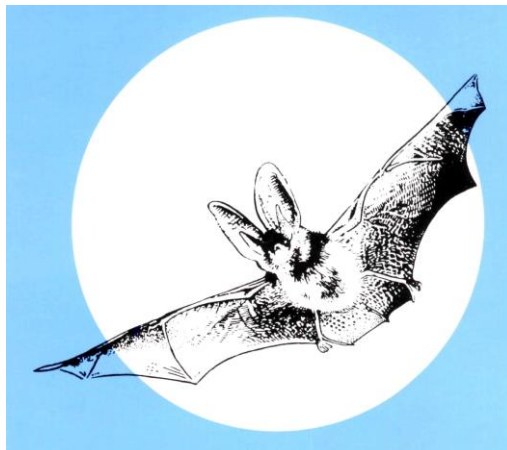


**The Rufford Maurice Laing Foundation**

**Bat population status survey in the Ukrainian Carpathians Mts. (Ukraine)**

**Final report**

**Bat Research and Protection Group**



**Lviv, 2007**

**Final report**

**Bat population status survey in the Ukrainian Carpathians Mts. (Ukraine)**

**RSG Reference Number: 03.06.05**

**Duration of the project realisation: 15 months (1.11.2005-31.01.2007).**

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## **Acknowledgement**

This project was a very successful for the bat Status Survey in the Eastern Carpathian Mts. We would like to thank The Rufford Maurice Laing Foundation, which has support this important investigations that enable us to survey for determination the population status and distribution of bats in the Eastern Carpathians. We sincerely thankful to Myhailo Levynets, Volodymyr Petriv and Lesia Monych (Uzhgorod adventure club "Lynx"), Vasyl Pokynchereda and Bogdan Godovanets (Carpathian Biosphere Reserve), Volodymyr Buchko (Galytsky NP), Ludvig Potish (Uzhgorod state university), Igor Chudiovich for the essential help in carrying out bat research.

Special thanks are due the many biologists, managers, and staff of parks, refuges and management areas that we surveyed. We thank a Galytsky NP, NP "Skolivski Beskydy", Carpathian NP, Uzhansky NP, NP "Synevir", and Carpathian Biosphere Reserve, Nature Reserve "Gorgany" etc. for their collective support.

## **Objectives of the project:**

- assessing and evaluation of the data concerning of bat species occurrence in the Ukrainian Carpathians;
- winter inspection of all known, but not yet investigated or investigated long time ago (at least 10 years) underground shelters in the Carpathians;
- summer investigations: localisation and number estimation of bat maternity colonies (especially in caves and buildings, especially churches) in the Ukrainian Carpathians;
- development of database on bat population in the Ukrainian Carpathians on the base of investigation results and literature data.

## **Study areas**

The areas covered by this project included all the territory of the Eastern Carpathians (in border of Ukraine). Especial attention was paid to the undergrounds of different origin, which were situated in the different parts of the investigated region.

## **Methods**

### **Winter**

Visual inspections of natural and artificial undergrounds (caves, mines, cellars military fortifications etc.), parts of buildings were the main methods of the bat field investigations during the winter period.

Besides our team member (6 pers.), the investigations were carried out together with the scientists of the Carpathian Biosphere Reserve and speleologists of the Adventure Club "Lynx" (city of Uzhgorod) on the south-western macroslope of the Carpathians and with scientists of the Carpathian, "Skolivski Beskydy" and Galytsky National Parks on the north-eastern one.

### **Summer**

The bats are a distinctive animal group, which, accordingly, demands special methods of research, especially in the summer.

Investigation of the species composition, spatial distribution, habitat preferences of bats was carried out mainly on transects in different biotope types in many sites of the region, taking account of biocoenotical and geomorphologic features of the territory.

