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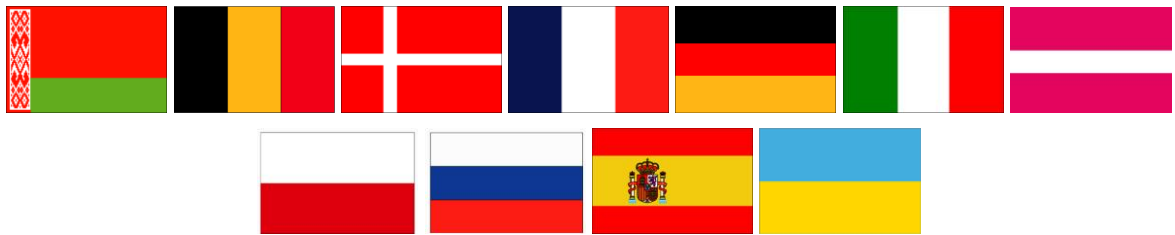
# BOOK OF ABSTRACTS

of the 2<sup>nd</sup> international workshop–conference

**“RESEARCH AND CONSERVATION OF EUROPEAN HERPETOFAUNA AND ITS ENVIRONMENT: *BOMBINA BOMBINA*, *EMYS ORBICULARIS*, AND *CORONELLA AUSTRIACA*”**



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The LIFE+ Project LIFE-HerpetoLatvia LIFE09NAT/LV/000239 "**Conservation of rare reptiles and amphibians in Latvia**", which is co-financed by the LIFE Programme of the European Commission, in a scientific cooperation with the: Institute of Ecology of Daugavpils University; Institute of Systematic Biology of Daugavpils University; Latgales Zoo of Daugavpils city council; Latgales Ecological Society, and with support of the: Ministry of Environment of Latvia; Nature conservation agency of Latvia, is organizing the 2<sup>nd</sup> international workshop–conference entitled:

**RESEARCH AND CONSERVATION OF EUROPEAN HERPETOFAUNA AND ITS ENVIRONMENT:  
*BOMBINA BOMBINA, EMYS ORBICULARIS, AND CORONELLA AUSTRICA***

The international scientific – practical workshop–conference was held in **Daugavpils, Latvia on 14th – 15th August 2014**.

**The main topics** of the workshop–conference covered different aspects of research, management of populations, and conservation in-situ and ex-situ of three species of herpetofauna: *Bombina bombina*, *Emys orbicularis*, and *Coronella austriaca*:

- Practical results of LIFE, European, national, local and other projects connected with conservation or research on target species;
- Genetic analyses and its role in management of populations;
- Management practices for sustainability of populations;
- Zooculture and aquaculture of main species *ex-situ* and *in-situ*, technologies of keeping, domestication's problems, modernization;
- General biology and ecology of target species;
- Other species connected with main species (plants forming biotope; animals species as a food, predators, sympatric species, competitors etc.)
- Connections between human impact, water and terrestrial ecosystems and target species;
- Experimental and theoretical approaches to surveys and data processing;
- Distribution, new findings, natural area, climate and habitats;
- Health conditions, diseases and veterinary;
- Re-introduction programs, population enforcements by releasing in wild and their results or problems.
- Diets and feeding of these species;
- Aquatic and terrestrial invasive species as threats;
- Role of education and public awareness in conservation programs

**Practical part** of the workshop–conference was in a form of work visits to:

- sites and territories of Project LIFE-HerpetoLatvia (near to borders with Belarus and Lithuania);
- facilities for *Emys orbicularis* breeding in Rare Amphibian and Reptile Breeding Centre;
- new Laboratory of Aquaculture of Institute of Ecology of Daugavpils university;
- future Natura 2000 territory for *Bombina bombina*;
- sites of *Emys orbicularis* findings in wild near to Daugavpils;
- territory where largest *B.bombina* population in Latvia is found (site called "Demene").

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## **NIFS: THE DEFINITIVE THREAT TO ISOLATED POPULATIONS OF *EMYS ORBICULARIS*?**

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Non-indigenous freshwater species (NIFS) are one of the biggest problems to local biodiversity, especially in freshwater habitats. Some of these species have severely affected their new habitats, changing the composition of the original communities and even their physical habitat (Cobo et al., 2010).

The impact of some of the most common NIFS, as the red eared slider (*Trachemys scripta elegans*), are well known (Cadi and Joly 2003, 2004). Usually the impact is based on direct competence for food, basking areas or nesting areas.

Other NIFS as the racoon (*Procyon lotor*) can predate over European pond turtles, being able to mutilate or even eradicate small isolated populations.

But the last threat, and maybe the most important, could be the spillover of parasites from NIFS to *Emys orbicularis*. This is the case of the event detected in a small population from Nw Spain, where transmission of trematodes from red eared sliders resulted in mortality (Iglesias et al., in press).

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**THE HISTORY OF THE AREA OF *EMYS ORBICULARIS* AND THE CURRENT STATE BORDERS WITHIN BELARUS AND ADJACENT TERRITORIES**

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The research gives a brief historical background and analysis of the status of knowledge of the European Marsh turtles in the Western region of Belarus. In the article are issues related to the protection and evaluation of the current status of the Red data book of Belarus.

However, a more detailed analysis of findings of the turtles shows very interesting picture, when occasionally on the same field individuals appear with remarkable regularity. Special studies [27] on the project of the TACIS programme of the European Union identified two point habitat types (Âkubovskoe Lake-North of Berezovka and in r. Izovka (d. Izovka of the Novogrudok district). two migratory turtles later settled into a reservoir formed by the river Tricevkoj near Dzyatlava, Kozlovšinoj Tricevka several kilometers below the falls in r. Šaru. Moreover, local residents claimed that there are observed migrating individuals of r. Šary, because turtles here no one has launched.

According to unverified data turtle is observed in Kotra River, downstream from the town of Skidel. In addition there is a publication of S.M. Drobenkov [28] on the findings of single individuals or small groups of turtles in the suburb of Grodno. This case, like finding a turtle in the Čértovo Lake of Hrodna region, explained as the release of animals into the nature. In the Grodno region long existence of the turtle is doubtful due to high urban density.

So, to sum up, it should be noted that, as in the old days [20, 21, 22, 23, 24], and now with remarkable persistence in the same areas finds individuals. The tributaries of the river Neman (Szczara River Svislach,) and the river flowing from the territory of Poland (Narev, Lesnaya Pravaya). There is a possibility of finds of this species in the territories of the boundary with Lithuania. The official confirmation is received on the habitat of turtles in the Smorgon'skom area. The findings of the European pond turtle in Lithuania are published [12, 13]. In the long term existence of the species in the western part of Belarus is possible due to the protected areas and the migration from Poland, Lithuania and Latvia.

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## **ALIEN MAMMAL SPECIES IN THE BIOSPHERE RESERVES OF RUSSIA**

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The main criterion used to classify mammal species as alien is an extension of their area, that is, the appearance of a species in places that it did not inhabit previously. The penetration of alien mammals into new areas can differ between species. We discuss four possible ways: intentional introductions, reintroductions, accidental introductions and self-spreading. Intentional introduction is the deliberate delivery of animals outside of their native area. Reintroduction is the Accidental introduction is the export of a species beyond its native area with transport or cargo and escape of animals from farms, zoos, etc., as well as feralization and straying of pets.

Self-spreading is expansion of a species by itself beyond the limits of its previous area, including the phase of area restoration during its pulsation.

There are no distinct boundaries between the listed groups. Moreover, the same species can enter aboriginal ecosystems via several pathways, restoration of a species on a territory where it previously lived and then vanished.

**THE SMOOTH SNAKE (*CORONELLA AUSTRIACA*) IN THE CROSS-BORDER NATURE PARK DE ZOOM – KALMTHOUTSE HEIDE**

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From 2011 until 2013, the Herpetological Society of GP DZ-KH led an investigation into the behavioural ecology and distribution of the Smooth snake (*Coronella austriaca*) in the cross-border nature park De Zoom – Kalmthoutse Heide, in order evaluate the effect of the LIFE HELA project and to formulate any necessary nature management measures, also in function of the coming LIFE HELVEX project.

To achieve this goal, we could build on the data (1998-2010) collected during previous Smooth snake surveys.

From 1998 to 2013, 1120 Smooth snake sightings were collected and processed into this report. The morphological data which we collected, accord well with the literature. As in other studies, males remain very hard to find. Very striking is the annual reproduction, recorded in our population, apparently unique in Western Europe. Smooth snakes seem present in all suitable habitats within the nature reserve, particularly in the dry heath habitats with lots of small dunes. The population is estimated to consist of several thousands of individuals, which is considered realistic by the authors.

Several important locations for breeding and also some hibernation sites were discovered. Both of which should be spared of any radical management actions. Specific migration routes could not be determined with certainty, but corridors constructed before the current investigation appeared to be well populated.

A big fire in 2011 destroyed a big part of the habitat and seemed to have killed a big part of the resident population through direct (burning) and indirect (lack of food, habitat, increased predation) effects. Also a road through the nature reserve is a current threat and shows that Smooth snakes are very vulnerable to traffic. Despite these threats, the population seems big and robust enough to be able to recover from them.

## OVERVIEW OF *E.ORBICULARIS* AND *B.BOMBINA* HABITAT CHARACTERISTICS IN POLAND

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Data for habitat characteristics analysis were collected from 104 ponds in Northern Poland in 2009-2010. Visual observations and traps were used to detect the European pond turtle, while dip-netting, sound and visual checking were used for the Fire-bellied toad among the field methods during this survey. Ponds and their surroundings were checked for a variety of characteristics such as physical parameters, composition of neighboring habitats, biotic factors etc. Analyzing the significance of obtained results we used Chi-square test based on the null hypothesis theory. Attention was paid to the significant results and the most interesting data trends. The results provide an overview of typical habitat characteristics for the investigated species.

