east part (Sterijovski et al., 2014).
New record: Baltalija village (332 m).
Comments: Large numbers of individuals were recorded near Nikolić village. At the new locality in Baltalija village, one dead specimen was found on the road.

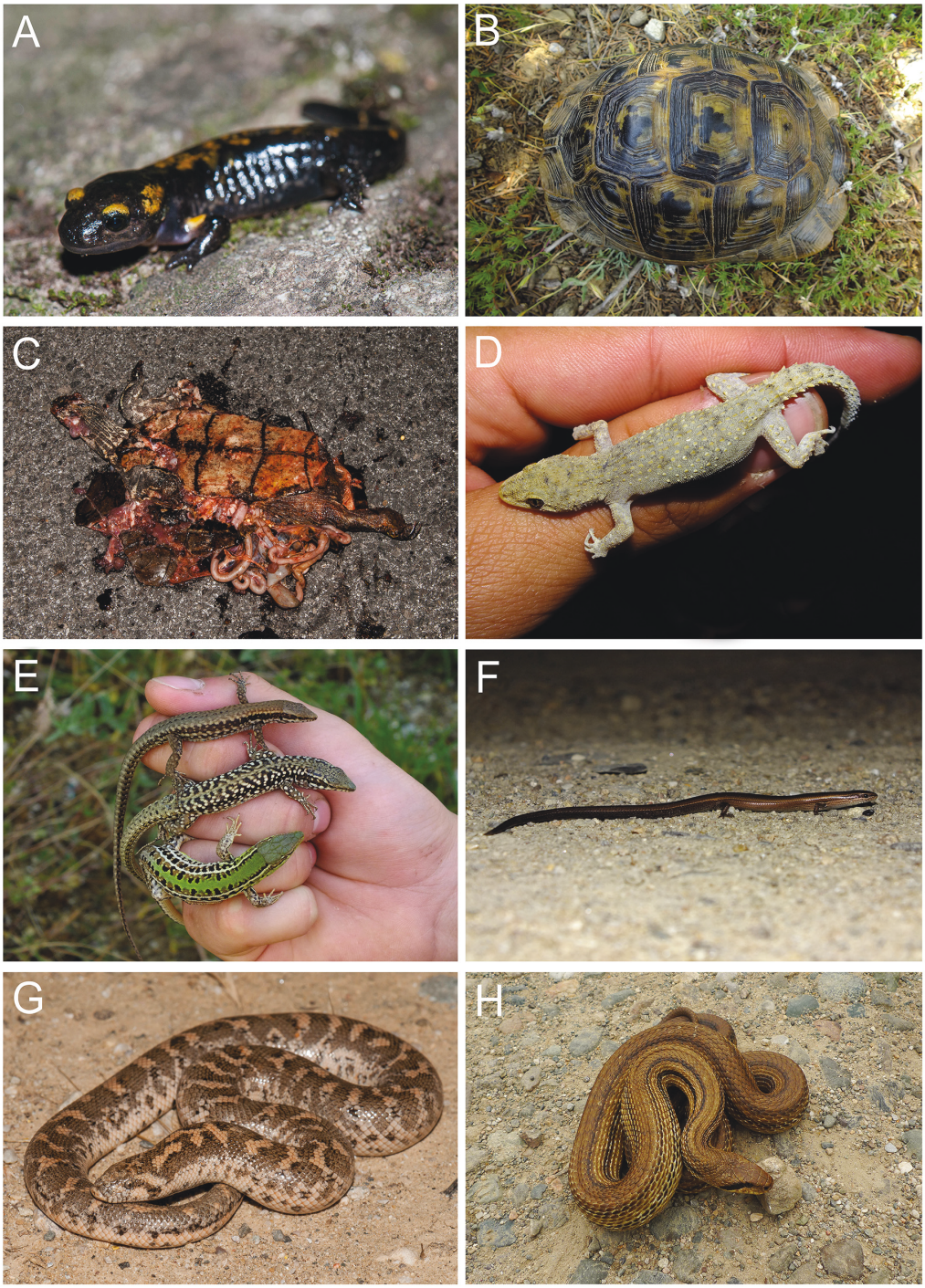

Figure 4. Some representatives of batrachofauna and herpetofauna from Macedonia. A – *Salamandra salamandra*, a juvenile individual from the Treska River Gorge near Dolna Matka village. B – *Testudo graeca*, an adult individual from Krivolak village. C – *Mauremys rivulata*, an adult female killed near Dedeli village. D – *Mediodactylus kotschyi*, an adult individual from Krivolak village. E – *Podarcis tauricus* (bottom), *P. erhardii* (middle), *P. muralis* (top), adult individuals occurring in syntopy near Stenje village (Prespa Lake). F – *Ablepharus kitaibelii*, an adult male from Trojaci village. G – *Eryx jaculus*, a subadult individual from the Kurija village vicinity. H – *Elaphe quatuorlineata*, an adult female from Gevgelija near the Vardar River.