A basic method for this research was inspection of territory with the help of the ultrasonic detector, using the methodical approaches submitted in "The UK's National Bat Monitoring Programme" (2001). The detector D-240x (Pettersson Elektronik AB, Sweden) was used for this research. Some species are not easily distinguished by their calls alone and require capture for certain identification. In this survey we used time-expanded full-spectrum audio analysis for acoustic bat identification because it provides the most acoustic information available from the recorded calls because it includes amplitude and harmonic components. Bat calls were acquired using devices that acquire calls at high digital sampling rates. We analyzed these time expanded calls using software that converts the audio signals to sonograms displaying time, frequency, and amplitude. We then compared unknown calls with known reference calls. The analysis of bat calls recorded was carried out with the program "BatSound". Ultrasound detector surveys were carried out at all visited places and conducted from May to October. Survey began approximately just after sunset on rainless nights.

The characteristic bat voices with their specific rhythm and sounding, and also size, form and length of ears, wing lengths, flight features and hunting were taken into account for the bat species identification also.

We used the method of bat netting by mist-net in potential foraging habitats or on the flight corridors. This method is very helpful especially for the identification of the species whose calls are rather difficult to fix with the detector (e.g., *Rhinolophidae*, *Plecotus auritus/austriacus*, *Myotis bechsteinii*), or for the sibling species (*Myotis myotis/blythii*, *Myotis mystacinus/brandtii* etc.). Inspection of buildings, tree hollow and cracks in the summer period were carried out with same purpose. Mist nets were typically placed across narrow roads or narrow rivers, in opening of wooded areas adjacent to waters etc. Nets were erected before sunset and attended constantly until 23.00-24.00 hr.

Several methods for catching bats were used during year. The main method was the use of twelve mist-nets and two harp traps which were used during July-September 2006. Mist nets were set in a variety of locations in both primary and old secondary forest and in disturbed agricultural sites. These sites were located in disturbed vegetation and often near human habitation.

Visual inspections of natural and artificial undergrounds, different parts of buildings were the methods of the bat field investigations too. We used effectively the endoscope for investigations of the tree hollows.

The definite presence of a species can also be confirmed from other signs. For example, the accumulation of butterflies' wings anywhere in an attic specifies a feeding perch of long-eared bats.

The size, form, structure of the excrements, together with biotope character, can also frequently assist in the bat species identification. For bats excrement frequently helps to determine the species or family.

The specimens captured by any of the above methods were identified to species and the right forearm length was measured; they were sexed, aged and released at the point of capture.

Newspaper article and radio interviews were generated in an attempt to gather information from the public. Leads regarding sightings, roosts etc. were investigated to verify the species of bat present. Confirmed occurrences of bats were compiled, including the exact location of the site, habitat, date and the kind and number of bats seen.

120 day of investigations were carried out in general by both project team and volunteers, namely speleologists, students and amateurs as well as staff of the Nature Reserves

## Results

Bats have very particular roost and foraging requirements, and they reproduce slowly, having a single birth per year. Unfortunately, this specialization has resulted in bat populations declines in many areas that have experienced disturbance. Because of these strict requirements, however, they serve as useful indicators of ecosystem health and management. In addition to abundance, bat species diversity is a positive indicator of overall system diversity and robustness. Bat populations can also indicate changes in the status of the vegetation communities because they forage on the insects that depend upon that vegetation. They can thus also serve as indicators of subtle hydrologic changes that impact vegetation communities.

This report has provided a complete inventory of bat species and data on the diversity of bats in the Eastern Carpathians. Data on bat distribution in the Eastern Carpathians is collected by Bat Research and Protection Group. The database on bat population in the Ukrainian Carpathians is developed on the base of investigation results and literature data.

The information about the bat distribution and roosts localisation in the Ukrainian Carpathians is collected. The summer distribution of bats is rather scattered throughout the region. From other side, the winter distribution is connected strictly with the underground hibernacula mainly, such as cave and mine systems (see map).

