

Research on the Herpetofauna of Başkomutan Historical National Park, Afyonkarahisar, Turkey

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Abstract. Amphibians and reptiles of the Başkomutan Historical National Park (B.H.N.P), situated within the borders of Afyonkarahisar province, were investigated between 2009 and 2013. Among the total 106 specimens collected from field work, 21 amphibians and reptiles belong to 13 families were identified. Of these, 1 was urodelan, 6 were anuran, 1 was a turtle, 1 was a tortoise, 7 were lizards and 5 were snakes. A zoogeographic analysis showed that the herpetofauna of B.H.N.P could be classified into at least 9 chorotypes in total. The most dominant chorotype being the Eastern-Mediterranean with 5 species, followed by the Turano-Europeo-Mediterranean and Turano-Mediterranean with four and Endemics Anatolia with three species. Detailed distribution data of this study could be basis for future action plans, protection and conservation measures of amphibian and reptiles in B.H.N.P.

Key words: amphibians, reptiles, Anatolia, nature protection.

Introduction

Anatolia is at the intersection point of the Asian, European and African continents such as this feature makes it a land rich in biological diversity due to its good ecosystems that enable animals to find food, shelter and migrate. On the other hand, over the last 40 years, various factors such as global warming, excessive increase in the human population and habitat destruction have caused disturbances to these natural ecosystems. These factors have resulted in a decreasing numbers of species living in their natural environments (Drost & Fellers 1996, Houlahan et al. 2000, Antal & Puttonen 2006, IUCN 2014). As a result of these conditions, modern mankind began to understand the natural and cultural values of the environment and accelerated activities for the protection of ecosystems as they were. These are performed either voluntarily or by conducting research/conservation activity projects. Moreover, national parks, which have both national and international values due to their scientific and aesthetic features, not only protect the integrity of the ecosystem but also have some scientific, educational and recreational uses.

Due to its various topographical, geological and climatic features, Turkey has a very high level of biodiversity, encompassing a wide range of different groups. Turkey has 40 national parks, of which only 5 have been studied for their herpetofauna (Uğurtaş 1989, Doğan 1998, Kumlutaş et al. 2001 Kumlutaş & Ilgaz 2005, Hür et al. 2008). On the other hand, some of the mountains' herpetofauna have also been studied in western Anatolia (Kumlutaş et al. 2000, Arıkan et al. 2001, Özdemir & Baran 2002, Kumlutaş et al. 2004, Afşar & Tok 2011).

The Başkomutan Historical National Park (B.H.N.P) is situated near Afyon, Kütahya and Uşak provinces of western Anatolia. Although both the vegetation and flora of the B.H.N.P, which are situated in the inner-west part of Anatolia and possess a potential for cultural tourism, have already been studied, no research on its fauna have been reported (Vural et al. 1985, Akçiçek 2003, Kargioğlu 2003). The aim of this study was to determine both amphibian and reptile fauna of the study area. We believe that the results of the

study will generate very remarkable data that will contribute to the knowledge on both western and inner Anatolian herpetofauna.

Material and Methods

From 2009 to 2013, a total of 106 amphibian and reptile specimens belonging to 21 species were collected during our excursion to the B.H.N.P., which is approximately between 1000 and 1834 m in elevation. The study area was divided into the following 4 stations: Station 1 (1000 - 1200 m a.s.l.): Ataköy and Kışlacık villages; Station 2 (1100 - 1800 m a.s.l.): Büyükkalecik and Küçükalecik towns, Gölcük plateau and Gölcük Lake; Station 3 (1050 - 1150 m a.s.l.): Akören Lake and Erkmen town and Station 4 (1100 - 1830 m a.s.l.): Kayadibi, Tınaztepe and Ahmetpaşa towns and the Kumalar Mountains (Fig. 1).

They were transferred to the laboratory of the Zoology Section of the Department of Biology at Afyon Kocatepe University, and their morphometric measurements were taken, as they were in an inactive form, at +4°C; after establishing their taxonomic status, they were released to their natural habitats. All species were identified by comparing key morphological characteristics, such as the number of scales and plates, colour and pattern characteristics and body measurements and ratios, with previous herpetofaunistic studies (e.g., Schmidtler 1975, Baran 1976, 1977a, 1977b, 1982, Başoğlu & Baran 1980, Yılmaz & Uğurtaş 1990, Tok 1993, 1999a, 1999b, 1999c, Göçmen et al. 1996, 2003, Baran & Atatür 1998, Ayaz 2003, Kumlutaş et al. 2004, Afşar 2006, Cihan 2007, Güçlü & Olgun 2008, Afşar et al. 2011). The material list is presented in Table 1.