Table 1. A review of amphibian and reptile records from Macedonia (June 2014). An asterisk (*) represents a new species site for Macedonia as compared with previously published data (for details see the species accounts in the text).

Site name	Date	Coordinates N/E	Altitude [m a. s. l.]	*Salamandra salamandra*	*Triturus* sp.	*Bombina variegata*	*Pelobates syriacus*	*Bufo bufo*	*Bufo viridis* complex	*Hyla arborea* complex	*Pelophylax ridibundus*	*Rana dalmatina*	*Rana temporaria*	*Testudo graeca*	*Testudo hermanni*	*Mauremys rivulata*	*Emys orbicularis*	*Mediodactylus kotschyi*	*Algyroides nigropunctatus*	*Lacerta trilineata*	*Lacerta viridis* complex	*Podarcis erhardii*	*Podarcis muralis*
Asamati village (Prespa Lake)	8. 6. 2014	40°58' 21 □03'	880																	1*			
Baba (Galičica Mt.)	8. & 10. 6. 2014	40°57' 20°49'	1,600			9			1														
Babuna village	5. 6. 2014	41°41' 21°48'	172					1			>10									1			
Baltalija village	7. 6. 2014	41°37' 22°15'	333											2									
Bibaj (Korab Mt.)	9. 6. 2014	41°43' 20°37'	1,175			>5																	
Bilbil Kamen (Bitola)	7. 6. 2014	41°02' 21°18'	676																				
Brli kamen (Galičica Mt.)	10. 6.2014	40°57' 20°48'	1,353																				>10
Bučište village	6. 6. 2014	41°56' 22°11'	387																				
Carina village	8. 6. 2014	40°57' 20°53'	1,053																	1			
Crkvino village	5. 6. 2014	41°39' 21°48'	276–356								1				2					>10			
Crničani village	6.–8. 6. 2014	41°14' 22°38'	176–256								>10				1					1			
Dedeli village 1	7. 6. 2014	41°16' 22°36'	165											1	1								
Dedeli village 2	5. 6. 2014	41°16' 22°36'	205													1*							
Dervenska klisura Gorge	7. 6. 2014	41°37' 22°17'	371																				
Dojran (Nov Dojran, Star Dojran) (Dojran Lake)	6.–8. 6. 2014	41°12' 22°42'	143–178					1			>10	1					8			1	1		
Dolna Matka village 1 (Treska River Gorge)	6., 7. & 9. 6. 2014	41°57' 21°17'	296–450			1					1				2			>10*			>10		
Dolna Matka village 2 (Treska River Gorge)	9. 6. 2014	41°56' 21°18'	296–450	1				1	1										>10		1	>10	
Frangovo village	9. 6. 2014	41°08' 20°37'	752																				>10
Gevgelija (Vardar River)	9. 6. 2014	41°09' 22°30'	58								>5				1*		3*						
Gjavato village	8. 6. 2014	41°10' 22°32'	58												2*					>5*			
Gjavato village (Vardar River)	9. 6. 2014	41°11' 22°31'	60												1					3			
Glumovo village	9. 6. 2014	41°59' 21°19'	282					1															
Gorna Bela Crkva village	11. 6. 2014	41°03' 21°01'	862																				
Gorni Disan village	9. 6. 2014	41°24' 22°06'	406												1*								
Gorno Perovo village	8. & 11. 6. 2014	41°01' 20°59'	859																		2*		
Heradea Lyncestis (Bitola)	12. 6. 2014	41°00' 21°20'	614–630																				>5
Kalin Kamen (Sveta voda) (Osogovski Planini Mts.)	6. 6. 2014	42°11' 22°23'	1,285																		1		>5
Kastiljo (Pčinja River)	5. 6. 2014	41°50' 21°41'	274																		1*		
Koritski rid (Galičica Mt.)	8. 6. 2014	40°58' 20°48'	1,353–1,422			1																	

Table 1. Continued.

