Designation of Emerald sites for the conservation of Amphibian and Reptiles: practices and methodology

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Introduction

- Development of natural reserves is now declared as one of the most important policy priorities of Ukraine. As of January 1 this year, they are composed of over 8154 territories and objects with total area of 3.99 million hectares, representing 6,15% of the state. Thus, in the context of the implementation of action plans adopted by the Standing Committee of the Bern Convention, with the assistance of the Ministry of Ecology and Natural Resources of Ukraine during 2013 and 2014 the number of sites and areas of natural reserve fund increased by 145 units with a total area 65283.2523 ha (in 2013 102 facilities covering an area 39659.2491 ha in 2014 to 43 facilities covering an area 25624.0032).
- At the present stage of development of Ukraine there is an urgent need for appropriate methodological basis for the selection of protected areas to ensure a holistic ecosystem approach in the implementation of the state policy in the sphere of natural reserves and accelerate the formation of the national ecological network as a part of Pan-European Network (Pashkevich, Fitsaylo, 2012). In this context, it is necessary to distinguish *the Conventiononthe Conservationof European Wildlifeand Natural Habitats*, signed by Ukraine in 1996 (the Law of Ukraine "OnUkraine's Accessiontothe Convention...», № 436/96-VR of 29.10. 1996), and ratified - in May 1999. Composition of species, listed in the annexes of the Berne Convention, is much broader than the list of the Red Book of Ukraine. This makes possible to justify the protection of species not listed in the Red Book of Ukraine.
- Action plans, created under the Berne Convention or action plans,which have references to the recommendations and resolutions and recommendations approved by the Standing Committee of the Bern Convention, are weighty arguments, in the process of creation and / or defense the protected areas.

Materials and methods

- The current results are based on field studies conducted by me during 2001-2015 years mainly in the Carpathian region of Ukraine, in addition the materials of zoological museums of Ukraine were used. The relative strength was determined by Transect method. The transect length was 1 km., width is fixed, and smooth 2 m. On the majority of transects reckonings were conducted repeatedly in different seasons and time of the day. The total number of records held there is 1478, and the length of the routes is 1478 km respectively. The total number of individuals amphibians and reptiles counted is 121862. The systematic of lower taxons of reptiles and their Latin names are listed in the database TIGR Reptile Database; Amphibians - egg by E.M. Pisanets (2007).

Results

- The fauna of reptiles of Ukraine consists of 21 species including 7 families 2 rows (Amphibians and reptiles protected by the Bern Convention, 1999; Dotsenko, Darevskiy, 2005) and fauna of amphibians - 20 species of 6 families 2 rows (Pisanets, 2007).
- Thus, among the amphibians of Ukraine 1 species is included in the European Red List; 12 - Appendix 2, 8 - Appendix 3 of the Berne Convention, and 6 types are included in the resolution №6 (1998); The Red Book of Ukraine (2009) in the status of endangered is put 1 species, vulnerable - 7. Among the reptiles, 1 species is included in the Red List of the International Union for Conservation of Nature, 3 - European Red List; 13 - Appendix 2, 8 - Appendix 3 of the Berne Convention, and 4 species are included in the resolution №6 (1998); The Red Book of Ukraine (2009) 4 have a status of disappearing species, vulnerable - 7.
- The correspondence between the national and Berne lists is approximately 40%.
- For these reasons, we consider particularly relevant to explore populations of amphibians and reptiles listed in Resolution №6 (1998) on the territory of objects within the Emerald Network habitats from the list included in Resolution №4 (1996)

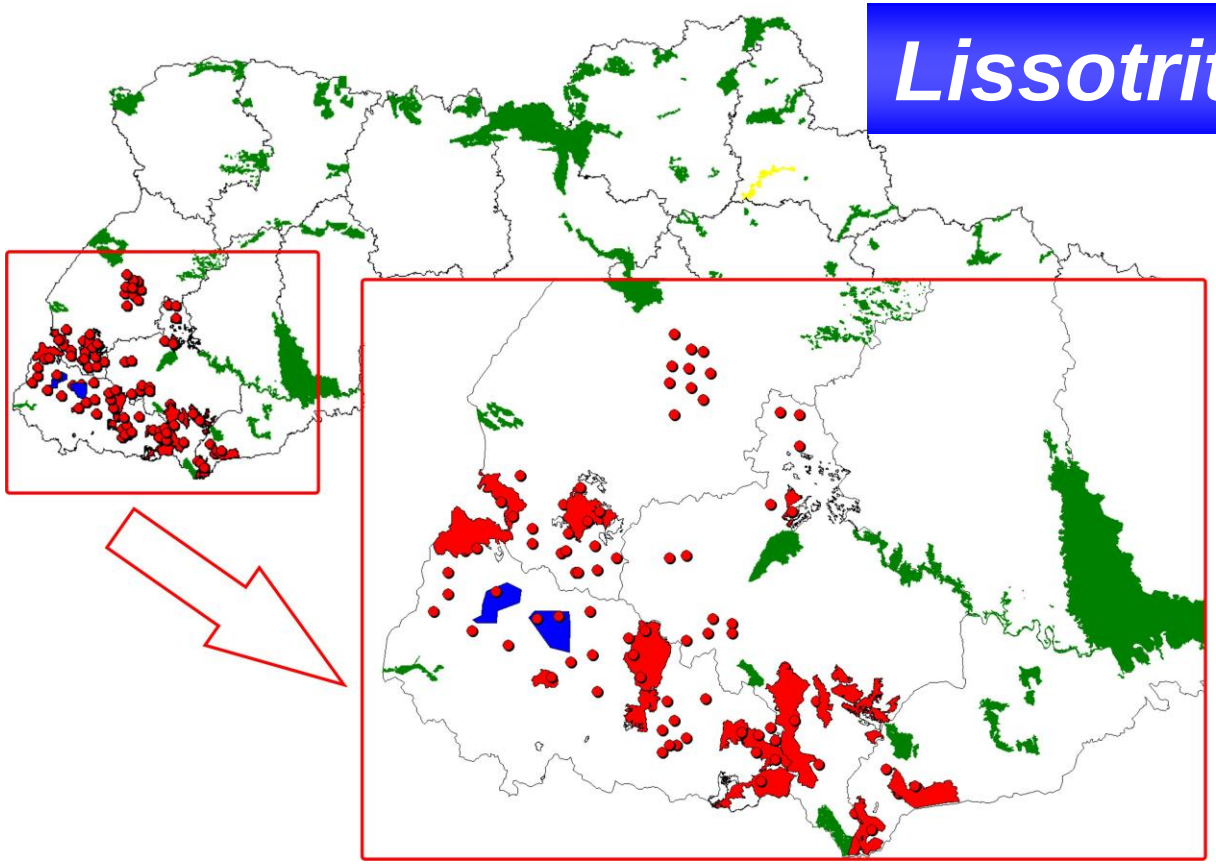
The rare species of amphibians on the territory of Ukraine

Name (Lat.)	Berne Convention	Resolution №6 (1998)	The Red Book of Ukraine, 2009
Salamandra salamandra	3		vulnerable
Lissotriton vulgaris	3		
Lissotriton montandoni	2	2001	vulnerable
Mesotriton alpestris	3		vulnerable
Triturus cristatus	2	1166	
Triturus dobrogicus	2	1993	vulnerable
Triturus karelinii	2	1171	vulnerable
Bombina bombina	2	1188	
Bombina variegata	2	1193	vulnerable
Bufo bufo	3		
Bufo calamita	2		vulnerable
Bufo viridis	2		
Hyla arborea	2		
Pelobates fuscus	2		
Rana arvalis	2		
Rana dalmatina	2		endangered
Rana temporaria	3		
Pelophylax esculentus	3		
Pelophylax lessonae	3		
Pelophylax ridibundus	3		
In all	**12 (60%)/8 (40%)**	**6 (30%)**	**8 (40%)**

The rare species of reptiles on the territory of Ukraine

Name (Lat.)	Berne Convention	Resolution №6 (1998)	The Red Book of Ukraine, 2009
Emys orbicularis	2	1220	
Anguis fragilis	3		
Coronella austriaca	2		vulnerable
Cyrtopodion kotschyi	2		endangered
Darevskia lindholmi	3		
Dolichophis caspius	2		vulnerable
Elaphe dione	3		endangered
Elaphe sauromates	2	1279	vulnerable
Eremias arguta	3		
Lacerta agilis	2		
Lacerta viridis	2		vulnerable
Natrix natrix	3		
Natrix tessellata	2		
Podarcis tauricus	2		
Pseudopus apodus	2		vulnerable
Vipera berus	3		
Vipera nikolskii	3		vulnerable
Vipera ursinii renardi	2	1298	vulnerable
Zamenis longissimus	2		endangered
Zamenis situla	2	1293	endangered
Zootoca vivipara	3		
Emys orbicularis	2	1220	
In all	**14 (66,6%)/7 (44,4%)**	**5 (23,8%)**	**11 (52,4%)**

Lissotriton montandoni



NOTES:
Green and yellow mark the objects of the Emerald network
Red colour marks the points of discovered species and objects of the Emerald network in which it occurs
Blue colour marks the suggested Emerald network objects

Preservation status. Listed in the Red Book of Ukraine (RBU) (category "endangered species"), the Annex II to the Convention on the conservation of wild flora and fauna and natural habitats in Europe (category "Species under special protection"), in the Red book of vertebrates of the International Union for conservation of nature (IUCN).