So, ponds over 2000 sq m found out to be preferable for the turtle and adult *Bombina bombina*; water depth has to be over 1 m for *Emys orbicularis*, while adult *B. bombina* doesn't show any significant preference to this criteria. The inclination of pond slopes seems to be optimal between 11 and 25 degrees for both of the species. Shallow water zone is less than 25% of total pond area for *E.orbicularis* and between 11 and 25% for the young fire-bellied toads. Muddy (NE Poland) and sandy sediments (WE Poland) are the main types of pond bottom for both of the species. Over 50 m of uncultivated land around the pond is important for both of the species, especially for the young ones. No grazing was found to be important for the adult turtles and some trend to extensively grazed surroundings for *B.bombina*. The appearance of dead wood, shrub, grassland and deciduous forest in close vicinity of the ponds seem to be important habitat requirements for *E.orbicularis*; terrestrial habitat composition for *B.bombina* was considered to be not statistically significant, but field, inhabited locality, grassland and meadow (for *B.bombina* only) are significantly important part of it in radius 50-500 m for both species. Presence of other ponds in vicinity of several hundred meters to the occupied pond seems not to be very important for *E.orbicularis* due to its mobility compare to *B.bombina* which highest occupancy (73%) was recorded in the ponds with neighbor ones in 100-200 m. The most optimal level of shade over the water surface is 25-49% for the European pond turtle, and the less shade the better conditions for the Fire-bellied toad are found. Presence of fish reduces the occupancy of *B.bombina* larvae, while adults of *B.bombina* and *E.orbicularis* seem to be more or less indifferent to the criteria. Appearance of turtle nesting site close to the pond seems to be very important, as the analysis of such parameter shows twice higher occupancy of adult *E.orbicularis* (40%) and almost three times higher of younglings (16%) in the ponds with distance to nesting sites less than 500 m compare to the others.

Thus, the most critical factors for the investigated species in Poland on our point of view are lack of buffer zones around the ponds and lack of suitable nesting sites for *E.orbicularis*, the insufficient amount of fishless ponds and overgrowing ponds for *B.bombina*, etc.

Taking the results into account the following actions were proposed: secure 50 m buffer zone around some ponds, create additional ponds for *B.bombina* and some nesting sites for *E.orbicularis*, to ensure the existence of large floodings with benefit for the fire-bellied toad.

## **SMOOTH SNAKE (*CORONELLA AUSTRIACA*) IN POLAND – PROBLEMS WITH STATUS RECOGNITION AND CONSERVATION**

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Smooth Snake is one of the rarest species of reptiles in Poland, next to European Pond Turtle and Aesculapian Snake. Furthermore its status in other European countries is also unfavorable. For example in central Europe Smooth Snake is treated as endangered or vulnerable not only in Poland but also in Germany, Latvia and Lithuania.

Most data on distribution and abundance of Smooth Snake in Poland indicates poor condition of the population and reveals major threats, like habitat destruction and killing snakes, yet real status of this species is still not completely recognized. During last few years many new localities were described, but still in most of them the population size is very low. Monitoring conducted in whole-country scale in 2009 reveals different pattern of status, threats and habitat maintenance depending on biogeographical region (alpine vs continental), yet small number of controls per locality (3 during entire season) does not provide sufficient of data for strong inference. It clearly indicates the need of more widely-planned survey focused on distribution and status recognition.

According to the polish law Smooth Snake is a species that requires specific protected areas. Despite this passive type of protection also active conservation is postulated. So far not many conservation surveys were conducted in Poland. Furthermore most of them were only short-term project without long term monitoring of their effects. What also should be mentioned in most situation there was lack of knowledge about initial status of population covered by conservation programmes.

At the moment it seems that most important actions that should be taken are: long term monitoring prepared with standardized methods; development methods for inventory of new localities; monitoring of effects of conservation surveys. What is more – Smooth Snake conservation, for long term effects, should be taken into account in plans of management of areas containing localities of this species.

## IMPLEMENTATION OF CONSERVATION AND MANAGEMENT OF THE SMOOTH SNAKE *CORONELLA AUSTRIACA* IN LATVIA

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*Coronella austriaca* is very rare and endangered species in Latvia with few isolated populations along the western and southern coasts of Gulf of Riga. Most important threats are isolation of population with following genetic degradation, extent of food resources, slow reproduction rate, and habitat change. There is proved local population extinction in waste region around Rīga and Jūrmala Cities in second half of 20th century.

Best-known is snake population in the Slokas Bog in the Ķemeri National Park, where it is a subject of the Project LIFE-HerpetoLatvia carried out in 2010-2014. *Coronella austriaca*-related activities here were preliminary study, development of habitat management plans, habitat improving actions and monitoring of population. Population was studied using artificial covers method and snake marking using PIT-tags; 18 plots with total area of 20 ha surveyed in four-year study. About 50 snakes were marked with several sub-populations identified. Management plans developed in 2012 to enhance the connectivity between sub-populations, improve snake habitats, and improve their food – lizard habitats. Habitat improvement measures are thinning of tall pine stands and clearing of shrubs to improve habitat insolation. Due to strong forest clearing restrictions in National Park, it was decided that best way to do large-scale improve of snake habitat here is to do forest care clearing via official forest auction outside LIFE Project. In this way, about 20 ha of forest stands will be thinned that make them suitable for the snake. In some parts of the bog with less forestry restrictions, habitat improvement was done with LIFE HerpetoLatvia project in 2013/2014 winter, and covered 2 ha of pine stands.

Further *Coronella austriaca* conservation measures are prescribed in Species Conservation Plan developed by LIFE-HerpetoLatvia and signed by the Minister of Environment. These measures include incorporation of species conservation measures into Protected Area Nature Conservation Plans, establishment of micro-reserves, population enforcements, further habitat management, monitoring, and public awareness actions.

## PECULIARITY OF EXTERNAL MORPHOLOGY OF COLUBRID SNAKES (COLUBRIDAE) FOUND ON SARALINSKY DISTRICT OF THE VOLGA-KAMA WILDLIFE SANCTUARY

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**Introduction.** Investigation of pholidosis and coloring is an important task of modern ecological and morphological research of reptiles related to the study of variability and adaptation to environment conditions. Furthermore differences in coloring are the basis of the subspecies differentiation of reptiles.

**Material and methods.** The morphological features of two species of colubrid snakes were investigated: the smooth snake (*Coronella austriaca* Laurenti, 1768) and the grass snake (*Natrix natrix* Linnaeus, 1758). The smooth snake included to the Tatarstan Republic Red List is a rare representative of our snakes. The material for this research was collected from June to August 2010-2013 on Saralinsky district of the Volga-Kama Wildlife Sanctuary (Russia, Tatarstan Republic). 18 individuals (8 males and 10 females) of smooth snake and 79 individuals (32 males and 47 females) of grass snake were caught. To study morphology the standard technique of reptiles handling was used.

**Results.** The smooth snake was observed on demi-island part of Saralinsky district. Relative abundance is about 0.5 individuals per km, the average density is about 0.7 individuals per ha. Sex differences in some features were noted: body length and number of ventral scutes (more in females), tail length and number of undernail scales (more on males) (differences are significant,  $p < 0,05$ ). It should be noted that the body length of smooth snakes from Saralinsky district is less than those observed for the Volga-Kama region as a whole. Of special interest is coloring of smooth snake from Saralinsky region. There are several types of snakes`coloring: light-grey (50% of individuals), brownish-gray (18% of individuals), olive (12% of individuals) and dark (20% of individuals). The dark-colored (melanistic) individuals not found in any other regions of republic make up a high proportion of population.

The grass snake was found both on the demi-island and the mainland part of Saralinsky district. Relative abundance is about 2 individuals per km and the average density is about 4.6 individuals per ha. There are some sex differences in body length, head length and number of sublabial scales (more in females), tail length and number of undernail scales (more on males) (differences are significant,  $p < 0,05$ ). Varying degree of melanisation grass snakes were observed in the investigated area – full black snakes without temporal spots (5% of individuals) and black snakes having pale grayish-yellow or grayish-orange temporal spots (6% of individuals). Three forms of the grass snake have been identified: the nominative subspecies (*N. n. natrix* Linnaeus, 1758) (43% of individuals), the eastern subspecies (*N. n. scutata* Pallas, 1771) (28% of individuals) and a hybrid form (29% of individuals) that combines the features of both subspecies. The existence of hybrid form is understandable because of Volga-Kama region is a zone of integration of two subspecies where they are crossing.

**Conclusions.** Generally it should be mentioned that snakes` populations from Saralinsky region are singular. A great diversity of smooth snakes` coloring, a high frequency of the eastern subspecies and a hybrid form of the grass snake, as well as high percentage of snakes` melanizm are distinguish them from the other ones. A high percentage of melanistic snakes may be influenced by environment conditions. Humid and warm microclimate near the river influences on populations of snakes and it ultimately determines their phenotypes.

## **FINDINGS OF FIRE-BELLIED TOAD (*BOMBINA BOMBINA*) HABITATS OUTSIDE THE SPREAD BOUNDARIES IN THE TERRITORY OF BELARUS**

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The distribution area of *Bombina bombina* is Central and Eastern Europe to the Urals and Asia Minor. In Belarus, the northeast border of this species distribution is situated to the south of the towns Postavy - Dokshitsa - Novolukoml – Orsha (Pikulik, 1985).

Searching for habitats and the count of *Bombina bombina* were carried out during the reproduction period in the period of highest activity. The method of aural detection was used.

Outside the previously identified area border single Fire-Bellied toad calling males were found. The males were detected in the Braslav region, Vitebsk area in 2007 in the temporary ponds near Lake Sita.

In 2011 three new habitats of *Bombina bombina* were discovered in the ponds in the territory of The National park «Braslavskie ozero», Braslav region. All discovered habitats were constant reservoirs. The first one is a meliorative channel dammed by the beavers. This habitat is near Domashi village. There were 10 calling males in the pond with area 1500 m<sup>2</sup>. The second habitat is a shallow pond near of the village Kovshenki. The pond is under the line of high-voltage transfers. There were 7 calling males and some clutches of this species. The third habitat is in the north of the village Edlovichi. There were 9 calling males of *Bombina bombina* in a shallow meliorative channel.

During 2012-2013 years, 12 new habitats of Fire-bellied toad were discovered in the Braslav region in the cross-border territory with Latvia and Lithuania.

According the results of our investigation it is possible to claim that *Bombina bombina's* area border in Belarus significantly moved to the north and demands further studying.

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**ECOLOGICAL FEATURES AND LANDSCAPE - BIOTOPICAL DISTRIBUTION *EMYS ORBICULARIS* (L., 1758) IN NATURAL ECOSYSTEMS OF PRIPAYT POLESYE OF BELARUS**

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Unique finds *Emys orbicularis* (L., 1758) in Belarus for today studying, as rare kind of special interest. The European marsh turtle *Emys orbicularis* (L., 1758) is the unique representative of group of turtles (*Testudines*) living in Belarus. As the rare species, which number has the essential tendency to decrease, is brought in the Red book.

**The purpose and research problems.** The purpose of the present research was studying of ecological features, spatial distribution *Emys orbicularis* (L., 1758) in various landscapes - biotopic natural ecosystems of Pripjatsky Polesye.

For object in view achievement it was necessary to solve following problems:

- 1) to give the ecological description of habitats *Emys orbicularis* (L., 1758);
- 2) to define features of spatial distribution *Emys orbicularis* (L., 1758) in various landscape - biotopic ecosystems;
- 3) to establish new habitats *Emys orbicularis* (L., 1758).

