

# On the herpetofauna of the East Anatolian Province of Bitlis (Turkey)

(Amphibia; Reptilia)

Zur Herpetofauna der ostanatolischen Provinz Bitlis (Türkei)

(Amphibia; Reptilia)

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## KURZFASSUNG

Anhand ihrer Feld- und Literaturstudien identifizierten die Autoren 36 Amphibien- und Reptilienarten, die nachweislich in der türkischen Provinz Bitlis vorkommen, wobei die Fundorte und die an ihnen angetroffenen Habitattypen angegeben werden. Die durch Beobachtung festgestellten Hauptgefährdungsursachen werden benannt. Insgesamt kennt man aus dem Untersuchungsgebiet Vorkommen von vier Froschlurch-, zwei Schwanzlurch- und Schildkrötenarten sowie 15 Echsen- und 13 Schlangenarten. *Hyla savignyi* AUDOUIN, 1827, *Heremites vittatus* (OLIVIER, 1804), *Timon kurdistanicus* (SUCHOW, 1936) and *Eirenis thospitis* SCHMIDTLER & LANZA, 1990, stellen Erstnachweise für die Provinz Bitlis dar.

## ABSTRACT

Based on their field studies and data from the literature, the authors identified 36 amphibian and reptile species occurring in the East Anatolian Province of Bitlis (Turkey). The record localities and habitat types are specified and the authors' observations regarding the major factors threatening the species are addressed. In total, the presence of four anuran, two urodelan, two chelonian, 15 lizard and 13 snake species was verified. *Hyla savignyi* AUDOUIN, 1827, *Heremites vittatus* (OLIVIER, 1804), *Timon kurdistanicus* (SUCHOW, 1936) and *Eirenis thospitis* SCHMIDTLER & LANZA, 1990, represent first records for the Bitlis Province.

## KEY WORDS

Amphibia; Reptilia; distribution, herpetofauna, new provincial record; *Hyla savignyi*, *Heremites vittatus*, *Timon kurdistanicus*, *Eirenis thospitis*, Province of Bitlis, East Anatolia, Turkey

## INTRODUCTION

The high biodiversity in the territory of Turkey is due to its variety in topographical, geological and climatic features. Based on its position and geology, Anatolia acted in the past as a bridge or as a barrier for species' dispersal between Asia, Europe, and the Ethiopian region via the Middle East, providing a natural pathway or acting as a vicariant agent (CIHAN & TOK 2014; ÖZCAN & ÜZÜM 2014; AMBARLI et al. 2016). Reptiles and amphibians play an important role in the high biodiversity of Turkey. Its herpetofauna has been examined in detail by native and foreign investigators until today (BARAN 1982; BARAN & ATATÜR 1986; MÜLDER 1995; BARAN & ATATÜR 1998; SINDACO

et al. 2000; GÖÇMEN et al. 2007, 2009; YILDIZ et al. 2007, 2013; HÜR et al. 2008; AFSAR & TOK 2011; TOK & ÇİÇEK 2014; TUNIYEV et al. 2014; EGE et al. 2015; İĞCI et al. 2015; SAMI et al. 2015; YILDIZ & İĞCI 2015; SARIKAYA et al. 2017). These studies contributed to the knowledge of the herpetofauna of Turkey with regard to the species' taxonomy, ecology and distribution.

The study of the herpetofaunal biodiversity of the East Anatolian Province of Bitlis (6,707 km<sup>2</sup>) has not come to an end yet. Pertinent information comes from published surveys covering wider areas or studies focusing on the distribution and ecology of a particular species (EISELT 1940, 1979;

BISCHOFF & BÖHME 1980; SCHMIDTLER 1986; ÖZ 1987; EISELT et al. 1992; ÖZ 1994; SCHMIDTLER 1994; SCHMIDTLER et al. 1994; STEINFARTZ 1995; AYAZ et al. 2006; SCHNEIDER & SCHNEIDER 2010; AKMAN 2013; KAPLI et al. 2013), with the emphasis on the northern part of the province.

The present study aimed to specify the species of amphibians and reptiles occurring in Bitlis, show their distribution and identify the habitat types utilized by the species. In addition, the authors' observations regarding the major factors threatening the herpetofauna is addressed.

## MATERIALS AND METHODS

The Province of Bitlis, also simply referred to as Bitlis below, was herpetologically surveyed three times during May 2015

to June 2016. Field studies were conducted in all types of suitable habitats such as wetlands, forests, steppes, dunes, high moun-