Result

This study was based on a total of 106 specimens collected from the B.H.N.P. The specimens were obtained during the regularly performed field work. Detailed excursions to the study area yielded 13 families, 19 genera and 21 species. Of these, 1 species was an urodelan, 6 species were anurans, 1 was a tortoise, 1 was a turtle, 7 were lizards and 5 were snakes. In this study, the anuran populations showed the highest abundance (N = 41), followed by lizards (N = 26), urodelan, turtles, tortoises (N = 10) and snakes (N = 9). The distribution of the species according to the stations is pre-

sented in Table 1. Stations 2 and 3 showed higher species diversity compared with the other stations; 4 amphibian, 1 tortoise, 1 turtle, 3 lizard and 2 snake species were collected from Station 2, whereas 3 amphibian, 1 tortoise, 1 turtle, 5 lizard and 4 snake species were collected from Station 3. The importance of this study lies in the discovery of *Triturus karelinii*, *Pelophylax caralitanus*, *Testudo graeca*, *Natrix natrix*, *Natrix tessellata*, *Pelophylax ridibundus*, *Emys orbicularis*, *Anatololacerta danfordi* and *Bufo variabilis* in the research area. Specimens of these species were collected for the first time from B.H.N.P (Table 1). Moreover, we determined for the first time that this species lives in the north-east part of the

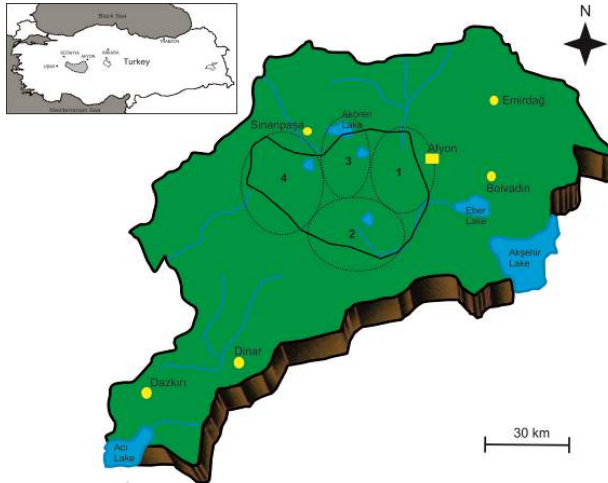


Figure 1. The stations in which specimens were collected: Station 1 (1000 m. - 1200 m a.s.l.) : Ataköy and Kışlacık villages; Station 2 (1100 - 1800 m a.s.l.): Büyükkalecik and Küçükalecik towns, Gölçük plateau and Gölçük Lake; Station 3 (1050 m - 1150 m. a.s.l.): Akören Lake, Erkmén town; Station 4 (1100 m - 1830 m a.s.l.): Kayadibi, Tınaztepe and Ahmetpaşa towns, Kumalar Mountains.



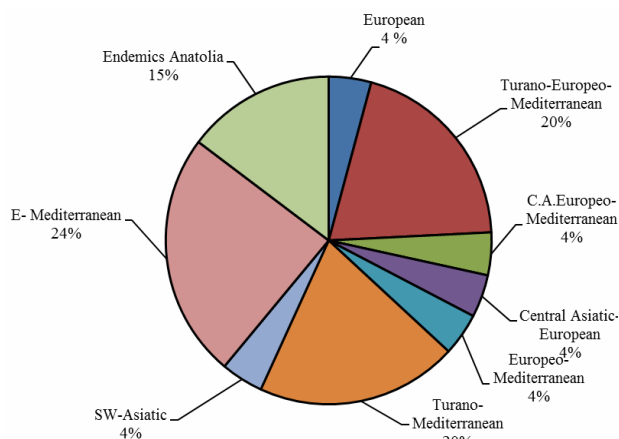
Figure 2. General views of specimens of *Pelobates syriacus* (a), *Rana macrocnemis* (b), *Typhlops vermicularis* (c), *Parvilacerta parva* (d) and *Lacerta trilineata* (e), *Platyceps najadum* (f) from Başkomutan Historical National Park.

Table 1. The list of Amphibian and reptile species in Başkomutan Historical National Park, an asteriks (*) indicates new records for the study area the province of Başkomutan Historical National Park.