**Material and methods.** Researches were spent to the spring-and-summer period of 2013-2014 in territory of Pripjatsky Polesye. As modelling object of research Zhitkovichsky and Mozyrsky areas of the Gomel area have been chosen. In Zhitkovichsky area vicinities of twenty villages and settlements (by Dedovka, Lagvoshchi, Ljudenevichi, Berezina, Long Dubrova, Cheretjanka, Rudnja, Red Zorka, Borki, the Country churchyard, Rounds, the Crest, Naut, Ostranka, Zabrode, Mlynok, Podovzh, Dubrova, Otskovano, Morohorovo) have been surveyed. Mozyrsky area it is surveyed fourteen vicinities of villages and settlements (Novelties, Krinichnyj, Akulinka, Bibiki, Matrunki, Tvarichevka, Kamenka, Kozenki, Is small. Зимовищи, Rudnja Gorbovichsky, Starosele, Prudok, Zagoriny, Meleshkovichi). Studying of settlement *Emys orbicularis* (L., 1758) it was spent by technique M.M.Pikulik [1].

**Results of research and their discussion.** The European marsh turtle *Emys orbicularis* (L., 1758) during supervision in territory of Zhitkovichsky area has been registered in vicinities of the left coast of the river of Skripitsa, village Otskovano, namely floodplain parts of a terrace of the first level. The landscape organisation of the region represented Subboreal subzone lake - alluvial floodplain of the terrace. Alluvial terraced landscape is poorly drained with pine forests on the sod-podzolic soils. Territory area is not waterlogged. Flat topography, formed by small dunes, characterized by dry places with sandy hillocks and small mounds. Given landscape organisation is favorable for fulfilment of migrations to places of reproduction and a laying of eggs. The territory is rather opened, with dense grassy vegetation and rare, both low, and high wood plantings. Biotopic organization expressed the first tier of wood - *Pinus sylvestris*, the second - *Betula pubescens*, adolescents presented *Alnus incana*, undergrowth - *Sorbus aucuparia*. The grass - shrub layer marked *Vaccinium uliginosum*, *Vaccinium myrtillus*, *Dactylis glomerata*, *Bromus inermis*, *Juniperus communis*.

Two more individuals *Emys orbicularis* (L., 1758) have been registered in settlement Zabrode vicinities. Landscape - biotopic the organisation of the given district is presented by a subband subborealis lake - marsh landscape, with sod - podzolic soil, sometimes partially peat - wetlands. A



relief flat, poorly bent or poorly convex. Places of registration *Emys orbicularis* (L., 1758) have on biotopic a pine forest mossy (dry). Earlier this territory of ball boggy, and for today is drained. The given transformation of territory can be the precondition for settling of these kinds as peatbogs are optimum soil for a laying of eggs, and temperature on 3-5 °C above. The biotopichesky organisation is expressed by the first wood circle - *Pinus sylvestris*, the second - *Alnus incana*, undergrowth presented *Betula pubescens*, the underbrush - *Sorbus aucuparia*. In grassy - bush a circle dominants are *Vaccinium myrtillus*, *Vaccinium vitis-idaea*, *Rubus ulmifolius*, *Vaccinium uliginosum*.

Researches of Mozyrsky area have shown that *Emys orbicularis* (L., 1758) meets in small lakes in green space territory "Molodezhnyj". Among surveyed in number of 4 reservoirs, it has been met three individuals *Emys orbicularis* (L., 1758). The district landscape is presented by small ravines, as with abrupt, and flat biases that is an optimum habitat of population of the given kind. More often *Emys orbicularis* (L., 1758) met on east and southern gentle slopes where light exposure of territory has more long period of time. In biotopichesky organisation of territory of reservoirs grow plantings *Pinus sylvestris*, *Betula pubescens*, *Alnus incana*. Are numerous bushes *Rubus ulmifolius* and *Salix alba*. Grass - shrub layer is formed by the dominant plants *Fragaria vesca*, *Vaccinium vitis-idaea*, *Sagittaria trifolia*, *Carex pilosa*, *Typha latifolia*, *Scirpus sylvaticus* and others. Fodder reservoirs which can be used *Emys orbicularis* (L., 1758) includes such kinds of animals, as *Cochlicopa lubrica*, *Anisus leucostoma*, *Anisus spirobris*, *Physella acuta*, *Triturus vulgaris* 6 ekz/ha, *Rana ridibunda* 18 ekz/ha, *Rana lessonae* 78 ekz/ha, *Rana temporaria* 23 ekz/ha.

Decrease in number of the European marsh turtle to Polesye is connected with radical transformation and reduction of the area of the natural habitats which have followed anthropogenous changes of natural landscapes, drainage of the boggy earths, collapse and a flattening channel the rivers [2].

Among major factors of decrease in number *Emys orbicularis* (L., 1758) in natural ecosystems it is possible to allocate influence on populations of direct destruction and change biotopic and ecosystems that is reduction of natural habitats of the given kind.

### Conclusions

1. Prefers *Emys orbicularis* (L., 1758) shallow reservoirs with quiet water and oxbow. Settles in meliorative channels and ponds. The best places for its dwelling are not broken sites with a dense network of reservoirs and bogs grown wood, bush and grassy vegetation. Chooses open sites of territory with gentle slopes and small heights. A fodder food allowance make (*Caudata*, *Mollusca*, *Insecta*).

2. Spatial distribution *Emys orbicularis* (L., 1758) in territory of Pripayt Polesye it is subboreal subzone lake - alluvial, lake - marsh landscapes, with sod - podzolic soil, sometimes partially peat - wetlands. The relief flat, is formed by small dunes, presence of dry places with sandy hillocks and small embankments is characteristic.

3. During the spent researches in territory of Pripayt Polesye, new habitats *Emys orbicularis* (L., 1758) settlements occupying vicinity of villages Otskovanoe and Zabrode of Zhitkovichsky area, green space "Molodezhnyj" of Mozyrsky area.

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## CONDITION OF *BOMBINA BOMBINA* L. POPULATED HABITATS IN THE SOUTH PART OF ILUKSTE DISTRICT (LATVIA) IN SUMMER 2014

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**Introduction.** *Bombina bombina* is one of the rarest amphibian species that located in Latvia. The conservation of Fire-bellied toad is important for each country of Europe which has signed Bern Convention and EU Habitat Directive. Legislation and Plan on conservation *Bombina bombina* in Latvia (Pupiņš, Pupiņa, 2006) are good basis for creating new protection areas (Mikroreserve, MK Noteikumi Nr.940). The activists of nature protection (f. e. Society of Latgales ecology) are trying to promote conservation of *Bombina bombina* population in various ways focusing on public attention. However attention should be paid on current weather conditions, which plays a vital role in the successful survival of the species in the natural environment. Hot and dry weather in the summer is an important risk factor for *Bombina bombina* populations survival and spread. The second decade of July (2014) was particularly hot and dry, thereby influencing the species populated habitat in the state of Ilūkste district.

**Materials and methods.** The study was carried out in 2014 in Ilukste district. It was based on research results of *Bombina bombina* distribution in Eglaines parish in 2011-2012. New *B.b.* habitats were revealed by population survey. Water physico-chemical parameters were determined by Hydrolab MiniSonde in June 2014.

**Results.** During the research were described 20 habitats inhabited by *Bombina Bombina*. In Eglaines parish recorded - 3, but in Šēderes parish - 2 new unrecorded *Bombina Bombina* newly populated habitats. In June, the average temperature of the water in these habitats was + 20.8 ° C, the average pH of 8.6 - in all habitats pointed alkaline environment. Average DO% was 82.8%, while vocalisation habitats DO% is higher than 50%. In total, the average water level of 15 cm - 2 m, while the June *Bombina bombina* vokalized in 15 cm - 100 cm deep water body. The average temperature in second decade of July was + 18.7 ° C (+ 1,60C higher than the norm), while the total precipitation amount did not reach the standards (LVĢMC..., 2014). Thus, the 7 of 20 habitats are completely dried up, most of which have pools and lowering terrain site, in other aquatic habitats the water level has dropped. In 2013 *Bombina bombina* development of tadpoles occurred at least in 6 habitats, but this year, five of them are completely dried up and *Bombina bombina* tadpoles were recorded only in one habitat.

**Conclusions.** Hot and dry summer endangers small and shallow *Bombina bombina* populated habitats and their disappearance may affect completing development of juvenile. However, adaptation to such weather conditions can contribute to the spread of *Bombina bombina* species in the corresponding habitat quest.

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**ПОЛЕСКИЙ ГОСУДАРСТВЕННЫЙ РАДИАЦИОННО-ЭКОЛОГИЧЕСКИЙ ЗАПОВЕДНИК КАК РЕЗЕРВАТ МЕДЯНКИ (*CORONELLA AUSTRIACA*) В РЕСПУБЛИКЕ БЕЛАРУСЬ**

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**Введение.** По территории Беларуси медянка встречается неравномерно. Большинство её известных местообитаний находятся в южной и юго-западной частях республики, несколько меньше в центральной части. Основные же ядра данной группировки, находятся, видимо, в мало трансформированных районах Полесья. Одним из таких уголков является Полесский государственный радиационно-экологический заповедник – самая крупная в Беларуси охраняемая территория площадью 216 тыс. га.

**Материал и методы.** Материал собирался на территории ПГРЭЗ в 2008-2014 гг. Ежегодное время пребывания в заповеднике составляло около 160 дней. Точки встреч медянки отмечались GPS-навигатором. У 11 особей или 61,1 % от встреченных, снимались с помощью штангенциркуля и линейки общепринятые морфометрические показатели.

**Результаты.** Из 17 зарегистрированных в ПГРЭЗ медянок, 11 были живыми, 6 мёртвыми. Между 10 из 17 точек встреч расстояние составляло более 1 км. Из шести медянок найденных мёртвыми, пять или 83,3 % тоже были встречены на асфальтированной дороге. Шестой труп найден в 20 м от гравийной дороги, на бетонной плите. Три особи или 50 % найденных мёртвыми медянок (одна сеголетка и две прошлогодки) погибли в результате наезда автотранспорта. Другая половина мёртвых медянок, погибли от хищничества (прошлогодка и два взрослых самца). Возрастной состав встреченных в ПГРЭЗ животных исследуемого вида был представлен следующим образом: сеголетки – две особи или 11,8 %; прошлогодки – три особи или 17,6 %; неполовозрелые с длиной туловища (L.c.) от 306 мм до 365 мм и массой (M) от 13,0 г. до 19,5 г. – пять особей или 29,4 %; взрослые – семь особей.