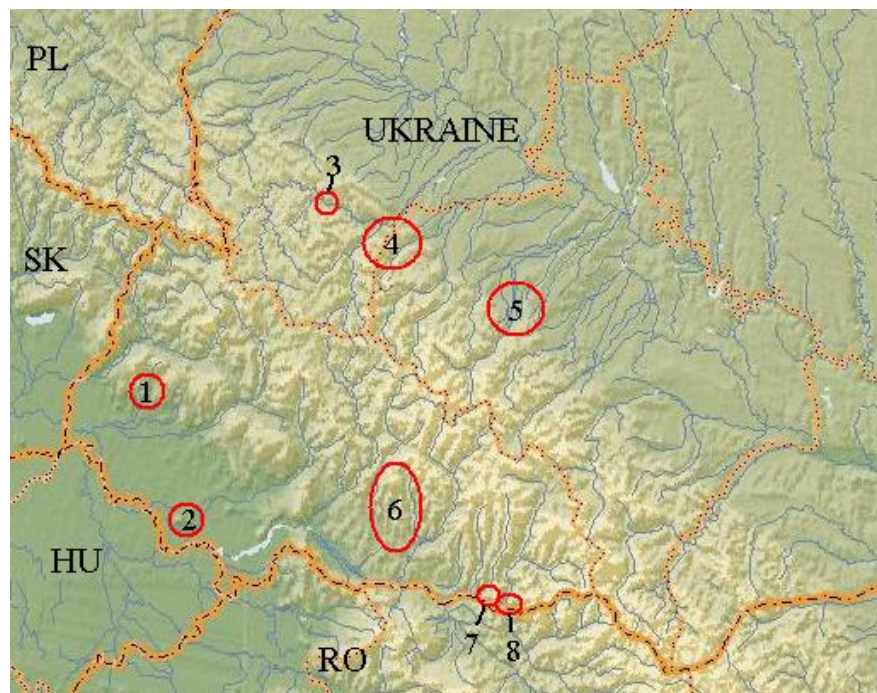


Fig. 1. The main bat hibernacula in the Eastern Carpathian area.

1. Mines near the village of Hlyboka;
2. Mines near the Berehove-town;
3. Urych rocks;
4. Kluch-range;
5. Limestone caves;
6. Ugolka massive;
7. Kuzij massive;
8. "Dovharunia" mine.

## Current Status

Twenty two of the bat species found in the Ukraine have been recorded in the Eastern Carpathians. One more species, Schreiber's bat, extinct from the territory of Eastern Carpathians. It was occurred in the Transcarpathian region up to 1994. Last records are dated 1993 years and origin from the underground shelters of the southern part of the Ukrainian Carpathians (Vargovich, 2000). However, taking into account the localization of the nearest to

Ukrainian border large Schreiber's bat colony (about 5000 individuals) at a distance of 70 km in south-western part of Hungary (Z. Bihari, in lett.), as well as the distance of the Schreiber's bat migrations, it is possible to expect its observations in the Transcarpathian region.

All are insectivorous, requiring well-structured and insect-rich habitats such as wetlands, natural forest edges, deciduous woodland and unimproved pasture in which to feed. Linear landscape features (hedgerows, tree lines, water courses, etc.) are thought to be particularly important to a number of species for travel between roosts and feeding areas. Bats need warm breeding sites in buildings and trees in summer, and cold, secure hibernation sites in winter.

The information about the bat species is described in the **species list**. The records showed at the maps are for the period of the last 15 years. Red circles – summer shelters, black circles – winter ones.

Not enough is known about the current status of most of bat species, although the available evidence suggests an overall decline in population levels of some species. For example, the Greater mouse-eared bat, Brown long-eared bat, Common Noctule bat although relatively abundant and widespread bats in the Eastern Carpathians are thought to have undergone a significant decline in numbers during the second half of 20th century.

Population levels of bats in the Eastern Carpathians inadequately known, but the level of information is increased significantly thankful to this project realisation. The status of each species in the Eastern Carpathians summarised below:

22 bat species were noted during the project realisation. 6 bat species are evaluated as the rare species, 4 – very rare, 6 – common, 2 – restricted, 2 – numerous, 2 – data deficient for status evaluation.

Table 1. Species composition and abundance noted in the Eastern Carpathian Mts.