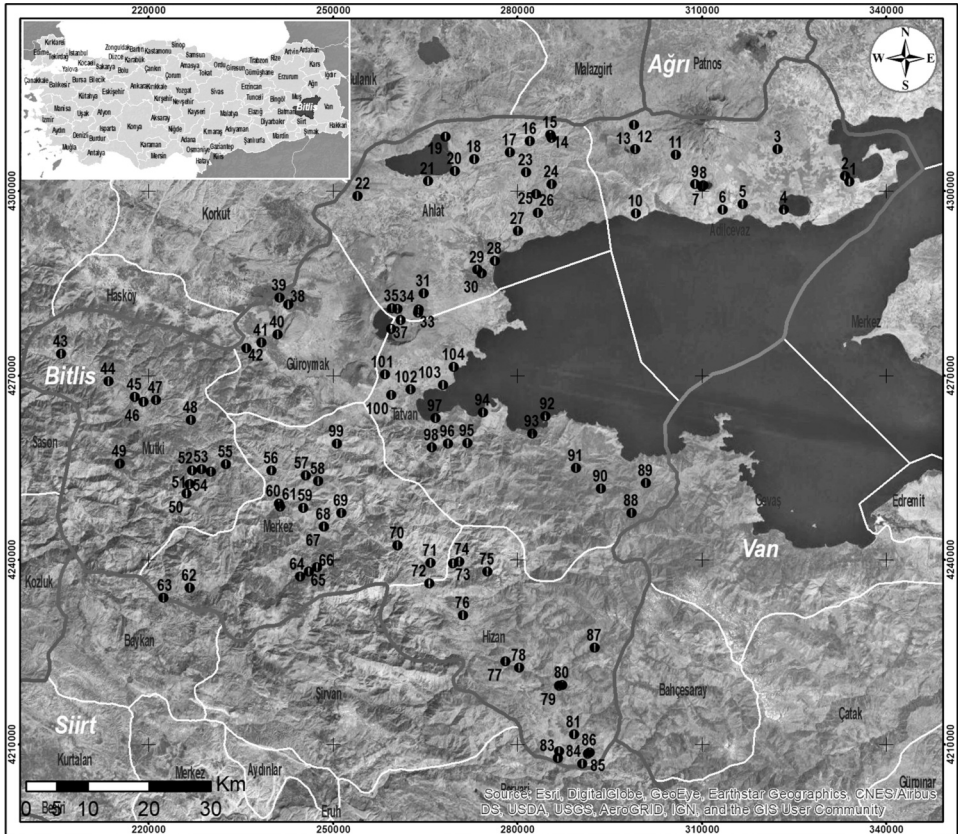


Fig. 1: Map showing the record localities of the amphibians and reptiles observed in the Province of Bitlis (Turkey). The numbering corresponds to the locality numbers and names in Table 1 and the Appendix. Gray lines represent province borders.

Abb. 1: Fundortkarte der in der türkischen Provinz Bitlis beobachteten Amphibien- und Reptilien. Die Numerierung entspricht jener der Fundorte in Tabelle 1 und im Appendix. Graue Linien stellen Provinzgrenzen dar.



Fig. 2: Amphibians and reptiles of the east Anatolian Province of Bitlis (Turkey).

Abb. 2: Amphibien und Reptilien der ostanatolischen Provinz Bitlis (Türkei).

- a – *Hyla savignyi* AUDOUIN, 1827, b – *Mediodactylus heterocercus* (BLANFORD, 1874), c – *Heremites vittatus* (OLIVIER, 1804),  
 d – *Timon kurdistanicus* (SUCHOW, 1936), e – *Eremis thospitis* SCHMIDTLER & LANZA, 1990.

tains, settlements and agricultural areas. Using Google Earth® and similar map programs, the areas were selected by visual evaluation of the satellite images during the field survey. A total of 104 localities lying approximately between 755 and 2,405 m a.s.l. (altitudinal range of Bitlis: 750-4,035 m) were surveyed during these excursions. The geographical coordinates of the recorded species were marked with a GPS device (model Garmin Montana 650) but the exact coordinates are not given here for the protection of species. The position of these localities is shown on a map (Fig. 1) and the coordinates were deposited in the Zoology Museum of the Adıyaman University (ZMADYU, Adıyaman/Turkey) and The Noah's Ark Biodiversity Database (< <http://www.nuhungemisi.gov.tr/> >, April 20, 2018; The Republic of Turkey, Ministry of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks).

Field studies were conducted by the authors. Reptile and amphibian specimens were caught by hand, and the latter using a scoop if needed. Color photographs of the live specimens were taken in their natural habitats. After examination and photographing, they were released at the points where they had been observed. The photographs of the species and their habitats were taken

using digital cameras (Nikon D80, Nikon D300s) and lenses (Sigma 90 mm Macro, 70-300 mm, 18-105 mm and 50-500 mm).

For the identification of the amphibian and reptile species collected from the study areas established literature was used (BAŞOĞLU & BARAN 1977; 1980; LEVITON et al. 1992; BARAN & ATATÜR 1998; BUDAK & GÖÇMEN 2008). Additionally, the conservation status of the amphibian and reptile species detected was indicated according to IUCN (2018) Red List of Threatened Species, CITES (2018), and Bern Convention (2018). The chorotype classification for the Near East fauna follows VIGNA TAGLIANTI et al. (1999), the amphibian and reptile habitats were categorized into 11 groups according to the following EUNIS level two habitat types (EUNIS 2018): C1 - Surface standing waters; C3 - Littoral zone of inland surface water bodies; D2 - Valley mires, poor fens and transition mires; E1 - Dry Grasslands; E2 - Mesic Grasslands; G5 - Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice; H3 - Inland cliffs, rock pavements and outcrops; H5 - Miscellaneous inland habitats with very sparse or no vegetation; I1 - Arable land and market gardens; J1 - Buildings of cities, towns and villages; and J2 - Low density buildings.

