

**First data on the fauna of amphibians and reptiles of the lower Una River
and its coastal area**

**Prilog poznavanju faune vodozemaca i gmazova donjeg dijela rijeke Une i
njenog priobalnog pojasa**

DUŠAN JELIĆ & DEAN KARAICA

¹State Institute for Nature Protection, Trg Mažuranića 5, 10 000 Zagreb, Croatia

²Croatian Herpetological Society HYLA, Radučka 15, 10 000 Zagreb, Croatia

Corresponding author: DUŠAN JELIĆ, State Institute for Nature Protection, Trg Mažuranića 5, 10 000 Zagreb,
jelic.dusan@gmail.com

SUMMARY:

With this paper the authors wanted to gather more information about the presence of reptilian and amphibian species in the area of lower Una River and its surroundings. For this purpose field surveys in the form of active searching in promising places was conducted on four separate occasions in 2009. Here we present the list of 10 amphibian species (plus one klepton) and 7 reptile species recorded during the course of our study. 11 of these, all together 18 taxa, are in the strictly protected and 7 of them are in the protected category according to the Croatian Nature Protection Act.

Key words: Amphibia, Reptilia, herpetofauna, Una River, protection, conservation

SAŽETAK:

S ovim radom autori su željeli prikupiti više informacija o prisutnosti vodozemaca i gmazova na širem području donjeg toka rijeke Une. U tu svrhu tokom 2009. godine provedena su iscrpna terenska istraživanja u obliku aktivnog pretraživanja terena na pogodnim staništima. Ovdje donosimo popis 10 vrsta vodozemaca (plus jedan “klepton”) i 7 vrsta gmazova zabilježenih tijekom našeg istraživanja. 11 od njih nalazi se u kategoriji strogo zaštićenih, a sedam u kategoriji zaštićenih svojti prema Zakonu o zaštiti prirode Republike Hrvatske.

Ključne riječi: vodozemci, gmazovi, herpetofauna, Una, zaštita

INTRODUCTION

River Una has a total length of 212 km and it flows through Croatia and Bosnia and Herzegovina. The Una spring, also known as Vrelo Une, is located at the north-eastern slopes of the Stražbenica Mountain in Croatia and represents one of the deepest explored springs in Croatia (~ 205 m deep). In its upper parts it is a fast flowing river with mountain characteristics, but in its lower course it becomes a large lowland river which joins river Sava, as its right tributary, at the town of Jasenovac (Bognar 2005).

Moderate continental climate of the area along the Una River is characterized by mild summers with the highest precipitation period from August to December (Table 1.). The most prominent and interesting geomorphological characteristics (beside numerous rapids, cascades and waterfalls) of the rivers longitudinal profile are calcareous sinter small barriers (the most numerous), sinter riverbeds and calcareous sinter caves and islets inhabited by higher, even forest vegetation (Bognar 2005).

Typical vegetation of the mentioned area are mesophyllous sessile oak and hornbeam forests (*Epimedio-Carpinetum betuli* (Ht. 1938) Borhidi 1963), while by the mouth of the river Una and its lower course alluvial forests with black alder (*Alnion glutinosae* Malcuit 1929) as well as alluvial willow and poplar forests (*Salicion albae* Soó 1930 and *Populion albae* Br.-Bl. 1931) prevail (Boršić et al. 2012).

Whole area of Central Croatia is in climatic sense a kind of transitional area, where a strong influence of the general climatic circulation, characteristic for these geographical latitudes, is present, but it is also strongly influenced by the large Panonic lowlands on one side and high mountains of the Alps and Dinarids on the other side. Mentioned mountains also weaken the

influence of the warm climate coming from the Atlantic ocean and Adriatic sea (Crkvenčić et al., 1974).

Table 1. Climate data for Hrvatska Kostajnica, which represents the climate conditions in the area along the Una River, as part of Central Croatia; Meteorological and Hydrological Service 1998-2008.