Distribution in Ukraine. Endemic to the Carpathians, is found in the mountains and foothills of Chernivtsi, Ivano-Frankivsk, Lviv and Transcarpathian regions.

Lissotriton montandoni

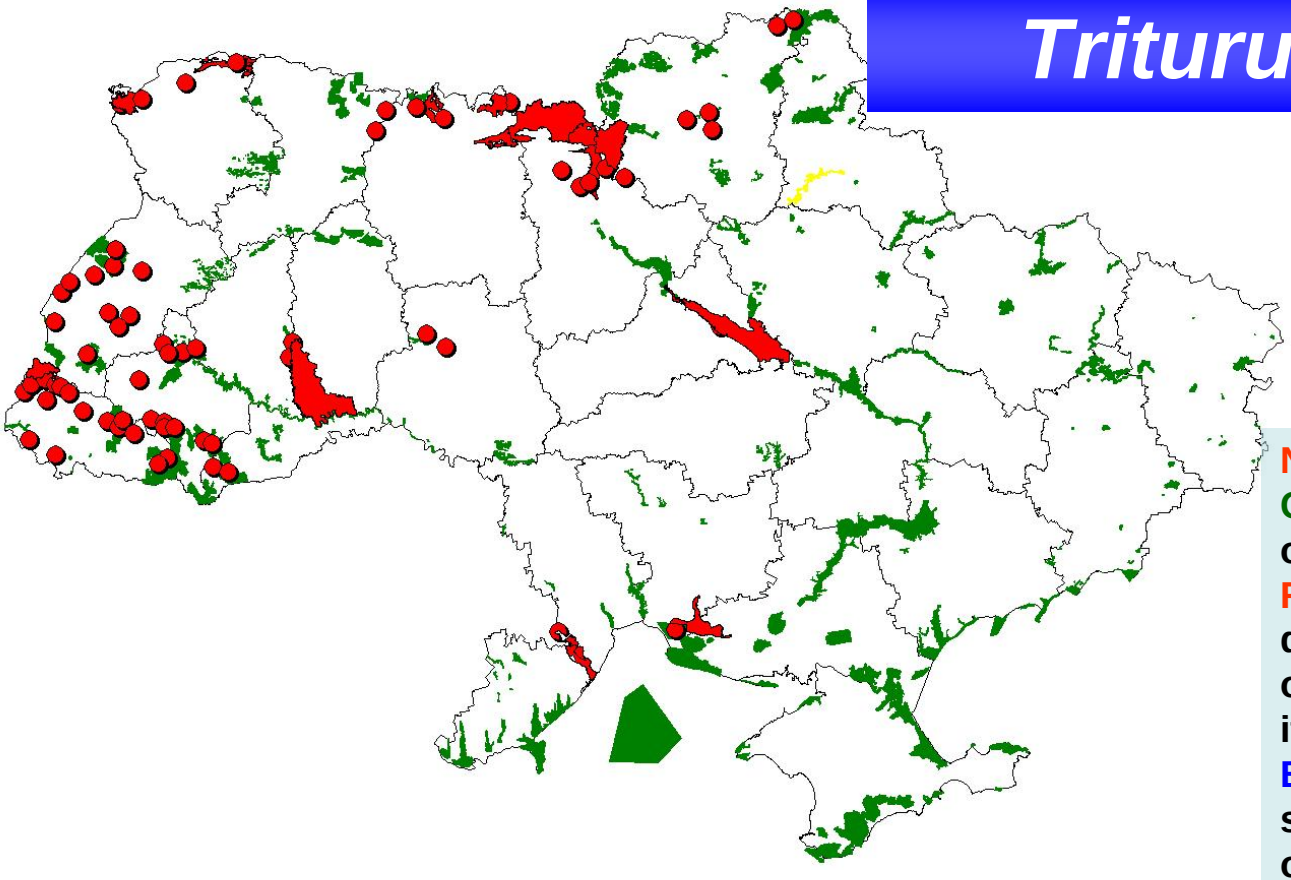
Types of habitat. Eudominant in groups of amphibians in mountain beech forests (16,7%); subdominant in habitats of river valleys (10,5%), Carpathian spruce boreal forest (17,7%); mixed forest (15,8%), subalpine meadows (25,0%), Alpine shales (25,0%). Dominant in beech-hornbeam-oak forests (5.3 percent).

The population and tendencies of its change. The population in suitable habitats is high. According to our data, the decline in the number of species is observed while maintaining biotope distribution and habitat within the studied area. Thus, over the past 30 years, the population of species has declined in 33 times, while the percentage in the sample - in 17.14 times.

Factors of population decline: the population decreases in biotopes transformation, they are killed by vehicles when they use puddles on the back roads for spawning.

Implemented and necessary measures of protection. Protected within 9 environmental objects in the Emerald network, which cover more than 60% of the species range. For the purpose of species conservation, it is necessary to create a number of environmental protection facilities in the valleys of the rivers Abranka (tributary of the Latorytsa, Irshava district, Transcarpathian region) and Shypot (tributary of the Uzh, Perechyn district, Transcarpathian region).

Triturus cristatus



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Preservation status. Listed in Appendix II of the Convention on the conservation of wild flora and fauna and natural habitats in Europe (category "Species under special protection").

Distribution in Ukraine. Distributed sporadically in the Carpathian mountains, to a height of 1450 meters above the sea level, less common farther to the East, in the South it is distributed to the Odessa region.

Triturus cristatus

Types of habitat. Triturus cristatus is found in forest and forest-steppe habitats where the average population reaches 2,20 individuals per 100 m of the route which comprises 7,32% of amphibian populations. In water reservoirs, the number of species in the spring period is 2.70 m, respectively, it comprises 8.56%. In addition, a significant number of species reaches in agrocenoses 5,50, the percentage in the sample is 5,86%.