## RESULTS

A total number of 36 herpetological species belonging to four orders and 15 families were recorded in Bitlis: Urodela (Salamandridae, 2 spp.); Anura (Bufonidae, 1 sp.; Ranidae, 2 spp.; Hylidae, 1 sp.); Testudines (Geoemydidae, 1 sp.; Testudinidae, 1 sp.); Squamata - Sauria (Gekkonidae, 1 sp.; Agamidae, 3 spp.; Lacertidae, 7 spp.; Scincidae, 4 spp.) Serpentes (Boidae, 1 sp.; Colubridae, 9 spp.; Natricidae, 1 sp.; Typhlopidae, 1 sp.; Viperidae, 1 sp.). The taxonomic categories with their species are listed in Table 1 that also enumerates the locations at which the species of this study and previous studies were observed, and the conservation status of each species according to international agreements signed by Turkey. The species most commonly encountered in the study

area were *Pelophylax ridibundus* (PALLAS, 1771), *Testudo graeca* LINNAEUS, 1758, *Lacerta media* LANTZ & CYRÉN, 1920, *Ophisops elegans* MÉNÉTRIES, 1832 and *Dolichophis jugularis* (LINNAEUS, 1758).

Of the 36 species observed, one [*Neurergus strauchii* (STEINDACHNER, 1887)] is endemic to Turkey. *Eirenis thospitis* SCHMIDTLER & LANZA, 1990, previously known as Anatolian endemic was recently reported from Iraq (MOHAMAD & AFRA-SIAB 2015). The IUCN Red List of Threatened Species (IUCN 2018) classifies *N. strauchii* and *T. graeca* in the category "Vulnerable (VU)", *Salamandra infra-maculata* (MARTENS, 1885) as "Near Threatened (NT)", *Bufotes variabilis* (PALLAS, 1769) and *E. thospitis* as "Data De-

Table 1, part 1 (3): List of the amphibian and reptile species known to occur in the Turkish Province of Bitlis including record localities, status according to Bern Convention (2018), CITES (2018) and IUCN (2018) Red List classification, assignment to chorotypes (VIGNA TAGLIANTI et al. 1999) and selected references which contain herpetological records from Bitlis. International agreements and abbreviations used: IUCN (International Union for the Conservation of Nature and Natural Resources) Red List criteria (VU – Vulnerable; NT – Near Threatened; DD – Data Deficient; LC – Least Concern; NE – Not Evaluated) and the criteria of the Bern Convention (Appendix II – Strictly Protected Fauna Species; Appendix III – Protected Fauna Species). The numbers of the record localities correspond to those in Fig. 1 and the Appendix.

Tab. 1, Teil 1 (3): Liste der aus der türkischen Provinz Bitlis bekannten Amphibien- und Reptilien mit Angabe ihrer Fundorte, ihres Status gemäß Berner Konvention (2018), CITES (2018) und IUCN Roter Liste gefährdeter Arten (2018), ihrer chorotypischen Zuordnung (VIGNA TAGLIANTI et al. 1999) und Literatur, die Nachweise aus Bitlis enthält. Internationale Übereinkommen und die verwendeten Abkürzungen: IUCN (Internationale Union zur Bewahrung der Natur und natürlicher Ressourcen) Rote Liste Kriterien (VU – gefährdet; NT – potentiell gefährdet; DD – ungenügende Datengrundlage; LC – nicht gefährdet; NE – nicht beurteilt) und die Kriterien der Berner Konvention (Appendix II – streng geschützte Tierarten; Appendix III – geschützte Tierarten). Die Zahlen in der Spalte Fundorte entsprechen denen in Abb. 1 und im Appendix.

