

1-1-2014

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LIDIJA POLOVIC

NATALIJA CADENOVIC

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### Recommended Citation

POLOVIC, LIDIJA and CADENOVIC, NATALIJA (2014) "The herpetofauna of the Great Ulcinj Beach area including Ada Island (Montenegro)," *Turkish Journal of Zoology*: Vol. 38: No. 1, Article 15. <https://doi.org/10.3906/zoo-1303-7>

Available at: <https://journals.tubitak.gov.tr/zoology/vol38/iss1/15>

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## The herpetofauna of the Great Ulcinj Beach area including Ada Island (Montenegro)

Lidija POLOVIĆ\*, Natalija ČAĐENOVIĆ

The Natural History Museum of Montenegro, Podgorica, Montenegro

Received: 05.03.2013 • Accepted: 09.09.2013 • Published Online: 01.01.2014 • Printed: 15.01.2014

**Abstract:** In this paper, we present the results of a study conducted in the Great Ulcinj Beach area, including its hinterland and Ada Island. In the study area, we recorded 10 species of amphibians (*Lissotriton vulgaris*, *Bombina variegata*, *Bufo bufo*, *Pseudepidalea viridis*, *Hyla arborea*, *Pelophylax ridibundus*, *Pelophylax lessonae*, *Pelophylax shqipericus*, *Rana dalmatina*, and *Rana temporaria*) and 20 species of reptiles (*Testudo hermanni*, *Emys orbicularis*, *Mauremys rivulata*, *Caretta caretta*, *Hemidactylus turcicus*, *Lacerta viridis*, *Lacerta trilineata*, *Podarcis muralis*, *Podarcis melisellensis*, *Anguis fragilis*, *Pseudopus apodus*, *Natrix natrix*, *Natrix tessellata*, *Hierophis gemonensis*, *Dolichophis caspius*, *Zamenis longissimus*, *Elaphe quatuorlineata*, *Malpolon insignitus*, *Telescopus fallax*, and *Vipera ammodytes*). *Mauremys rivulata* and *Telescopus fallax* were recorded for the first time in this area.

**Key words:** Amphibians, reptiles, species list, *Mauremys rivulata*, *Telescopus fallax*

There are no detailed studies on the herpetofauna of southern Montenegro, and so it can be considered as unexplored. The Great Ulcinj Beach area is located in the southernmost part of Montenegro and belongs to the Mediterranean region. The beach is more than 12 km long, partly bordered by wide natural dunes connected by brackish and freshwater habitats. The large number of species reflects the great diversity of habitat types, from wet habitats to dry terrestrial habitats. In spite of the great number of amphibian and reptile species, including many rare and endemic taxa, detailed studies on the herpetofauna of this area are very scarce (Radovanović, 1951; Jovanović, 2009).

Recent studies have also revealed the existence of considerable genetic diversity in several taxa along the broader zone of the Adriatic coast (which includes the Great Ulcinj Beach area), such as *Vipera ammodytes* (Ursenbacher et al., 2008), *Testudo hermanni* (Fritz et al., 2006), *Emys orbicularis* (Fritz et al., 2007), and *Lacerta viridis* complex (Böhme et al., 2007).

The entirety of Great Ulcinj Beach is protected as a natural monument, but massive impacts, including illegal building, excavation of sand, solid waste disposal, automobiles driving on beaches, and the creation of new roads and trails to reach remote parts of the dune landscape, are widespread.

The main aims of our study were: 1) to provide basic data about composition and distribution of amphibian

and reptile species in the area, and 2) to contribute to the knowledge of Montenegrin herpetofauna in general. Such information provides a basis for possible future conservation programs.

The data were collected during field surveys in 2011 and 2012. The specimens were mostly directly observed, but some of them were captured and released in the study area after determination. We also identified specimens killed by predators, cars, or local people. Killed specimens were preserved with 70% ethanol and stored in the herpetological collections of the Natural History Museum of Montenegro. Determination of amphibian and reptile species was conducted using appropriate literature (Radovanović, 1951; Arnold and Ovenden, 2002; Kwet, 2009). A total of 687 observations were recorded for the amphibian species and 280 for the reptile species (Table) in the 15 investigated localities (Figure).

As it now stands, from 17 amphibian species and 36 reptile species known for the territory of Montenegro (Džukić, 1991; Crnobrnja-Isailović and Džukić, 1995; Džukić, 1995; Tomović et al., 2004; Ljubisavljević et al., 2007; Polović and Ljubisavljević, 2010), 10 amphibian species (59%) and 20 reptile species (56%) were recorded in this area. One of the recorded species belonged to Caudata, 9 were anurans, 1 was a tortoise, 1 was a sea turtle, 2 were terrapins, 7 were lizards, and 9 were snakes (Table). Only 20 amphibian and reptile species had been previously identified in this area (Jovanović, 2009).