**Заключение.** 1) На территории ПГРЭЗ выявлено интенсивное заселение медянкой бывших населённых пунктов и других застроек антропогенного происхождения. 2) Отмечены встречи медянки в биотопах, «нехарактерных» вида на остальной части Беларуси. 3) Освоение медянкой новых территорий происходит во благодаря значительным миграциям самок. 4) Показано негативное воздействие на вид автотранспорта. 5) Указывается на высокий пресс хищничества. 6) Исследуемая территориальная группировка вида характеризуется значительной долей неполовозрелых особей. 7) Указывается на высокую степень заселённости видом бывших населённых пунктов и освоение суходольных участков бывших мелиоративных систем. 8) Делается заключение о имеющих место относительно протяжённых кормовых миграциях взрослых особей. 9) Ставится под сомнения известная для Беларуси численность медянки и предполагается, что она в 3-5 раз выше известной. 10) Предположительная численность медянки в ПГРЭЗ составляет около 1 тыс. особей. 11) ПГРЭЗ в настоящее время является для медянки одним из важнейших резерватов в стране.

## ПОЛОВОЗРАСТНОЙ СОСТАВ ЕВРОПЕЙСКОЙ БОЛОТНОЙ ЧЕРЕПАХИ (*EMYS ORBICULARIS*) НА ОСНОВНЫХ ВОДОЁМАХ ПОЛЕССКОГО ГОСУДАРСТВЕННОГО РАДИАЦИОННО-ЭКОЛОГИЧЕСКОГО ЗАПОВЕДНИКА

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**Введение.** По литературным данным, в конце XX в. доля половозрелых болотных черепах на территории ПГРЭЗ составляла 93,8 %, а соотношение самцов и самок равнялось 1:4,3.

**Материал и методы.** Исследовались черепахи, отловленные в апреле-августе 2013 года в водоёмах ПГРЭЗ. Возраст животных, отловленных в ПГРЭЗ, устанавливали по годовым кольцам, которые ежегодно прибавляются на щитках панциря у обитающих в естественных условиях черепах. Количество годовых колец у одной особи на единицу больше пережитых ею зимовок (Mitrus 2009).

**Результаты.** В исследуемых в апреле водоёмах половозрастная структура имела следующий вид – 2,2:1:0 (n=38), в мае – 1:4:3,5 (n=34), в августе – 2:1:7 (n=69). В целом в 2013 году на основных водоёмах ПГРЭЗ половозрастная структура была 1,1:1:2,3 (n=119), даже в случае исключения из исследований двух водоемов, где была отмечена высокая концентрация неполовозрелых особей 0:0:22 (n=22) и 0:0:11 (n=11), половозрастной состав в заповеднике является достаточно гармоничным – 1,1:1:1,1. Не менее половины (53,9 %) отмеченных на территории ПГРЭЗ половозрелых самцов находятся в возрасте от 15 лет и старше.

**Заключение.** 1. В большинстве водоёмов ПГРЭЗ в течении одного календарного года наблюдается значительная изменчивость половозрастного состава болотной черепахи связанная с миграционной активностью. 2. В половозрастной структуре болотной черепахи водоемов вблизи коллективных станций размножения в большинстве случаев встречаются неполовозрелые особи (80-100 % всего населения). 3. На территории ПГРЭЗ половозрастная структура вида – 1,1:1:2,3. 4. Применение понятия «минимальный возраст», позволяет наиболее объективно провести анализ возрастной структуры особей, у которых точный возраст по годовым кольцам визуалью не определим (Пупиньш, Пупиня 2005). 5. Половой и возрастной составы европейской болотной черепахи в ПГРЭЗ значительно более гармоничны, а иногда и вовсе противоположны тому, что указывалось для этой территории ранее.

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## REINTRODUCTION OF THE EUROPEAN POND TURTLE IN ALSACE, NE OF FRANCE

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Reintroduction is considered as one of the most appropriate strategy to entangle biodiversity loss during the forthcoming century. The European pond turtle *Emys orbicularis* counts amongst the reptile species that suffered the most extreme demographic decline throughout Europe. As such, this small sized turtle benefits massive conservation actions throughout its geographical distribution, from Northern Africa to Eastern Europe.

France hosts several large native populations, but some populations have declined and even collapsed. Such situation led the French Ministry of Ecology, Sustainable Development and Energy to implement a « National Plan of Actions for the European pond turtle » (see the other abstract by Martin et al. in this issue).

In Alsace, NE of France, the historical population of European pond turtle is considered to have collapsed during the 19th Century, most probably due to consumption by human, changes in natural habitats (Rhine River channelization), and intensifying human activities. Accordingly, the French local council (Conseil Général du Bas-Rhin, CGBS) included the European pond turtle in its Environment Charter in 1996, and recently cooperated with neighbouring German local council (Landkreis Germersheim) through the INTERREG project « Frontierless pond turtles » aiming at restoring favourable habitats, promoting transbordering connectivity for reintroducing pond turtles purposely raised in captivity at Petite Camargue alsacienne and Parc Zoologique et Botanique de Mulhouse. Both zootechnic and scientific monitoring are coordinated by CNRS-IPHC with the final goal of assessing the capacity of the headstarted individuals to adapt to natural conditions at the most-eastern range in France while estimating the socio-ecological values of such reintroducing.

Here, we will present a summary of transnational actions implemented during the last 15 years by local councils, land managers, zoological parks, and research institutes, with specific focus on recent conservation-oriented research projects implemented in captive and released individuals.

**TOUR DE FRANCE OF CONSERVATION ACTIONS FOR THE EUROPEAN POND TURTLE *EMYS ORBICULARIS***

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Today the European pond turtle *Emys orbicularis* survives in 11 French regions and 26 countries contain at least one population.

Archeozoological data and historical documents show that in ancient (classical and early historical) times, a large part of the French territory was inhabited by this species. It is clear from the present distribution that since the 19<sup>th</sup> century the area inhabited by the turtle population has greatly diminished. The original factors of this decline are firstly human consumption, and more recently the reduction and destruction of their habitat. At the present time, the regression observed at a national level, combined with an important fragmentation of the population, justifies a plan of action in favour of the species.

Here, we will present a summary of the National Action Plan for the European pond turtle (Thienpont, 2011) implemented for 2011-2015 by the French Ministry for Ecology, Sustainable Development and Energy, with some examples of specific conservation measures:

- 1) Preservation of wetlands with good water quality, combined with a favourable landscape for nesting
- 2) An adapted management of the species' habitat
- 3) Maintenance of displacement corridors allowing free movement between the populations
- 4) Problems relating to the coexistence of numerous exotic species, sharing the same ecological niche, must be taken into account.

## USING ECOLOGICAL NICHE MODELING TO PREDICT DISTRIBUTIONS OF *CORONELLA AUSTRIACA* IN UKRAINE

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Geographical Information Systems (GIS) are used widely in zoology and ecology, particularly in herpetology (Sillero, Tarroso, 2010). Predictive habitat distribution modelling is an important tool for conservation biodiversity. For instance, it is used to calculate potential distribution of species (Bombi et al., 2009; Brito et al., 2009), evaluate effects of climatic warming on species distribution (Araújo et al., 2006), and the suitability of protected areas (García, 2006; Doko et al., 2011). Ecological niche modelling (hereafter referred to as ENM) uses environmental variables such as climatic, topographical and habitat data (Tytar, 2011). It is most helpful in studying rare species - *Coronella austriaca* Laurenti, 1768 (Red Data Book of Ukraine, category of protective status Vulnerable (II))

**Material and methods.** We used our database finds (about 190 points) of *Coronella austriaca* to predict species distributions using the BIOCLIM models - DIVA GIS (<http://www.diva-gis.org>). Climatic data consisted of 19 bioclimatic variables. The climate information used here was taken from Worldclim (Hijmans et al., 2005) with spatial resolution of 2.5 minutes.

**Results.** The result of simulation is a raster file with the values that characterize the suitability of the site for a certain species. Six types of areas are mapped in the BIOCLIM output. Areas outside the 0-100 percentile climatic envelope of the species for one or more 'bioclimate' variables are considered unsuitable. The best habitat of smooth snake is forest-steppe Central part of Ukraine ("very high" climatic stability is 10-20 percentile in the map). And even higher "excellent" climatic stability of 20-100 percentile is also registered on other territories of Kiev, North of Cherkasy, the South-East of Vinnytsia, North of Odesa, Kharkiv, North of Zaporizhia regions, along the middle part of the Dnieper. This species inhabits ecotone biotopes in brushwood or forest. The numbers of smooth snake amounted maximum to 1-2 specimens per km of the route (for example, at North of Cherkasy region).

We suggest that smooth snake can be used as an indicator of undisturbed habitats because of its ecological preferences.

## THE SMOOTH SNAKE *CORONELLA AUSTRIACA* POPULATION SIZE AND STRUCTURE IN KEMERI NATIONAL PARK SLOKAS AND VECAIS BOGS

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The smooth snake is rare protected species in Latvia (LR MK noteikumi Nr. 396, (14.11.2000)), but despite its status still poorly studied, so almost nothing is known about snakes population size and structure in country.

This four years (2011-2014) research was carried out in Kemeru National Park that is one of three localities inhabited by the species in Latvia (Čeirāns 2012). In this study artificial refuge method was used and in total were placed 371 refuges (corrugated steel 1.14 x 0.5 m, brown in colour) in 14 arrays. To determine population size individual snakes were marked with PIT tags (adults and subadults with length >32 cm) or distinguished by head colouring (snakes < 32 cm in length). To determine age structure all captured snakes were measured with measuring tape and divided in 3 groups depending on their total length – newborn and yearlings (< 280 mm), subadults (280-440 mm) and adults (> 440 mm) (Drobenkov 2000). To find out sex structure of the population used tail length and snout-vent length ratio, but some snakes also were probed because of some overlapping in ratios.

In total 50 snakes were found. Most of them were adult specimens (23 snakes or 46%) and subadults (21 snakes or 42%), but only 6 snakes (or 12%) were newborns or yearlings. Sex ratio in population (adults ad subadults) appeared to be equal with small overweight in males (19 and 17).

Total amount of snakes in study territory (50) show that this locality is important for species in Latvia. Taking into account new specimen appearance in the investigated area population size probably reaches 200 or more individuals. Age structure of the population revealed almost equal amount of adult and subadult specimens (46% and 42%) that probably show low mortality in this location, for example in Belarus newborns and subadult make only 27% (Drobenkov 2000). Sex structure of the population show equal amount of males and females with small overweight in males (19 and 17), but further research and probing are needed to be certain it's true because of length ratio overlapping.