Family / Familie	Species / Art	Bern	IUCN	CITES	Chorotype	Record Localities / Fundorte	References / Literatur
Salamandridae	<i>Neuregus strauchii</i> (STEINDACHNER, 1887)	II	VU	-	Anatolian endemic	44, 45, 46, 47, 48, 53, 57, 61, 83, 84, 86, 97, 99	COŞKUN et al. (2013), BARAN & ÖZ (1986), ÖZ (1994), SCHMIDTLER (1994), SCHMIDTLER & SCHNEIDER (1970), SCHNEIDER & SCHNEIDER (2010), STEINFARTZ (1995)
Bufonidae	<i>Salamandra infra-immaculata</i> (MARTENS, 1885)	III	NT	-	SW-Asiatic	61, 83	ÇOŞKUN et al. (2013), BAŞOĞLU & ARIKAN (1990), ÖZETİ (1973), EISELT (1967), ÖZ & KARAHISAR & DEMIRSOY (2012), BAŞOĞLU & HELLMICH (1959), TOSUNOĞLU (1999)
	<i>Bufoles variabilis</i> (PALLAS, 1769)	III	DD	-	Turano-European-Mediterranean	3, 35, 37, 44, 48, 49, 50, 51, 55, 57, 61, 65, 67, 70, 75, 76, 83, 84, 86, 88, 90, 101	
Ranidae	<i>Rana macrocnemis</i> BOULENGER, 1885	III	LC	-	SW-Asiatic	22, 27, 35, 37, 69, 73, 74, 76, 96	BARAN & ATATÜR (1986), BAŞOĞLU & HELLMICH (1959), MULDER (1995)
	<i>Pelodytes rütimundus</i> (PALLAS, 1771)	III	LC	-	Turano-European-Mediterranean	8, 12, 14, 15, 16, 17, 18, 19, 20, 28, 30, 40, 41, 42, 43, 44, 45, 46, 50, 55, 57, 58, 59, 60, 61, 65, 66, 67, 68, 69, 70, 71, 73, 75, 76, 78, 80, 82, 83, 84, 86, 87, 88, 89, 90, 91, 93, 98, 99, 100, 102, 97, 98	BAŞOĞLU & HELLMICH (1959), MULDER (1995), MULDER (1995)
Hylidae	<i>Hyla savignyi</i> AUDOUIN, 1827	III	LC	-	SW-Asiatic	64, 65, 68, 69, 75, 76, 83, 86, 89,	This study (new record for Bitlis)
Geoemydidae	<i>Muremys caspica</i> (GMELIN, 1774)	II	NE	-	Turano-Mediterranean	14, 20, 39, 46, 93, 98	AYAZ et al. (2006), FRITZ & FREYTAG (1993)
Testudinidae	<i>Testudo graeca</i> LINNAEUS, 1758	II	VU	II	Turano-Mediterranean	6, 7, 8, 10, 11, 14, 21, 22, 26, 30, 31, 32, 42, 49, 50, 52, 53, 54, 55, 56, 58, 59, 61, 66, 68, 69, 72, 73, 76, 83, 86, 95, 98, 102, 103, 104	BAŞOĞLU & HELLMICH (1959), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977) BAŞOĞLU & HELLMICH (1959), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)

Table 1., part 2 (3) / Tab. 1, Teil 2 (3)

Family / Familie	Species / Art	Bern	IUCN	CITES	Chorotype	Record Localities / Fundorte	References / Literatur
Gekkonidae	<i>Mediodactylus heterocercus</i> (BLANFORD, 1874)	III	LC	-	SW-Asiatic	49, 62, 63, 83	BARAN & GRUBER (1982)
Agamidae	<i>Paralaladikia caucasia</i> (EICHWALD, 1831)	III	NE	-	Turanian	5, 10	BAŞOĞLU & HELLMICH (1959), MULDER et al. (2000), SCHMIDTLER (1986), SINDACO (1995), BAŞOĞLU & BARAN (1977)
	<i>Stellagama stellio</i> (LINNAEUS, 1758)	II	LC	-	E-Mediterranean	48, 73, 80, 83, 84, 85, 86	BARAN & ÖZ (1985), BAŞOĞLU & HELLMICH (1959), CLARK & CLARK (1973), MULDER (1995), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)
Lacertidae	<i>Trapelus lessonae</i> (DE FILIPPI, 1865)	III	LC	-	SW-Asiatic	9	BAŞOĞLU & HELLMICH (1959), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)
	<i>Apathya cappadocica</i> (WERNER, 1902)	III	LC	-	SW-Asiatic	34, 49, 54, 55, 57, 61, 62, 63, 70, 83, 84, 94, 101	BAŞOĞLU & HELLMICH (1959), EISEL (1979), KAPLI et al. (2013), LEVITON et al. (1992), MULDER (1995), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)
	<i>Darevskia raddlei</i> (BOETTGER, 1892)	III	LC	-	SW-Asiatic	10, 12, 13, 14, 16, 21, 22, 31, 35, 36, 37	BAŞOĞLU & HELLMICH (1959, 1970), SINDACO et al. (2000)
	<i>Darevskia valentini</i> (BOETTGER, 1892)	III	LC	-	SW-Asiatic	11, 13, 14, 16, 21, 22, 31, 35, 36, 37, 79, 80, 84	EISEL et al. (1992), SCHMIDTLER et al. (1994), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)
	<i>Eremias suphani</i> (BAŞOĞLU & HELLMICH 1968)	III	LC	-	SW-Asiatic	6, 7, 8	BAŞOĞLU & HELLMICH (1968), BISCHOFF & BÖHME (1979), RASTEGAR-POUYANI et al. (2013), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)
	<i>Lacerta media</i> LANTZ & CYREN, 1920	III	LC	-	SW-Asiatic	14, 15, 16, 24, 26, 27, 31, 32, 33, 42, 43, 46, 47, 49, 52, 53, 54, 55, 59, 60, 61, 66, 68, 69, 70, 73, 75, 76, 78, 80, 81, 83, 85, 86, 88, 94, 95, 96, 97, 98, 101	BAŞOĞLU & HELLMICH (1959), MULDER (1995), SCHMIDTLER (1986), SINDACO et al. (2000), BAŞOĞLU & BARAN (1977)
	<i>Ophisops elegans</i> MÉNÉTRIÉS, 1832	II	NE	-	E-Mediterranean	1, 6, 7, 8, 11, 14, 16, 17, 21, 22, 23, 24, 26, 29, 30, 31, 51, 53, 54, 55, 56, 57, 58, 59, 71, 72, 73, 75, 78, 80, 81, 83, 84, 85, 86, 94, 95, 97, 98, 101, 102	BAŞOĞLU & HELLMICH (1959), CLARK & CLARK (1973), MULDER (1995), SINDACO et al. (2000)
Scincidae	<i>Timon kardistanicus</i> (SUCHOW, 1936)	II	LC	-	SW-Asiatic	80, 83, 84	This study (new record for Bitlis)
	<i>Ablepharus chermovi</i> DAREVSKY, 1953	III	LC	-	SW-Asiatic	55, 83, 86	SINDACO et al. (2000)

Table 1, part 3 (3) / Tab. 1, Teil 3 (3).