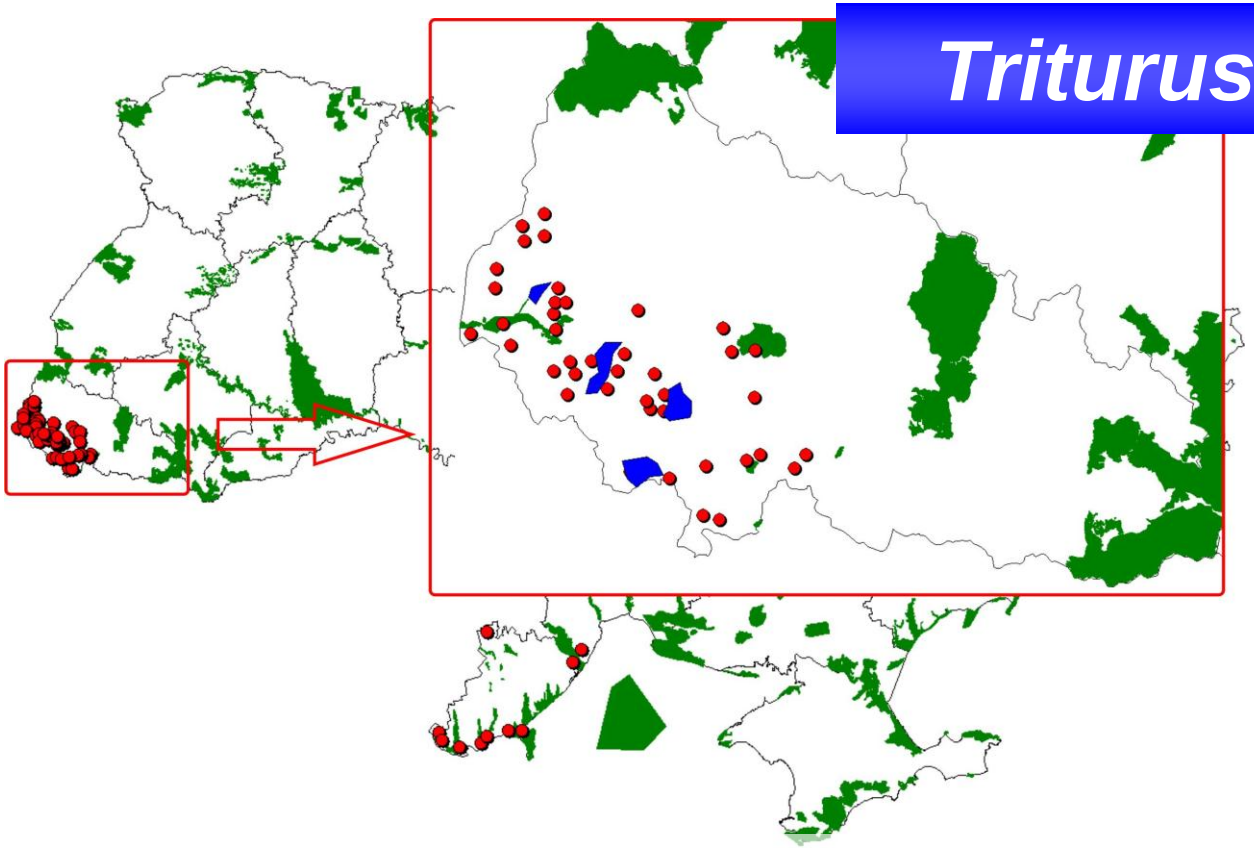
The population and tendencies of its change. The decline of the species range within the study region is observed. In the meadows, where according to the literature, Triturus cristatus was the only species and was found in large quantities, has not been attested in our study.

We can state that the population of Triturus cristatus in Ukraine has decreased by 3.34, and the percentage of its groupings of amphibians has decreased by 1.74 times.

Factors of population decline: the population decreases in biotopes transformation, they are killed by vehicles when they use puddles on the back roads for spawning.

Implemented and necessary measures of protection. Protected within 39 environmental objects in the Emerald network, which significantly represent the species range.

Triturus dobrogicus



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Distribution in Ukraine. Odessa, Kherson and Mykolaiv regions (in the latter two regions, more research is needed); in Transcarpathia — Triturus d. macrosomus (Boulenger, 1908).

Triturus dobrogicus

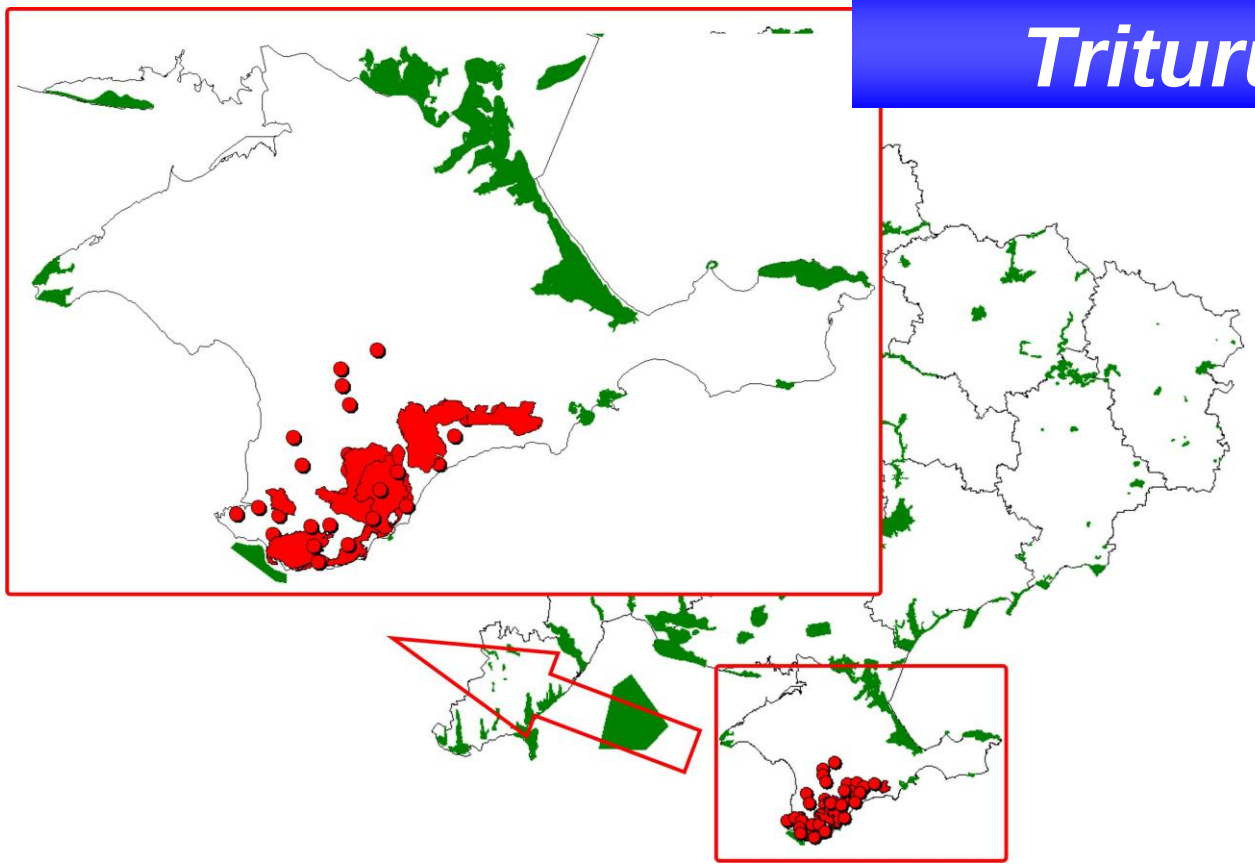
Types of habitat. The species is associated with water types of habitat, where it is found from spring to late autumn. Thus, in habitats near forests, the number of species reaches 2.20±0,97 individuals per 100 m of the route that is 7,32±3,23% of the total number of amphibians. In water reservoirs, the number reaches 2,82±0,41 which comprises 9.67±1,42%. In addition, although it seldom occurs, species, however, is found in agrocenosis, where the number reaches 2,52±0,33 individuals per 100 m of the route, i.e. 2,68±0,33%.

The population and tendencies of its change. The number of *Triturus dobrogicus* shows a tendency to decrease compared to the data obtained 30 years ago - in 1.75 times.

Factors of population decline: The population decreases in biotopes transformation, decrease of places for reproduction and their pollution.

Implemented and necessary measures of protection. Protected within 3 environmental objects in the Emerald network. The area of environmental protection facilities scarcely covers the natural habitat of the species. Naturally protected objects on plain territory of Transcarpathia should be created for effective protection: Pereshsky forest (Uzhhorod region), the valley of the river Borzhava (near the village Vary, Transcarpathia), the valley of the river Serne (near the village Rafailovo, Transcarpathia), Shalankivsky forest (Vynogradivsky region, Transcarpathia).