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**MONITORING AND PROTECTION OF RARE AMPHIBIANS IN BELARUS WITH FOCUSES ON FIRE-BELLIED TOAD (*BOMBINA BOMBINA*)**

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For nearly 16 years 20 localities cane toads and 18 populations of the crested newt was observed population dynamics. Over the last 5 years there has been reduction in the number of populations of toads cane by 50%, accompanied by a decrease in the number 20 times. Significant changes in the number of crested newt were observed.

Monitoring of wildlife - one of the constituent elements of the national environmental monitoring system of the Republic of Belarus (NEMS), which allows to carry out regular monitoring of the main populations of individual species and judge the dynamics of populations inhabiting a large territory.

In world practice, there are two main approaches for monitoring: territorial and selective. On the territory of Belarus is mainly used selective monitoring and as individual, the most significant populations of conclusions about the trends of population dynamics in the whole territory.

In the course of monitoring the observations were made on 20 localities reed toad populations is 6 and 18 populations of the crested newt, located on 5 administrative regions of Belarus. The investigations were performed by standard methods to estimate the abundance. Combined approaches used by the local (population) and spatial (areal) monitoring of these species of amphibians.

During the period of observation crested newt experiencing slight interannual fluctuations in numbers, as well as the reduction of suitable habitats, combined with the disappearance of local populations. It is mainly observed in the central province of the landscape, as well as the western regions Predpolessky. This is largely associated with the overgrowth of temporary pools breeding (20%), as well as stocking (15%) and eutrophication permanent water bodies (15%).

In general, throughout the period of observation cane toads in 4 administrative districts surveyed has been a steady downward trend, as the number of species and the number of habitats in some areas up to 100%, to a total of 50%. This is mainly associated with the unstable dynamics of rainfall in recent years (30%), stocking ponds breeding (25%), the intensification of agriculture with the use of pesticides and fertilizers (65%).

International experience shows that the loss of more than 70% of the population in the country in the aftermath requires a significant financial investment in the restoration of the strength and habitats of this species, combined with the activities of resettlement. In this connection, the natterjack needs in the early development of the management plan view of the territory of Belarus, as well as keeping the species distribution in spatial planning and the use of object-oriented protection measures. Thus, based on an analysis of population dynamics in recent years the state of the reed toads in Belarus close to critical.

## CONSERVATION OF *EMYS ORBICULARIS* IN LIGURIA (NW ITALY)

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**Introduction.** In Liguria (NW Italy), *Emys orbicularis* was commonly found along the west coast until 1970 (Salvidio et al., 2005). However, in the last 20 years, this species was considered extinct in the wild. The causes of its disappearance were mainly due to habitat loss and modification (Andreotti, 1994). Furthermore, the presence of invasive species, fishing activities, water table lowering and the water pollution contributed to the decrease of this species. Recently, few small and isolated populations were discovered in the Albenga plain (Jesu et al., 2000, 2004). These native populations are recognized deserving priority conservation actions at the Regional level. Therefore since 2000, a restoration and breeding program was implemented by different public Authorities, private entities, NGOs and volunteers. A LIFE+ Nature project was co-financed in the 2013 by the EU Community (LIFE EMYS - LIFE12 NAT/IT/000395). This project is developed with many others actions such as the removal and management of allochthonous freshwater chelonians, veterinary protocols, communications but in this paper we focus mainly on facilities and methods of *Emys orbicularis* rearing.

**Material and Methods.** The concrete actions of the project consisted of five integrated parts:

1) Monitoring: all wild populations were monitored annually since the 2002. 2) Habitat management: Creation/restoration of several freshwater habitats inside Natura 2000 sites in the Province of Savona and removal of allochthonous freshwater chelonians. 3) Rearing: Creation of a small *ex-situ* breeding center in Leca di Albenga (SV) in 2000. The outdoor center of 150 m<sup>2</sup> is divided in four pens: an area for adults (15 females and 7 males) that communicate only during the nesting period with a nesting area. Two areas of acclimatation for different age group terrapins. Thanks to the LIFE EMYS the "Centro Emys" will be implemented with four new units, aimed at keeping the juveniles. The new tank, as the existent, will be equipped with phytodepuration system, basking sites and hibernation area. 4) Creation of an indoor facility composed by a total of 14 tanks that is able to host a maximum of 200 young terrapins at one time, coming from *ex-situ* breeding center. The animals will be kept in a controlled environment for about one year before they are transferred back to the breeding center for environmental acclimatation. 5) Reinforcement, since 2008, of the remnant *E. orbicularis* populations in the Albenga plain with captive bred individuals (several of them radiotracked during their first season of activity). All specimens released in the wild are firstly checked according the veterinary protocols and the Disease Risk Analysis (DRA).

**Results and discussion.** Despite the initial difficulties, the *ex-situ* breeding center is now well equipped with a number of hatchlings comprised between 50 and 70 per year. Since the 2000 more than 350 animals hatched in the facility and 156 specimens were released in protected areas. The annual survival of released *E. orbicularis* is site-dependent. Based on first recapture data, survival is estimated to be almost 70% in relatively isolated ponds and 30% in stream habitats. These first monitoring results suggest that the populations are demographically increasing but still highly endangered. Concerning reproduction in the wild of the released specimens, we have photo of individuals mating but no data on egg-laying or newborns. The attitude of local people towards the project was generally positive, and the integrated experience of Liguria was successfully exported in Sicily. However to guarantee an efficient conservation action this project should be supported for many years together a proper landscape planning.

## OVERVIEW ON CONSERVATION OF THE *EMYS* GENUS IN ITALY

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Two species belonging to the genus *Emys* are currently recognised in Italy: *E. orbicularis* found in mainland Italy and Sardinia, and *E. trinacris*, endemic to Sicily (Di Cerbo, 2011; Zuffi et al., 2011). The Sicilian pond turtle (*Emys trinacris*) has infact recently been distinguished from *E. orbicularis* by genetic and morphological characters (Fritz et al., 2005). Preliminary analysis based on comparison data on mtDNA control region sequences showed a significant differences on haplotype frequency and distribution along the apennines between western and eastern populations confirming the current taxonomic distribution between *E. orbicularis galloitalica* and *E. orbicularis hellenica*, and also a strong differentiation for Sicily population (Manfredi, 2013). Pond turtle colonized several type of habitat in Italy, mainly in lowland areas, including complex wetland system, small lakes, canals and slow river courses, reaching 1500 m in Calabria. In the last century, pond turtles population suffered a strong decline mainly due to habitat loss and alteration. Many population are now isolated, increasing the risk of population extinction, because of demographic or genetic isolation (Zuffi et al., 2011). The largest populations of *E. orbicularis* occur in protected areas of the Po River Delta, of Friuli Venezia-Giulia, Tuscany, Latium, Campania and Calabria (Mazzotti and Zuffi, 2006). *E. trinacris* seems to be mainly threatened by destruction and pollution of habitats, fragmentation and in some cases from illegal capture for pet trade (Di Cerbo, 2010; D'Angelo, 2013). Although the knowledge on the distribution, ecological requirements and threats are very fragmentary, this species was recently ranked in the Italian Red List in the category "In Endangered (EN) A2c" (Andreone et al., 2013). *E. trinacris* is, however, more widespread in the northern and central part of the island while it become more rare in southern part (Di Cerbo, 2010). One of the last threats occuring for both species in the last decades is the introduction of several allochthonous species of freshwater turtles, that, as *T. scripta elegans*, could compete with *Emys*, reducing its individual fitness (Zuffi et al., 2011). A very good aid in *Emys* conservation was its inclusion into the Annexes of the Directive 92/43/CEE "Habitat". Thanks to this Directive many projects are started during the last decades. According to the official database of the LIFE program, since 1992 eleven Italian Life-Nature projects specifically targeting *Emys orbicularis* or its habitats have been funded. Others minor projects were developed locally as well summarized by Ficetola et al. (2013). The majority of these conservation efforts concentrate in Northern Italy with nine project, one project in Center Italy and one project in Sicily on *Emys trinacris* and a national project on presence/absence into the system of natural areas managed by the WWF Italy. The main topics of these projects are population monitoring, habitat management and restoration, reintroduction and captive breeding. We are aware of four projects concernig the rearing of *Emys orbicularis* for conservation purpose, respectively in Province of Savona (Liguria), Province of Piacenza, Province of Modena, Province of Forlì-Cesena (Emilia-Romagna) and one on *Emys trinacris* in the Province of Trapani (Sicily). As stated by Ficetola et al. (2013) we confirm that the limited exchange of experiences or good practices obtained from these conservation activities is the mainly defect of all these project. For this reason an increase of coordination with national and international project is needed to improve the effectiveness of conservation actions.

**BODY LENGTH OF *BOMBINA BOMBINA* L., 1761 (AMPHIBIA, ANURA, DISCOGLOSSIDAE) IN CLEAN AND CONTAMINATED PONDS NEAR THE SOUTHERN BORDER OF THE SPECIES AREA**

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The purpose of the study is the analyse of the linear sizes of fire-bellied toad on the southern border of the species area in the natural and anthropogenic contaminated ponds. The body length is measured at 657 of toads in Western Ciscaucasia (including 336 individuals from the clean ponds and 321 of pesticide-contaminated ponds) and 33 toads in Bulgaria. The digital data is processed standard statistical methods.

On the basis of analyse of body size of fire-bellied toads it is established (by own and literature datas) that the maximum length of a body of individuals of this species are marked at the southern borders of the area: 42°–43° n.l. in the South-West (Bulgaria) here body length is 40,3 mm (male), and 41,4 mm (female), and 45° n.l. in the South-East (Western and Central Ciscaucasia) there body length is 45,0 mm (males and females). The differences in mean values of the length of the individuals' body ( $36,4 \pm 0,68$  mm;  $36,5 \pm 0,98$  mm;  $37,8 \pm 0,86$  mm;  $39,0 \pm 0,59$  mm) in the South-West and South-East is within the statistical error ( $t_{\text{facto}} = 1,99$  and  $1,52$  when  $t_{\text{statistic}} = 2,00$ ). The one individual of *Bombina Bombina* described from the Crimea, had a length of 38,0 mm.

The comparison of linear dimensions of fire-bellied toads of different age groups in the populations of pure and pesticide-contaminated ponds from Western Ciscaucasia was conducted. It is established of statistically significant differences in the mean length of two-, three - and four-year-old animals in the spring, in clear ponds fire-bellied toads are 23,3; 29,6; 32,8; 39,0 mm respectively and in contaminated ponds they are 22,1; 25,2; 28,3; 32,8 mm respectively. These differences increase with the age, that is, the rate of increase in clean water is higher than in the polluted water. In the autumn only individuals of three years are large in clean ponds (32,0 mm) and 27,7 mm in contaminated water. In all other age groups the differences in the body length of animals in clean and polluted ponds are within the statistical error. Thus, the body length of *Bombina bombina* in the populations of Western Ciscaucasia can be simple, effective and intravital characteristic for identification of polluted ponds.

