

Contributions to knowledge regarding the geographical distribution of the herpetofauna of Dobrudja, Romania.

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Abstract. In Dobrudja we encountered 10 species of amphibians (*Triturus dobrogicus*, *Bombina bombina*, *Hyla arborea*, *Pelobates fuscus*, *Pelobates syriacus*, *Bufo bufo*, *Bufo viridis*, *Rana dalmatina*, *Rana ridibunda*, *Rana lessonae*), 16 species of reptiles (*Emys orbicularis*, *Testudo graeca*, *Ablepharus kitaibelli*, *Lacerta agilis*, *Lacerta viridis*, *Lacerta trilineata*, *Podarcis taurica*, *Podarcis muralis*, *Eremias arguta*, *Coronella austriaca*, *Zamensis longissimus*, *Elaphe quatuorlineata*, *Dolichophis caspius*, *Natrix natrix*, *Natrix tessellata*, *Vipera ammodytes*) and also *Rana* kl. *esculenta* populations. Some species of amphibians (*Pelobates fuscus*, *Pelobates syriacus*) that were only previously known inform the lower regions of the Danube's meadow and in the vicinity of the Black Sea, were recorded in the high areas of northern Dobrudja. Also here, all three forms of the green frogs' complex documented for Romania have been encountered, but *Rana lessonae* and *Rana esculenta* are very rare, being found only in the north. The central sectors of Dobrudja are severely impacted by human activities, almost completely cleared as a result of agriculture and showed very low number of herpetofauna species as being present. The most important areas for the herpetofauna are the northern and south-western regions.

Key words: herpetofauna, Dobrudja, distribution maps, *Rana lessonae*, *Podarcis muralis*

Introduction

Studies regarding species' geographical distributions are important since realizing conservation programs without them is difficult (Ghira et al. 2002). As a result, several studies have taken place examining the geo-

graphical distribution of Romania's herpetofauna (Ghira et al. 2002, Covaciu-Marcov et al. 2004, 2005 a, b, 2006, Strugariu et al. 2006 a, b), and numerous other countries (e.g. Petrov 2004, Naumov 2005, Toth et al 2006, Razetti et al. 2006).

Our work represents a contribution to the geographical distribution of the amphibians and reptiles in Dobrudja. Dobrudja's herpetofauna has been well investigated in comparison with other regions of Romania. A fact proven by past studies (e.g. Andrei 2002, Băcescu 1934, Fuhn 1952, Fuhn & Hârsu 1962, Iana 1970, Kotenko 1993 a, b, 2001, Oțel 1998, Popescu 1977, Torok 1997, 1998 a, b, 1999) and some more recent studies, of selected areas within Dobrudja (Schluter 2003, 2005). However, most of these papers only refer to a certain part of this territory such as the Danube Delta and its coterminous regions (Torok 1997, Kotenko 2001), or to the distribution of only one species (Fuhn & Hârsu 1962, Popescu 1977). Data regarding the entire Dobrudja region are only found in the volumes referring to the amphibians and reptiles from the Fauna of the P.R. of Romania (Fuhn 1960, Fuhn & Vancea 1961), or more recently in the guide to Romanian amphibians (Cogălniceanu et al. 2000).

Our objectives were: i.) the analysis of the composition and the geographical distribution of the herpetofauna in the entire Dobrudja (excluding the Danube's Delta), ii.) the identification of regions with an important and special herpetofauna, iii.) the establishment of the most damaging human activities upon the herpetofauna.

Material and Methods

The study of the geographical distribution of Dobrudja's herpetofauna involved numerous field trips between 2002 and 2006, both in the spring and the summer. In total, we analyzed the herpetofauna of 136 Dobrudjan localities (fig.1, annex: tab.1), situated in both Constanta and Tulcea Counties.

In order to establish the composition and the geographical distribution of the herpetofauna, we used visual transects (Cogălniceanu 1997), making numerous surveys. The animals were determined mostly directly, without the necessity of capturing them. When the capture of some specimens was required, it was usually made by hand. Amphibians in their aquatic period were captured with the help of rectangle drags or using round nets mounted on long metallic poles. After determining the captured species, they were released in their habitats of origin. An important role in the charting of the herpetofauna of the investigated region was played by the dead animals that we found killed either by local people or by cars.

The hybrids were determined by their morphological and chromatic characteristics, the determination being made with regard to main features and measurements as indicated in the specialty literature (Berger 1966, 1973, Cogălniceanu et al. 2000).

Results and Discussions

Species accounts

The herpetofauna observed during our study comprised a total of 26 (annex: tab. 1). 10 species of which were amphibians: *Triturus dobrogeticus*, *Bombina bombina*, *Hyla arborea*, *Pelobates fuscus*, *Pelobates syriacus*, *Bufo bufo*, *Bufo viridis*, *Rana dalmatina*, *Rana*

ridibunda, *Rana lessonae* and 16 reptile species: *Emys orbicularis*, *Testudo graeca*, *Ablepharus kitaibelli*, *Lacerta agilis*, *Lacerta viridis*, *Lacerta trilineata*, *Podarcis taurica*, *Podarcis muralis*, *Eremias arguta*, *Coronella austriaca*, *Zamenis longissimus*, *Elaphe quatuor-*

lineata, *Dolichophis caspius*, *Natrix natrix*, *Natrix tessellate* and *Vipera ammodytes*. Alongside these 26 species, we also encountered populations of *Rana kl. esculenta* in the region, a hybrid form between *Rana ridibunda* and *Rana lessonae*.



Figure no.1 The geographical position and the detailed map of the studied area (after Romania Road Map 1 : 1700 000, 4th ed. 2000/2001 - modified)

We analyzed the distribution of the 26 species and that of the hybrid form in all the 136 localities surveyed in Dobrudja. We identified 664 localities for the existing species in these 136 field localities. Each species' distribution in the investigated localities is shown in table 1 (annexed).

Triturus dobrogicus (Kiritzescu 1903) is an extremely rare species, identified in only one locality, at Histria (fig. 2). Prior to this it was only recorded in the lower areas of the Danube's meadow and the Razelm - Sinoe lagoon complex (Cogalniceanu et al 2000, Iftime 2005). Histria is situated in the low area coterminous to Sinoe Lake, but more southerly than previously recorded localities in the Razelm - Sinoe lagoon complex.

Bombina bombina (Linnaeus, 1761) is a constant presence, being spread throughout Dobrudja (fig. 3). Most of the populations are present in the lower areas, near the Danube or the Razelm - Sinoe lagoon complex. However, the species is also to be found in the higher regions from the northern Dobrudjan plateau, reaching altitudes of about 300 m in the Babadag or Casimcea Plateau. It is present in the south-eastern part of Dobrudja, too, in the Oltina Plateau.

Hyla arborea (Linnaeus, 1758) is well represented here, being

identified by us in numerous localities (fig.4). Although previously it was mostly recorded in the low areas, coterminous to the Danube (Cogalniceanu et al 2000), we frequently encountered it in the high regions of northern Dobrudja, where it is very common in afforested areas. Besides these, *Hyla arborea* is present in the vegetation surrounding permanent water bodies. However, due to mass-clearance of forest areas, the species is absent, or has become very rare, in the central part of Dobrudja.