Site name	Date	Coordinates N/E	Altitude [m a. s. l.]	*Salamandra salamandra*	*Triturus* sp.	*Bombina variegata*	*Pelobates syriacus*	*Bufo bufo*	*Bufo viridis* complex	*Hyla arborea* complex	*Pelophylax ridibundus*	*Rana dalmatina*	*Rana temporaria*	*Testudo graeca*	*Testudo hermanni*	*Mauremys rivulata*	*Emys orbicularis*	*Mediodactylus kotschyi*	*Algyroides nigropunctatus*	*Lacerta trilineata*	*Lacerta viridis* complex	*Podarcis erhardii*	*Podarcis muralis*
Kosel village	10. & 13. 6. 2014	41°10' 20°50'	770												1*							1*	1*
Krajna plos (Galičica Mt.)	13. 6.2014	40°58' 20°52'	1,287												1								>5
Kratovo (Kratovska reka River)	6. 6. 2014	41°04' 22°10'	620																				
Kriva Palanka (Kriva reka River)	6. 6. 2014	42°12' 22°19'	694								2												
Krivolak village	13. 6. 2014	41°32' 22°08'	120–155					1	1		>5			1*				7*					
Kurija village	5. & 7. 6. 2014	41°32' 22°02'	167											1*	>10						>10		
Leskoec village	12. 6. 2014	41°08' 20°49'	739																				
Magarevo village (Izvidnica, Pelister Mts.)	7. 6. 2014	41°02' 21°13'	1,286,1,626									2									1		>10
Mavrovi Anovi village 1	8. 6. 2014	41°43' 20°37'	929	5																			>5
Mavrovi Anovi village 2	9. 6. 2014	41°43' 20°37'	887	1																			>5
Moin village	8. 6. 2014	41°08' 22°27'	120–151																				
Mrdaja village 1 (Dojran Lake)	6. 6. 2014	41°10' 22°44'	153		>5		>5				>10	1											
Mrdaja village 2 (Dojran Lake)	6. 6. 2014	41°13' 22°41'	178									1											
Mrzenci village	9. 6. 2014	41°09' 22°30'	61–84															2					
Naselba Damjan	7. 6. 2014	41°38' 22°22'	480																				
Nikolić village 1 (Dojran Lake)	6. 6. 2014	41°15' 22°44'	190–280							2	>10			2	2					>10*	>10*		
Nikolić village 2 (Dojran Lake)	6. 6. 2014	41°14' 22°42'	180																				
Novo Konsko village (Konska reka River)	8. 6. 2014	41°09' 22°25'	198						2									1*					
Ohrid (old town)	13. 6. 2014	41°06' 20°47'	729																				>5*
Orašac village	14. 6. 2014	42°04' 21°48'	330																				
Oteševo village (Prespa Lake)	8. 6. 2014	40°59' 20°55'	862–890																	2			1
Pepelište village	12. 6. 2014	41°31' 22°07'	126															1*					
Pirava village	5. 6. 2014	41°18' 22°32'	97																				
Pokrvenik village (Prespa Lake)	8. 6. 2014	41°00' 20°57'	860																				
Popova Šapka 1 (Šar Planina Mt.)	7. 6. 2014	42°00' 20°51'	2,050–2,300						1														
Popova Šapka 2 (Šar Planina Mt.)	7. 6. 2014	41°59' 20°47'	2,241										>5										
Popova Šapka 3 (Šar Planina Mt.)	8. 6. 2014	42°00' 20°55'	1,680	1																	3		>5
Pretor village (Prespa Lake)	7. 6. 2014	40°57' 21°04'	854					1			>10			3	>10*							>10*	>10
Raborci village	7. 6. 2014	41°23' 22°36'	367																				

Table 1. Continued.