## PHENOTYPIC ANALYSIS OF THE FIRE BELLIED TOAD *BOMBINA BOMBINA* IN LATVIA

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Keywords: *Bombina Bombina*, fire-bellied toad, Latvia, spots, phenotype

There is a northern border of the distribution areal of the fire-bellied toad *Bombina bombina* in Latvia. The studies of phenotypic changes in *Bombina bombina* populations will give an opportunity to understand adaptive capabilities of this species under the influence of environment limiting factors at its distribution areal border. The use of *Amphibia* pattern individuality is a widespread method in recognizing individuals.

The first step in this research was to investigate the cluster composition in *Bombina bombina* populations and compare the results with the five-year old research. The pattern of ventral spots of 20 *Bombina bombina* individuals from two locations in Latvia (Ilgas, Demene) was investigated. Typification of variations was based on the analysis of the form of prevailing fragments of orange ventral spots.

Abdominal fenocomplex is different for each *Bombina bombina* individual in a population, but it can be divided into 5 clusters by spots of visual similarity. The analysis of ventral spots of *Bombina bombina* showed the domination of definite clusters in concrete locations. It was found that the diversity of clusters in one location increased, whereas in another location the diversity of clusters does not change, but the number of *Bombina bombina* individuals in each cluster was equalizing. That can indicate a high degree of relationship of individuals. Ventral spots can also serve as a genetic link between individuals in a population.

**SPATIAL GENETIC DIFFERENTIATION AND MIGRATION PATTERNS OF THE EUROPEAN POND TURTLE (*EMYS ORBICULARIS*) POPULATIONS FROM POLAND**

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Population structure is influenced by variety of factors like demographic, genetic or ecological ones. Understanding the historical species distribution and the current genetic diversity including patterns of gene flow and genetic discontinuities are equally important for the conservation of declining species. Despite the clear importance of population genetic data for directing management plans, population studies of the European pond turtle from different parts of its geographical range are scarce. In Poland, different initiatives have been taken to reinforce this species and different management plans were implemented in each of four main regions inhabited by pond turtles in Poland. The four regions differ also in regard to population size, landscape characteristics and habitat availability. These differences may be reflected in the differences of genetic diversity. In all four regions active conservation projects included protection and recovering of suitable habitats and nesting sites and population monitoring. In the eastern Poland with the biggest population of the European pond turtle, protection involves also headstarting. The possible effects could be however apparent until few decades. We investigated the genetic differentiation and migration patterns of four populations of the European pond turtle from Poland. We examined the population genetics of 164 European pond turtles by analysis of eleven microsatellite loci. We identified two well-supported groups that are geographically clustered. AMOVA showed low genetic differentiation between populations and a PCoA approach clustered individuals into two main clusters and four groups, with most Polish western individuals in one group and most Polish eastern individuals in the other three. Analysis of variance of basic diversity indices showed no significant differences among populations. Only in paired t-tests central and western Poland populations differed slightly in Shannon's index and allelic richness. Our data suggested also a mild loss of genetic variability correlating with the population bottleneck in two populations. Most populations do not seem at immediate risk of low genetic variation, however the present diversity may reflect previous distributions owing to species long live span.

## PROJECT LIFE-HERPETOLATVIA RESULTS ON CONSERVATION OF *EMYS ORBICULARIS* IN LATVIA

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**Introduction.** *Emys orbicularis* was found in several Natura 2000 territories in Latvia (Pupins, Pupina 2008). No *E. orbicularis* conservation measures had been specified for any of present Natura 2000 territories with approved Territory protection plans. However, *E. orbicularis* have approved Species Protection Plan (Pupiņš, Pupina 2007), where species records and general information on recommended conservation actions are described. *E. orbicularis* included in the List of the Specially Protected Species and in the List of the Specially Protected Species for whom microreserves should be established. Therefore the project “Conservation of rare reptiles and amphibians in Latvia” (LIFE-HerpetoLatvia) was established with co-financing of European Commission and realized in 2010 – 2014. Project goal is to facilitate the enlargement of *E. orbicularis* population and to ensure its long-time persistence in Latvia by combining in-situ, ex-situ methods, and creation of a suitable corridor network for *E. orbicularis* key population for Nature Park Silene near to border of Belarus.

**Materials and methods.** Preliminary study was one-year field study and had goal to collect data for population management measures. The study was consisted of the collection of the most recent information on habitat composition in areas (GIS data and site surveys), animal counts, population and their home range mapping. Habitat management measures were restoration of 4 ponds and creating of open egg-laying sites for *E. orbicularis* by vegetation cutting. The breeding in aquaculture had included establishment of population in captivity, breeding and releasing of juvenile.

**Results.** 1) For the *E. orbicularis* 16 ponds were created or restored in Nature Park Silene in four sites (key site areas – 6.3 ha; 15.4 ha; 16.4 ha; 0.5 ha). The ponds have sun-basking places and eggs-laying places near to the ponds. Some ponds are shallow, they are planned also for juvenile *E. orbicularis*. 2) The building of Rare Reptile and Amphibian Centre is renovated and equipped with indoor and outdoor basins. 3) 42 (210% from planned 20) adults, semi-adults and juveniles *E. orbicularis* were raised in aquaculture and are released in wild in Nature Park Silene near to border of Belarus.

**Conclusions.** Probably, conserved on the territory single individuals already cannot restore independently its own quantity. Thus, functioning of the Project enables to save and restore the given population, as well as provide corridors for the contacts of populations. The present project has apparent very long-term after-LIFE effectiveness and sustainability.

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## PROJECT LIFE-HERPETOLATVIA RESULTS ON CONSERVATION OF *BOMBINA BOMBINA* IN LATVIA

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**Introduction.** There are several *Bombina bombina* populations located in South-eastern Latvia and along south-central border of the state (Kuzmin et al. 2008). *B. bombina* does have approved Species Protection Plan (Pupiņš, Pupiņa 2006) where general information on recommended conservation actions are described. The project “Conservation of rare reptiles and amphibians in Latvia” (LIFE-HerpetoLatvia) was established with co-financing of European Commission and realized in 2010 – 2014. Project target objectives are: 1) creation of a suitable habitat network for key populations for proposed Natura 2000 sites; 2) establishing of two new Natura 2000 sites for main population of *B. bombina* in Latvia; 3) captive breeding in aquaculture and enforcement of *B. bombina* populations in key positions.

**Material and methods.** Preliminary one-year field study was carried out in Demene. The study was consisted of the collection of the most recent information on habitat composition in areas, population by counting of vocalizing males. After the study Population management plans (Pupina, Pupins 2012) was created. Habitat management measures were ponds digging for *B. bombina* for two newly established Natura 2000 sites in Demene. *B. bombina* were reared in aquaculture.

**Results.** As a result of the Project: 1) Proposals for two new Natura 2000 sites (Katrīniski and Strauti) for *B. bombina* in the Daugavpils District of Latvia are submitted to the Government of Latvia. 2) Habitats are improved for key population. 27 ponds were created or restored in Demene (14 in Katrīniski and 13 in Strauti). 3) The Rare Reptile and Amphibian Breeding Centre is equipped for *B. bombina* rearing in aquaculture. 4) ~ 4 000 (133% from initially planned) *B. bombina* juveniles were raised in aquaculture and released for population enforcement. The new waterbodies are populated by *Bombina bombina*

**Conclusions.** We have already observed *B. bombina* in some newly dug ponds in both future Natura 2000 sites. This species was also observed in improved *Emys orbicularis* water bodies in Silene as well. They come from small peripheral population Ilgas and *Emys orbicularis* habitat improvement has important additional value for creating corridors for *B. bombina* inter-population dispersal between target population Demene and small population Ilgas.

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## PROBLEMS AND MODERNIZATION OF AQUACULTURE OF *EMYS ORBICULARIS* IN DAUGAVPILS, LATVIA

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**Introduction.** *Emys orbicularis* (Linnaeus, 1758) is a rare Reptile of Europe, Latvia is situated on the northern edge of the species distribution. As a result of human activities new factors of anthropogenic origin (Pupins, Pupina 2012) appear which negatively influence the *E. orbicularis* in Latvia. The one of the recommended by official "Plan of conservation of *E. orbicularis* in Latvia" (Pupiņš, Pupiņa 2007) measures is rearing in aquaculture for releasing. This also determines the importance of solutions of problems of *E. orbicularis* aquaculture and modernization of aquaculture in Latvia.

**Material and methods.** *E. orbicularis* has well established aquaculture breeding group at the Latgale Ecological Society and Latgale Zoo, this group consist from individuals caught in Latvia. The *E. orbicularis* breeding group is reared in 2010 – 2014 in out-door aquaculture with a semi-natural environment in a natural climate conditions, they are fed by fishes, insects, snails. Young turtles are kept in in-door aquaculture with filtration, place for sun-basking and UV. Level of viability was estimated by normality of development of carapace, speed of growing, health conditions in young turtles, behavior.

**Results.** *E. orbicularis* is successfully bred in this full-cycle aquaculture for many years. After analyses of the results we found 15 problems of the aquaculture, need for modernization, the five biggest are: 1) The reared juveniles turtles can scoliosis etc.). 2) The juveniles can take part in reproduction after a many years only. 3) The predators' danger is very actual. 4) *E. orbicularis* can be not adapted to a natural climate. 5) The *E. orbicularis* from a zooculture haven't fear on big animals. The five modernizations were consequently: 1) Feeding by gammarus, cats food *KiteKat*, fish with bones and UV lightening. 2) The *E. orbicularis* are reared to an subadult status (~ 4-5 years) in aquaculture. 3) Only subadult *E. orbicularis* are released in wild. 4) The *E. orbicularis* have adaptation period in a natural climate conditions. 5) We use a special fear learning program for the *E. orbicularis*.

**Conclusions.** The modernizations are effective in the aquaculture. Danger can be possibility that *E. orbicularis* in the established breeding group (although caught in Latvia), are not autochthonous (e.g Ukrainian origin), and the risk of establishing non-native gene pool for this species; the genetics of the breeding group turtles was checked and is currently under additional testing. The breeding group from geographically closest populations (Belarus) was used for restoration of near-to Belarus border population in Ilgas (Silene Nature park)..