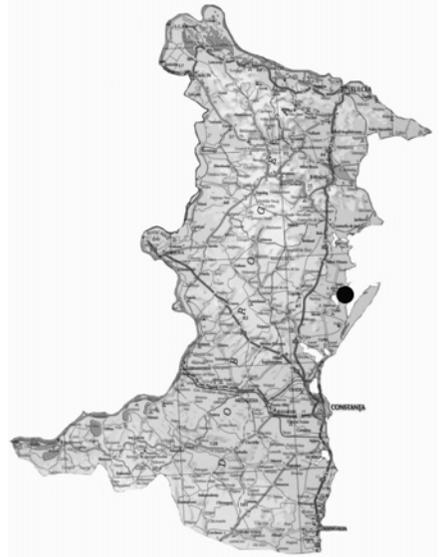


Figure no.2 Records for *Triturus dobrogicus* in the studied area

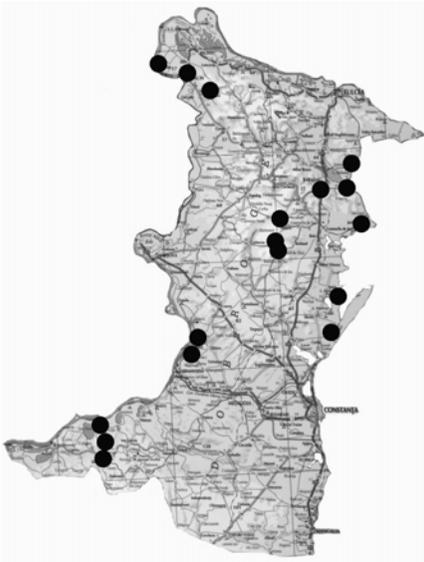


Figure no.3 Records for *Bombina bombina* in the studied area

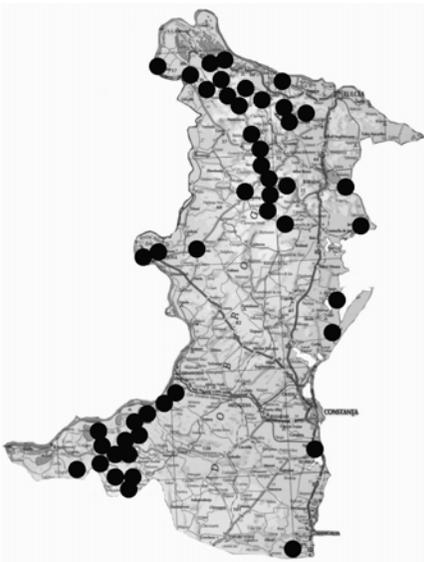


Figure no.4 Records for *Hyla arborea* in the studied area

Pelobates fuscus (Laurenti, 1768) (fig. A) is rarer than the previous species, being identified in a small number of localities but distributed rather uniformly throughout the investigated area (fig.5). Similar to the cases of the above mentioned species, we think it is important that we discovered it, for the first time, in the higher areas (up to 300 m a.s.l.) of the northern part of the territory. Generally it ascends here alongside the main waterways, but it can also occur in the high sectors of the Casimcea Plateau. It is present in some towns too for example, being encountered by us in Tulcea, near the train station.

Pelobates syriacus (Boettger, 1889) (fig. B) is a rare species, identified only in 6 localities (fig. 6). It is generally found in the low areas from the Danube's meadow or near the seaside, these being the only sectors in which it was previously pointed out (Iftime 2005). We also identified two populations in the Casimcea Plateau (300 m a.s.l.). Whilst the number of localities is small, the populations appear large - at Histria we managed to count several hundred individuals per night, many more than the *Pelobates fuscus* individuals at the locality.

Bufo bufo (Linnaeus, 1758) is a very rare species, identified in only 3 localities situated in the high and more humid afforested areas from

Macin Hills and the Danube's meadow (fig. 7).

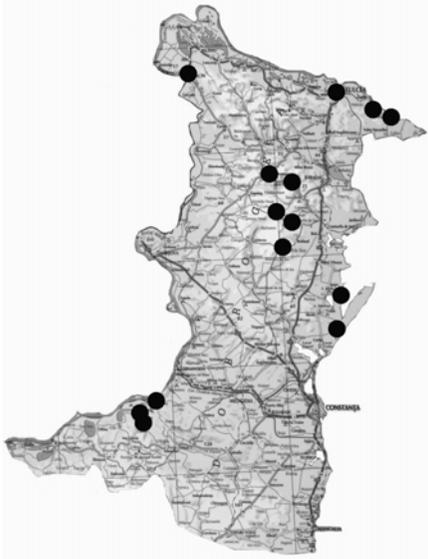


Figure no.5 Records for *Pelobates fuscus* in the studied area

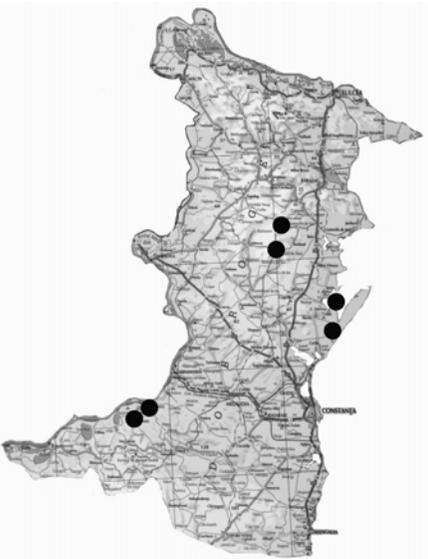


Figure no.6 Records for *Pelobates syriacus* in the studied area



Figure no.7 Records for *Bufo bufo* in the studied area

Bufo viridis (Laurenti 1768) is one of the most common species of amphibians from Dobrudja, being found in 78 localities (fig. 8). It is spread throughout entire Dobrudja, even in the areas affected most by human activities including land clearance or degradation by over-grazing. It also appears in some towns, especially on the seaside. However, large numbers are recorded as road fatalities every year.

Rana dalmatina (Bonaparte 1839) is not t common, found in a rather disjunctive area in Dobrudja, an area that corresponds to that of the forest sectors (fig. 9). Thus it is present only in the north and the south-west, missing from the central deforested areas. However, the populations are

quite large, including the ones from the southern part of Dobrudja, where the species was recently recorded for the first time in Constanta County (Dragomir 2002).

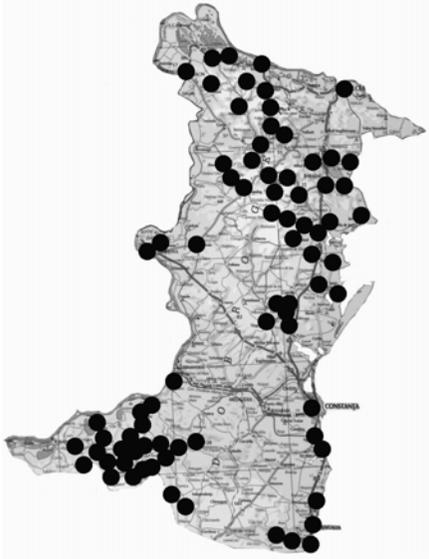


Figure no.8 Records for *Bufo viridis* in the studied area

Rana ridibunda (Pallas 1771) is one of the most common species of amphibians in Dobrudja, documented in 78 localities across the territory (fig.10). Despite the fact that most of these localities are situated in the Danube's meadow or near the seaside, the species also appears constantly in the high areas from inner Dobrudja, being present in the central degraded sectors inclusively. In these cases it populates the small, temporary waterways. In the area of

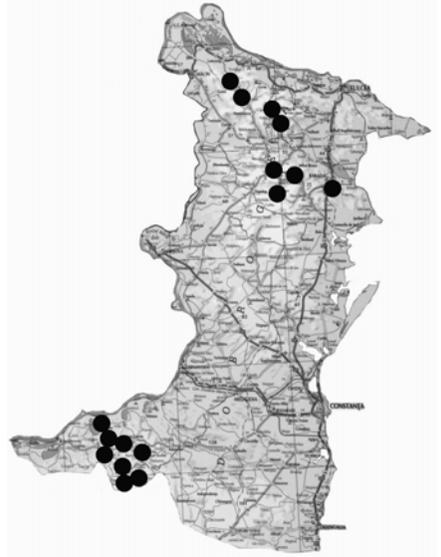


Figure no.9 Records for *Rana dalmatina* in the studied area

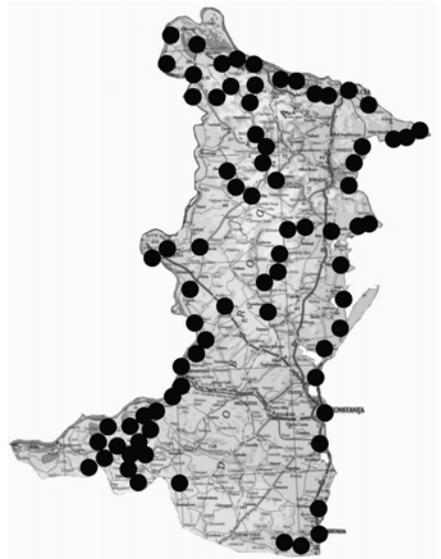


Figure no.10 Records for *Rana ridibunda* in the studied area

the Razelm-Sinoe lagoon complex numerous *Rana ridibunda* populations are found in brackish waters.