Family	Species	Amount of the specimens (N)	IUCN	Station
Salamandridae	<i>Triturus karelini</i> (Strauch, 1870)	10 (6♂♂; 4♀♀)	LC	2
Bufo	<i>Bufo variabilis</i> (Pallas, 1769)	10 (5♂♂; 5♀♀)	LC	2, 3, 4
Hylidae	* <i>Hyla orientalis</i> (Bedriaga, 1890)	5 (3♂♂; 2♀♀)	LC	2
Pelobatidae	* <i>Pelobates syriacus</i> , Boettger, 1889	1 ♂	LC	3
Ranidae	<i>Pelophylax ridibundus</i> (Pallas, 1771)	10 (6♂♂; 4♀♀)	LC	1, 3, 4
	<i>Pelophylax caralitanus</i> (Arıkan, 1988)	10 (7♂♂; 3♀♀)	NT	2
	* <i>Rana macrocnemis</i> Boulenger, 1885	5 (3♂♂; 2♀♀)	LC	4
Emydidae	<i>Emys orbicularis</i> (Linnaeus, 1758)	10 (7♂♂; 3♀♀)	NT	2, 3, 4
Testudinidae	<i>Testudo graeca</i> Linnaeus, 1758	10 (5♂♂; 5♀♀)	VU	1, 2, 3, 4
Gekkonidae	* <i>Mediodactylus kotschyi</i> (Steindachner, 1870)	1 ♂	LC	1
Agamidae	* <i>Stellaagama stellio</i> (L., 1758)	6 (4♂♂; 2♀♀)	LC	1, 3
Lacertidae	<i>Anatololacerta danfordi</i> (Günther, 1876)	3 (2♂♂; 1♀♀)	LC	1, 2, 3
	* <i>Parvilacerta parva</i> (Boulenger, 1887)	4 (3♂♂; 1♀♀)	LC	3
	* <i>Lacerta trilineata</i> Bedriaga, 1886	6 (5♂♂; 1♀♀)	LC	1, 2, 3, 4
	<i>Ophisops elegans</i> Menetries, 1832	5 (4♂♂; 1♀♀)	LC	1, 3, 4
Scincidae	* <i>Trachylepis vittata</i> (Olivier, 1804)	1 ♂	LC	2
Typhlopidae	* <i>Typhlops vermicularis</i> Merrem, 1820	1 ?	LC	3
Colubridae	* <i>Dolichophis caspius</i> (Gmelin, 1789)	2 ♂♂	LC	2, 3
	* <i>Platyceps najadum</i> (Eichwald, 1831)	1 ♀	LC	4
	<i>Natrix natrix</i> (L., 1758)	3 (3♂♂)	LC	2, 3, 4
	<i>Natrix tessellata</i> Laurenti, 1768	2 (1♂; 1♀)	LC	3, 4
	Total	106 (70♂♂; 35♀♀; 1?)		

Table 2. Chorotype classification of amphibians and reptiles in the Başkomutan Historical National Park.

Chorotype	Amphibia	Reptilia	Species
European	1		<i>Triturus karelini</i>
Turano-European-Mediterranean	2	2	<i>Pelophylax ridibundus</i> , <i>Bufo variabilis</i> , <i>Emys orbicularis</i> , <i>Dolichophis caspius</i>
Central Asiatic-European		1	<i>Natrix tessellata</i>
C. Asiatic-European-Mediterranean		1	<i>Natrix natrix</i>
Europeo-Mediterranean	1		<i>Hyla orientalis</i>
Turano-Mediterranean	1	3	<i>Pelobates syriacus</i> , <i>Testudo graeca</i> , <i>Platycephalus najadum</i> , <i>Typhlops vermicularis</i>
SW-Asiatic	1		<i>Rana macrocnemis</i>
E- Mediterranean		5	<i>Stellagama stellio</i> , <i>Ophisops elegans</i> , <i>Lacerta trilineata</i> , <i>Mediodactylus kotschy</i> , <i>Trachylepis vittata</i>
Endemics Anatolia	1	2	<i>Pelophylax caralitanus</i> , <i>Parvilacerta parva</i> , <i>Anatololacerta danfordi</i>

**Figure 3.** Percentages of the main chorotypes of the Başkomutan Historical National Park.

Kumalar Mountains, which is situated in Station 4 (Table 1, Fig. 2), and that *Pelobates syriacus* known to be distributed in southern Anatolia is found around the Akören Lake in Station 3 (Table 1, Fig. 2). This is also the first report on the presence of this species in the inner-west part of Anatolia. The endemic Beyşehir frog specimens, identified as *P. caralitanus*, live only in and/or around the Gölçük Lake (Station 3).