Triturus karelinii



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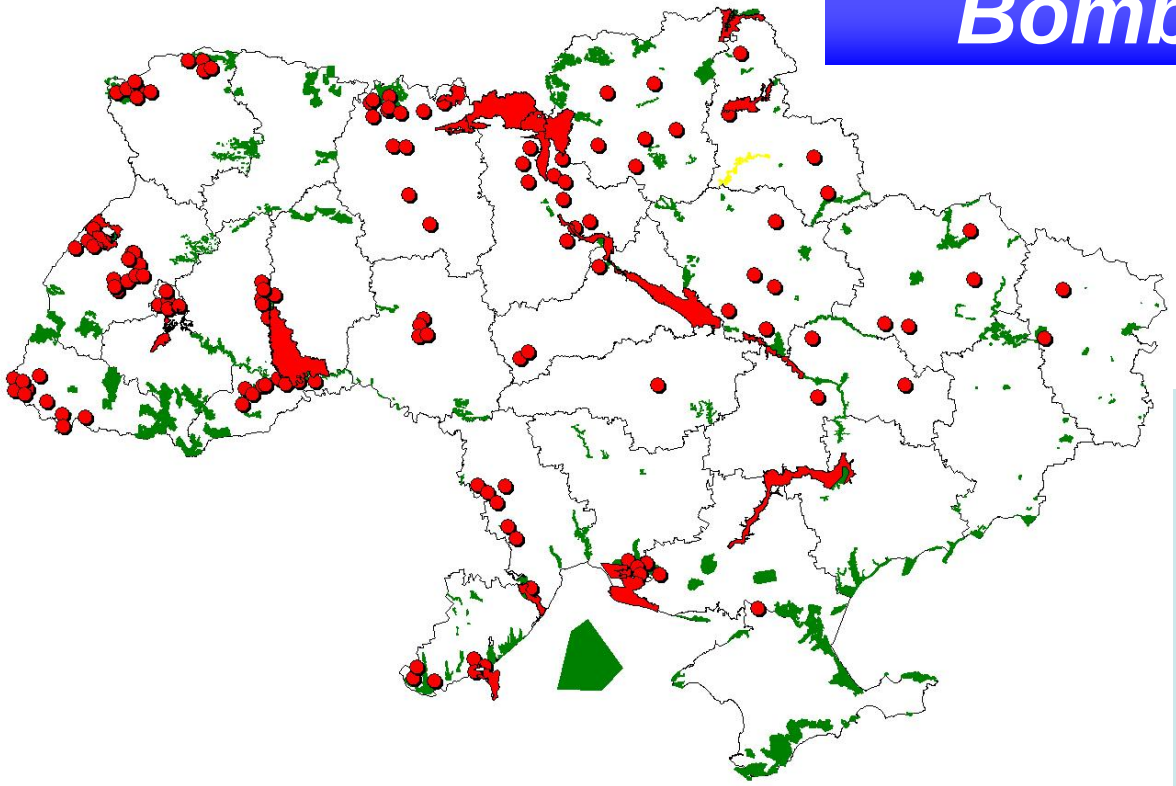
Distribution in Ukraine. In the South of Crimea from the city Sevastopol to Alushta, in the North — approximately to the city Simferopol and Bakhchisarai.

Triturus karelinii

Types of habitat. Inhabits forested mountain areas.
The population and tendencies of its change. The maximum population of 4.64 individuals per m2 is observed in a puddle next to the bank of Kutuzov lake. The number remains high and stable. However, suitable breeding habitats is not are very few.
Factors of population decline: deforestation, drainage and pollution of water bodies; increase of road network, digging activity of wild boar, especially in deciduous forests.
Implemented and necessary measures of protection. Protected within 4 environmental objects in the Emerald network, which cover more than 80% of the natural habitat of the species.

Bombina bombina



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Preservation status. Listed in the Annex II to the Convention on the conservation of wild flora and fauna and natural habitats in Europe (category "Species under special protection").

Distribution in Ukraine. Distributed on the whole territory of Ukraine, except the Crimea.

Bombina bombina

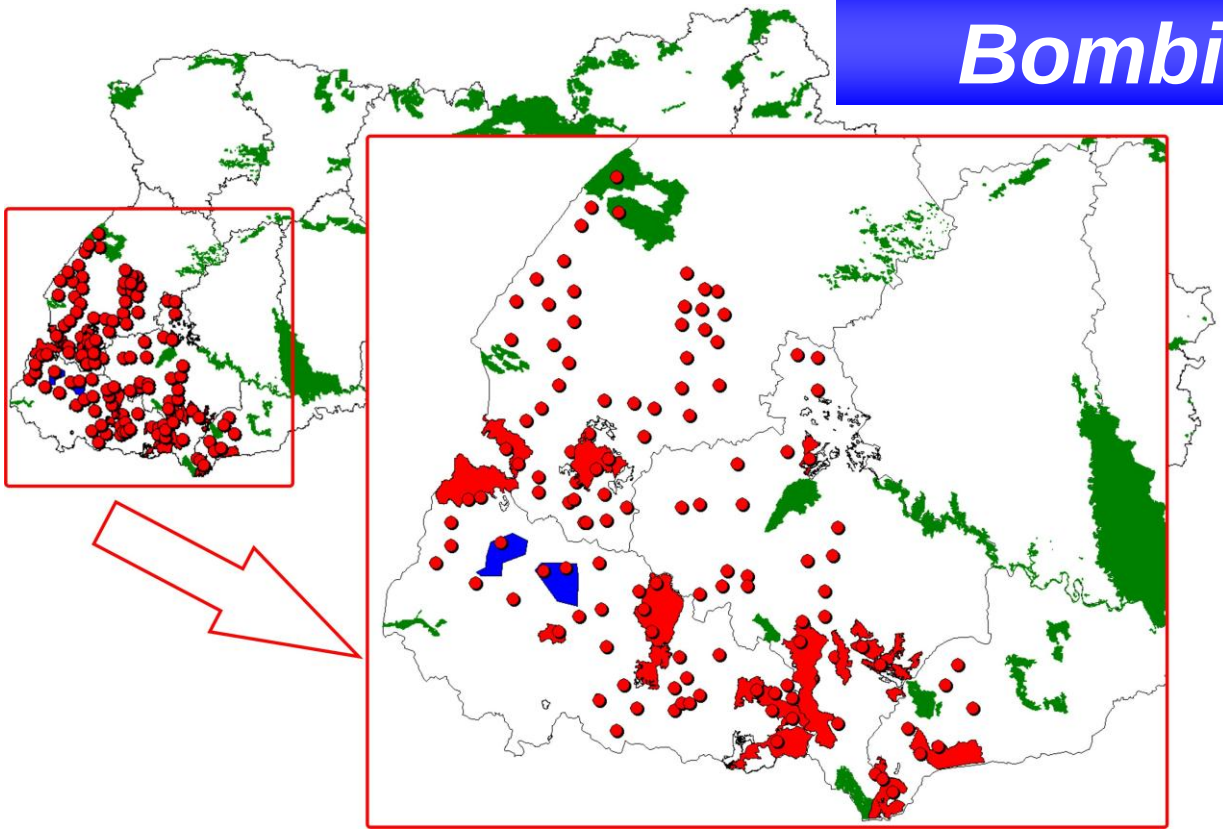
Types of habitat. Habitat places of *Bombina bombina* are most often associated with temporary water reservoirs in the river valleys.

The population and tendencies of its change. Analyzing the biotopes of distribution, we may note that Bombina bombina is found in most water bodies where its density reaches its 31,90 individuals per 100 m of the route which comprises 4.86 of the sample. A significant number of toad occur in bogs, ruts, agrocenoses. It is evident, that the number of species has increased 1.44 times compared to 30 years ago, and the distribution in the biotopes – in 2,78 times respectively. The species is increasingly adaptable to life in agroecosystems, where it occupies ryts near roads, small swamps, pits filled with water.

Factors of population decline: A significant factor affecting the population of species is drying of water bodies and the loss of tadpoles which is repeatedly observed throughout Ukraine.

Implemented and necessary measures of protection. It occurs on the territory of 116 objects of Emerald network that adequately cover the species habitat. Additional protection measures are not needed.

Bombina variegata



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Distribution in Ukraine. In Ukraine, it is spread in the Carpathian mountains (up to 2000 m) and the Carpathian Foothills or Subcarpathia.

Bombina variegata

Types of habitat. Eudominant in groups of amphibians in mountain beech forests (16,7%); subdominant in habitats of beech-hornbeam-oak forests (15,8%); river valleys in deciduous forests (15,8%); Carpathian spruce boreal forest (17,7%); mixed forest (15,8%); river valleys of mixed forests (16,7%); subalpine meadows (25,0%), highland shale's (25,0%).