Family / Familie	Species / Art	Bern	IUCN	CITES	Chorotype	Record Localities / Fundorte	References / Literatur
Scincidae	<i>Eumeces schneideri</i> (DAUDIN, 1802)	III	NE	-	SW-Asiatic	83, 84	EISELT (1940), SINDACO et al. (2000)
	<i>Heremites auratus</i> (LINNAEUS, 1758)	III	LC	-	SW-Asiatic	62, 63, 83, 84, 86	CLARK & CLARK (1973), BAŞOĞLU & BARAN (1977), YILMAZ (1977), SINDACO et al. (2000)
Boidae	<i>Heremites vitatus</i> (OLIVIER, 1804)	III	LC	-	Mediterranean	83, 84	This study (new record for Bitlis)
	<i>Eryx jaculus</i> (LINNAEUS, 1758)	III	NE	-	Mediterranean	6, 73	BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
Colubridae	<i>Dolichophis jugularis</i> (LINNAEUS, 1758)	II	LC	-	SW-Asiatic	4, 16, 21, 27, 35, 37, 38, 42, 43, 44, 45, 46, 49, 53, 55, 59, 61, 68, 69, 70, 73, 75, 83, 84, 86, 88, 98, 101	BAŞOĞLU & HELLMICH (1959), SINDACO et al. (2000), GÖÇMEN et al. (2013)
	<i>Dolichophis schmidti</i> (NIKOLSKY, 1909)	III	LC	-	SW-Asiatic	16, 21, 25, 42, 43, 45, 49, 55, 61, 69, 70, 73, 75, 83, 84, 88, 101	BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
	<i>Eirenis modestus</i> MARTIN, 1838	III	LC	-	SW-Asiatic	14	BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
	<i>Eirenis punctatolineatus</i> (BOETTGER, 1892)	III	LC	-	SW-Asiatic	94	BARAN (1982), EISELT (1970), SINDACO et al. (2000)
	<i>Eirenis thospitis</i> SCHMIDTLER & LANZA, 1990	III	DD	-	Anatolian endemic	83, 84	This study (new record for Bitlis)
	<i>Elaphe saurovates</i> (PALLAS, 1811)	II	NE	-	Turano-Mediterranean	21, 46, 73, 83, 84, 86, 92	BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
	<i>Hemorrhois ravergieri</i> (MÉNÉTRIÉS, 1832)	III	NE	-	Centralasiatic	4, 31, 53, 83	BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
	<i>Maipolon insignitus</i> (GEOFROY DE ST-HILAIRE, 1827)	III	NE	-	Mediterranean	73, 75, 86, 97	SINDACO et al. (2000)
	<i>Platyceps najadum</i> (EICHWALD, 1831)	II	LC	-	Turano-Mediterranean	4, 21, 55, 73, 83, 98	SINDACO et al. (2000)
	<i>Natrix tessellata</i> (LAURENTI, 1768)	II	LC	-	Centralasiatic-European	2, 12, 18, 19, 22, 35, 37, 42, 46, 49, 55, 61, 68, 69, 73, 76, 83, 86, 88, 93	BAŞOĞLU & HELLMICH (1959), BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
Natricidae	<i>Xerotyphlops vermicularis</i> (MERRIM, 1820)	III	NE	-	Turano-Mediterranean	49, 55, 61, 62, 63, 83, 86	BAŞOĞLU & HELLMICH (1959), BAŞOĞLU & BARAN (1980), SINDACO et al. (2000)
Typhlopidae	<i>Macrovipera lebetina</i> (LINNAEUS, 1758)	II	NE	-	Turano-Mediterranean	21, 61, 73, 77, 83, 84	AKMAN (2013), SINDACO et al. (2000)
Viperidae							CLARK & CLARK (1973), SINDACO et al. (2000)

Table 2: Presence or absence of 11 EUNIS (2017) level two habitat types at the record localities of 36 amphibian and reptile species in the Turkish Province of Bitlis. The column on the far right indicates the number and proportion of habitat types occupied by a particular species, the bottom row the number and proportion of species using a particular habitat type. C1 – Surface standing waters, C3 – Littoral zone of inland surface water bodies, D2 – Valley mires, poor fens and transition mires, E1 – Dry Grasslands, E2 – Mesic Grasslands, G5 – Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice, H3 – Inland cliffs, rock pavements and outcrops, H5 – Miscellaneous inland habitats with very sparse or no vegetation, I1 – Arable land and market gardens, J1 – Buildings of cities, towns and villages, and J2 – Low density buildings.