Tablica 1. Klimatski podatci za Hrvatsku Kostajnicu, koja predstavlja klimatske uvijete područja istraživanja uz donje dijelove rijeke Une, kao dijela središnje Hrvatske; DHMZ 1998-2008

Month	Average air temperature (°C)	Precipitation (mm)	Una water level (cm)
January	0,5	73,5	247,3
February	2,5	60,4	250,6
March	6,5	69,3	297,8
April	11,2	97,2	291,1
May	15,8	74,8	174,3
June	19,4	87,2	155,7
July	20,7	79,7	86,5
August	20,2	90,6	84,3
September	15	126,3	169,5
October	11,4	85,8	174
November	5,9	99,9	252,2
December	1	91,6	263,4
Σ; x	x = 10,9	Σ = 1036,4	Σ = 2446,6

The data about reptile and amphibian species presence, for the research area and surrounding areas, is only scarcely represented in most of the previous publications (Rossler 1904, Karaman 1921, Pavletić 1964, Schneider-Jacoby & Ern 1993) and the data for the usual continental species do not exist. Most of the authors just cite occasional findings or samples deposited in museum collections. Rossler (1904) was the first to mention the finding of the *Vipera ammodytes* by Mr. Omčikus somewhere around Srb (upper Una area in Lika, Croatia). Later both Karaman (1921) and Pavletić (1964) mention the samples of *Natrix natrix* and *Podarcis muralis* from Kostajnica, deposited in the Croatian natural History Museum in

Zagreb, but no precise data is given. These two samples actually represent the only literature data present for our precise research area. Schneider-Jacoby & Ern (1993) in their book present nine usual species of herpetofauna occurring in Lonjsko polje Nature Park, and this species are expected in our research area as well.

MATERIALS AND METHODS

With this study the authors wanted to remedy the deficiency of data for the Una River area by gathering information about the presence and precise localities for any reptilian and amphibian species commonly found in the continental region of Croatia. For this purpose field surveys in the form of active searching in promising places was conducted on four separate occasions (08. April, 11. - 12. May, 01. June and 15. June 2009.) during which 20 different localities along the Una River course from Jasenovac to Dvor (Fig 1.) were checked. Two persons on average conducted the search. The goal was to find species which were never recorded and to confirm the occurrence of the species already mentioned in the available and published data sets covering the nearest localities to the Una River area.