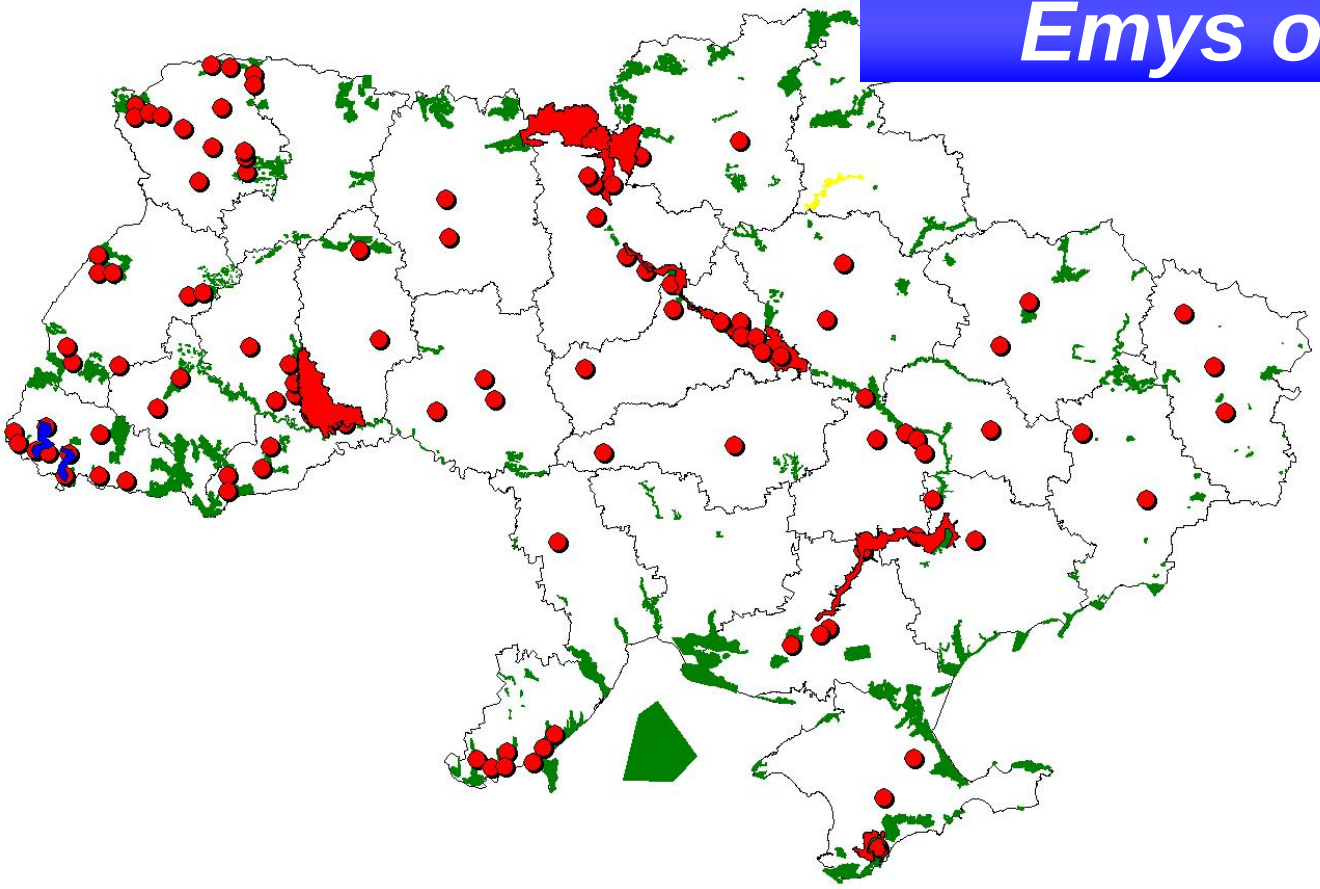
The population and tendencies of its change. Distribution of Bombina variegata is confined to small water reservoirs (sometimes partially flooded forest edges), paths, roads, etc. In our study, Bombina variegata has been found only in water habitats, where the number has reached 42 individuals per 100 m of the route comprising 12.15±1,64% of the sample in these biotopes.

We have noted the tendency the population's increase within sustainable habitat in the study area. From the period 1971-1980 till the period 1999-2015, the population of Bombina variegata has increased to 1.49 and the percentage in groupings of amphibians in typical biotopes - in 2.87 times respectively.

Factors of population decline: significant fluctuations in the number of species is associated with the drying of suitable breeding habitats.

Implemented and necessary measures of protection. Protected within 19 environmental objects in the Emerald network, which cover more than 70% of the species range. For the purpose of species conservation, it is necessary to create a number of environmental protection facilities in the valleys of the rivers Abranka (tributary of the Latorytsa, Volovetsky district, Transcarpathian region) and Shypot (tributary of the Uzh, Perechyn district, Transcarpathian region).

Emys orbicularis



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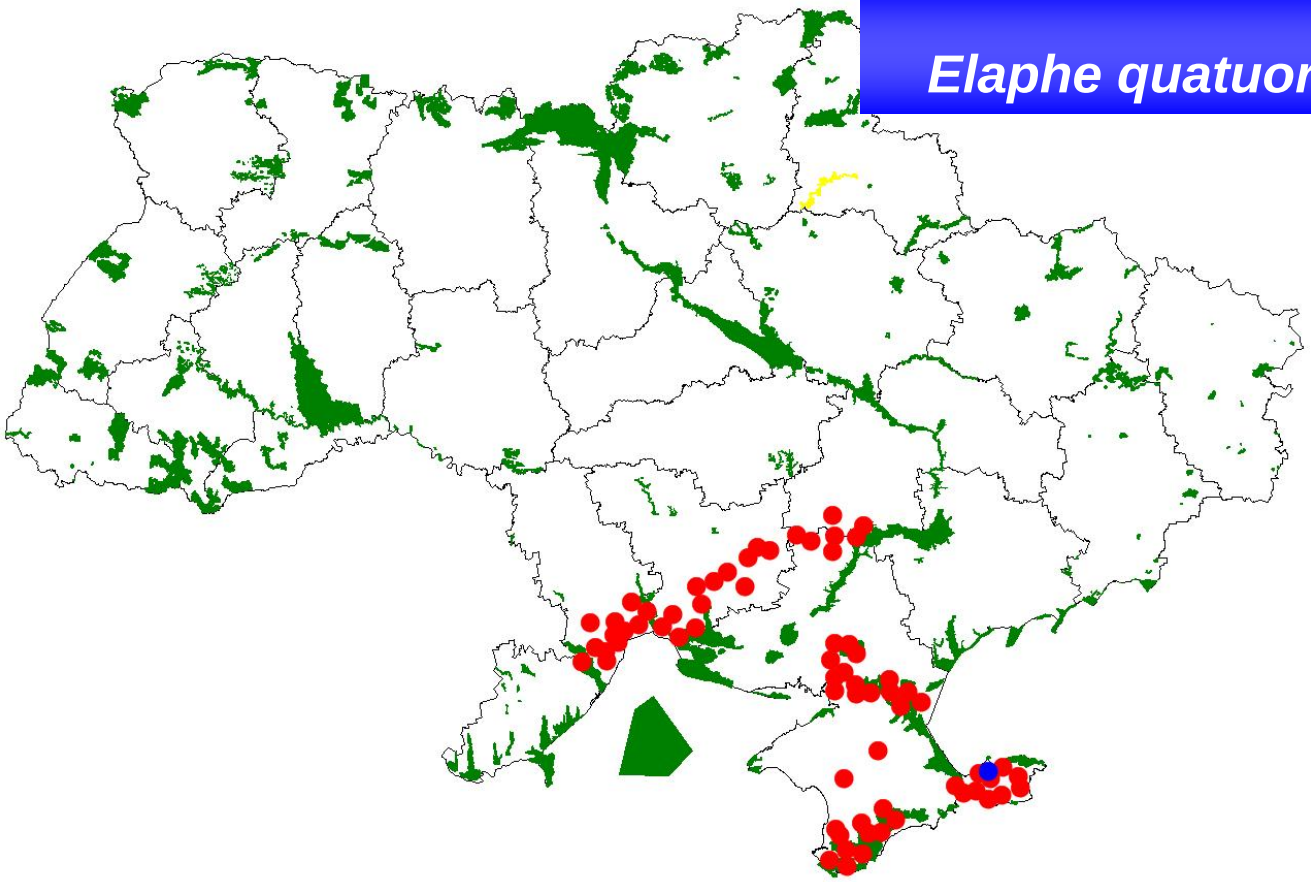
Preservation status. The species is under special protection of the Berne Convention (Annex II) and in the list of IUCN (low risk category).
Distribution in Ukraine. Distributed in Ukraine in the rivers of the Black sea basin and in the Crimea.