Rana lessonae (Camerano 1878) (fig. C) is an extremely rare species, identified in just one locality, in the extreme northern part of Dobrudja (Danube's meadow, near Saon Monastery; fig. 11). The species is present in the permanent wetlands near the tip of Saon Lake and some temporary streams which flow in it. Here it inhabits sectors with rich vegetation (reed and sea club rush) and high levels of humidity. Previously *Rana lessonae* was documented in the Danube Delta (Kotenko 2001) in both the Romanian and Ukrainian side, where the species is well represented (Gunther 1997). Thus, this is the first ever population, as far as we know, of *Rana lessonae* from Dobrudja outside the territory of the Danube Delta - on the Dobrudjan platform. At Saon Monastery, the species is found at the south-eastern extreme limit of its distribution, but probably in direct connection with the populations from Ukraine.

Rana esculenta (Linnaeus 1758) was identified in more localities than the previous, but it is still rare (fig. 12). It is exclusive to the wetlands of the Danube meadow from northern Dobrudja. It is present in lakes, ponds and canals, in areas with abundant vegetation.



Figure no.11 Records for *Rana lessonae* in the studied area

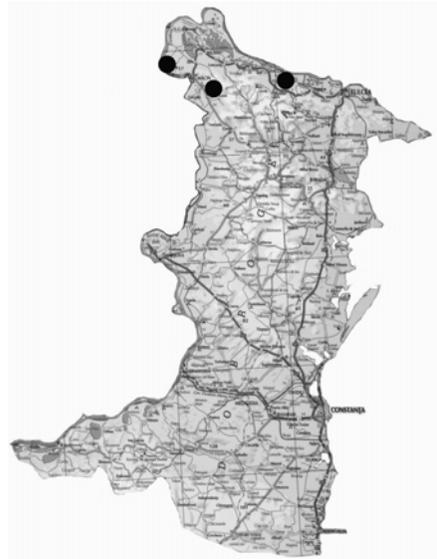


Figure no.12 Records for *Rana kl. esculenta* in the studied area



Figure A. *Pelobates fuscus* sample from Histria
(photo by: Groza Marius, CHO-2006)



Figure B. *Pelobates syriacus* sample from Histria
(photo by: Groza Marius, CHO-2006)



Figure C. *Rana lessonae* sample from Monastery Saon
(photo by: Bogdan Horia, CHO-2006)

Emys orbicularis (Linnaeus, 1758) is relatively rare, being distributed only in the Danube meadow and the seaside lakes (fig. 13), mainly because it doesn't have any of its ecological needs met anywhere else.

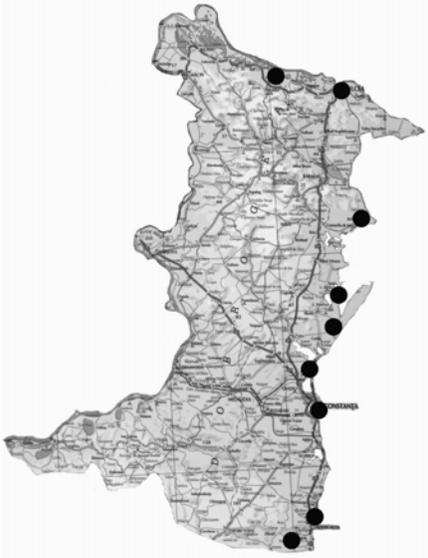


Figure no.13 Records for *Emys orbicularis* in the studied area

Testudo graeca (Linnaeus, 1758) (fig. D) is well represented in Dobruja, recorded in 40 different localities (fig. 14). However, it is not distributed evenly, with infrequent records from the central area. It is present in almost all the forest areas or around the forests. Exceptionally, it can appear in open lands, with grassy vegetation or at the limit of some agricultural fields.

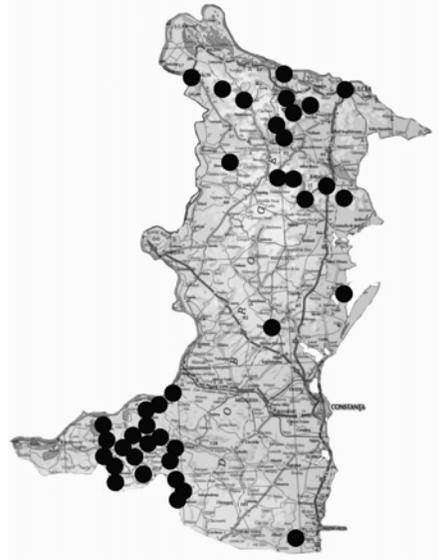


Figure no.14 Records for *Testudo graeca* in the studied area

Ablepharus kitaibelli (Bibron et Bory 1833) (fig. E) is exclusively distributed in the forested regions from Northern and South-Western Dobruja (fig. 15). Near the Măcin Hills we also found this species in agricultural fields.

Lacerta agilis (Linnaeus 1758) (fig. F) is a rare species that was observed by us in very few localities (fig. 16). Its distribution is limited to the areas neighboring the sea shore and the Razelm-Sinoe lagoon complex. Even though the number of localities is small, identifying these contributes to the knowledge regarding the distribution of this species in the area. Thus, we have observed that *Lacerta*

agilis is not present only in the Danube delta islands with sandy soil, as it was previously considered (Torok 1998 b). Our results indicate that this species also inhabits clay soils and agricultural fields. We have reconfirmed this species' presence at Enisala, where it was recorded in the 1930's (Băcescu 1934), even though recent studies suggest this species' absence in this region (Torok 1998 b). Our results suggest that the factor which the species' distribution depends on is not necessarily soil but humidity, *Lacerta agilis* being encountered in regions with a high humidity level, which are situated near a permanent accumulation of water.

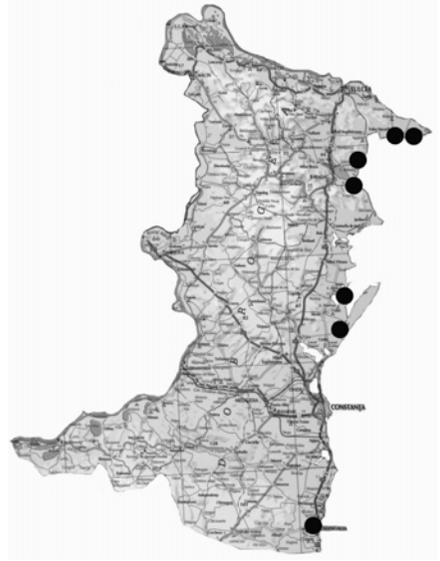


Figure no.16 Records for *Lacerta agilis* in the studied area

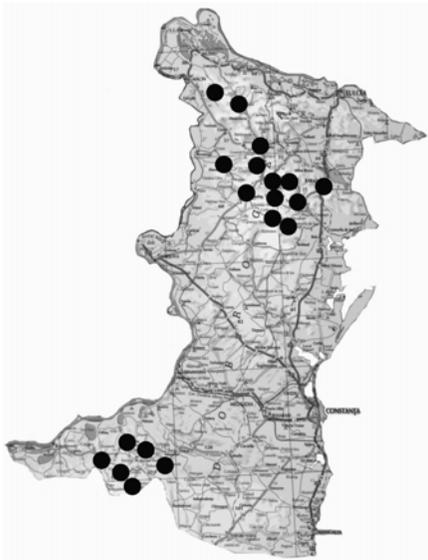


Figure no.15 Records for *Ablepharus kitaibelli* in the studied area

Lacerta viridis (Laurenti 1768) is a common species in Dobrudja, being present even in the central deforested areas (fig. 17). It populates forest margins but also rocky areas and areas with scrubs.