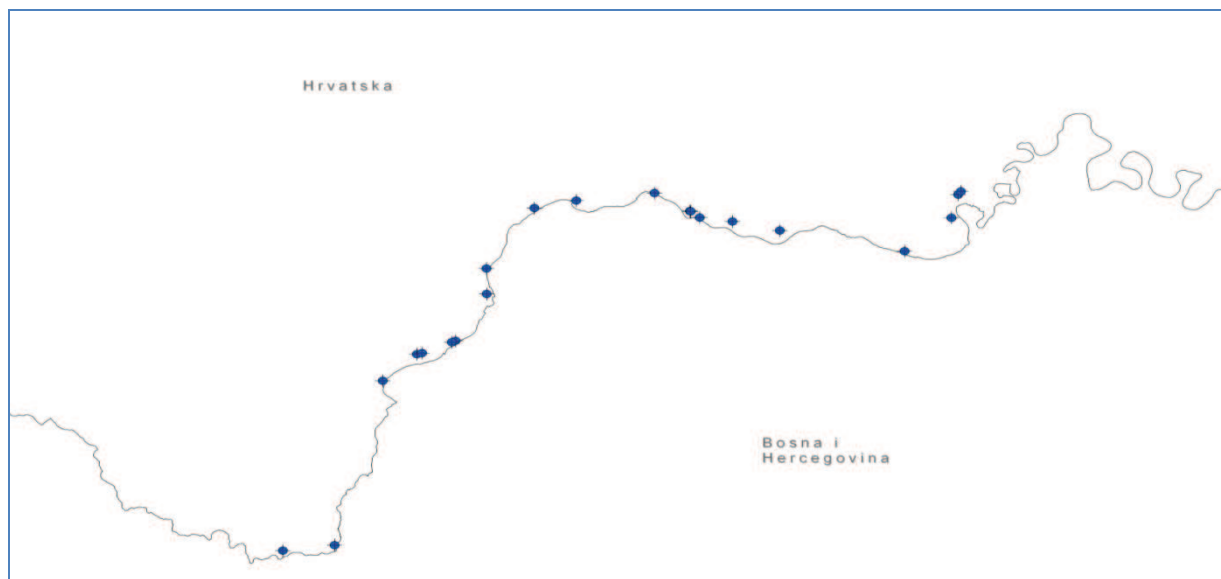


Figure 1. Distribution map of the 20 different localities along the course of the lower Una River

Slika 1. Raspored 20 istraživanih postaja uz donji dio rijeke Une

RESULTS

This study summarizes the current knowledge of the herpetofauna of the Una River area. During our research 10 amphibian (plus one klepton species) and 7 reptile species has been recorded (Table 2.) out of which 11 species are in the strictly protected and 7 of them are in the protected category. Two of the recorded species, *Emys orbicularis* (Linnaeus, 1758) and *Hyla arborea* (Linnaeus, 1758), are listed in the Red Book of Amphibians and Reptiles of Croatia as Nearly threatened while the Dice snake, *Natrix tessellata* (Laurenti, 1768) is considered data deficient species (Janev-Hutinec et al. 2006).

Table 2. List of the recorded amphibian and reptile species along the course of the lower Una River.

Tablica 2. Popis zabilježenih vrsta vodozemaca i gmazova na području istraživanja uz donji dio rijeke Une

AMPHIBIA	ANURA	<i>Bombinatoridae</i>	<i>Bombina bombina</i>
		<i>Bufo</i>	<i>Bufo bufo</i>
		<i>Hylidae</i>	<i>Hyla arborea</i>
		<i>Ranidae</i>	<i>Rana dalmatina</i>
			<i>Rana arvalis</i>
			<i>Rana temporaria</i>
			<i>Pelophylax lessonae</i>
			<i>Pelophylax kl. esculentus*</i>
	URODELA (CAUDATA)	<i>Salamandridae</i>	<i>Salamandra salamandra</i>
			<i>Ichthyosaura alpestris</i>
REPTILIA	SAURIA	<i>Anguidae</i>	<i>Anguis fragilis</i>
		<i>Lacertidae</i>	<i>Lacerta viridis</i>
			<i>Podarcis muralis</i>
	SERPENTES	<i>Colubridae</i>	<i>Natrix natrix</i>
			<i>Natrix tessellata</i>
			<i>Zamenis longissimus</i>
		<i>Viperidae</i>	<i>Vipera ammodytes**</i>
	TESTUDINES	<i>Emydidae</i>	<i>Emys orbicularis</i>

*the klepton species (a hybrid of *Pelophylax lessonae* and *Pelophylax ridibundus* species)

** Vukušić I. (pers. comm.) - additional confirmation of this species is needed

SPECIES ACCOUNT

Amphibians

Bombina bombina (Linnaeus, 1761) – Fire-bellied Toad *

The first record of this species can be found in the report from the Croatian Natural History Museum dating from 1985, that indicates a find near Jasenovac (and in the Lonjsko polje Nature Park), created by Jalžić, Kučinić and Perović (Kobašlić, 2002). Subsequently, Schneider-Jacoby and Ern (1993) indicate the existence of the *Bombina* genera at the nearby area of Lonjsko polje Nature Park. Our research during 2009 confirmed the existence of *Bombina* genera in the area of Una River. The Fire-bellied Toad was recorded by us near the Una River in the Kladnik canal as well as in the canal at Tanac locality by two separate investigators.