Emys orbicularis

Types of habitat. Found in forest, forest-steppe and steppe regions, where it inhabits swamps, marshes, lakes, ponds, river backwaters with a muddy bottom.
The population and tendencies of its change. The species is numerous on the most part of the territory of Ukraine. The rapid decline in the number of species on the territory of Left-bank Forest-steppe of Ukraine has been noted.
Factors of population decline: the reclamation activities covering most of the area of medium rivers' floodplains of Ukraine have negatively affected the population of *E. orbicularis*. The trophic competitor of the species is *Trachemys scripta elegans*, which has been found in our study in the vast plains of Transcarpathia.
Implemented and necessary measures of protection. Protected on the territory of 68 environmental objects in the Emerald network, which significantly cover the species range. To maintain the species population, it is expedient to establish protected areas in sites of the maximum abundance of the species: floodplains of the Latorytsa, Borzhava, Uzh of the Transcarpathian region.

Elaphe quatuorlineata sauromates



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Preservation status. I category (“endangered”). The species is included in the IUCN Red list (1996) in the category of understudied species.

Distribution in Ukraine. Distributed in the steppe zone (except Northern areas) and in the Mountainous Crimea. Occurs sporadically in Sivash region (Prysivashie) and more often on the Kerch Peninsula.

Elaphe quatuorlineata sauromates

Types of habitat. It inhabits steppes, slopes of hills and hills with bushes and rocky outcrops, steep coastal slopes, areas with sandy steppe and forest groves, forest edges and clearings in the wood, tree belt areas.

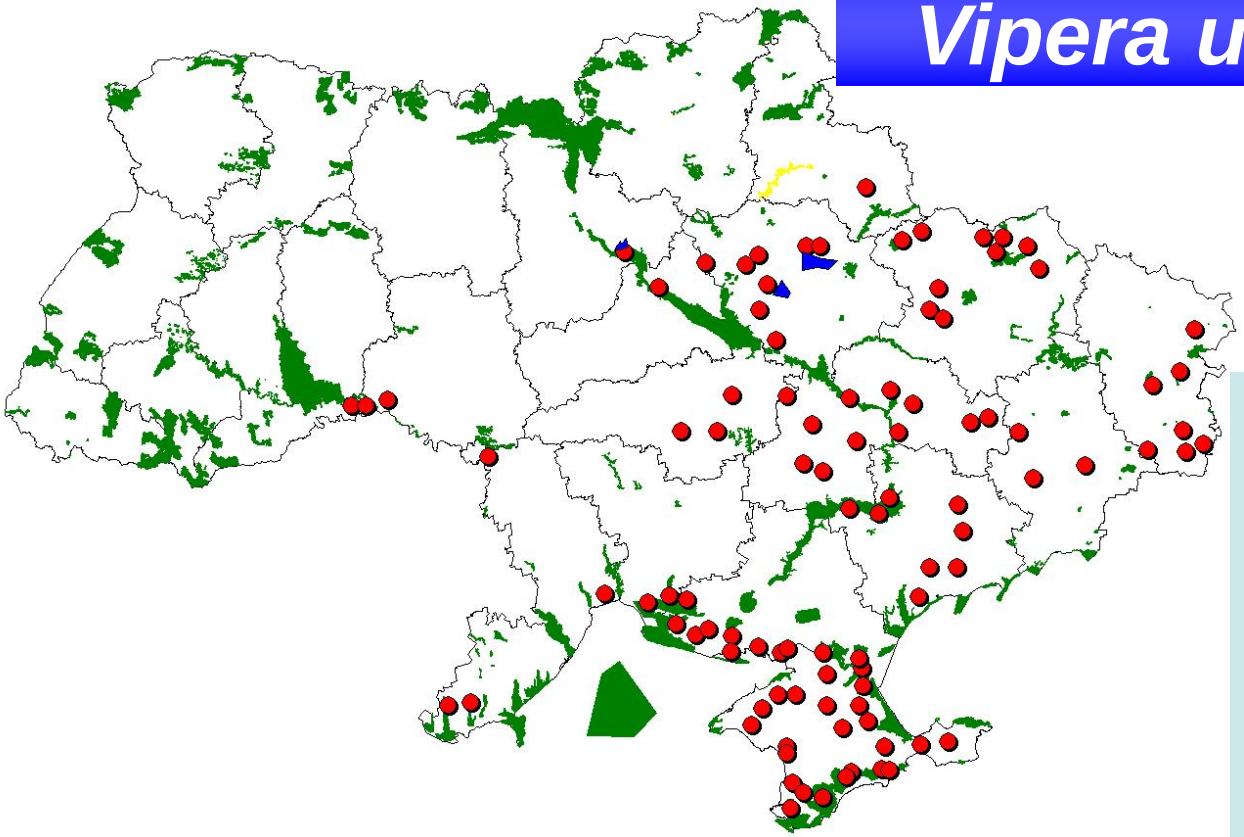
The population and tendencies of its change. Usually, isolated individuals are found. The species is common in forest-steppe areas of the Black sea reserve, on the banks of the Kuyalnyk, in the natural reserve "Elanetska steppe", the Azov-Sivash natural Park, Crimean Sivash region and in the North of the Kerch Peninsula. 1-3 specimens have been discovered during a walking tour, including up to 5 specimens per kilometer on separate sites.

Factors of population decline. The main factors that negatively affect the species population is the changing environment resulting from economic activity, human-caused destruction, harsh winters. The species is positively affected by favourable wintering conditions and attraction of birds nesting in tree hollows.

Implemented and necessary measures of protection. Protected on the territory of seven environmental objects in the Emerald network.

Although the population status in five of them is satisfactory, in the process of expanding the protected network, the habitat of this species should be taken into account, in particular, the Karalarsky steppe should be reserved. An effective measure to increase the number of species is to increase its food reserve by hanging birdhouses for nesting birds.

Vipera ursinii renardi



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Preservation status. The species is under special protection of the Berne Convention (Annex II) and is listed in the IUCN Red list in the category "Endangered".

Distribution in Ukraine. It inhabits the southern part of Forest-steppe and Steppe, and southern macroslope of the Mountainous Crimea to a height of 1100 m amsl.

Vipera ursinii renardi

Types of habitat. Steppe, South-thermophilic species.
The population and tendencies of its change. The decline in population and extinction in some regions of the dry steppe of Ukraine since the 1970s has been observed.
In many steppe nature reserves on the Left Bank and island Dzharylhach, it is a common snake (1-10 ind./ha), in Sivash region (Prysivashie) and on the Kerch Peninsula, it is numerous (20 to 60 ind./ha, sometimes more).
Factors of population decline: Ploughing of steppe lands on the territory of forest-steppe zone. The slopes of hills, representing almost the only suitable habitats for the species, suffer from grazing or are built up.
Implemented and necessary measures of protection. Protected in 9 natural reserves (NR) and national natural parks (NNP) of Ukraine, in many of which it represents a common species. For the purpose of species conservation in the left-Bank Forest-steppe, it is necessary to create a number of environmental protection territories near the village Stare, Kyiv region, village Velyky Pereviz, Shyshatsky region and the village Burty, Poltava region. To preserve the species, it is suggested to breed it in artificial conditions and the introduction of the viper into the protected territories.

Zamenis longissimus

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Preservation status. Endangered. The species is under special protection of the Berne Convention (Annex II).

Distribution in Ukraine. In Ukraine, it is sporadically found in the Western regions and locally in the Mykolaiv region.

Types of habitat. According to our data, it is a dominant species in pine-hardwood (up to 4 individuals per 1 km) and deciduous forests (1 individual per 1 km) of the Carpathians. It has become rare in the hayfields which is explained by higher levels of anthropic transformation and conscious destruction of species representatives that can be seen on the slide. In our study, the species is found in agroecosystems, where it was not observed in the past.