Lacerta trilineata (Bedriaga, 1886) (fig. G) is rare, being recorded in only 9 localities (fig. 18). The species prefers dry areas, usually slopes with bushy vegetation, but it is linked to a higher level of humidity, in most of the cases the populated habitats being situated near and under the influence of large water sources. Even though it usually avoids forests (Fuhn & Vancea 1961), at Gärvan, its northern distribution limit, we have recorded



Figure D. *Testudo graeca* sample from Baneasa
(photo by: Bogdan Horia, CHO-2006)



Figure E. *Ablepharus kitaibelli* sample from Greci
(photo by: Alexandru Strugariu, CHM-2006)



Figure F. *Lacerta agilis* sample from Enisala
(photo by: Horia Bogdan, CHO-2006)



Figure G. *Lacerta trilineata* sample from Garvan
(photo by: Horia Bogdan, CHO-2006)

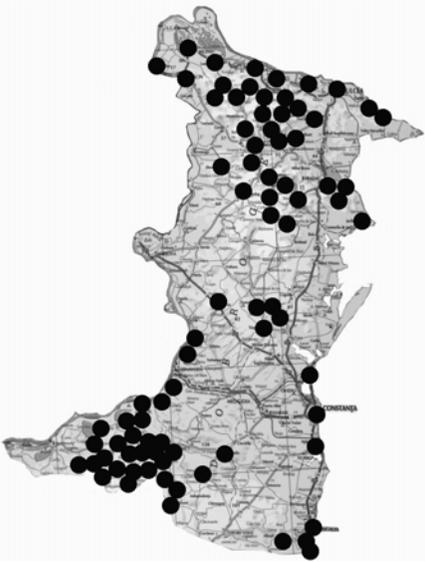


Figure no.17 Records for *Lacerta viridis* in the studied area

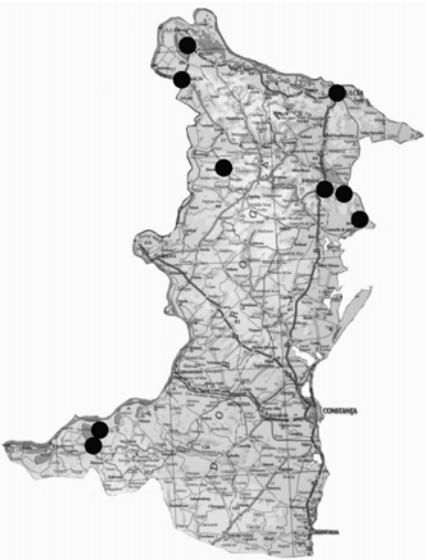


Figure no.18 Records for *Lacerta trilineata* in the studied area

this species in an atypical habitat represented by an acacia plantation on sandy soil, at the limit of the continental Dobrudjan plateau with the Danube river meadow.

Podarcis taurica (Pallas 1814) (fig. H) is the most common lizard species in Dobrudja (fig. 19). It populates various habitats, being present even in the areas with the highest level of anthropogenic interference including heavily grazed areas and garbage dumping grounds from the edge of agricultural fields.

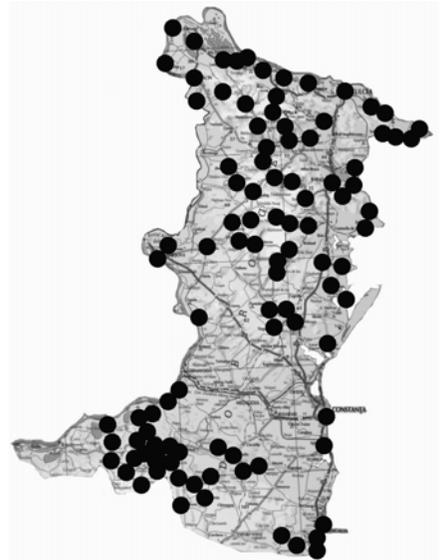


Figure no.19 Records for *Podarcis taurica* in the studied area

Podarcis muralis (Laurenti 1768) (fig. I) is a very rare species that was recorded by us in only 3 localities

from south-western Dobrudja (fig. 20). It inhabits rocky areas or ruins situated near water streams (fig. J, K). The recorded populations seem to be very small, most probably due to the restricted amount of suitable habitat.

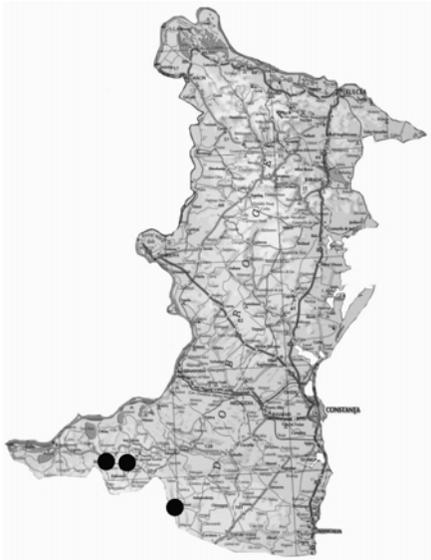


Figure no.20 Records for *Podarcis muralis* in the studied area

Eremias arguta (Pallas, 1773) is a very rare species which we recorded in a single locality (Vadu; fig. 21). This is probably the south-western limit for the species, since our investigations in more southern areas, on the beaches from Corbu have failed to record their presence. It is distributed exclusively within the narrow band of beaches (fig. L) which are starting to be affected by tourists.

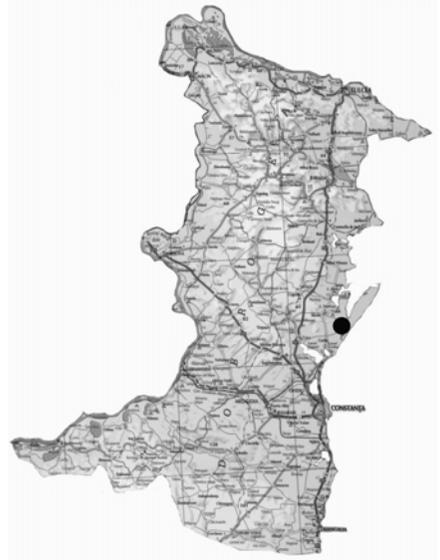


Figure no.21 Records for *Eremias arguta* in the studied area

Coronella austriaca (Laurenti 1768) (fig. M) mainly populates the forested areas from northern Dobrudja (fig. 22), where we have recorded numerous specimens, including ones killed by cars. It is also present on the beaches from Vadu and Corbu, on the sand dunes. At Vadu, a larger area with less anthropogenic interference, numerous specimens are present in the same habitat as *Eremias arguta*.

Zamenis longissimus (Laurenti 1768) (fig. N) was exclusively recorded in the forested, more humid sector of the studied region (fig. 23)

Elaphe quatuorlineata (Lacepede, 1789) (fig. O) is a very rare species, being encountered by us in only 4 localities (fig. 24).



Figure H. *Podarcis taurica* sample from Baneasa
(photo by: Horia Bogdan, CHO-2006)



Figure I. *Podarcis muralis* sample from Baneasa
(photo by: Horia Bogdan, CHO-2006)



Figure J. Habitat of *Podarcis muralis* at Raristea
(photo by: Horia Bogdan, CHO-2006)



Figure K. Typical habitat from southern Dobrudja at Baneasa, of *Podarcis muralis*, *Podarcis taurica*, *Ablepharus kitaibelli*, *Lacerta viridis*, *Testudo graeca*, *Vipera ammodytes*
(photo by: Marius Groza, CHO-2006)



Figure L. Habitat of *Eremias arguta* at Vadu
(photo by: Horia Bogdan, CHO-2006)



Figure M. *Coronella austriaca* sample from Vadu
(photo by: Horia Bogdan, CHO-2006)



Figure N. *Zamenis longissimus* sample from Sipotele
(photo by: Marius Groza, CHO-2006)



Figure O. *Elaphe quatuorlineata* sample from Greci
(photo by: Ioan Ghira, SHR-2006)

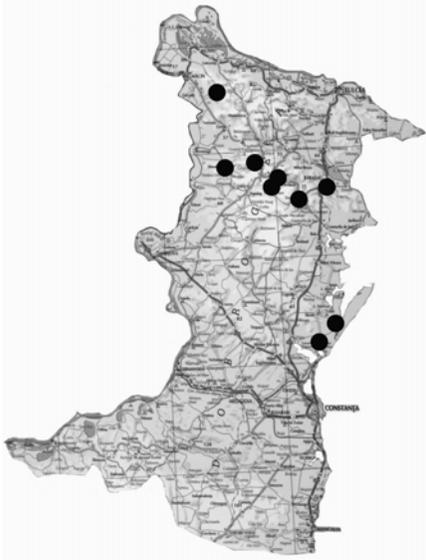


Figure no.22 Records for *Coronella austriaca* in the studied area

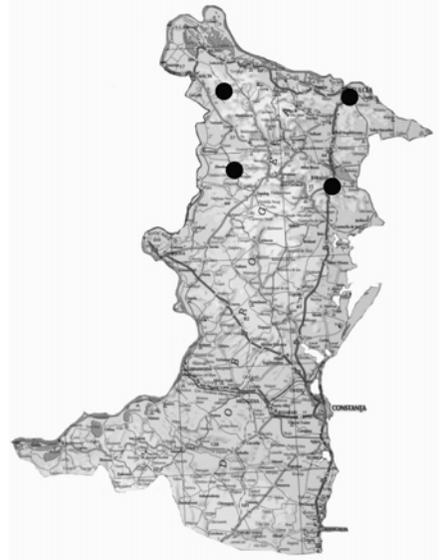


Figure no.24 Records for *Elaphe quatuorlineata* in the studied area

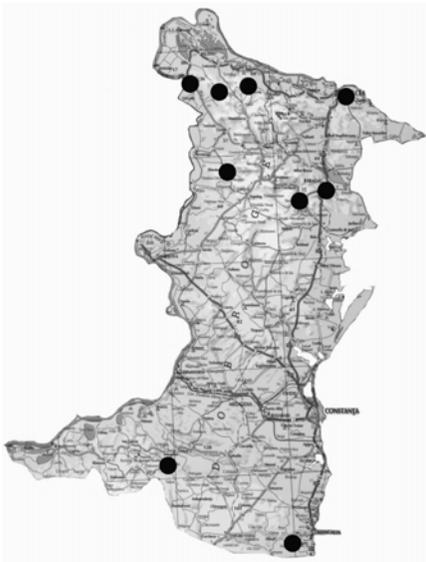


Figure no.23 Records for *Zamenis longissimus* in the studied area

Dolichophis caspius (Gmelin 1789) (fig. P) is a very common snake in Dobrudja (fig. 25), being distributed throughout the territory, in open areas and forest margins. Many specimens are recorded as road traffic fatalities.