Bombina variegata (Linnaeus, 1758) – Yellow-bellied Toad **

As is for the previous species from the same genera, the first record of the Yellow-bellied Toad near Jasenovac (and in the Lonjsko polje Nature Park) can be found in the report from Croatian Natural History Museum dating from 1985, created by Jalžić, Kučinić and Perović (Kobašlić, 2002). Our field research in the area of the Una River did not confirm the occurrence of this species.

Bufo bufo (Linnaeus, 1758) – Common Toad *

In spite of being very common in the continental region of Croatia only one record, from the report of Schneider-Jacoby and Ern (1993), of the Common Toad for the broader area around the Una River exists.

Our research in 2009 confirmed the occurrence of this species. There was small number of tadpoles observed in Hrvatska Kostajnica (Ribički dom, area near the Una River).

Hyla arborea (Linnaeus, 1758) – European Tree Frog *

For the Tree Frog species there is none published or recorded data for the area which we are referring (Una River and its banks). Nonetheless our research has revealed the occurrence of this species in the three different localities along the coast of the Una River. At Dudunići locality three tadpoles were observed while in Hrvatska Kostajnica two adult individuals of this species were heard. In addition to the mentioned localities two adult individuals were observed at the third, Tanac locality.

Pelobates fuscus (Laurenti, 1768) – Common Spadefoot **

The only record of Common Spadefoot in the area of Jasenovac (and Lonjsko polje Nature Park) can be found in the report from the Croatian Natural History Museum made by Jalžić, Kučinić and Perović (Kobašić, 2002) but our research did not confirm the occurrence of this particular species in the area of the Una River.

Pelophylax ridibundus (Pallas, 1771) – Marsh Frog *

Previous data about the occurrence of the Marsh Frog in the area of our research does not exist. Despite the mentioned fact our field research detected the occurrence of this species in eight different localities along the Una River (Divuša, Donji Dobrotin, Dubica, Hrvatska Kostajnica, the road between the Rosulje and Jukići village, Tanac, Šuplji kamen, Struga Banijska). The adult individuals were found at all mentioned localities with the obvious habitat differences (canal which flows in the Una River – Dubica; fish ponds near the Una River in Hrvatska Kostajnica (Ribički dom); pool of water created by digging earth for the

house foundations - the road between the Rosulje and Jukići village; stream – Struga Banijska). Couple of juveniles were observed at Divuše locality and a large number of tadpoles were recorded in the pool of water nonintentionally created by digging the foundations for a house (the road between the Rosulje and Jukići village).

Pelophylax lessonae (Camerano, 1882) – Pool Frog *

This species was recorded in 1985 by Jalžić, Kučinić and Perović (Kobašlić, 2002) at the area of Jasenovac, Krapje, Dol and Lonjsko polje Nature Park. Schneider-Jacoby and Ern (1993) in their report also mark the occurrence of this species in the area of Lonjsko polje. During our research in 2009 we confirmed the occurrence of this species by observing only one adult individual at the Hrvatska Kostajnica (Kuljani) locality.

Pelophylax kl. esculentus (Linnaeus, 1758) – Edible Frog *

Jalžić, Kučinić and Perović recorded this klepton species in their report for the Croatian Nature History Museum in 1985 for the area of Lonjsko polje Nature Park, Krapje, Dol and Jasenovac but no other references exist for this species in the area of Una River. Our team observed this klepton species during the field work in 2009 at Žutica (Lonjsko polje Nature Park) locality confirming the previously mentioned find. Despite the fact that this area is quite near the Una River we recommend that the occurrence of this species in the area along the Una River should be confirmed with additional observations.