Site name	Date	Coordinates N/E	Altitude [m a. s. l.]	*Salamandra salamandra*	*Triturus* sp.	*Bombina variegata*	*Pelobates syriacus*	*Bufo bufo*	*Bufo viridis* complex	*Hyla arborea* complex	*Pelophylax ridibundus*	*Rana dalmatina*	*Rana temporaria*	*Testudo graeca*	*Testudo hermanni*	*Mauremys rivulata*	*Emys orbicularis*	*Mediodactylus kotschyi*	*Algyroides nigropunctatus*	*Lacerta trilineata*	*Lacerta viridis* complex	*Podarcis erhardii*	*Podarcis muralis*
Rabrovo village	7. 6. 2014	41°19' 22°36'	344																				
Radobor village	10.–11. 6. 2014	41°06' 21°25'	573–588								>10						7*			3	>5*		
Raec River gorge	10. 6. 2014	41°26' 21°52'	211											1*						1*			
Rankovce village	6. 6. 2014	42°09' 22°05'	529–543																	1			
Ribnica village 1	9. 6. 2014	41°43' 20°36'	971–1,096																		1		
Ribnica village 2	9. 6. 2014	41°43' 20°37'	1,242																				
Rosoman village	7. 6. 2014	41°30' 21°56'	157																	1			
Rotino village	7. 6. 2014	41°03' 21°12'	1,003																	1			
Sofilari village, Kriva Lakavica River	6.–7. 6. 2014	41°42' 22°09'	258								>5												
Stenje village 1	8. & 11.–12. 6. 2014	40°57' 20°53'	860–870				2	2	2	>5	>5				6			5			>10	>10	>10
Stenje village 2	13. 6. 2014	40°58' 20°54'	858												>5				>5			>10	>10
Sveti Naum	8. & 10. 6. 2014	40°54' 20°44'	694								>5										1*		>10
Šurlenci village (Prespa Lake)	8. 6. 2014	41°00' 20°56'	855												1								
Tikveško Ezero Lake	10. 6. 2014	41°23' 21°58'	290												2*								
Toplica village	10. 6. 2014	41°24' 21°44'	577–677			1									2					4*			
Topolčani village	10. 6. 2014	41°13' 21°26'	599																				
Trebeništa village	13. 6. 2014	41°12' 20°45'	725																				
Trnovac village	6. 6. 2014	42°08' 22°05'	516																	1			
Trnovo village (Pelister Mt.)	7. 6. 2014	41°02' 21°15'	833																	1			
Trojaci village	12. 6. 2014	41°22' 21°44'	549																				
Trpejca village	9. 6. 2014	40°57' 20°46'	702–720																>10				>10
Valandovo village	7. 6. 2014	41°19' 22°34'	143																				
Vataša village 1 (Luda Mara River)	9.–10. 6. 2014	41°23' 22°02'	401					1							1*								
Vataša village 2 (Luda Mara River)	10. 6. 2014	41°24' 22°01'	350												1*								
Vojnik village	5. 6. 2014	42°09' 21°53'	329																				
Vojnik village (Kriva reka River)	6. 6. 2014	42°09' 21°51'	326								2												
Vozarci village (Crna reka River)	10. 6. 2014	41°25' 21°55'	171								1												
Vrben village	13.–14. 6. 2014	41°43' 20°44'	1,289–1,418										1								2		>5
No of sites				**4**	**1**	**5**	**2**	**8**	**6**	**2**	**17**	**4**	**2**	**7**	**20**	**1**	**3**	**6**	**3**	**18**	**15**	**5**	**18**
No of specimen				**8**	**>5**	**>17**	**>7**	**9**	**8**	**>7**	**>102**	**5**	**>6**	**12**	**>53**	**1**	**18**	**>26**	**>25**	**>48**	**>58**	**>41**	**>107**

Table 1. Continued.

Site name	Date	Coordinates N/E	Altitude [m a. s. l.]	*Podarcis tauricus*	*Zootoca vivipara*	*Ablepharus kitaibelii*	*Anguis fragilis complex*	*Pseudopus apodus*	*Xerotyphlops vermicularis*	*Eryx jaculus*	*Malpolon insignitus*	*Natrix natrix*	*Natrix tessellata*	*Coronella austriaca*	*Dolichophis caspius*	*Elaphe quatuorlineata*	*Platyceps najadum*	*Telescopus fallax*	*Zamenis longissimus*	*Zamenis situla*	*Vipera ammodytes*
Asamati village (Prespa Lake)	8. 6. 2014	40°58' 21 □03'	880									1*									1*
Baba (Galičica Mt.)	8. & 10. 6. 2014	40°57' 20°49'	1,600																		
Babuna village	5. 6. 2014	41°41' 21°48'	172																		
Baltalija village	7. 6. 2014	41°37' 22°15'	333						1*		1*										
Bibaj (Korab Mt.)	9. 6. 2014	41°43' 20°37'	1,175																		
Bilbil Kamen (Bitola)	7. 6. 2014	41°02' 21°18'	676												1						
Brli kamen (Galičica Mt.)	10. 6.2014	40°57' 20°48'	1,353																		
Bučište village	6. 6. 2014	41°56' 22°11'	387												1*						
Carina village	8. 6. 2014	40°57' 20°53'	1,053																		
Crkvino village	5. 6. 2014	41°39' 21°48'	276–356									1				1					
Crničani village	6.–8. 6. 2014	41°14' 22°38'	176–256								1		1*				1				1
Dedeli village 1	7. 6. 2014	41°16' 22°36'	165								1*										
Dedeli village 2	5. 6. 2014	41°16' 22°36'	205																		
Dervenska klisura Gorge	7. 6. 2014	41°37' 22°17'	371								1*										
Dojran (Nov Dojran, Star Dojran) (Dojran Lake)	6.–8. 6. 2014	41°12' 22°42'	143–178					1			1	2*	1						1		
Dolna Matka village 1 (Treska River Gorge)	6., 7. & 9. 6. 2014	41°57' 21°17'	296–450									1*						2		1	
Dolna Matka village 2 (Treska River Gorge)	9. 6. 2014	41°56' 21°18'	296–450																		
Frangovo village	9. 6. 2014	41°08' 20°37'	752																		
Gevgelija (Vardar River)	9. 6. 2014	41°09' 22°30'	58	>10*												1*					
Gjavato village	8. 6. 2014	41°10' 22°32'	58								1*										
Gjavato village (Vardar River)	9. 6. 2014	41°11' 22°31'	60																		
Glumovo village	9. 6. 2014	41°59' 21°19'	282																		
Gorna Bela Crkva village	11. 6. 2014	41°03' 21°01'	862									1							1		
Gorni Disan village	9. 6. 2014	41°24' 22°06'	406																		
Gorno Perovo village	8. & 11. 6. 2014	41°01' 20°59'	859								1*				1						
Heraclea Lyncestis (Bitola)	12. 6. 2014	41°00' 21°20'	614–630												1						
Kalin Kamen (Sveta voda) (Osogovski Planini Mts.)	6. 6. 2014	42°11' 22°23'	1,285											1							
Kastiljo (Pčinja River)	5. 6. 2014	41°50' 21°41'	274																		
Koritski rid (Galičica Mt.)	8. 6.2014	40°58' 20°48'	1,353–1,422											1							