Natrix natrix (Linnaeus, 1758) (fig. Q) is also common (fig. 26), but mostly distributed in the vicinity of large permanent water pools. Most of the populations are present in the Danube river meadow and in the Razelm-Sinoe lagoon system. On rare occasions, it reaches the continental Dobrudjan plateau, following the main water streams.

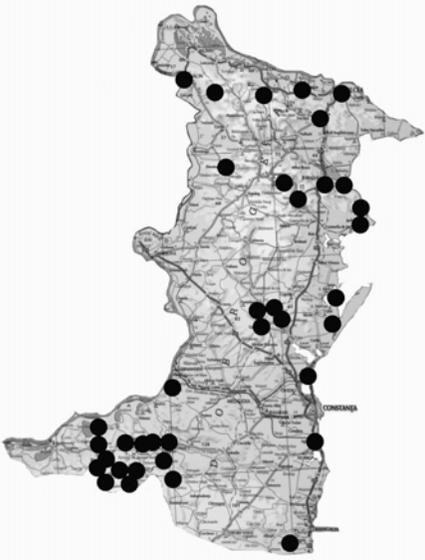


Figure no.25 Records for *Dolichophis caspius* in the studied area

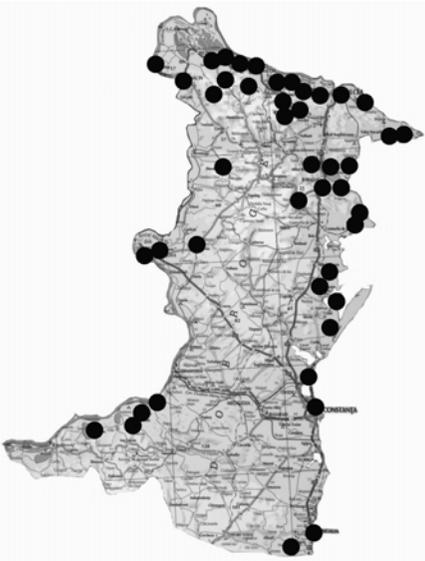


Figure no.26 Records for *Natrix natrix* in the studied area

Natrix tessellata (Laurenti 1768) (fig. R) is rarer than the previous species (fig. 27), being recorded exclusively in the Danube river meadow, the Razelm-Sinoe lagoon system and near the sea shore. In the latter situation, it especially populates fresh water lakes but also, occasionally, reaches into the sea.

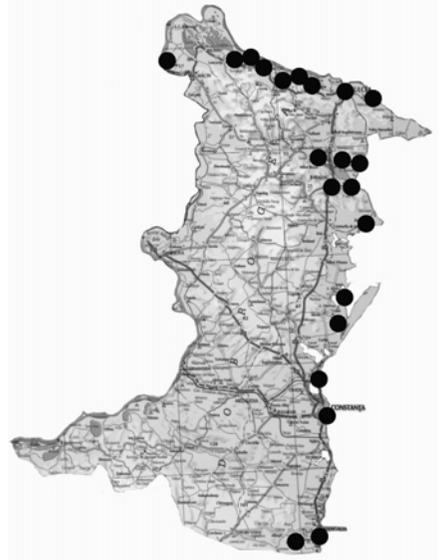


Figure no.27 Records for *Natrix tessellata* in the studied area

Vipera ammodytes (Linnaeus, 1758) (fig. S₁₋₂) is a rare species, recorded by us in just 6 localities (fig. 28). It was mostly recorded in the rocky areas (fig. T) situated in the vicinity of forested regions from northern and southern Dobrudja. Near Greci, in the Macin Hills, and at Hagieni, we also observed specimens inhabiting forest margins (fig. K), on rare occasions.

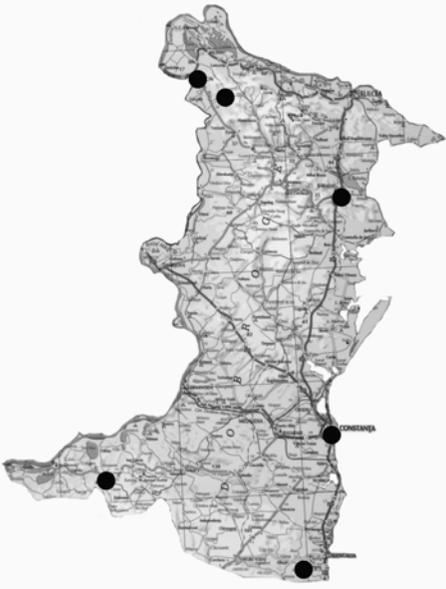


Figure no.28 Records for *Vipera ammodytes* in the studied area

General discussions

The herpetofauna of Dobruja is composed of more reptile species than amphibians, due to the warmer and dryer climate of the region, having, in this way, a unique composition, compared to other regions of Romania (Ghira et al 2002). From the amphibians, the most common species are *Bufo viridis* and *Rana ridibunda*, and *Testudo graeca*, *Lacerta viridis*, *Podarcis taurica* and *Dolichophis caspius* represent the most common reptile species.

An important result of our study is the broadening of the knowledge regarding the distribution of certain species, which have been identified in

a larger area than previously known. Thus, *Bombina bombina*, *Hyla arborea*, *Pelobates fuscus* and *Pelobates syriacus* were previously recorded exclusively, or almost exclusively, in the lower regions from the Danube Delta or from the vicinity of the sea shore (Cogălniceanu et al 2000, Iftime 2005). We have identified populations in several areas from the Dobrudjan plateau, including the northern area situated at higher altitudes, up to 300 m a.s.l. This is especially important in the case of *Pelobates syriacus*, a thermophile submedi-teranean species, for which the investigated area represents its northern distributional limit. Also, *Rana dalmatina* is from our results, a common species in the forests from southern Dobrudja, even though it was previously identified in a single locality (Dragomir 2002).

The data presented above indicate a wide range of distribution for the amphibian species in Dobrudja, in spite of the less favorable conditions. Still, certain species are absent or are very rare in Dobrudja. This is the case of the newts in the Dobrudjan continental plateau. Even though, in April 2006, we have investigated favorable habitats both from southern and central Dobrudja, we did not succeed in finding any newts. These amphibians are absent even in the permanent aquatic habitats from the Dobrudjan plateau, probably due to



Figure P. *Dolichophis caspius* sample from Enisala
(photo by: Horia Bogdan, CHO-2006)



Figure Q. *Natrix natrix* sample from Vadu
(photo by: Horia Bogdan, CHO-2006)



Figure R. *Natrix tessalata* sample from the ruin's of Histria
(photo by: Horia Bogdan, CHO-2006)



Figure S1. *Vipera ammodytes* sample from rocky region at Greci
(photo by: Alexandru Strugariu, CHM-2006)



Figure S₂. *Vipera ammodytes* sample from forested region at Baneasa
(photo by: Marius Groza, CHO-2006)



Figure T. Rocky habitat of *Vipera ammodytes* at Greci
(photo by: Alexandru Strugariu, CHM-2006)

the lack of habitats necessary for the newts' terrestrial phase. In Dobrudja, *Bombina bombina* even inhabits areas situated at above 300 m, being present in small atypical habitats. This is probably a consequence of the fact that *Bombina variegata* is absent from this territory, *Bombina bombina* thereby colonizing the habitats usually occupied by its congener. In western Romania, *Bombina bombina* doesn't reach altitudes higher than 200m a.s.l., at higher altitudes it is replaced by *Bombina variegata* (Covaciu-Marcov et al 2000, 2004, 2005 a, b 2006). However in Transylvania, *Bombina bombina* does ascend to higher regions, hybrids between it and *Bombina variegata* being encountered at altitudes of 200-400 m, depending on the habitat (Ghira et al 2003). All these dissimilarities demonstrate the importance of the differences between the habitats from certain regions when it comes to the species of the *Bombina* genus.