Rana arvalis (Nilsson, 1842) – Moor Frog *

The only two records of Moor Frog was made by Jalžić, Kučinić and Perović (Kobašlić, 2002) in 1985 at the area of Lonjsko polje Nature Park, Krapje, Dol and Jasenovac and Schneider-Jacoby and Ern (1993) at the area of Lonjsko polje Nature Park . Our finding of the

adult individual at Tanac locality during the field research in 2009 only confirms the occurrence of this species along the Una River which passes near the already mentioned areas.

Rana dalmatina (Bonaparte, 1839) – Agile Frog *

Agile Frog was recorded in the area of Lonjsko polje Nature Park, Krapje, Dol and Jasenovac by Jalžić, Kučinić and Perović in their 1985 report for Croatian Nature History Museum. During our field research in 2009 we observed adult individuals at Kladnik, Žutica and Tanac localities. At Kladnik and Žutica localities individuals were located in flood canals.

Rana temporaria (Linnaeus, 1758) – Common Frog *

For this particular amphibian species there is no available data that indicates its presence in the area of Una River. Nonetheless we were able to observe one individual in the grass along the coast of the Una River near Dubica locality during our field research in 2009.

Salamandra salamandra (Linnaeus, 1758) – Fire Salamander *

Although a very common species in the continental part of Croatia no data concerning the existence of this species in the area along the Una River is available. During our field research in 2009 we observed larvae and an adult dead individual at four different localities. Most of the larvae in small water bodies (puddles) in Dudunići and in the concreted spring Šuplji kamen. The rest of the larvae were found in the Struga Banijska stream, which was rather polluted. One adult individual was found dead on the gravel road in Dudunići and one living adult was recorded in Hrvatska Kostajnica.

Ichthyosaura alpestris (Laurenti, 1768) – Alpine Newt *

Published data or any kind of available data which could confirm the occurrence of this species in the area of our research (near the Una River) do not exist. During our research in

2009 we observed a great number of adult individuals and larvae at the spring Šuplji kamen. They were found in the canal near the road. It is interesting to note that we found 25 males and 20 females at this locality in one day (11th of May 2009).

Triturus (Lissotriton) vulgaris (Linnaeus, 1758) – Smooth Newt **

According to the previous data available to us this species was found and recorded in the report of Schneider-Jacoby and Ern (1993) for the Lonjsko polje Nature Park area. Despite the fact that this area is geographically near to our research area we did not confirm the occurrence of the Smooth Newt along the coastal region of Una River.

Reptiles

Anguis fragilis (Linnaeus, 1758) – Slow Worm *

The occurrence of Slow Worm was not recorded for the area along the Una River and no data of this species for the mentioned area of our research exist. We recorded the first data on this species during our research in 2009. Three adult dead individuals were found (thrown from the bridge into the shallow water) at Dubica near Una River. The second observation was at Javornik.

Coronella austriaca (Laurenti, 1768) – Smooth Snake **

Schneider-Jacoby and Ern (1993) recorded this species for the area of Lonjsko polje Natural Park. Even though it is geographically close we did not confirm the occurrence of this species in the area along the Una River during our field research in 2009.

Emys orbicularis (Linnaeus, 1758) – European Pond Turtle *

There is one record of this species in the Lonjsko polje Nature Park made by Schneider-Jacoby and Ern (1993) which is geographically close to our area of research. The occurrence of this species was confirmed by our field research during 2009 when we observed one juvenile individual at Donji Dobrotin and one adult female at Divuše. The juvenile was found along the edge of the stream while the adult female was found in the shallow water along the bank of the Una River.

Podarcis muralis (Laurenti, 1768) – Wall Lizard *

Pavletić (1964) mentions the record of Wall Lizard being found at Kostajnica and Divuša localities dating from the 1911 (25th July 1911). A decade after there is another observation of this species by Karaman (1921) at Kostajnica locality. During our field research in 2009 we observed many individuals of this species at eight different localities along the Una River (Kuljani, Hrvatska Kostajnica, spring at the Šuplji kamen, Struga Banijska, Dubica, Divuša, Tanac, Dudunići).