Common name	Scientific name	Total number of shelters*	Part from occupied shelters, %	Part from investigated shelters, %	Status (UDRB*, IUCN)
Lesser horseshoe bat	<i>Rhinolophus hipposideros</i>	47	38,8	24,9	URDB, 2
Greater mouse-eared bat	<i>Myotis myotis</i>	39	32,2	20,7	
Daubenton's bat	<i>Myotis daubentonii</i>	32	26,5	17,0	
Brown long-eared bat	<i>Plecotus auritus</i>	28	23,1	14,8	
Greater horseshoe bat	<i>Rhinolophus ferrumequinum</i>	26	21,5	13,8	URDB, 2; LR: nt
Serotine bat	<i>Eptesicus serotinus</i>	24	19,8	12,7	
Common Noctule bat	<i>Nyctalus noctula</i>	22	18,2	11,7	
Nathusius' pipistrelle bat	<i>Pipistrellus nathusii</i>	15	13,4	8,0	
Common pipistrelle bat	<i>Pipistrellus pipistrellus</i>	15	13,4	8,0	
Barbastelle bat	<i>Barbastella barbastellus</i>	14	11,6	7,4	URDB, 3 VU
Natterer's bat	<i>Myotis nattereri</i>	14	11,6	7,4	URDB, 3
Lesser mouse-eared bat	<i>Myotis blythii</i>	13	10,7	6,9	LR: nt
Gray long-eared bat	<i>Plecotus austriacus</i>	12	9,9	6,4	
Bechstein's bat	<i>Myotis bechsteinii</i>	10	8,3	5,5	URDB, 3 VU
Geoffroy's bat	<i>Myotis emarginatus</i>	7	5,8	3,7	URDB, 3; VU
Parti-coloured bat	<i>Vespertilio murinus</i>	7	5,8	3,7	
Whiskered bat	<i>Myotis mystacinus</i>	7	5,8	3,7	
Northern bat	<i>Eptesicus nilssonii</i>	4	3,3	2,1	
Pond bat	<i>Myotis dasycneme</i>	1	0,8	0,5	
Brandt's bat	<i>Myotis brandtii</i>	1	0,8	0,5	
Soprano (Midge) pipistrelle bat	<i>Pipistrellus pygmaeus</i>	1	0,8	0,5	
Leisler's bat	<i>Nyctalus leisleri</i>	+	+	+	
Total:		121			

+ - the species was noted by the ultrasound detector only;

\*UDRB – Ukrainian Red Data Book.



## Winter period

According to the field work plan we monitored hibernation sites of the Eastern Carpathian area during the winter 2005-2006 and December 2006. So far we have received bat winter counts from 81 sites, both natural (such as caves and grottoes) and artificial (mines, tunnels, cellars etc.); the bats are noted in 62 of them. 36 undergrounds were inspected in the first time and 14 after 15-20-years interval. One complex of natural caves is unobserved due to the impossible to get it in winter condition.

Twenty two bat species occur in the territory of the Ukrainian Carpathians. During both winter periods 14 species of bats were noted (see column 1 of Table). The wintering of two more species (*Myotis brandtii*, *Vespertilio murinus*) are known from the literature sources.

There are two main underground complexes in the Eastern Carpathians, where the largest bat hibernacula are situated. One of them, the cave system in the southern part of Eastern Carpathians has mainly karst origin. The natural cave "Druzhba" which is situated in the Uholsky massive was a most rich for the bat number consisting more as 1020 individuals of 6 species. The second one is new discovered cave complex (6 species, about 70 sp.) in the north-eastern parts of the Eastern Carpathians (on the Kluch range near the village of Kamianka) pseudo-karst empties caused by tectonic processes.

Based on data received so far the Mouse-eared bats *Myotis Myotis/blythii*-complex were the most numerous bat species, which reached about 1470 inds. (68,9 % of all noted specimens). The Lesser Horseshoe bat *Rhinolophus hipposideros* was a most abundant bat species; it was found at 29 sites (47,5% of sites surveyed). The Greater Horseshoe bat *Rhinolophus ferrumequinum* was recorded at 18 sites (29,5% of sites surveyed), Barbastelle *Barbastella barbastellus* at 19 sites (31,2%), Common long-eared bat *Plecotus auritus* at 14 (23,0%), Daubenton's bat *Myotis daubentonii* at 8 sites (13,1%) and Bechstein's bat *Myotis bechsteinii* at 6 sites (9,8%) (see Table 2).

Table 2. Species composition and abundance noted in the undergrounds of the Eastern Carpathian Mts. during the winter season of 2005-2006 and December 2006.