Even though the Dobrudjan climate is less favorable for amphibians, species that are primarily aquatic such as *Rana ridibunda* are well represented. This is due to the fact that Dobrudja is surrounded from three directions by large permanent water sources. In northern Dobrudja, *Rana ridibunda* is present alongside the other two forms of green frogs from Romania. Water frogs can occur in different species complexes, several

systems being described (Tunner & Heppich-Tunner, 1991), many of them also being present in Dobrudja. In northern Dobrudja, the most common of these is the R-E complex (*Rana ridibunda* and *Rana kl. esculenta*) but at Saon Monastery, all three forms are present in the same habitat (R-E-L complex). Still, in most areas of Dobrudja, *Rana ridibunda* is the only water frog, being better represented, both in terms of its distribution and the number of specimens recorded. *Rana ridibunda* was recorded populating any type of aquatic habitat, including brackish waters. *Rana lessonae* inhabits areas with a high humidity level, similar to habitats populated in Northern Romania, in the Oaș region (Covaciu-Marcov et al 2004). Still, these habitats are extremely rare in Dobrudja.

Important areas for herpetofauna

Two areas from Dobrudja stand out as important herpetofaunal regions (fig. 29): the northern region and the south-western region. The northern regions have a larger area, containing forested areas from the Casimca Plateau, the Babadag Plateau and the Macin Hills. The southern Dobrudjan region is much more reduced in size, including the few forested areas from this sector of Dobrudja, which have been subject to decline (Andrei 2002). The territory situated between these two regions,

central Dobrudja, primarily comprises agricultural land as is home to a poor and stereotypical herpetofauna of steppe regions. Thus, in most areas of central Dobrudja, the only amphibians that were recorded are *Bufo viridis* and *Rana ridibunda* along the water systems and, of the reptiles, only numerous populations of *Podarcis taurica* are present.



Figure no.29 The 2 important herpetofaunal regions of Dobrudja: the northern and south-western region

The two important regions are home to the most important species of the Dobrudjan herpetofauna. Species including; *Rana dalmatina*, *Ablepharus kitaibelli* and *Elaphe longissima* are spread exclusively in these areas. Even if the herpetofauna of these

regions is very similar, some differences do exist between them. South-western Dobrudja contains a more typical sub-Mediterranean herpetofauna, while in the north, species that are linked to high humidity levels appear. Thus, in the northern Dobrudjan forests from the Macin Hills, *Bufo bufo* is present. Also, in the areas situated in the vicinity of the Danube, there are populations of *Rana kl. esculenta* and *Rana lessonae*, species which are more characteristic of the more cold and humid areas from Northern Romania (Covaciu-Marcov et al 2004, 2006). These populations from Northern Dobrudja are probably relicts that survive due to the large water accumulations. From the reptiles, in the more humid areas near the Danube and the Razelm-Sinoe lagoon system, populations of *Lacerta agilis* appear, a species which is more linked to a higher level of humidity and which is absent from southern Dobrudja.

In the south-western Dobrudjan areas the elements mentioned above are absent. Still, in spite of the dryer aspect of the area, good populations of amphibians are present in the forested areas. At the same time, even though the forested areas from southern Dobrudja are smaller in size, populations of the more thermophilic species are numerous, with more individuals being present than in the northern regions, where most species

are at their northern limit of distribution. Thus, the number of tortoises and of snake-eyed skinks observed in southern Dobrudja is higher in the same period and in the same conditions.

Along with these two regions, a unique herpetofaunal assemblage is found in the areas situated in the vicinity of the Razelm-Sinoe lagoon, in the Histria – Vadu sector.

Anthropogenic impact

Anthropogenic impact (fig. U) can only be estimated within the important herpetofaunal areas. The central areas are, in essence, the result of human activities, here only a small number of species have persisted. In northern Dobrudja negative impacts include deforestation, an activity that continues to this day in the Macin Hills. The most threatened species in the area is the common toad which is extremely rare in Dobrudja. In the central area from the Macin Hills, *Bufo bufo* cannot find suitable spawning habitats, as a result of deforestation. At the end of April, we have observed hundreds of specimens which were reproducing in small temporary puddles on the dirt road from between Lucavita and Nifon. Of these, dozens of specimens were killed by cars and forestry equipment, during amplexus (fig. V₁₋₂). It is imperative that urgent measures should be taken to prevent these deaths, because, even

if not all the toads are killed by cars, the tadpoles are not able to develop in the small temporary puddles next to the dirt roads. We believe that artificial water pools should be created at a certain distance from the road.

In southern Dobrudja, deforestation is also having a negative impact but occurs at a smaller scale. Afforestation with acacias and coniferous trees also has a negative effect, since these areas are almost completely lacking in herpetofauna. Plantations with native species have a proper herpetofauna but only if they border a natural forest, from which the species could have colonized the new plantation. In both regions, a powerful negative impact is created by the heavy vehicle traffic. Victims to this are primarily snakes (fig. W) but near the Danube, frogs also fall victim to this factor (fig. V₁₋₂). In the area near Vadu, the beaches are starting to be affected by the tourists, which leave rubbish in the area.

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Figure U. Anthropogenic impact at Jurilovca
(photo by: Ioan Ghira, SHR-2006)



Figure W. *Zamenis longissimus* sample killed by road traffic at Babadag
(photo by: Horia Bogdan, CHO-2006)



Figure V. *Bufo bufo* samples killed in the breeding period by road traffic at Nifon (upper: 2 males in amplexus with a road killed female; lower: killed male) (photo by: Horia Bogdan, CHO-2006)

References

- Andrei, M.D. (2002): Contributions to the knowledge of the herpetofauna of southern Dobruja (Romania). *Trav. Mus. natl. Hist. nat. Grigore Antipa*, 44: 357-373.
- Băcescu, M. (1934): Contributions a la faune des reptiles de Dobrogea. *Anal. scient. Univ. Jassy*, 19 (1-4): 317-330.
- Berger, L. (1966): Biometrical studies on the population of water frog from the environs of Poznan. *Ann. Zool.* 23: 303-324.
- Berger, L. (1973): Systematics and hybridization in European green frogs of *Rana esculenta* Complex. *J. Herpetol.* 7: 1-10.
- Cogălniceanu, D. (1997): Practicum de ecologie a Amfibienilor - metode și tehnici în studiul ecologiei Amfibienilor. Ed. Universității din București.
- Cogălniceanu, D., Aioanei, F., Bogdan, M. (2000): Amfibienii din România, Determinator. Ed. Ars Docendi, București.
- Covaciu-Marcov, S.D., Ghira, I. Venczel, M. (2000): Contribuții la studiul herpetofaunei din zona Oradea. *Nymphaea, Folia Naturae Bihariae, Oradea*, 28: 143-158.
- Covaciu-Marcov, S.D., Ghira, I., Sas, I. (2004): Contributions to the study of the herpetofauna from Oaş region (Satu-Mare County, România). *Mediul Cercetare, Protecție și Gestiune, Cluj -Napoca*, 2: 107-112.
- Covaciu-Marcov, S.D., Cicort-Lucaciu, A.Șt., Sas, I., Bredet, A.M., Bogdan, H. (2005a): Herpetofauna from the basin of Mureș river in Arad county, Romania. *Mediul Cercetare, Protecție și Gestiune, Cluj-Napoca*, 5: 147-152.
- Covaciu-Marcov, S.D., Cicort-Lucaciu, A.Șt., Sas, I., Ile, R.D. (2005b): The herpetological fauna of "Culmea Codrului" (Satu - Mare county, Romania). *Analele Univ. din Craiova*, 46: 163-168.
- Covaciu-Marcov, S.D., Sas, I., Kiss, A., Bogdan, H., Cicort-Lucaciu, A.Șt. (2006): The herpetofauna from the Teuz River hydrographic basin (Arad County, Romania). *N. West. J. Zool.*, 2 (1): 27-38.
- Fuhn, I. (1952): Notă asupra herpetofaunei dobrogene. *Natura*, 6 (4): 79-80.
- Fuhn, I. (1960): "Fauna R.P.R.", vol. XIV, fascicola I, Amphibia. Editura Academiei R.P.R., București.
- Fuhn, I., Vancea, Șt. (1961): "Fauna R.P.R.", vol. XIV, Fascicola II, Reptilia. Editura Academiei R.P.R., București.
- Fuhn, I., Hârsu, M. (1962): *Lacerta praticola* Lantz & Cyren, o șopârlă nouă pentru fauna herpetologică a Dobrogei. *Natura*, 14 (5): 39-41.
- Ghira, I., Venczel, M., Covaciu-Marcov, S.D., Mara, Gy., Ghile, P., Hartel, T., Török, Z., Farkas, L., Rácz, T., Farkas, Z., Brad, T. (2002): Mapping of Transylvanian Herpetofauna. *Nymphaea, Folia Naturae Bihariae, Oradea*, 29: 145-203.
- Gunther, R. (1997): *Rana lessonae* Camerano 1882. In: Gasc J. P., (ed.). Atlas of Amphibians and Reptiles in Europe, pp. 148-149. Museum National D'Histoire Naturelle, Paris.
- Iana, S. (1970): Noutăți faunistice în ecosistemele Dobrogei de sud. *Ocotirea Naturii. Studii și Comunicări, Suceava*, 17-23.
- Iftime, Al. (2005): Reptilia. Amphibia. In: "Cartea Roșie a Vertebratelor din România", Eds: Botnariuc & Tatole. Ed. Acad. Române.
- Kotenko, T. (1993a): The reptiles of Beștepe hill range (Romania). *Vestnik zoologii*, 1: 71.
- Kotenko, T. (1993b): Information on large whip snake (*Coluber caspius*) in Dobrugea (Romania). *Vestnik zoologii*, 2: 71.
- Kotenko, T. (2001): Herpetofauna of the Danube Biosphere reserve (Ukraine) against the background of the loer Danube region herpetofauna. *Scientific Annals of the Danube Delta institute for research and development, Tulcea-Romania*: 111-123.
- Naumov, B.Y. (2005): New records of some herpetofauna species in Bulgaria *Acta Zoologica Bulgarica*, 57 (3): 391-396