Table 1. Continued.

Table 1. Continued.

Site name	Date	Coordinates N/E	Altitude [m a. s. l.]	*Podarcis tauricus*	*Zootoca vivipara*	*Ablepharus kitaibelii*	*Anguis fragilis* complex	*Pseudopus apodus*	*Xerotyphlops vermicularis*	*Eryx jaculus*	*Malpolon insignitus*	*Natrix natrix*	*Natrix tessellata*	*Coronella austriaca*	*Dolichophis caspius*	*Elaphe quatuorlineata*	*Platyceps najadum*	*Telescopus fallax*	*Zamenis longissimus*	*Zamenis situla*	*Vipera ammodytes*
Kosel village	10. & 13. 6. 2014	41°10' 20°50'	770																		
Krajna plos (Galičica Mt.)	13. 6.2014	40°58' 20°52'	1,287																		
Kratovo (Kratovska reka River)	6. 6. 2014	41°04' 22°10'	620									1									
Kriva Palanka (Kriva reka River)	6. 6. 2014	42°12' 22°19'	694																		
Krivolak village	13. 6. 2014	41°32' 22°08'	120–155																		
Kurija village	5. & 7. 6. 2014	41°32' 22°02'	167							1*											
Leskoec village	12. 6. 2014	41°08' 20°49'	739												1*						
Magarevo village (Izvidnica, Pelister Mts.)	7. 6. 2014	41°02' 21°13'	1,286,1,626				5												1		
Mavrovi Anovi village 1	8. 6.2014	41°43' 20°37'	929				1						1*								
Mavrovi Anovi village 2	9. 6.2014	41°43' 20°37'	887				1						1*								
Moin village	8. 6. 2014	41°08' 22°27'	120–151								1*										
Mrdaja village 1 (Dojran Lake)	6. 6. 2014	41°10' 22°44'	153									5*	1*								
Mrdaja village 2 (Dojran Lake)	6. 6. 2014	41°13' 22°41'	178																		
Mrzenci village	9. 6. 2014	41°09' 22°30'	61–84								2*						1*				
Naselba Damjan	7. 6. 2014	41°38' 22°22'	480								1*				3*						
Nikolić village 1 (Dojran Lake)	6. 6. 2014	41°15' 22°44'	190–280						>10												1
Nikolić village 2 (Dojran Lake)	6. 6. 2014	41°14' 22°42'	180					1													
Novo Konsko village (Konska reka River)	8. 6. 2014	41°09' 22°25'	198																		
Ohrid (old town)	13. 6. 2014	41°06' 20°47'	729																		
Orašac village	14. 6. 2014	42°04' 21°48'	330								2*										
Oteševo village (Prespa Lake)	8. 6. 2014	40°59' 20°55'	862–890																		
Pepelište village	12. 6. 2014	41°31' 22°07'	126																		
Pirava village	5. 6. 2014	41°18' 22°32'	97												1						
Pokrvenik village (Prespa Lake)	8. 6. 2014	41°00' 20°57'	860									1			1						
Popova Šapka 1 (Šar Planina Mt.)	7. 6. 2014	42°00' 20°51'	2,050–2,300		2																
Popova Šapka 2 (Šar Planina Mt.)	7. 6. 2014	41°59' 20°47'	2,241																		
Popova Šapka 3 (Šar Planina Mt.)	8. 6. 2014	42°00' 20°55'	1,680				1												1*		
Pretor village (Prespa Lake)	7. 6. 2014	40°57' 21°04'	854	>10*								1*									
Raborci village	7. 6. 2014	41°23' 22°36'	367																		

Table 1. Continued.