Species	Total number of ind.	Portion, %	Portion of undergrounds, %*
<i>Myotis myotis/blythii</i>	1470	68,9	31,2 (19)
<i>Rhinolophus hipposideros</i>	312	14,6	47,5(29)
<i>Rhinolophus ferrumequinum</i>	95	4,5	29,5 (18)
<i>Barbastella barbastellus</i>	86	4,0	31,2 (19)
<i>Myotis daubentonii</i>	48	2,3	13,1 (8)
<i>Nyctalus noctula</i>	48	2,3	3,2 (2)
<i>Plecotus auritus</i>	39	1,8	23,0 (14)
<i>Myotis bechsteinii</i>	9	0,4	9,8 (6)
<i>Myotis emarginatus</i>	8	0,4	4,9 (3)
<i>Myotis nattereri</i>	8	0,4	4,9 (3)
<i>Myotis mystacinus</i>	6	0,3	4,9 (3)
<i>Eptesicus serotinus</i>	4	0,2	6,6 (4)
<i>Plecotus austriacus</i>	3	0,1	4,9 (3)
Total:	2136	100	

\* - quantity of undergrounds, which consisted the bat individuals or colonies.

## Summer period

Twenty two bat species occur in the territory of the Ukrainian Carpathians. During this summer period 20 species of bats were noted (see column 1 of Table 3).

Mist nets were set up at 48 different sites on 51 nights. Mist yielded 416 bats of 7 species in 254 net-hours. There were Lesser horseshoe bat, Greater mouse-eared bat, Daubenton's bat, Natterer's bat, Bechstein's bat, Whiskered bat, Brown long-eared bat, Common pipistrelle bat, Soprano (Midge) pipistrelle bat, Nathusius' pipistrelle bat, Common Noctule bat, Leisler's bat, Barbastelle bat, Northern bat.

36 churches and bell-towns were inspected in the region. Bats were found in 6 points only, however guano was noted in 18 points. 5 bat species were noted during this investigation. The Lesser mouse-eared bat (63,5 %) and Brown long-eared bat (28,3 %) were the most numerous species. Three more species (Lesser horseshoe bat, Serotine bat and Common Noctule bat) are noted singly.

On the words of local people, the bat colonies disappeared mainly after the churches roof reparations, which had happened during the last 10 years.

Table 3. Species composition and abundance of bat noted in shelters in the "warm" period of year in the Eastern Carpathian Mts.

Species	Total number of specimens*	Portion, %	Number of occupied shelters	% from investigated shelters
<i>Myotis Myotis</i>	486	24,9	20	22,8
<i>Rhinolophus hipposideros</i>	340	17,4	13	14,6
<i>Myotis blythii</i>	280	14,3	6	6,7
<i>Nyctalus noctyla</i>	218	11,2	18	20,2
<i>Eptesicus serotinus</i>	211	10,8	19	21,3
<i>Pipistrellus pipistrellus</i>	106	5,4	12	13,5
<i>Myotis daubentonii</i>	94	4,8	24	27,0
<i>Plecotus auritus</i>	82	4,2	9	10,1
<i>Pipistrellus nathusii</i>	56	2,9	14	15,7
<i>Rhinolophus ferrumequinum</i>	22	1,1	4	4,5
<i>Vespertilio murinus</i>	14	0,7	2	2,3
<i>Pipistrellus pygmaeus</i>	12	0,6	1	1,1
<i>Barbastella barbastellus</i>	8	0,4	1	1,1
<i>Myotis nattereri</i>	7	0,4	1	1,1
<i>Myotis bechsteinii</i>	6	0,3	3	9,0
<i>Myotis mystacinus</i>	4	0,2	8	3,4
<i>Eptesicus nilssonii</i>	3	0,2	3	9,0
<i>Myotis dasycneme</i>	2	0,1	1	3,4
<i>Plecotus austriacus</i>	2	0,1	1	1,1
<i>Nyctalus leisleri</i>	+	+	+	+
Total:	1953			

\* - number of specimens which are noted in the shelters.

## General remarks

Bats and their roosts are protected under a range of legislation, including the Red Data Book of Ukraine, the Bern Convention and the Bonn Convention, which includes an Agreement on the Conservation Of Bats in Europe. Anyone intending to carry out an operation which may affect bats or their roosts (outside the living area of a dwelling) is required by law to receive the permission from the State Department of Nature Protection.