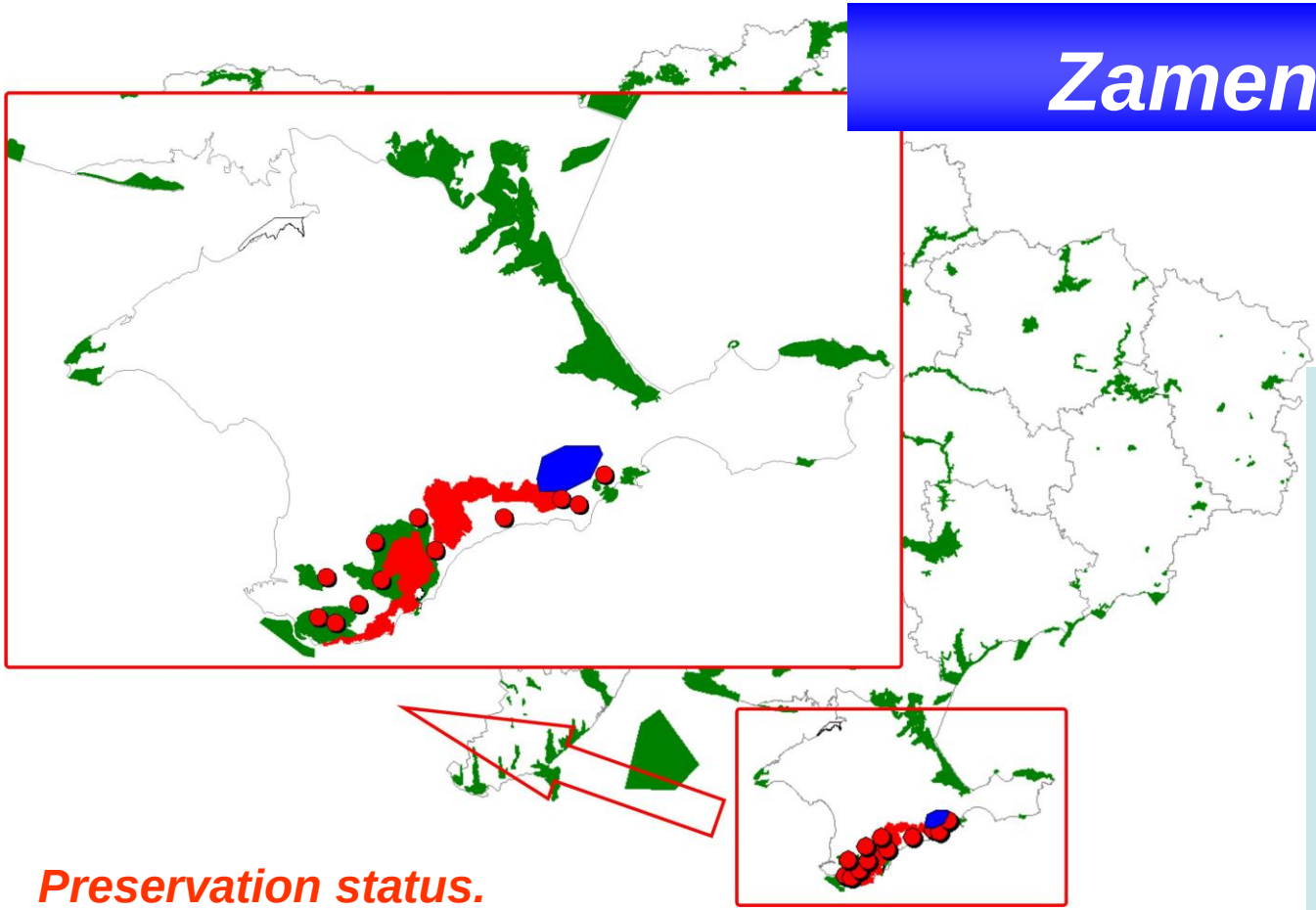
Zamenis longissimus

The population and tendencies of its change. We found that the relative quantity of Z. longissimus populations, over a forty-year period has grown more than in 2 times (from 1.5 to 3.2 individuals per 1 km of the route).
The satisfactory condition of the species populations is evidenced by discovered individuals which are more than two meters long. The photo shows an individual killed by a local citizen in 2013, that was 2 m 64 cm long.

Factors of population decline: Intentional destruction of species, habitat transformation, including hydraulic engineering construction.

Implemented and necessary measures of protection. Found on the territory of 24 environmental objects in the Emerald network. In addition, it is necessary to preserve the populations in the valleys of the rivers Latorytsia and Borzhava that suffer from excessive recreational use of the river banks and may disappear from flooding as a result of the construction of complex hydraulic structures, as well as to create environmental objects on the territory of the Mykolaiv region.

Zamenis situla



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Preservation status.
I category (“endangered). The species is included in the IUCN Red list (1996) in the category of understudied species.

Distribution in Ukraine. The most Northern, isolated portion of the areal is in the Crimea, where *Z. situla* inhabits the southern coast from Sevastopol to Feodosiya and warm mountainous terrain within ridges Holovna and Vnutrishnia to the southern outskirts of Bakhchisarai and Old Crimea in the North. Distributed in the mountains up to 500-700 m amsl.

Zamenis situla

Types of habitat. Thermophilic mountain and forest species. Inhabits rocky woodlands, sparse areas and clearings in the oak-hornbeam, oak and beech and pine forests. It is often found in the valleys of rivers and streams. Willingly inhabits various ruins and residential buildings within cities.

The population and tendencies of its change. Usually, isolated individuals are found. In optimal habitats, the number can locally reach 2-9 ind./ha. The total population in the Crimea does not exceed 5 thousand individuals. The quantity of many populations is fairly stable, but in general, it has a tendency to decrease on the peninsula. In the first half of the twentieth century Zamenis situla was relatively common in the Crimea, in the last decade zoologists register 2-3 dozen discoveries annually.

Factors of population decline: the destruction of habitats in the process of construction, conversion of seaside terraces and mountain valleys into orchards and vineyards, the demolition of old buildings, the depression of rodent population, killing on the roads, the immediate destruction by people and poaching for commercial purposes. Near settlements *Z. situla is* often destroyed by domestic cats. The species is especially vulnerable due to low fertility and the adverse sex ratio.

Implemented and necessary measures of protection. Protected in 4 out of all existing objects in the Emerald network: Yalta mountain-forest, Crimean, “Cape Martyan” and Karadagsky. To guarantee the conservation of mountain populations, it is necessary to strengthen the security mode of the state reserve "Baidar" and its inclusion into the canyon of the river Chorna.

The population status of amphibians in Ukraine

Name (Lat.)	Changes in the population over a 40-year period (times)	Coverage of typical habitat by the objects of the Emerald network in Ukraine
Salamandra salamandra	+1,44	74%
Lissotriton vulgaris	-2,65	68%
Lissotriton montandoni	-33,02	60%
Mesotriton alpestris	-9,40	58%
Triturus cristatus	-3,34	74%
Triturus dobrogicus	-1,75	15%
Triturus karelinii	-3,82	80%
Bombina bombina	+1,44	80%
Bombina variegata	+1,44	70%
Bufo bufo	-2,59	78%
Bufo calamita	-6,89	45%
Bufo viridis	+1,27	78%
Hyla arborea	-1,40	69%
Pelobates fuscus	+1,42	76%
Rana arvalis	-13,28	64%
Rana dalmatina	-3,69	43%
Rana temporaria	-26,77	87%
Pelophylax esculentus	-1,81	67%
Pelophylax lessonae	-5,76	74%
Pelophylax ridibundus	-1,83	82%

The population status of reptiles in Ukraine

Name (Lat.)	Changes in the population over a 40-year period (times)	Coverage of typical habitat by the objects of the Emerald network in Ukraine
Emys orbicularis	-1,03	80%
Anguis fragilis	-2	63%
Coronella austriaca	+1,86	56%
Cyrtopodion kotschyi	?	75%
Darevskia lindholmi	?	45%
Dolichophis caspius	?	68%
Elaphe dione	-6	64%
Elaphe quatuorlineata sauromates	-2	56%
Eremias arguta	?	60%
Lacerta agilis	-1,5	74%
Lacerta viridis	-9,8	49%
Natrix natrix	-4,6	63%
Natrix tessellata	-5,2	72%
Podarcis tauricus	-3	36%
Pseudopus apodus	-5	64%
Vipera berus	-17	56%
Vipera nikolskii	-?	51%
Vipera ursinii renardi	-2,64	53%
Zamenis longissimus	+2,12	58%
Zamenis situla	-3,64	86%
Zootoca vivipara	-3,02	66%

The population status of amphibians in Ukraine

Having analyzed the status of species populations of amphibians and reptiles included in the list of Resolution No. 6 (1998) at the sites of the Emerald network within natural habitats from the list of resolution No. 4 (1996), we consider it expedient to briefly show the status of populations, represented within the Emerald network in Ukraine and the need for additional measures for the protection of all species of amphibians and reptiles in Ukraine. Out of the total list of 20 amphibian species, distributed on the territory of Ukraine, 14 species (i.e. 70 %) have a protection category. Of particular concern is the status of the populations in the Ukrainian Carpathians and the Crimea. Particularly rare species of **Caudata** is ***Triturus dobrogicus***.