Site name	Date	Coordinates N/E	Altitude [m a. s. l.]	*Podarcis tauricus*	*Zootoca vivipara*	*Ablepharus kitaibelii*	*Anguis fragilis* complex	*Pseudopus apodus*	*Xerotyphlops vermicularis*	*Eryx jaculus*	*Malpolon insignitus*	*Natrix natrix*	*Natrix tessellata*	*Coronella austriaca*	*Dolichophis caspius*	*Elaphe quatuorlineata*	*Platyceps najadum*	*Telescopus fallax*	*Zamenis longissimus*	*Zamenis situla*	*Vipera ammodytes*
Rabrovo village	7. 6. 2014	41°19' 22°36'	344												1*						
Radobor village	10.–11. 6. 2014	41°06' 21°25'	573–588									2									
Raec River gorge	10. 6. 2014	41°26' 21°52'	211								1*										
Rankovce village	6. 6. 2014	42°09' 22°05'	529–543												2						
Ribnica village 1	9. 6. 2014	41°43' 20°36'	971–1,096																3		1
Ribnica village 2	9. 6. 2014	41°43' 20°37'	1,242																		3
Rosoman village	7. 6. 2014	41°30' 21°56'	157																		
Rotino village	7. 6. 2014	41°03' 21°12'	1,003																		
Sofilari village, Kriva Lakavica River	6.–7. 6. 2014	41°42' 22°09'	258										1*								
Stenje village 1	8. & 11.–12. 6. 2014	40°57' 20°53'	860–870	>10								2			3	4			2		
Stenje village 2	13. 6. 2014	40°58' 20°54'	858	>5			1														
Sveti Naum	8. & 10. 6. 2014	40°54' 20°44'	694									4*	1*								
Šurlenci village (Prespa Lake)	8. 6. 2014	41°00' 20°56'	855																		
Tikveško Ezero Lake	10. 6. 2014	41°23' 21°58'	290																		
Toplica village	10. 6. 2014	41°24' 21°44'	577–677																		
Topolčani village	10. 6. 2014	41°13' 21°26'	599												1						
Trebeništa village	13. 6. 2014	41°12' 20°45'	725												1*						
Trnovac village	6. 6. 2014	42°08' 22°05'	516																		
Trnovo village (Pelister Mt.)	7. 6. 2014	41°02' 21°15'	833																		
Trojaci village	12. 6. 2014	41°22' 21°44'	549			1*															
Trpejca village	9. 6. 2014	40°57' 20°46'	702–720										>10								
Valandovo village	7. 6. 2014	41°19' 22°34'	143								1*										
Vataša village 1 (Luda Mara River)	9.–10. 6. 2014	41°23' 22°02'	401																		
Vataša village 2 (Luda Mara River)	10. 6. 2014	41°24' 22°01'	350																		
Vojnik village	5. 6. 2014	42°09' 21°53'	329												1						
Vojnik village (Kriva reka River)	6. 6. 2014	42°09' 21°51'	326																		
Vozarci village (Crna reka River)	10. 6. 2014	41°25' 21°55'	171																		
Vrben village	13.–14. 6. 2014	41°43' 20°44'	1,289–1,418																		1
No of sites				**4**	**1**	**1**	**5**	**2**	**2**	**1**	**13**	**12**	**8**	**2**	**14**	**3**	**2**	**1**	**6**	**1**	**6**
No of specimen				**>35**	**2**	**1**	**8**	**2**	**>11**	**1**	**15**	**22**	**>16**	**2**	**19**	**6**	**2**	**2**	**9**	**1**	**8**

Erycidae

Eryx jaculus (Linnaeus, 1758) (N=1) (Tab. 1, Fig. 3)

Occurrence in Macedonia: This species is very rare in Macedonia, with only six recorded quadrates without any recent records (Sterijovski et al. 2014). Historically, this species was recorded in central Macedonia, in the Babuna River gorge, Bašino village (both Veles region) and Ulanci village in the Gradsko region (Dimovski, 1971; Sterijovski et al., 2014).
New record: Kurija village (166 m).
Comments: The historical record from Ulanci village (Dimovski, 1971) is the closest to our new record located near Kurija village. One subadult specimen (male, ca 30 cm) was found on a local road in a dry habitat with soft soil conditions (Fig. 4G).