In general 121 bat shelters were investigated. 74 underground shelters and 47 ground ones during the period of the project realisation.

Two new important for bats and not yet protected places (complexes of caves and grottoes) were discovered. Those places are evaluated as new key areas for the Ukrainian Carpathians bat populations:

- The cave system on the Kluch range (near the village of Kamianka). It is large hibernacula place of the Lesser Horseshoe bat and the Greater mouse-eared bat as well as some other bat species (Daubenton's bat, Bechstein's bat, Brown long-eared bat, Barbastelle bat; in general about 70 specimens). Substantiation for including of this area to the territory of the National Park "Skolivski Beskydy" is under preparation.
- The system of small limestone caves on the banks of Limnytsia river. It is the largest known in Ukraine maternity colony of the Lesser Horseshoe bat (more as 300 specimens). Substantiation for including of this area to the territory of the Galytsky National Park is prepared.

Database concerning the bat distribution and roosts localisation in the Ukrainian Carpathians Mts. is prepared on the base of our investigation results and literature data.

The general Action Plan for the conservation of bat species in the Ukrainian Carpathians is under development on the base of created database and it will be given for the Ukrainian Ministry of Ecology and Natural Recourses and existing local nature protection institutions. It would be proposed to enhance, where necessary, roosting sites (including hibernation sites) and important feeding habitats (particularly around maternity roosts) - with the aim of increasing bat population levels within the Carpathians.

The local and regional radios were used for the raising of public awareness on human disturbance of bats in roosts. We organised three radio programmes (15, 15 and 20 min.) about bats, its necessity of conservation and their role in ecosystems and for the people. Especially it was concerning the house-dwelling and cave-dwelling bat species. It was one more source of information obtaining about the range of new bat shelters, first of all very important bat hibernacula in the cave system near the village of Kamianka (Skole distr.).

The necessity of including of some bat species (Greater mouse-eared bat, Lesser mouse-eared bat, Whiskered bat, Brand's bat, Parti-coloured bat, Northern bat, Soprano (Midge) pipistrelle bat and Nathusius' pipistrelle bat) to the new edition of Red Data Book of Ukraine was confirmed on the results of our investigations.

The article concerning the current population status and distribution of bats in the Eastern Carpathians is under preparation. It was noted in the article that the investigations were carried out thank to the Rufford Maurice Laing Foundation which has support this important investigations.

## Financial report

All the costs were used according to the budget plan. All the supporting documents are available (excluding the costs of batteries which were bought in the market and some expenses for the small local travel and some costs of meal.

All declared office and field equipment was bought and used very effectively. It help us very successful realized our tasks and objectives.

	<b>Amount requested</b>	<b>Amount spent</b>
Office costs	135	135
Travel & subsistence	2466	2461
Equipment & consumables	2386	2391
<b>Total</b>	<b>4987</b>	<b>4987</b>

Budget report, in £ sterling

<b>Item</b>	<b>Amount requested</b>	<b>Amount spent</b>
Internet (15 months x 5 £)	75	75
Stationary	60	60
<b>Office equipment</b>		
Computer PC	625	629
Cartridge for printer	29	24
Modem	28	28
<b>Total office equipments:</b>	<b>682</b>	<b>681</b>
<b>Field equipment</b>		
Mist-nets (12 ex.)	300	300
Digital camera, Olympus E-300 Kit	420	426
Photo processing	30	30
GPS Map 76S, Garmin	320	320
Endoscopes PV-300	255	255
Electric torch (2 ex.)	48	44
Batteries (6 ex., recharger)	31	31
Head torch Petzl Zoom Zora (2 ex.)	90	90
Rucksack	80	84
Special speleological equipment (2 ex.)	130	130
<b>Total field equipments:</b>	<b>1704</b>	<b>1710</b>
<b>Travel:</b>		
Travel for investigations	420	415
Subsistence (62 days @ 3 pers. @ 11 £/day)	2046	2046
<b>Total travel costs required:</b>	<b>2466</b>	<b>2461</b>
<b>Total</b>	<b>4987</b>	<b>4987</b>