The probability of its conservation is closely connected with the preservation of typical biotopes on the Prytysianska lowlands and the Danube floodplains. Along with this, owing to the reduction of habitats and the decrease in the population, the following species need special protection: ***Lissotriton montandoni, Mesotriton alpestris, Triturus cristatus, Triturus karelinii.***

The rarest **Anura** in our fauna is ***Bufo calamita***, whose population is rapidly declining.

The following species has become very rare: ***Rana arvalis, Rana dalmatina*** and ***Rana temporaria***.

The populations of ***Pelobates fuscus, Pelophylax lessonae*** require urgent conservation measures.

The population status of reptiles in Ukraine

Out of the total list of 21 reptile species, distributed on the territory of Ukraine, 13 species (i.e. 61 %) have a protection category.

Of particular concern is the status of the populations in the Ukrainian Carpathians, the steppe regions of the Black sea and the Crimea. Particularly rare species is ***Zamenis situla***. The probability of its preservation in the Crimea in the future is closely connected with the preservation of typical biotopes on Cape Martyan and in Karadagsky and Yalta reserves.

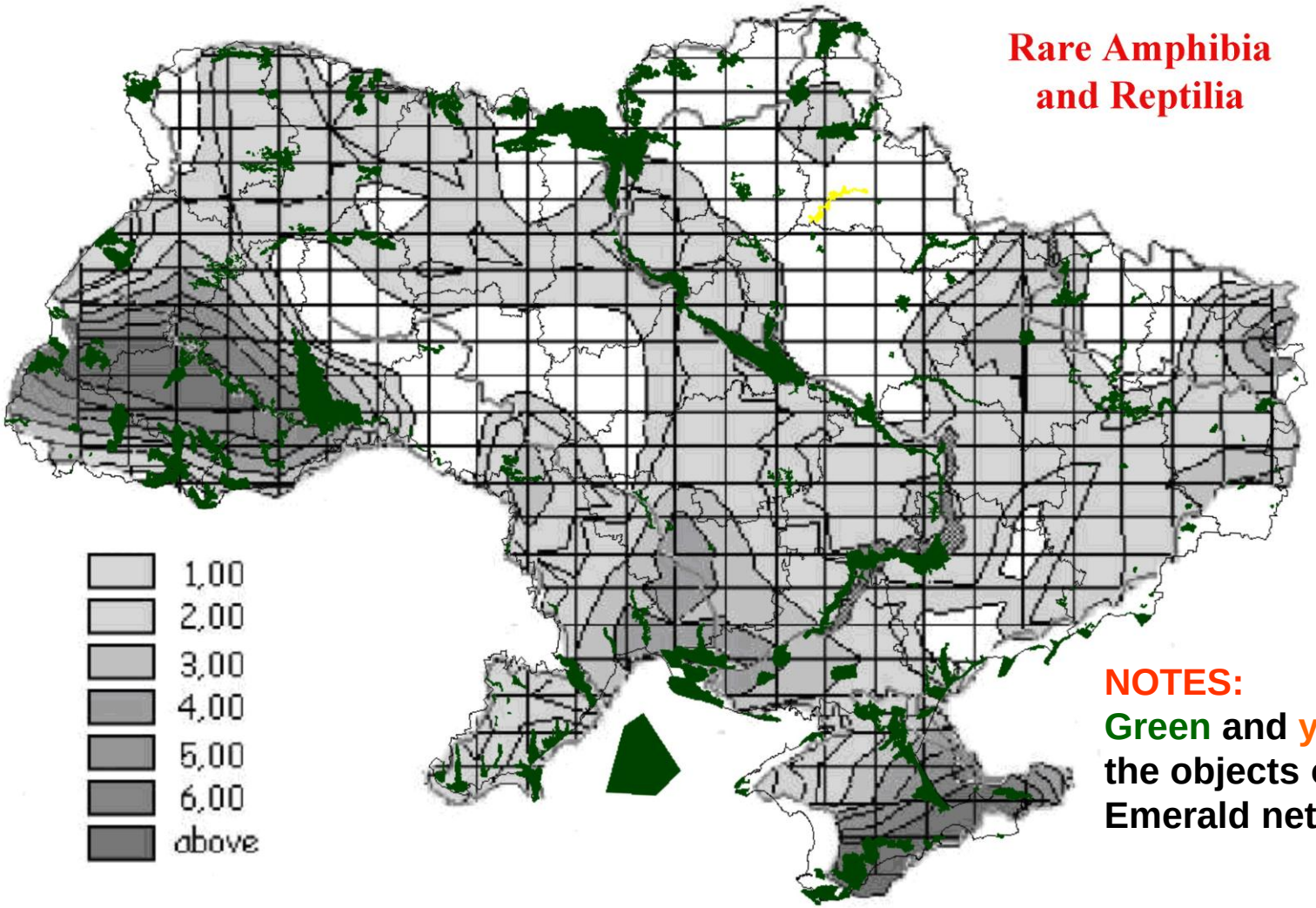
The rarest lizards in our fauna include two Crimean species — ***Cyrtodactylus kotschyi***, whose population is low but stable, and ***Pseudopus apodus***, whose separate representatives are found on the southern coast of the Crimea, in particular, on the West side of Ayu-Dag and the Northern part of the Kerch Peninsula.

In the North-Western Black sea region, the following species have become very rare: ***Coronella austriaca*** and ***Elaphe sauromates***.

The populations of ***Lacerta viridis*** and ***Podarcis tauricus***, ***Eremias arguta***, ***Zamenis longissimus*** and ***Dolichophis caspius*** require urgent conservation measures.

In the South-West of the Left Bank, separate populations of ***Elaphe dione*** are preserved, however, its exemplars have become very rare due to anthropogenic changes in the nature of this region.

The Emerald network (marked green) and the spatial distribution of rare species abundance of amphibians and reptiles on the territory of Ukraine



NOTES:
Green and yellow mark the objects of the Emerald network

Significance of the Emerald network objects in the protection of amphibians and reptiles of Ukraine

Amphibians and reptiles form natural spatial complexes, among which it is worth mentioning: steppe and mountain-Crimean fauna nuclei, a significant share in the structure belongs to scaly **Squamata** and Carpathian fauna nucleus, which is based on **Caudata**.

These fauna nuclei, first of all, the Carpathian and South-Crimean ones, are centers of regional taxonomic diversity of herpetofauna, whose indicators of species richness centrifugally decrease. Overlaying the map with the spatial distribution of species abundance of amphibians and reptiles and that of the Emerald network objects, we see almost full compliance of fauna nuclei.

Thus, except for a few species requiring new protected areas suggested in this study, to effectively conserve species: ***Triturus dobrogicus, Mesotriton alpestris, Bufo calamita, Rana dalmatina, Lacerta viridis, V. ursinii renardi*** and ***Zamenis longissimus***, the Emerald network in Ukraine is quite effective in the context of conserving the herpetofauna

Factors influencing the population of amphibians and reptiles

Amphibians and reptiles are under the influence of anthropogenic pressure almost everywhere. Normal conditions for life and reproduction of these animals do not exist on most areas suitable for farming. A significant factor influencing the population status of rare species is the uncontrolled removal of these animals from nature for the purpose of commercial activities.

Practically all species listed in Annex II to the Bern Convention are in demand in the West European market of zoological objects. Even species such as ***Emys orbicularus*** and ***Lacerta viridis***, which until recently were numerous, are now rare in many parts of Ukraine.

However, some species are resistant to anthropogenic impact. Thus, ***Natrix tessellata*** is well adapted to wetland habitats, both on the mainland and on the sea coasts. Its population can be reduced only as a result of large technological accident or due to its excessive extraction from nature by terrariophiles.

Means of conserving the herpetofauna

It is obvious that the primary means of preserving rare species of reptiles is the preservation of the territories where they reside. It is necessary to develop the network of protected territories where rare species of reptiles are found. This measure should be accompanied by promotion activities in respect of each rare species of reptiles. An important condition for the conservation of species in general and their natural populations in particular, is the strict control of extraction of these animals from nature, which, in recent years, acquires extreme proportions.

It is insufficient only to conduct environmental activities in contemporary conditions. An important assignment is the creation of laboratory populations of disappearing species. These populations allow creating the reserve fund for the possible introduction of endangered species into the nature. Activities in this direction and their coordination with the leading organisations and projects in Europe allow enhancing the chances to preserve amphibians and reptiles, particularly those species which are under special protection of the Berne Convention.

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Thank you for your patience!

Natrix tesselata

The photo shows an individual killed by a local citizen in 2015, that was 2 m 30 cm long.