Psammophiidae

Malpolon insignitus (Geoffroy Saint-Hilaire, 1827) (N=13) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The distribution of the Eastern Montpellier snake is probably not yet well documented; most records were so far from the eastern part of the country (Sterijovski et al. 2014).
New records: Baltalija village (333 m), Dedeli village (164 m), Dervenska klisura gorge (371 m), Gjavato village (58 m), Gorno Perovo village (859 m), Mojin village (151 m), Mrzenci village (84 m), Naselba Damjan (480 m), Orašac village (330 m), Raec River gorge (211 m), Valandovo (143 m).
Comments: Many new records found with our survey suggest that species' distribution in the country is still under-estimated. Only two of our 13 observations were situated in previously known UTM quadrates; thus, our findings considerably supplement the view on the species range in Macedonia. Almost all of our records (10) were specimens found killed on the road, thus we can assume that the detectability of live individuals is difficult. It could be the main reason behind the poor distributional knowledge on this species.

Natricidae

Natrix natrix (Linnaeus, 1758) (N=12) (Tab. 1, Fig. 3)

Occurrence in Macedonia: A common and an abundant species widely distributed throughout the whole country but lacking from the southern part (Sterijovski et al. 2014).
New records: Asamati village (878 m), Dolna Matka village (309 m), Mrdaja village (153 m), Pretor village (854 m), Star Dojran (156 m), Sveti Naum (694 m).
Comments: Four of the 12 records present observations in new quadrates. Among these records, the most surprising are the observations near Dojran Lake, which is a region with a long-term tradition of herpetological research (for review see Sterijovski et al., 2014); only in 2010 was the occurrence of this species confirmed here by Žagar et al. (2013).

Natrix tessellata (Laurenti, 1768) (N=8) (Tab. 1, Fig. 3)

Occurrence in Macedonia: A widespread and relatively common species all over the country with a scattered distribution pattern (Sterijovski et al., 2014).
New records: Crničani village (226 m), Mavrovi Anovi village (926 m), Mrdaja village (153 m), Sofilari village (Kriva Lakavica river) (258 m), Sveti Naum (694 m).
Comments: During the survey, a total of seven records were made with five records in quadrates where the occurrence of the species was not previously known.

Colubridae

Coronella austriaca Laurenti, 1768 (N=2) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The smooth snake is a common species in Macedonia distributed across the country (Sterijovski et al., 2014).
Comments: We made two observations that only confirmed previously known species occurrence in the north-eastern and south-western parts of the country.

Dolichophis caspius (Gmelin, 1789) (N=14) (Tab. 1, Fig. 3)

Occurrence in Macedonia: This is a common snake species in Macedonia occurring throughout the country (Sterijovski et al., 2014).
New records: Bučište village (387 m), Leskoec village (739 m), Naselba Damjan (480 m), Rabrovo village (344 m), Trebeništa village (725 m).
Comments: We recorded the Caspian whip snake at 14 sites; in eight quadrates we confirmed previously reported observations, while five records are in new UTM quadrates. We have observed frequent cases of road kills in this species (53% of all finds).

Elaphe quatuorlineata (Bonnaterre, 1790) (N=3) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The range of the four-lined snake in Macedonia is distributed in two distinct parts;

Figure 5. Localities of selected batrachofauna and herpetofauna records from Macedonia. A – Treska River Gorge near Dolna Matka village as a habitat of *Salamandra salamandra*, *Podarcis erhardii*, *Algyroides nigropunctatus* and *Telescopus fallax*. B – Vicinity of Dojran Lake near Nikolić village as a habitat of *Lacerta viridis* complex, *Podarcis muralis*, *Pseudopus apodus* and *Vipera ammodytes*. C – New locality of *Ablepharus kitaibelii* near Trojaci village. D – New locality of *Elaphe quatuorlineata* from Gevgelija.

the western and the central part, with most records from along the Vardar River valley. An additional region lies in the Ohrid and Prespa regions, where only a few records have been reported (Sterijovski et al., 2014).
New record: Gevgelija near the Vardar River (58 m).
Comments: We recorded a new locality of the species occurrence in the southernmost part of the Vardar River region (Fig. 4H and 5D).

Platyceps najadum (Eichwald, 1831) (N=2) (Tab. 1, Fig. 3)

Occurrence in Macedonia: *Platyceps najadum* has a distinct distribution in Macedonia, with most records situated in the eastern part of the country (Sterijovski et al., 2014).
New record: Mrzenci village (84 m).
Comments: We confirmed this species at two sites in the south only. Mrzenci village near the Vardar River is a new site reported from this part of the species range.

Telescopus fallax (Fleischmann, 1831) (N=1) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The cat snake is very rare in Macedonia, being confirmed in only eight mapping quadrates (Sterijovski et al., 2014). Records near the Dolna Matka village represent the northern distribution limit for the species in Macedonia.
Comments: Our record (two observations) confirmed species occurrence near the Dolna Matka village (Treska River Gorge), where *T. fallax* was recorded only recently in 2009 (Sterijovski et al., 2014). Probably the range of this species is not yet fully known due to its rarity with only occasional finds.