Tab. 2: Das Vorhandensein oder Fehlen von 11 EUNIS (2017) Habitattypen der zweiten Gliederungsebene an den Fundorten von 36 Amphibien- und Reptilienarten der türkischen Provinz Bitlis. Die Spalte rechts außen gibt die absolute und relative Häufigkeit der von einer Art genutzten Habitattypen an, die letzte Tabellenzeile absolute und relative Häufigkeit der Arten, die ein bestimmtes Habitat nutzen. C1 – stehende Oberflächengewässer, C3 – Uferzone von Oberflächengewässern des Inlandes, D2 – Moore verschiedener Ausprägung, E1 – trockenes Grasland, E2 – feuchtes Grasland, G5 – Baumreihen, kleine anthropogene Wälder, kürzlich gerodetes Waldland, Schonungen, Buschland, H3 – Felsformationen des Inlandes, Steinpflasterungen, Aufschlüsse, H5 – verschiedene Inlandshabitate ohne oder mit geringer Vegetation, I1 – Ackerland, Gemüsiefelder, J1 – städtische Bauformen, Städte, Ortschaften, J2 – locker bebaute Siedlungsformen.

Species / Art	C1	C3	D2	E1	E2	G5	H3	H5	I1	J1	J2	Frequency / Häufigkeit (I1 = 100 %)
<i>Neurergus strauchii</i>		+		+		+	+		+	+		6 (54.55)
<i>Salamandra infraimmaculata</i>									+			1 (9.09)
<i>Bufo variabilis</i>	+			+		+	+		+			5 (45.45)
<i>Rana macrocnemis</i>	+			+		+			+			4 (36.36)
<i>Pelophylax ridibundus</i>	+	+	+	+	+	+	+	+	+	+	+	11 (100.00)
<i>Hyla savignyi</i>						+	+		+			3 (27.27)
<i>Mauremys caspica</i>	+	+	+	+					+	+		6 (54.55)
<i>Testudo graeca</i>		+		+		+	+	+	+		+	7 (63.64)
<i>Mediodactylus heterocercus</i>						+			+			2 (18.18)
<i>Paralaudakia caucasia</i>								+	+			2 (18.18)
<i>Stellagama stellio</i>						+	+		+			3 (27.27)
<i>Trapelus lessonae</i>									+			1 (9.09)
<i>Apathya cappadocica</i>	+			+		+	+		+			5 (45.45)
<i>Darevskia raddei</i>	+			+	+	+	+	+	+			8 (72.73)
<i>Darevskia valentini</i>	+			+		+	+	+	+			6 (54.55)
<i>Eremias suphani</i>				+					+			2 (18.18)
<i>Lacerta media</i>		+		+		+	+	+	+			6 (54.55)
<i>Ophisops elegans</i>		+		+		+	+	+	+		+	7 (63.64)
<i>Timon kurdistanicus</i>						+	+		+			3 (27.27)
<i>Ablepharus chernovi</i>						+	+		+			3 (27.27)
<i>Eumeces schneideri</i>							+		+			2 (18.18)
<i>Heremites auratus</i>							+		+			2 (18.18)
<i>Heremites vittatus</i>							+		+			2 (18.18)
<i>Eryx jaculus</i>				+		+						2 (18.18)
<i>Dolichophis jugularis</i>	+	+		+		+	+	+	+			7 (63.64)
<i>Dolichophis schmidtii</i>		+				+	+	+	+			5 (45.45)
<i>Eirenis modestus</i>									+			1 (9.09)
<i>Eirenis punctatolineatus</i>							+					1 (9.09)
<i>Eirenis thospitis</i>							+		+			2 (18.18)
<i>Elaphe sauromates</i>		+				+	+		+			4 (36.36)
<i>Hemorrhois ravergieri</i>							+		+			2 (18.18)
<i>Malpolon insignitus</i>						+	+		+			3 (27.27)
<i>Platycephalus najadum</i>						+	+		+			2 (18.18)
<i>Natrix tessellata</i>	+	+		+	+	+	+		+			7 (63.64)
<i>Xerotyphlops vermicularis</i>						+	+		+			3 (27.27)
<i>Macrovipera lebetina</i>						+	+		+			3 (27.27)
Frequency / Häufigkeit (36 = 100 %)	9 25.0	10 27.8	2 5.6	15 41.7	4 11.1	25 69.4	27 75.0	12 33.3	34 94.4	2 5.6	3 8.3	



ficient (DD)”, whereas the others are placed in ‘Least Concern (LC)’ except *Mauremys caspica* (GMELIN, 1774), *Paralaudakia caucasica* (EICHWALD, 1831), *O. elegans*, *Eumeces schneideri* (DAUDIN, 1802), *Eryx jaculus* (LINNAEUS, 1758), *Elaphe sauromates* (PALLAS, 1811), *Hemorrhois ravergieri* (MÉNÉTRIÉS, 1832), *Malpolon insignitus* (GEOFFROY DE ST-HILAIRE, 1827), *Xerotyphlops vermicularis* (MERREM, 1820) and *Macrovipera lebetina* (LINNAEUS, 1758), that are categorized “Not Evaluated (NE)”. On the other hand, all the species are under protection according to the Bern criteria (Bern Convention 2018). Among them, 11 species are strictly protected (according to Appendix II) and 25 protected (listed in Appendix III). In addition, when evaluated according to CITES criteria (CITES 2018), only two species (*T. graeca* and *E. jaculus*) are under protection according to CITES Appendix II.