Lacerta viridis (Laurenti, 1768) – European Green Lizard *

Data on the presence of this species of lizard does not exist but our field research during 2009 revealed its presence at 11 different localities (Jukići, Javornik, Unčani, Donji Dobrotin, Dudunići, Hrvatska Kostajnica, Kukljani, road between Rosulje and Jukići village, Divuše, spring at the Šuplji kamen, Struga Banijska) along the Una River. In total nine adult and three subadult individuals were observed at the listed localities.

Natrix natrix (Linnaeus, 1758) – Grass Snake *

The Grass Snake (more accurately *Natrix natrix persa*) species is mentioned by Pavletić (1964) in the report of Croatian Natural History Museum to be found in Kostajnica locality in

1902. Karaman (1921) also observed this species at the same locality. In addition to the mentioned records Schneider-Jacoby and Ern (1993) recorded the occurrence of both *Natrix natrix helvetica* and *persa* subspecies at Lonjsko polje Nature Park with the description of localities as being in the lowland areas near Sava river. Our research during 2009 confirmed the existence of *Natrix natrix* species at the area along the Una River. Nine individuals were found in canals by the road and in the Una River itself at three different localities (Hrvatska Kostajnica, spring at Šuplji kamen and Tanac).

Natrix tessellata (Laurenti, 1768) – Dice Snake *

There is only one record of this species inhabiting the nearest area to the Una River made by Schneider-Jacoby and Ern (1993) for the area of Lonjsko polje Nature Park. During 2009 field research we observed 10 adult individuals of which one was found dead on the road at Struga Banijska locality. If we include a previously mentioned locality, individuals were found at nine different localities (Jukići, Dvor, Unčani, Divuša – near the stream Čatlan, Dubica, Hrvatska Kostajnica, spring at Šuplji kamen, Struga Banijska and Tanac).

Vipera ammodytes (Linnaeus, 1758) – Nose-horned Viper **

Rossler (1904) and Pavletić (1964) mention the finding of the Nose-horned Viper by Omčikus at the Srb locality (upper Una area). Besides that there is no other published or other known data which can confirm the occurrence of this venomous snake at the area of our research or Una River in whole. We must note that except the potentially highly subjective information from Vukušić I. (the “Elektra” driver), who claims that he ran over one individual, we do not have any substantial evidence to confirm the occurrence of this species in the area along the Una River because during our research in 2009 we did not observe individuals which would

indicate otherwise. All of local people claim that Nose-horned Viper is common in the area and authors found a lot of suitable habitats during the survey.

Zamenis longissimus (Laurenti, 1768) – Aesculapian Snake *

This usual and very dispersed snake species in Croatia does not have any previous record in the available publications and unpublished data which would imply its occurrence at the area along the Una River. In contrast to this fact our field research during 2009 revealed the presence of this species along the Una River area. In total six individuals were found from which three of them were found dead and one was a juvenile individual. The largest dead individual found was 1,5 m long. All of the individuals were found at four different localities (Javornik, Hrvatska Dubica, Hrvatska Kostajnica and Kuljani).

DISCUSSION

From the data we have gathered during our study of the Una River area it can be noted that 11 amphibian taxa and seven reptile species were found while five more species are known only from the literature data. Earlier authors for this area mention records of *B. variegata*, *P. fuscus*, *T. (Lissotriton) vulgaris*, *C. austriaca*, *V. ammodytes* with which the total number of recorded species changes to 22 (plus one klepton – *P. kl. esculentus*). We must note that most of these literature data are at least 19 years old which is a considerable time difference and may be one of the causes why some species were not found during our survey but are listed in some records.

The example of this is the record of the Nose-horned Viper species which has been mentioned by two authors, Rossler (1904) and Pavletić (1964) who were citing the same find (from 01.06.1899) but was not confirmed by us during our survey. Despite the fact that we obtained the information from the driver who confirms that he found a DOR individual, the bias for this information cannot be neglected. Nevertheless, authors believe that this species indeed inhabits the area along the Una River because of quite large amount of preferred habitats.