Zamenis longissimus (Laurenti, 1768) (N=6) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The Aesculapian snake belongs among the most common reptiles in Macedonia,

with most of the data concentrated in the western and northern parts of the country (Sterijovski et al., 2014).
New record: Popova Šapka (1279 m).
Comments: We recorded this species at six sites. They well confirmed the distribution patterns of the species in the western part of Macedonia. Our new record is from a higher elevation in the north of the country.

Zamenis situla (Linnaeus, 1758) (N=1) (Tab. 1, Fig. 3)

Occurrence in Macedonia: According to published data (Sterijovski et al., 2014), the range of the species in Macedonia is limited to the region along the Vardar river. Considering the overall species range, occurrence in the western part of the country cannot be excluded (cf. Sillero et al., 2014, 2015).
Comments: We recorded the leopard snake at a single site in the Treska River Gorge (Dolna Matka village). This observation confirmed species occurrence in the area ten years after the last record (Sterijovski et al., 2014).

Viperidae

Vipera ammodytes (Linnaeus, 1758) (N=6) (Tab. 1, Fig. 3)

Occurrence in Macedonia: The nose-horned viper belongs among the most common reptile species in Macedonia (Sterijovski et al. 2014), with a very wide altitudinal distribution (from sea level up to more than 2,000 m) and with a peak around 400–800 m (Jelić et al., 2013).
New record: Asamati village (878 m).
Comments: We recorded this species at six sites at altitudes from 190–1,418 m; two records in new quadrate supplement the distribution knowledge in the western part of the country.

Conclusion

During the short field surveillance we were able to confirm the occurrence of almost the entire batracho- and herpetofauna of Macedonia, only seven species were not observed (*Ichthyosaura alpestris*, *Lissotriton vulgaris*, *Rana graeca*, *Lacerta agilis*, *Hierophis gemonensis*, *Vipera berus*, and *V. ursinii*). On the other hand, despite the shortness of our field work, we reported here several significant additions and confirmations to chorological data on the amphibian and reptile fauna of the country.

New species site records are constantly being added to the known species' ranges, indicating that the full distribution of many of them is still not sufficiently known. Our updates on the distribution of amphibians and reptiles in Macedonia showed that limits of ranges of several species are present there (e.g. *Eryx jaculus*, *Xerotyphlops vermicularis*) and thus the special care should be taken to preserve their habitats. Therefore, further efforts should primarily focus, in particular, on the study of current distribution status and potential habitats of, e.g. *Emys orbicularis*, *Mauremys rivulata*, *Mediodactylus kotschyi*, *Pseudopus apodus*, *Algyroides nigropunctatus*, *Zootoca vivipara*, *Eryx jaculus*, *H. gemonensis*, *Telescopus fallax*, *Zamenis situla* and *V. ursinii*, which are considered to be extremely rare reptile species of Macedonia (Sterijovski et al., 2014). This is also true for all amphibian species occurring in the country because of scarcity of recent data and only limited available current records (e.g. Sidorovska, 2010).

As shown above, several of our data confirmed the occurrence of many species at sites where they have never been reported before (e.g. *Pelophylax ridibundus*, *Testudo graeca*, *M. rivulata*, *M. kotschyi*, *Lacerta* spp., *E. jaculus*, *Malpolon insignitus*). In the case of *E. jaculus*, our new record confirmed this rare species in central Macedonia after more than forty years. Also in some wide-spread and common species, like e.g. *Lacerta viridis* complex, *M. insignitus*, *Natrix tessellata*, we were able to find additional new data that contributed to filling the missing gaps in their distribution maps.

Historically, some species were recorded at single localities without subsequent confirmations (e.g. *E. jaculus* near Skopje or *T. fallax* near Tetovo; Radovanović, 1964; Grillitsch and Grillitsch, 1999). The distribution patterns of *M. rivulata*, *P. apodus* or *H. gemonensis* are interesting in view of the limited records in the southern part of the country (cf. Sterijovski et al., 2014), even though their overall distribution in other regions of the Balkans extends more northerly (e.g. in Croatia; see Sillero et al., 2014). An explanation for this occurrence cannot be clearly provided yet. A specific question remains the distribution and borders of contact zones of morphologically uniform species complexes detected by genetics which do not allow their determination in the field (e.g. *Triturus ivanbureschi* / *macedonicus*, *Hyla arborea* / *orientalis*, *Bufo viridis* / *variabilis*, *Anguis fragilis* / *graeca*). We cannot precisely identify these distribution areas here but an extensive field study in combination with an analysis of molecular data would be necessary for understanding the general biogeographical patterns of batracho- and herpetofauna of Macedonia as well as whole central Balkans.

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