- Oțel, V. (1998): Investigații herpetologice în zona Munților Măcin și Podișul Baba-dagului. Anal. Șt. ale I. D. D., 6 (1): 71-77.
- Petrov, B.P. (2004): The herpetofauna (Amphibia and Reptilia) of the Eastern Rhodopes (Bulgaria and Greece), pp. 865-879. In: Beron P., Popov A. (eds). Biodiversity of Bulgaria. 2. Biodiversity of Eastern Rhodopes (Bulgaria and Greece). Nat. Mus. Natur. Hist., Sofia.
- Popescu, M. (1977): Contribuții la cunoașterea broaștei roșii de pădure (*Rana dalmatina*) în județul Tulcea. Peuce, Zoologie, 5: 155-163.
- Razzetti, E., Bader, T., Bilek, K., Delfino, M., Di Cerbo, A.R., Duda, M., Hill, J. (2006): A contribution to the knowledge of the herpetofauna of the Greek island of Corfu pp. 207-216, In: Marco A. L. Zuffi (ed.) 2006. - Societas Herpetologica Italica : Atti del V Congresso Nazionale, Calci (Pisa), 29 settembre-3 ottobre 2004. Firenze University Press, Firenze.
- Strugariu, Al., Săhlean, T.C., Volosciuc-Hutuleac, M.V., Pușcașu, Cr.M. (2006a): Preliminary data regarding the distribution of reptilian fauna in Suceava County (Romania). N. West. J. Zool, 2 (1): 39-43.
- Strugariu, Al., Gherghel, I., Huțuleac-Volosciuc, M.V., Sahlean, T.C., Sas, I., Pușcașu, C.M. (2006b): Preliminary data concerning the distribution of amphibian fauna in Suceava county (Romania). Analele Universității din Oradea, Fascicula Biologie, 13: 39-47.
- Török, Zs. (1997): Data on the ecology of amphibians and reptiles from sandy areas of the Razim-Sinoe lagoony system (Romania). Trav. Mus. natl. Hist. nat. Grigore Antipa, 37: 297-303.
- Török, Zs. (1998a): Ghid pentru cunoașterea Reptilelor din Dobrogea de nord. Ed. Aves.
- Török, Zs. (1998b): Contributions to the knowledge of the distribution of sand lizard (*Lacerta agilis euxinica* Fuhrn and Vancea 1964) in south-eastern Romania. Sesiunea Științifică a ICPDD – Tulcea: 498-500.
- Török, Zs. (1999): Note privind distribuția spațială a herpetofaunei Culmii Pricopanului (Jud. Tulcea, România). Acta oecologica, 6 (1-2): 57-61.
- Toth, T., Grillisch, H., Farkas, B., Gal, J., Susic, G. (2006): Herpetofaunal data from Cres Island, Croatia. Herpetozoa 19 (1-2): 27-58.
- Tunner, H.G., Heppich-Tunners, S., (1991): A new population system of the wather frogs discovered in Hungary. Pp. 453-460, In: Korsos, Z., Kiss, I. (ed), Proc. Sixth. Ord. Gen. Met. S. H. E., Budapest.

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Table no.1 Amphibian and reptile locality records in the studied area

(Geographical localities = 136, No. of herpetological records = 664)

[Td=*Triturus dobrogicus*, Bb=*Bombina bombina*, Ha=*Hyla arborea*, Pf=*Pelobates fuscus*, Ps=*Pelobates syriacus* Buf=*Bufo bufo*, Buv=*Bufo viridis*, Rd=*Rana dalmatina*, Rr=*Rana ridibunda*, Rl=*Rana lessonae*, Re=*Rana esculenta*, Eo=*Emys orbicularis* Tg=*Testudo graeca*, Ak=*Ablepharus kitabelli*, La=*Lacerta agilis*, Lv=*Lacerta viridis*, La=*Lacerta trilineata*, Pt=*Podarcis taurica*, Pm=*Podarcis muralis*, Ea=*Eremias arguta*, Ca=*Coronella austriaca*, Zi=*Zamenis longissimus*, Eq=*Elaphe quatuorlineata*, De=*Dolichophis caspius*, Nn=*Natrix natrix*, Nn=*Natrix tessellata*, Va=*Vipera ammodytes*.]

Species	T	B	B	H	P	P	P	B	B	R	R	R	R	E	T	A	L	L	L	L	P	P	E	C	Z	E	D	N	N	V			
Localities	d	b	b	a	f	s	u	u	f	d	r	r	r	o	g	k	a	v	t	t	t	m	a	a	i	q	c	n	n	t	a		
Adamclisi	-	-	-	-	-	-	-	X	-	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-	-	X	-	-	-	-			
Agigea	-	X	-	-	-	-	-	X	-	X	-	-	-	X	-	-	X	-	-	-	X	-	-	-	-	-	X	-	-	-	-		
Alba	-	-	-	-	-	-	-	X	X	-	-	-	-	X	-	-	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-		
Albești	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-		
Aliman	-	-	X	X	-	-	-	X	-	X	-	-	-	X	-	-	X	-	-	-	X	-	-	-	-	-	-	-	X	-	-		
Atmeaga	-	X	-	X	-	-	-	X	-	X	-	-	-	-	X	-	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-		
Babadag	-	X	-	-	-	-	-	X	X	-	-	-	-	X	-	X	-	X	-	X	X	-	-	-	X	X	X	X	X	X	X		
Baia	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-		
Balabancea	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-		
Băneasa	-	X	X	-	-	-	-	X	X	X	-	-	-	X	-	X	-	X	-	X	X	-	-	-	-	-	-	X	-	-	-	X	
Beidaud	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	
Beștepe	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	
Capidava	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	
Casian	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-	-	-	-	
Carcaliu	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	
Casimcea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	
Cataloi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-	-	-	-	
Ceamurlia de Jos	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ceamurlia de Sus	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Cernavodă	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cetatea Hîstria	X	X	X	X	X	-	-	X	-	X	-	-	-	X	X	-	X	-	X	-	X	-	-	-	-	-	X	X	X	X	X	X	X
Cetățuia	-	-	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cheia	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-

Table no.1 (continued)