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## PROBLEMS AND MODERNIZATION OF AQUACULTURE OF *BOMBINA BOMBINA* IN DAUGAVPILS, LATVIA

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**Introduction.** New factors of anthropogenic origin (allochthonous fish predators (Pupins, Pupina 2012), amelioration) appear which negatively influence the *Bombina bombina* in Latvia. In connection with this it is important to conserve *B. bombina* on the northern edge of the species distribution in Latvia. The one of the "Plan of conservation of *B. bombina* in Latvia" (Pupiņš, Pupiņa 2006) measures is conservation ex-situ: rearing in aquaculture for releasing (Pupina, Pupins 2012). This also determines the importance of modernization of *B. bombina* aquaculture in Latvia.

**Materials and methods.** The tadpoles were reared in aquaculture in natural climate conditions and in labor, the food was fish food *Vipan*, we didn't used filters, and there were big *Culex sp.* and *Daphnia sp.* populations in the basins. The tadpoles were kept in the basins before metamorphosis, when they were released in restored ponds in Demene district. Level of viability was estimated by normality of development of body, speed of growing, health conditions, behavior.

**Results.** *B. bombina* tadpoles were kept successfully in this aquaculture. After analyses of the results we found 15 problems of the aquaculture, need for modernization, and the five biggest are: 1) If the number of tadpoles in the basin is too big, the development will be longer, and the tadpoles will be smaller. 2) The tadpoles can't have experience in using of substratum, if they are reared without it. 3) The reared tadpoles and juveniles can have illness of development (scoliosis etc.). 4) The reared juveniles can don't have the phylopatry to the pond of releasing, if the time of releasing isn't optimal. 5) The juveniles introduced in one place can be removed by local predators. The five modernizations are consequently: 1) The relative number of tadpoles used in our zooculture is 1-2 tadpoles per liter of water. 2) The water plants (*Lemna sp.*) and plastic plants are used in aquariums. 3) We used the food "*Vipan*", *Culex sp.* and *Daphnia sp.* populations are living in the basins. 4) We introduce the juveniles on 4-leggs stadium of metamorphosis in wild. 5) We introduce the juveniles in a nature pond in many places and in many small groups (3-4 individuals per place).

**Conclusions.** We have already observed released *B. bombina* in the ponds of releasing and therefore can to conclude, that used modernizations are effective in our aquaculture.

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## GENETIC ANALYSIS OF THE LATVIAN POPULATION OF FIRE-BELLIED TOAD *BOMBINA BOMBINA*

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The fire-bellied toad *Bombina bombina*, an anuran species distributed in lowland aquatic habitats of eastern and central Europe, is critically endangered in most of its current distribution range and protected by the so-called 'habitat directive' of the European Union (Council of the European Communities 1992). The aim of this preliminary study is investigation of genetic structure of the fire-bellied toad population at the northern border of its distribution areal in Latvia. One of the genetic diversity criteria is the heterozygosity level in population, which provides an opportunity to rebuild population genetic structure or homeostasis after losing the balance because of various factors.

In this investigation, the buccal swabs and muscles from 22 individuals of Latvian populations (Demene, Medumi) were used. DNA was extracted by the rapid salt-out method. To determine the population genetic variation, polymorphism, and heterozygosity were used. Four microsatellites (*Bobom 1A*, *Bobom 7A*, *Bobom 3A*, and *Bobom 5F*) were amplified by the PCR method with different renaturation profiles at 57°C for *Bobom 1A* and *Bobom* and at 62°C or *Bobom 3A*, *Bobom 5F*. PCR amplifications products were visualised by electrophoresis in 10% PAAG with EtBr in UV. The genetic diversity, variability, means of alleles on locus and observed heterozygosity (Hobs) and expected heterozygosity (Hexp) were analysed at these four microsatellites markers.

We found that the H obs (from 0.06 to 0.45) and Hexp (from 0.37 to 0.48) in the Latvian population are lower than analogical parameters (from 0.62 to 0.91 and from 0.5 to 0.87, respectively) based on this microsatellite analysis in a German population of fire-bellied toads. It was found that an average observed heterozygosity level (H obs) in the Latvian *Bombina bombina* population is 0.32, an average expected heterozygosity (H exp) is 0.43, and an average F stat is 0.13. Probably, these genetic parameters of the population of *Bombina bombina* at the northern border of its areal is a result of the limiting act of environmental factors.

**DISTRIBUTION OF *BOMBINA BOMBINA* AND *BOMBINA VARIEGATA* IN CHERNIVTSI REGION  
(WESTERN UKRAINE)**

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The two European fire-bellied toads (*Bombina bombina* and *B. variegata*) inhabit in Ukraine. *B. bombina* is widespread in plain part of Ukraine, and *B. variegata* – in Ukrainian Carpathians and adjacent territories. The Yellow-bellied toad was including in Red Data Book of Ukraine (2009) as vulnerable species. Information about distribution of *Bombina* species in Western Ukraine (especially in eastern part of Ukrainian Carpathians) is too little. The aim of this work was to summarize all the available information about the geographical distribution these two amphibian species in Chernivtsi region, where they inhabit together.

This report bases on the results of the analysis of literary sources, museum collections, personal communication of some respondents, and own field researches, which were conducted in the all part of study area in 2002–2014. I was using the features of ventral picture (Hofman and Szymura, 1998) and some another characters (Taraschuk, 1959; Scherbak and Scherban, 1980) for identification the each *Bombina* specimen.

The results of investigation showing that *B. bombina* is a widespread amphibian species in plain part of Chernivtsi region (Prut-Dnister interfluves) and his found in some localities of foothills (eastern part of Bucovinian Ciscarpathians). This species was found in 36 localities from Chernivtsi City (3 localities) and seven administrative district: Khotyn (10), Kel'mentsi (3), Kitsman' (5), Novoselytsia (9), Sokyryany (3), Storozhynets' (1), and Zastavna (2).

*B. variegata* is a widespread and numerous in mountains and foothills (right bank of Prut River and upper part the basin of Siret River). This species was found in 63 localities from Chernivtsi City (4 localities) and five administrative district: Hlyboka (4), Kitsman' (3), Putyla (20), Storozhynets' (16), and Vyzhnytsya (18).

Our research indicates what a main border among two *Bombina* species in Chernivtsi region is a Prut river. The hybrids *B. bombina* x *B. variegata* was found in some localities from the territory of Bucovinian Ciscarpathians ((Chernivtsi (places Haryachy Urban), Storozhynets' and Zavaloka) and Prut-Dnister interfluves (Chernivtsi (place Sadhora), Dynivtsi, Rukhotyn, Toporivtsi). Our data significantly complementary to information about the distribution of the European fire-bellied toads in western part of Ukrainian Carpathians.

## НОВЫЕ НАХОДКИ *BOMBINA BOMBINA* (LINNAEUS, 1761) НА ПЕРИФЕРИИ АРЕАЛА

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Запорожская область – одна из наиболее антропогенно измененных территорий Украины, а ее природные условия неблагоприятны для обитания большинства видов амфибий. Южная граница распространения *Bombina bombina* (Linnaeus, 1761) в пределах Украины, подвержена флуктуации пространственного распределения (Котенко, 2005; Сурядна, 2013). Любые новые находки в данных условиях достаточно важны, как для экологии вида, так и для разработки эффективных мероприятий его сохранения.

В результате проведенных исследований выявлены новые места обитания *B. bombina* на периферии ареала в Запорожской области Украины.

Биотоп на о-ве Хортица, г.Запорожье, р. Днепр представлен непересыхающим внутренним замкнутым озером с илистым дном (40х10 до 1 м глубиной), недалеко (2 км) от разлива р. Днепр. Уникальное малодоступное место обитания обнаружено на Беленько-Разумовском островном архипелаге (р. Днепр). Сам остров представляет собой плавневый лес с многочисленными протоками, озерами, старицами и плотным подлеском. Не типичное для краснобрюхой жерлянки место обитания выявлено в урочище «Басанька» (Васильевский р-н). Небольшое озерцо, в виде своеобразной чаши (2х2 м, глубиной - 20-30 см), сформировалось на дне третичной балки, рядом с обрывом сарматского яруса. Постоянно подпитывается грунтовыми водами и ниже (350-400 м) впадает в Каховское водохранилище. Температура воды 9-10<sup>0</sup>. Особый интерес представляет обнаруженная популяция жерлянки непосредственно в самом городе Запорожье (верховье Гребного канала, детская ж/д). Биотоп находится под чрезвычайной антропогенной и природной нагрузкой. Состояние этой популяции очень критично.

Морфологический анализ всех исследуемых особей позволил установить, что длина тела в среднем составляет – 40,4±0,7 (21,2-52,8), что несколько меньше по сравнению с литературными данными (Писанець, 2014). Самки крупнее самцов по всем исследуемым признакам. Краснобрюхая жерлянка может обитать в достаточно широких пределах общей минерализации воды (от 1,19 до 15,9) и показателя Ph (6,2-8,3).

В результате проведенных исследований уточнена и дополнена юго-восточная граница ареала распространения *B. bombina*. Выявлены места обитания, устойчивые гидрологические условия которых способствуют развитию стабильных адаптационных возможностей у исследуемых животных. Обнаружены остатки реликтовой популяции, которая была здесь до зарегулирования крупных степных рек. Широкий спектр биотопов и пределы гидрохимических показателей позволяют утверждать, что вид достаточно экологически пластичен.

## **BOMBINA BOMBINA PHENETIC VARIABILITY IN PONDS WITH VARIOUS DEGREE OF ANTHROPOGENIC LOAD**

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In last decades, intensive anthropogenic transformation of environment and traditionally negative attitude of most of the people to amphibians have made *Bombina bombina* very vulnerable. In many countries, this species is in the Red List (Denmark, Germany, etc.), and today it needs special protection measures. Currently in Belarus, *Bombina bombina* is included in an annotated list of species that require further study and attention to preventive protection (Red Book of the Republic of Belarus, 2004). A set of definite phenes is mainly used as a characteristic of the intraspecific variation of species. Based on the correlation of particular variants of phenes and their occurrence, we can talk about the genetic specificity the species in the border of area. Also, based on phene evaluation of intraspecific structure we can identify the degree of stability of the gene pools of different taxa. So, the *Bombina bombina* may be considered one of the most interesting species for comparative phenetic studies.

The aim of our study was to identify *Bombina bombina*'s polymorph variability in water bodies with varying degrees of anthropogenic load. Investigations were carried out in May 2013 in three reservoirs in Grodno and its environs. The first pond, which has a low degree of anthropogenic load ( $N^* = 32$ ); is located near the village of Bogushevka, Grodno region (Belarus), 25 km from Grodno. The second pond is in Grodno near a meat-packing plant, and has a high degree of anthropogenic load ( $N = 33$ ). The third water body is located 3 km from the plant "Khimvolokno" (Grodno), in the village of Fabrichny ( $N = 28$ ), it has an average degree of anthropogenic load.