The herpetological species observed in Bitlis can be assigned to nine chorotype categories (Table 1). Among these, the SW-Asiatic category is represented by 18 (50.00 %), the Turano-Mediterranean category by six (16.66 %) and the Mediterranean category by three species (8.33 %). The categories Anatolian Endemic, East-Mediterranean and Turano-Europeo-Mediterranean are represented by two species each (5.55 %) and each of the categories Centralasiatic, Centralasiatic-European and Turanian by a single species (2.77 %).

*Pelophylax ridibundus* was observed in all of the 11 considered EUNIS habitat types, *T. graeca*, *Darevskia raddei* (BOETTGER, 1892), *O. elegans*, *D. jugularis* and *Natrix tessellata* (LAURENTI, 1768) in seven or eight (Table 2). Most records were made in habitat types II, H3 and G5.

Based on the impressions perceived during their field work, the authors identified habitat destruction, pollution, and collection for commercial purposes (particularly for amphibians) as the most important threats to the herpetofauna in the Province of Bitlis. The various habitats of this province accommodate a variety of herpetological species which are highly adapted to particular habitat types such as lakes, rivers, dams, canals, and streams that are important feeding and breeding areas for frogs, water turtles and aquatic snakes, with dunes, grassland and stony fields in their vicinity as important feeding grounds for amphibians and reptiles. Habitat loss due to destruction appears to be the most obvious threat to the herpetological species in Bitlis. The main process causing habitat destruction is the transformation of natural habitats to agricultural fields. Another important threat is pollution both chemical and physical. It was observed that waste including packings of agricultural pesticides had been disposed carelessly into terrestrial and wetland habitats. Additionally, *P. ridibundus* is harvested for its frogs’ legs and exported to Europe.

## DISCUSSION

This research established the presence of six species of amphibians and 30 of reptiles in the Province of Bitlis. The occurrence of five amphibian and 27 reptile species was known from previous studies, *Hyla savignyi* AUDOUIN, 1827, *Heremites vittatus* (OLIVIER, 1804), *Timon kurdistanicus* (SUCHOW, 1936) and *Eirenis thospitis* were recorded for the first time. Some published records of *H. savignyi*, *H. vittatus* and *T. kurdistanicus* are close to the boundaries of this province (SINDACO et al. 2000), so detection of these species in Bitlis was not surprising, whereas the record of *E. thospitis* at Sağırkaya (Hizan) and Hacı-

mehmet (Hizan) near the Bitlis-Siirt province border was unexpected. *Eirenis thospitis* was described based on specimens from the Turkish Province of Van (SCHMIDTLER & LANZA 1990). NAGY et al. (2003) considered *Eirenis hakkariensis* SCHMIDTLER & EISELT, 1991, described from the Turkish Province of Hakkari as a subspecies of *E. thospitis* based on studies of mitochondrial and nuclear marker genes. This view was adopted in the IUCN Red List of Threatened Species (TOK et al. 2009). However, MAHLOW et al. (2013) resurrected its full species status based on marked morphological differences in their

detailed check list of the genus *Eirenis*. Recently, MOHAMAD & AFRASIAB (2015) reported the occurrence of *E. thospitis* in northern Iraq. The Bitlis record shows that the distribution area of this snake is still insufficiently known.

*Pelophylax ridibundus*, *T. graeca*, *D. raddei*, *O. elegans*, *D. jugularis* and *N. tessellata* were observed in very different EUNIS habitat types, indicating high phenotypic plasticity as shown also by the species' wide distribution in Anatolia.

Based on the authors' observations, the most threatening factors to amphibians and reptiles in the Province of Bitlis comprise reduction in quality and quantity of the available aquatic and terrestrial habitats, environmental pollution including the easy and carefree use of agricultural pesticides, and the antipathetic behavior of the locals towards the herpetofauna. It is therefore essential and of crucial importance that the authorities inform and instruct the local population regarding the importance of amphibian and reptile conservation and

guide the rural peoples' agricultural activities.

Herpetofaunal surveys and inventory studies were important to develop profound knowledge of the Turkish herpetofauna (BIRD 1936; CLARK & CLARK 1973; BAŞOĞLU & BARAN 1977, 1980; LEVITON et al. 1992; KUMLUTAŞ et al. 2004; FRANZEN et al. 2008; GÖÇMEN et al. 2013, 2014; CİHAN & TOK 2014; YILDIZ et al. 2015; AKMAN et al. 2016). However, a comprehensive survey detailing the herpetofauna of the Province of Bitlis was not available to date. The herpetological species richness of Bitlis (36 known taxa) holds an intermediate position among the corresponding inventories of provinces in other parts of Turkey, e.g., 27 species in Iğdır (TOSUNOĞLU et al. 2010), 24 in Karabük (KUMLUTAŞ et al. 2017) and 56 species in Adana (SARIKAYA et al. 2017). The updated herpetofaunal inventory of Bitlis adds one anuran, two lizard and one snake species to the known herpetological population, providing a useful basis for conservation studies.