Species	T	B	B	B	B	B	R	R	R	E	T	A	L	L	P	P	E	C	Z	E	D	N	N	V
Localities	d	b	H	P	P	u	R	R	R	o	g	k	v	t	t	m	a	a	I	q	c	n	n	a
		a	a	s	s	f	d	r	e		a	a												
Ciobanu	-	-	X	-	-	X	-	X	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-
Ciobănița	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Ciucurova	-	-	X	X	-	X	X	-	-	X	X	-	X	-	-	-	-	X	-	-	-	-	-	-
Cișmeaua Nouă	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Cobadin	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Cochirleni	-	-	X	-	-	X	-	X	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-
Colina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Constanța	-	-	-	-	-	X	X	-	X	X	-	-	X	-	-	-	-	-	-	-	-	X	X	X
Corbu	-	-	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-
Corugea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Crângu	-	-	-	-	-	X	-	-	-	X	X	-	X	-	X	-	-	-	-	-	X	-	-	-
Crucea	-	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-
Deleni	-	-	-	-	-	X	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Dobromir	-	-	X	-	-	X	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	-	-
Dobromiru din Deal	-	-	X	-	-	X	X	-	-	-	-	X	-	X	-	-	-	-	-	-	X	X	X	-
Dorobanțu	-	-	-	-	-	X	-	X	-	-	-	-	X	X	-	-	-	X	-	-	-	-	-	-
Dumbrăveni	-	-	-	-	-	X	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Dunărea	X	-	-	-	-	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-
Eforie Nord	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-
Enisala	-	X	X	-	-	X	-	X	-	-	-	-	X	X	X	-	-	-	-	-	-	X	X	X
Făurei	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	-
Fântâna Mare	-	-	X	-	-	X	X	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-
Florile	-	-	X	-	-	X	-	X	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Furnica	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Garvăn	-	-	-	-	-	-	-	X	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-
Gorun	-	-	X	-	-	X	X	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-
Gura Dobrogei	-	-	-	-	-	X	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-
Greci	-	X	X	-	-	X	X	-	X	-	X	X	-	X	-	-	-	X	X	X	X	X	X	X
Hăgieni	-	-	X	-	-	X	-	X	-	X	-	-	X	-	X	-	-	-	X	X	X	X	X	X

Table no.1 (continued)

Species	T	B	B	H	P	P	B	B	R	R	R	E	T	A	L	L	L	P	P	E	C	Z	E	D	N	N	V
Localities	d	b	a	f	s	u	u	f	r	d	r	o	g	k	v	t	t	t	m	a	a	I	q	c	n	n	a
Hârşova	-	-	X	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	-	-
Horia	-	-	X	-	-	X	-	X	-	X	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-
I. C. Brătianu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Independența	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ion Corvin	-	-	X	-	-	X	-	X	-	X	-	-	X	X	-	X	-	X	-	-	-	-	-	X	-	-	-
Isaccea	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	-	-
Istria	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	-	-
Izvoarele	-	-	-	-	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	-	X	-	-
Jurilovca	-	X	X	-	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	X	X	X	-
Lespezi	-	-	-	-	-	-	-	-	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	X	-	-	-
Lipnița	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luncavița	-	-	X	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	-	-
2 Mai	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	-	-
Mamaia	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	X	X	X	-
Mangalia	-	-	-	-	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	-	X	X	-
Măcin	-	X	X	X	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	X	X	X	-
Mănăstirea Cilic Dere	-	-	X	-	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	-	X	X	-
Mănăstirea Cocoș	-	-	X	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	X	-
Mănăstire Peștera Apostol Andrei	-	-	X	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	X	X	-
Mănăstirea Saon	-	-	X	-	-	X	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	-	-	X	-
Meșteru	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Mihai Viteazu	-	-	-	-	-	X	-	X	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Mineri	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-
Murighiol	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Naibant	-	-	-	-	-	X	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Negureni	-	-	-	-	-	-	-	X	-	X	-	-	X	-	-	X	-	X	-	-	-	-	-	-	-	-	-
Negrești	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Niculifei	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-

Table no.1 (continued)

Species	T	B	B	P	P	B	R	R	R	E	T	A	L	L	P	P	E	C	Z	E	D	N	N	V	
Localities	d	b	H	a	f	u	B	R	R	R	e	g	k	v	t	t	m	a	I	q	c	n	n	t	a
Nifon	-	-	X	-	-	X	X	X	-	-	X	X	-	X	-	-	-	-	-	-	-	-	-	-	-
Nufăru	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-
Olimp	-	-	-	-	-	-	X	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-	X	X	-
Olteni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oltina	-	X	X	-	-	-	X	X	-	-	X	-	-	X	X	-	-	-	-	-	-	X	X	-	-
Osmancea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Palazu Mic	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Parcheș	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-
Pădureni	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Pietreni	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plopu	-	-	-	-	-	-	-	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	-	-
Poșta	-	-	X	-	-	-	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-	X	-	-
Rachelu	-	-	X	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	X	-
Rahman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Rariștea	-	-	-	-	-	-	X	X	-	-	-	X	-	X	-	X	-	-	-	-	-	-	-	-	-
Rasova	-	-	X	X	X	-	-	X	-	-	X	-	X	-	X	-	-	-	-	-	-	-	X	-	-
Răzoarele	-	X	X	-	-	X	X	X	-	-	X	-	X	X	X	-	-	-	-	-	-	-	X	-	-
Râmniciu de Jos	-	-	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Râmniciu de Sus	-	-	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Revârsarea	-	-	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	X	-
Sabangia	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saraiu	-	-	X	-	-	X	X	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	-
Sarichioi	-	X	-	-	-	X	-	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	X	-
Sarighiol de deal	-	X	-	X	X	-	-	X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
Sarinasuf	-	-	-	-	-	-	-	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	X	-	-
Satu Nou	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-
Sălcișoara	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	X	X	-
Seimeni	-	X	-	-	-	-	-	X	-	-	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-
Sinoe	-	-	-	-	-	-	X	-	X	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	-

Table no.1 (continued)

Species	T	B	H	P	P	B	B	R	R	E	T	A	L	L	P	P	E	C	Z	E	D	N	N	V
Localities	d	b	a	f	s	u	u	r	r	o	g	k	v	t	t	m	a	a	I	q	c	n	n	a
Slava Cercheză	-	-	X	X	-	-	X	-	-	-	X	X	X	X	X	-	-	-	-	X	-	-	-	-
Slava Rusă	-	X	-	-	-	-	X	-	-	-	X	X	X	X	X	-	-	X	X	X	X	X	X	-
Smârdan	-	-	X	-	-	-	-	X	-	-	-	-	X	X	X	-	-	-	-	-	-	X	X	-
Somova	-	-	-	-	-	-	-	X	-	-	-	-	X	X	X	-	-	-	-	-	X	X	X	-
Stearul	-	X	X	X	X	X	X	X	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-
Sipotele	-	-	-	-	-	-	X	-	-	-	X	X	X	X	X	-	-	-	X	X	X	-	-	-
Târgușor	-	-	-	-	-	-	X	-	-	-	X	-	X	X	X	-	-	-	-	X	X	-	-	-
Telița	-	-	X	-	-	-	-	-	-	-	X	-	X	X	-	-	-	-	-	-	X	-	-	-
Tichilești	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Topolog	-	X	-	-	-	X	X	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-
Tudor Vladimirescu	-	-	-	-	-	X	-	-	-	-	X	-	X	X	-	-	-	-	-	-	X	-	-	-
Tufani	-	-	-	-	-	-	-	X	-	-	X	-	X	X	X	-	-	-	-	-	X	-	-	-
Tulcea	-	-	-	X	-	X	X	X	-	-	X	-	X	X	X	-	-	-	X	X	X	X	X	-
Urluia	-	-	-	-	-	X	X	-	-	-	X	-	X	X	X	-	-	-	-	-	X	-	-	-
Vadu	-	X	X	X	X	-	-	X	-	-	X	-	X	X	X	-	-	X	X	-	X	X	X	-
Valea Teilor	-	-	-	-	-	X	X	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-
Vama Veche	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-
Vasile Alecsandri	-	-	X	X	-	X	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-
Văleni	-	-	-	-	-	X	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-
Victoria	-	-	-	X	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-
Ville	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Viișoara	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Visterna	-	-	-	-	-	-	-	-	-	-	X	-	X	X	X	-	-	-	-	-	-	-	-	-
Vîșina	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vlahii	-	-	X	X	X	X	X	X	-	-	X	-	X	X	X	-	-	-	-	-	-	X	X	-
Zebil	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	-
Zorile	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-
Σ of species records	1	1	4	1	6	3	7	1	3	9	4	1	7	8	1	3	1	8	9	4	3	4	2	6