Patterning in *Bombina bombina* ends after the first winter. 8 phene complexes on the dorsal side and 9 on the ventral are noticed in the *Bombina bombina*'s body. The phens has variations and are used as markers (submandibular spots, subpharyngeal spots, thoracic spots, nature of abdominal spots, nature of shoulder spots and forearm spots, pastern spots, inguinal spots, subinguinal, thigh, shin spots, tarsal spots, foot spots) (Novitskyi, Baharev, Andersen и др., 2001; Masalykin, 1989). For studying phenetical structure of *Bombina bombina*'s populations in conditions of various degree of anthropogenic load, the occurrence frequency of individual phenes and their variations were calculated. Overall, 11 phenes and their variations were studied.

The results comparison of the occurrence frequency for all studied *Bombina bombina*'s phenes showed the following: In all habitats such *Bombina bombina*'s phenes as presence of submandibular spots, presence of amoeboid chests spots, merging of shoulder spots and forearm spots, lack of inguinal spots, pastern spots come on the basis of 1-3 fingers occur with almost equal probability. In country populations in ponds with low anthropogenic load (village of Bogushevka) such phenes as fusion of the submandibular and subpharyngeal spots, chest spots with proper form, merged of chest spots, merged of inguinal spots, merged of inguinal and femoral spots, merged inguinal and subinguinal spots, merged of tarsus and foot spots were absent.

Thus, it can be noted that in the city the variability of pheneimage of the Fire-Bellied toad is much greater than in suburban populations, due to different degrees of anthropogenic load on water bodies. In urban populations of *Bombina bombina* spots are enlarged, because of merger. Country populations have small specks.  $N^*$ -number of *Bombina bombina*'s samples

**NATIVE HERPETOFAUNA: *BOMBINA BOMBINA*, *EMYS ORBICULARIS*, *CORONELLA AUSTRICA* IN EUROPEAN ZOOS AND ZOO COLLECTIONS**

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In National Program of Biodiversity conservation *ex-situ* methods are often used in particular endangered and threatened species. Zoological gardens, tropicariums, aquariums, animal parks and other such organizations have important role as centers of education and information with certain species conservation and recovery plans. The National Program provides and develops conservation methods, protection programs for wild, rare and endangered animals, also for zoos animal outside their natural habitat. Herpetofauna is one of animal's part, which often is exhibit in zoos collections. Zoo collections and the consequent implementation of the project on native biodiversity conservation need to be promoted to public in environmental protection and management. Animal collections should find promotion of local interest in endangered species.

The available open data on the Internet was studied and obtained information about 78 zoo collections in North Europe and Baltic States (registered in //http:www.zooworldwide.com). The zoo collections in this area can be divided into three large groups:

1<sup>st</sup> group - state/national zoo collections, belonging to one of the local municipality and dealing with exotic animal collection and display the local animal breeding or reintroduction of species. This group has an important role in the public education, in accordance with this zoo collection appearance and the information that is shown to the public, will depend on public attitudes and has the importance in protecting biodiversity;

2<sup>nd</sup> group - private collections (safari parks, rural house, birds and mammals collection), that offers animal exhibition for the visitors, and offers hunting and animal production sale;

3<sup>rd</sup> group - private collections that offer exotic animals (cats, insects, amphibians or reptiles, exotic birds), whose are showcased to visitors.

2<sup>nd</sup> and 3<sup>rd</sup> group are difficult to manage, because they don't have responsibility.

Information about endangered animal's species must be easy found in zoo home page. Unfortunately biggest part of zoos this info is difficult to find or it isn't.

Zoo collections are one of organizations what have a lot of experience and a lot of animal's welfare info, so that's why they should share it with society. One of zoo aim is popularize a nature protection and show an endangered animal info, so that's why in zoo home page must be included info about this animal.

**SUMMARY OF THE 1<sup>ST</sup> INTERNATIONAL WORKSHOP – CONFERENCE  
„RESEARCH AND CONSERVATION OF EUROPEAN HERPETOFAUNA AND ITS  
ENVIRONMENT: *BOMBINA BOMBINA*, *EMYS ORBICULARIS*, AND *CORONELLA  
AUSTRIACA*”**

**Latvia, Daugavpils, 08-09.10.2012.**

Project LIFE-HerpetoLatvia in a scientific cooperation with the: Institute of Ecology of Daugavpils University; Institute of Systematic Biology of Daugavpils University; Latgales Zoo of Daugavpils city council; Latgales Ecological Society, and with support of the: Ministry of Environment of Latvia; Nature conservation agency of Latvia, organized 1<sup>st</sup> International Conference - Workshop „Research and Conservation of European Herpetofauna and its Environment: *Bombina bombina*, *Emys orbicularis*, and *Coronella austriaca*”, held in Daugavpils, 08-09.10.2012.

The aim of the workshop was experience exchange over different aspects of research, management of populations, and conservation in-situ and ex-situ of three project species, meeting with other LIFE projects' representatives.

Two – day free-of-charge workshop included presentations, discussions, field visits to the sites of future habitat improvement works, and visiting of renovated RRABC building.

**24** presentations of **37** authors from **7** countries (Belarus, Estonia, Germany, Latvia, Lithuania, Netherlands, and Poland) were presented in a form of oral presentation or poster.

The results were published in Abstracts (paper and PDF) and in Proceedings (PDF) in open access in [www.life-herpetolatvia.biology.lv](http://www.life-herpetolatvia.biology.lv).



## STAPHYLINID BEETLES IN FOOD SPECTRA OF AMPHIBIA IN BELARUS

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Detailed study of the amphibian's food spectrum is important for analysis of the food getting strategy and for analysis of the trophic component of the ecological niche. Food preferences of the different species and age groups of amphibians in different habitats have special peculiarities and are insufficiently studied. Amphibian food spectrum analysis based on species lists is used sufficiently rare because the difficult and large work is need for production of such lists. The amphibian's food spectrum is very large. Because of the Staphylinid species richness among the prey items and high frequency of finding them in some samples (may be found in 80 % samples) the analysis of these beetles in the amphibian food spectra is very interesting. The quota of the staphylinid beetles in the food spectrum is from 1 to 7 per cent in different biotops.

Contents of the stomach of common toad (109 ex.) and green toad (145 ex.) were studied. Material was collected in the field by means of lavage of the stomach of living amphibians. Totally 46 staphylinid species were found as amphibian's victims. The most diverse genera of staphylinids in the diet are *Philonthus*, *Stenus*, *Anotylus*.

According to the literature data no exact size dependence was found in the predator-prey system for amphibians. According to our data this dependence exists but it is nonlinear because low degree of toad trophic specialization. With age (increase of predator size) food object size range only gets somewhat larger. The correlation coefficient for staphylinids is positive ( $p < 0,05$ ).

No good correlation was found between staphylinid catch in the biotop and them quota in the food spectrum. Therefore an analysis of the spectrum of the staphylinid ecological groups is more useful. Predators (*Philonthus*, *Stenus*, *Gabrieus*, etc.) were dominants in the amphibian's diet. The large part of the diet makes up parasitoids like *Aleochara*. Green toad mainly eats up inhabitants of decayed organic matter (51,7 %), other ecological groups are within the limit of 13 %. Common toad eats up epigeobionts on river banks (37,5 %), stratobionts in the forest litter (20,3 %), as well as anthophils (9,4 %) and myrmecophils (1,6 %).

When we examine the ecological group ratio of prey items we can judge with sufficient part of probability about ecological preference of predators. It is impossible to obtain reliable samples even for one prey species from a given habitat because the rich species composition of prey items (with the exception some dominant prey of individual predator). Therefore analysis of the ecological group ratio is richer in information for more exact division of the ecological niches.

Thus, based on the results of the analysis of the ratio of potential prey in communities and invertebrate ratios from stomachs of common frog we came to the conclusion that existed prey selectivity is not general. It directed on the individual groups of objects. The confirmation of that selectivity needs an additional analysis of analogous materials.

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## RURAL LANDSCAPE AND CONSERVATION OF *BOMBINA VARIEGATA PACHYPUS* IN ITALY

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### Introduction

In Liguria (NW Italy) the Apennine Yellow-bellied toad, *Bombina variegata pachypus*, breeds in small temporary streams and in small standing natural and human-made water bodies. In recent years, Apennine Yellow-bellied toad populations are in decline at cause of habitat loss and of abandonment of traditional agricultural practices (Canessa et al. 2013). To reverse this trend, an integrated regional conservation project has been coordinated from 2011 to 2014 by the Parco di Montemarcello-Magra and the University of Genova.

### Material and Methods

The conservation project consisted of four integrated parts:

- 1) Monitoring: all breeding sites were monitored annually and the most relevant populations estimated by capture-mark-recapture. For three consecutive years (2011-2013) all the known populations have been screened for the pathogen *Batrachochytrium dendrobatidis* (*Bd*) by means of PCR assay.
- 2) Habitat management: nine traditional stone tanks were created, and four standing water bodies completely restored within the historical range of the toad. These new habitats were created in accordance with private landowners that use them for traditional irrigation and farming activities.
- 3) Restocking: a small breeding facility has been created and since 2011 froglets born in this structure are introduced in one of the newly-created tanks located within a SCI where the species was once present but went recently extinct.
- 4) Social awareness: booklets on amphibians as indicators of a sustainable and traditional agriculture were printed. In addition breeding facility and restored sites open to the public.

### Results and discussion

The results of the monitoring suggest that the remnant populations *Bombina v. pachypus* are demographically stable, but very small (i.e. about 100 and often only few dozens of adults) and therefore highly endangered. More than 350 swabs were analysed for *Bd* and all of them were negative. Almost all the new stone tanks were naturally colonised by breeding amphibian populations, and in three cases by *Bombina v. pachypus*. About 100 tadpoles were restocked in the newly-created site, where in 2014 the first breeding event occurred. The attitude of local people towards the project was generally positive, and the integrated experience of Liguria was successfully exported in another region of Central Italy. Therefore, the take away message of this small conservation project should be: in Mediterranean areas of Italy, many standing water bodies are human-made and used in traditional agriculture or farming and their maintenance has a positive impact on amphibians. This because when artificial tanks are correctly managed by farmers, a reduction of predation on amphibian larvae is observed. The newly-created water tanks were well accepted by local people because they contributed to increase the economy of rural activities. For these reasons, amphibian populations may be proposed as good indicators of sustainable traditions in Mediterranean rural areas.