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## APPENDIX

Names of localities in the Province of Bitlis that were record localities of amphibians or reptiles. The numbers correspond to the numbers in Figure 1 and Table 1. Administrative districts in parentheses.

Namen der Amphibien- und Reptilienfundorte in der Provinz Bitlis. Die Nummern stimmen mit jenen in Abbildung 1 und Tabelle 1 überein. Die Namen der Landkreise stehen in Klammern.

1 - Akçıra (Adilcevaz), 2 - Akçıra (Adilcevaz), 3 - Aydınlar (Adilcevaz), 4 - Karşıyaka (Adilcevaz), 5 - Süphan (Adilcevaz), 6 - Yolçatı (Adilcevaz), 7 - Aygır (Adilcevaz), 8 - Aygır (Adilcevaz), 9 - Aygır (Adilcevaz), 10 - Danacı (Adilcevaz), 11 - Harmantepe (Adilcevaz), 12 - Batmış Lake (Adilcevaz), 13 - Dizdar (Adilcevaz), 14 - Develik (Ahlat), 15 - Develik (Ahlat), 16 - Yoğurt yemez (Ahlat), 17 - Kırkdönüm (Ahlat), 18 - Gölgören (Ahlat), 19 - Kırıkkaya (Ahlat),

20 - Gölgören (Ahlat), 21 - Dilburnu (Ahlat), 22 - Alakır (Ahlat), 23 - Kırkdönüm (Ahlat), 24 - Cemalettin (Ahlat), 25 - Cemalettin (Ahlat), 26 - Ahlat (Bitlis), 27 - Ahlat (Bitlis), 28 - Yeniköprü (Ahlat), 29 - Saka (Ahlat), 30 - Saka (Ahlat), 31 - Serinbayır (Ahlat), 32 - Nemrut (Ahlat), 33 - Nemrut (Ahlat), 34 - Nemrut caldere (Ahlat), 35 - Nemrut caldere (Ahlat), 36 - Nemrut caldere (Tatvan), 37 - Nemrut caldere (Tatvan), 38 - Budaklı (Güroymak), 39 - Budaklı (Güroymak),

40 - Budaklı (Güroymak), 41 - Değirmenköy (Güroymak) 42 - Günkırı (Güroymak), 43 - Akçağaç (Mutki), 44 - Beşevler (Mutki), 45 - Çitliyol (Mutki), 46 - Yenidoğan (Mutki), 47 - Arpaliseki (Mutki), 48 - Cığır (Mutki), 49 - Gümüşkanat (Mutki), 50 - Salman (Mutki), 51 - Salman (Mutki), 52 - Salman (Mutki), 53 - Üstyayla (Mutki), 54 - Üstyayla (Mutki), 55 - Mutki (Bitlis), 56 - Konuksayar (Bitlis), 57 - about 1,7 km from Bitlis city center to Mutki way (Bitlis), 58 - 8 Ağustos Mahallesi (Bitlis), 59 - Kireçtaşı (Bitlis),

60 - Deliktaş (Bitlis), 61 - Deliktaş (Bitlis), 62-Tanrıyar (Bitlis), 63 - Alaniçi (Bitlis), 64 - Yarönü (Bitlis), 65 - Çeltikli (Bitlis), 66 - Çeltikli (Bitlis), 67 - İçgeçit (Bitlis), 68 - İçgeçit (Bitlis), 69 - İçgeçit (Bitlis), 70 - Yolcular (Bitlis), 71 - Yolalan (Bitlis), 72 - Yolalan (Bitlis), 73 - Çökekyazı (Hizan), 74 - Çökekyazı (Hizan), 75 - Süttaş (Hizan), 76 - Karaağaç (Hizan), 77 - Yaylacık (Hizan), 78 - Yolbilen (Hizan), 79 - Doğancı (Hizan),

80 - Doğancı (Hizan), 81 - Gönüllü (Hizan), 82 - Sağırkaya (Hizan), 83 - Sağırkaya (Hizan), 84 - Hacımehmet (Hizan), 85 - Döküktaş (Hizan), 86 - Döküktaş (Hizan), 87 - Ke-  
pirli (Hizan), 88 - Kağanlı (Tatvan), 89 - Dağdibi (Tatvan), 90 - Kaynarca (Tatvan), 91 - Köprücük (Tatvan), 92 - Yelkenli (Tatvan), 93 - Koyluca (Tatvan), 94 - Tokaçlı (Tatvan), 95 - Obuz (Tatvan), 96 - Yoncabaşı (Tatvan), 97 - Hanelmalı (Tatvan), 98 - Küçüksu Bucağı (Tatvan), 99 - Beşminare (Bitlis),

100 - Benekli (Tatvan), 101 - Benekli (Tatvan), 102 - Tatvan (Bitlis), 103 - Kıyıldüzü (Tatvan), 104 - Kıyıldüzü (Tatvan).

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