\* Correspondence: lidijapolo@t-com.me

**Table.** List of amphibian and reptilian species (n: number of specimens).

Family	Species	N	Localities
Salamandridae	<i>Lissotriton vulgaris</i> (Linnaeus, 1758)	1	15
Bombinatoridae	<i>Bombina variegata</i> (Linnaeus, 1758)	5	13, 14
Bufonidae	<i>Bufo bufo</i> (Linnaeus, 1758)	34	2, 4, 5, 7, 12, 13
	<i>Pseudepidalea viridis</i> (Laurenti, 1768)	50	7, 12
Hylidae	<i>Hyla arborea</i> (Linnaeus, 1758)	5	4, 7
Ranidae	<i>Pelophylax ridibundus</i> (Pallas, 1771)	441	2, 4, 5, 6, 7, 8, 10, 12, 13, 14, 15
	<i>Pelophylax lessonae</i> (Camerano, 1882)	127	5, 7, 8, 9, 10, 11, 12, 14
	<i>Pelophylax shqipericus</i> (Hotz, Uzzell, Günther, Tunner and Heppich, 1987)	20	12
	<i>Rana dalmatina</i> Bonaparte, 1840	2	9, 14
	<i>Rana temporaria</i> Linnaeus, 1758	2	7, 13, 14
Emydidae	<i>Emys orbicularis</i> (Linnaeus, 1758)	46	3, 4, 5, 7, 9, 10, 11, 13, 14, 15
Geoemydidae	<i>Mauremys rivulata</i> (Valenciennes, 1833)	15	3, 14
Testudinidae	<i>Testudo hermanni</i> Gmelin, 1789	40	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
Cheloniidae	<i>Caretta caretta</i> (Linnaeus, 1758)	4	2, 5, 9
Gekkonidae	<i>Hemidactylus turcicus</i> (Linnaeus, 1758)	3	10, 12
Lacertidae	<i>Podarcis muralis</i> (Laurenti, 1768)	27	2, 9, 10, 11, 12, 13, 14, 15
	<i>Podarcis melisellensis</i> (Braun, 1877)	62	3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15
	<i>Lacerta viridis</i> (Laurenti, 1768)	2	8, 12
	<i>Lacerta trilineata</i> Bedriaga, 1886	4	8, 11, 13
Anguidae	<i>Pseudopus apodus</i> (Pallas, 1775)	6	2, 4, 7
	<i>Anguis fragilis</i> Linnaeus, 1758	2	7, 10
Colubridae	<i>Malpolon insignitus</i> (Geoffroy Saint- Hilaire, 1827)	2	10, 12
	<i>Telescopus fallax</i> (Fleischmann, 1831)	1	15
	<i>Natrix natrix</i> (Linnaeus, 1758)	31	2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
	<i>Natrix tessellata</i> (Laurenti, 1768)	15	2, 3, 5, 7, 9, 11, 13, 14, 15
	<i>Hierophis gemonensis</i> (Laurenti, 1768)	2	13, 14
	<i>Dolichophis caspius</i> (Gmelin, 1789)	5	7, 9, 10, 11
	<i>Zamenis longissimus</i> (Laurenti, 1768)	1	10
Viperidae	<i>Elaphe quatuorlineata</i> (Lacépède, 1789)	8	6, 7, 9, 10
	<i>Vipera ammodytes</i> (Linnaeus, 1758)	4	12, 13, 15

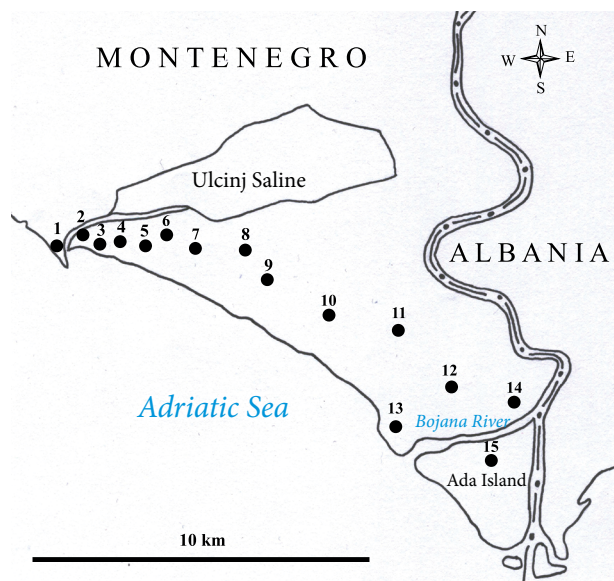
Based on the number of recorded specimens, the most abundant amphibian species in the study area are *Pelophylax ridibundus* (Pallas, 1771), *Pelophylax lessonae* (Camerano, 1882), and *Pseudepidalea viridis* (Laurenti, 1768); the most abundant reptile species are *Podarcis melisellensis* (Braun, 1877), *Emys orbicularis* (Linnaeus, 1758), and *Testudo hermanni* Gmelin, 1789 (Table).

This study is particularly important because the specimens of *Mauremys rivulata* and *Telescopus fallax* were documented in the research area for the first time. Both species are protected by national legislation.

*Mauremys rivulata* (Valenciennes, 1833) inhabits the Balkan Peninsula north to Montenegro and extreme southern Croatia, Macedonia, Greece, many of the Aegean islands including Crete and Cyprus, southern Bulgaria,

western and southern Turkey, and the coastal strip of Syria and Lebanon to Israel and Jordan (Radovanović, 1951; Wischuf and Busack, 2001; Arnold and Ovenden, 2002; Rifai and Amr, 2004). The stripe-necked terrapin is now recorded for the first time in the Great Ulcinj Beach area and for the second time in Montenegro. The only known record of this species for Montenegro was also on the Adriatic coast, in Boka Kotorska Bay (Radovanović, 1951, 1964).

The distribution of *Telescopus fallax* (Fleischmann, 1831) includes the eastern Adriatic coast and islands southwards from extreme northeastern Italy, the southern Balkans southward from Macedonia and southeastern Bulgaria, many of the Aegean islands including Crete and Rhodes, Malta, Turkey, and also the Caucasus



**Figure.** The study area where the species were registered (localities: 1–15).

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- Acknowledgments**  
We would like to thank the 3 reviewers for language corrections, constructive comments, and helpful suggestions that greatly improved the interpretation of our data. Part of this study was conducted within the framework of the Program of Biodiversity Monitoring (2012), supported by the Environmental Protection Agency and Natural History Museum of Montenegro.
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