The reptile species (*Mediodactylus kotschy*, *Stellagama stellio*, *Lacerta trilineata*, *Dolichophis caspius*, and *Platycephalus najadum*) not listed in the literature has also been identified in the study area for the first time (Table 1).

Anatolia is a predominantly mountainous area whose diverse geomorphology produces many different climatic regions and vegetation types. Sindaco et al. (2000) previously described the characteristics and geomorphology of Anatolia in a checklist study of Anatolian herpetofauna. Based on their distributions, the species recorded in the B.H.N.P could be divided into 9 chorotypes (Vigna et al. 1999, Sindaco et al. 2000, Fet & Popov 2007) (Table 2). The percentage values are shown in Figure 3. The B.H.N.P, which runs from north-west to west-east in the inner-west part of Anatolia, has a continental and semi-arid climate, with cold and snowy winters and hot and dry summers. The southern slopes are affected by the Mediterranean transition due to its geographical position, in which 24% of the species belong to the Eastern Mediterranean and 20% to the Turano-Mediterranean and Turano-European-Mediterranean chorotypes. The endemic Anatolia chorotype was represented by 3 species (15%). European and Central Asiatic-European-

Mediterranean, Central Asiatic-European, Europeo-Mediterranean and SW-Asiatic chorotypes were represented by only 1 species (4%) each (Fig. 3).

The most common amphibians in the B.H.N.P included *Bufo variabilis* (Pallas, 1769) and *P. ridibundus* (Pallas, 1771). The most common reptiles included *T. graeca* (L., 1758) and *L. trilineata* (Bedriaga, 1886), the presence of which are reported for first time in all these stations. The species reported in different stations in this area that were observed in the present study included *Hyla orientalis* (Bedriaga, 1890), *Pelobates syriacus* (Boettger, 1889), *R. macrocnemis* (Boulenger, 1885), *M. kotschy* (Steindachner, 1870), *S. stellio* (L., 1758), *Parvilacerta parva* (Boulenger, 1887), *T. vittata* (Olivier, 1804), *T. vermicularis* (Merrem, 1820), *D. caspius* (Gmelin, 1789) and *P. najadum* (Eichwald, 1831).

Discussion

In this research, 21 species of 13 amphibian and reptile families were detected in the vicinity of B.H.N.P. Of these, 1 is urodelan, 6 are anurans, 1 is a tortoise, 1 is a turtle, 7 are lizards, and 5 are snakes. The anurans population here had the highest abundance (43.46%), followed by reptiles (27.56%), urodelan, turtles, tortoises (10.26%), and snakes (9.54%). Among these, of *Triturus karelini*, *Pelophylax caralitanus* (Öz et al. 2009), *Testudo graeca* (Kiremit 2005), *Natrix natrix*, *Natrix tessellata*, *Pelophylax ridibundus* (Kaya & Erişmiş 2001), *Emys orbicularis* (Ayaz 2003), *Anatololacerta danfordi* (Budak 1976), *Bufo variabilis* (Erişmiş 2011) and *Ophisops elegans* (İret & Baran 2001) were found to be new records for the study area's herpetofauna (Table 1). *Rana macrocnemis*, one of the Anatolian mountain frogs, was formerly known to live in the Sultan Mountains and Murat Mountain (Özdemir & Baran 2002, Afşar & Tok 2011). Moreover, there were some isolated records of populations of *Trachylepis vittata* and *Typhlops vermicularis* from central Anatolia (Sindaco et al. 2000, Afşar & Tok 2011).

In this research, it was determined for the first time that *Rana macrocnemis* lives in the north-east part of the Kumalar Mountains, which is situated in Station 4 and that *Pelobates syriacus* known to be distributed in southern Anatolia is found around the Akören Lake in Station 3 of B.H.N.P. This is also the first report on the presence of this species in the inner-west part of Anatolia.

This study emphasises the importance of the B.H.N.P as a herpetological area, although the impact of anthropogenic activities is increasing. Protection of natural and cultural

values, tourism, preserve, evaluate and play a leading role in the promotion. However, uncontrolled tourism and daily or weekend visitors whose picnicking and camping lead to environmental pollution are wasteful, and also, this issue has not received sufficient supervision. Therefore, there is a need for the management of mountainous areas, requests for tourists, local people's needs and the need to ensure a sustainable balance between conservation of the natural resource. We therefore suggest better protection of the B.H.N.P accompanied by more detailed flora and fauna studies, which would provide more comprehensive data regarding its biological and ecological characteristics and better insights into management strategies. All of these natural and cultural resource values in the Inner Western Anatolia, B.H.N.P primarily a source of important alternative for the country.

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