We have a very similar situation with the Smooth snake which was just recorded by Schneider –Jacoby and Ern (1993) in the area adjacent to the Una River area, wetlands of Lonjsko polje. Because this species is common in the continental region of Croatia (author's personal observations) we can suspect that this species is present in the surveyed area. Authors believe that both of these snake species can be confirmed in the Una River area with frequent field surveys.

Pelobates fuscus and *Lissotriton vulgaris* are recorded for the adjacent Lonjsko polje area only once in 1985 and 1993, respectively. During our survey of the Una River area we did not encounter individuals of this two species which are common in the eastern continental part of Croatia, Slavonija (author's personal observation).

When we consider all of the species which occurrence we did not confirm, the possibility of specific herpetofauna species list for the Una River area seems plausible. Nevertheless the possibility of finding these “missing“ species is viable and additional field research should be conducted to verify the list of amphibian and reptile species reported in this paper.

Canalization of smaller tributaries which flow in the Una River and the destruction of old armlets and ponds which Una River creates in the flood periods are the main causes of concern and threaten the local herpetofauna species. Because the river is relatively cold, fast flowing and rich in fish the river itself is not the best place for the reproduction of amphibians. Amphibians are particularly sensitive to pollution caused by industrial and public canalization which guide waste waters directly into the river.

CONCLUSION

Despite the fact that we have records dating from the late 19th century they are very scarce and provide just the guidelines for the current herpetofauna survey of the Una River area. Trends of the population decline for any species of amphibians or reptiles cannot be known as a direct result of the missing data. Because of this fact, for the first time, this paper provides a relatively comprehensive list of the species that inhabit the area along the Una River. It is necessary to put some additional effort in researching amphibian and reptile species of this area whereby our list of species would receive further conformation and the state of particular populations would be clearer.

REFERENCES:

- Bognar, A. (2005): The Upper Part of the Una River Valley Between Martin Brod and Pritoka – Geomorphological Characteristics. *Hrvatski Geografski Glasnik*, 67(2): 21-38.
- Boršić, I., Posavec Vukelić, V., Alegro, A.L. (2012): Flora along the lower course of the Una river (Central Croatia) . *Natura Croatica*, 21(1): 1-20.
- Janev-Hutinec, B., Kletečki, E., Lazar, B., Podnar Lešić, M., Skejić, J., Tadić, Z., Tvrtković, N. (2006): Crvena knjiga vodozemaca i gmazova Hrvatske. Ministarstvo kulture, DZZP. 95 pp.
- Karaman, S. (1921): Beiträge zur Herpetologie von Jugoslavien. *Glasn.Hrv. prir.dr.* XXXIII: 194-209.
- Kobašić, A. (2002): Rasprostranjenost vodozemaca Hrvatske prema podacima Hrvatskog prirodoslovnog muzeja u Zagrebu. *Diplomski rad. PMF, Zagreb.*
- Pavletić, J. (1964): Amphibia i Reptilia zbirke Hrvatskog narodnog zoološkog muzeja u Zagrebu. *Hrv. narod.zool. muz.* 4: 1-37.
- Rössler, E. (1904): Popis reptilian i amfibija hrvatske faune koji su prispjeli "narodnom zoološkom muzeju" u Zagrebu do koncagodine 1900 [Verzeichnis der Reptilien und Amphibien der kroatischen Fauna, welchean das zoologische Nationalmuseum in Zagreb bis zum Schluss des Jahres 1900 eingesendetwurden]. *Glasnik Hrvatskoga narovoslovnog društva* 15: 221-224
- Schneider-Jacoby, M. & Ern, H. (1993): Park prirode Lonjskopolje. *Hrvatsko ekološko društvo, Zagreb.*