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“Study of biodiversity and development of nature reserve management”
Biological research institute of Kharkov National University &
National Nature Park “Gomolshanski lessy”**

The report

***Nyctalus lasiopterus* in Ukraine: inventory of current status, proposals
to revise the species status in IUCN Red List
and conservation**

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Location of fieldwork: the North and the East of Ukraine (Kiev and Kharkov cites), the South of Ukraine and the Crimea peninsula.

Duration of the project: fourteen months (August 2010 – October 2011).

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Summary:

Our project was targeted to estimation of current status of Greater Noctule (*Nyctalus lasiopterus*, Schreber, 1780) in Ukraine. Greater Noctule is the biggest and the least known forest-dwelling European bat. The project was realized from August 2010 to October 2011. In late spring and mid summer we observed the North points (breeding part of the species range), and in late summer and autumn we observed the South points (transit in migration time part of the species range). Two points on the North of Ukraine and five on the South and the Crimea were selected for inventory. There were points where more than one Greater Noctule was found from year to year. Two oak forests in Kiev and Kharkov cities were observed in May-June 2011 (the North points). 450 bats of 8 species were caught, 8 bat-tree-roosts were found. There was no Greater Noctule there. The other point (record of Greater Noctule in 2009), in Chernobyl exclusion zone was fundamentally observed in July 2010 (434 individuals of 7 bats species were caught). There was no Greater Noctule there also. On the South points and in the Crimea 170 individuals of 14 bats species were caught, Greater Noctule was not found also. 5, 5 hours of records of bat sounds were done by Time expansion Tranquility transect bat detector. The records were analyzed in software BatSound no records of Greater Noctule were done.

We confirm the working hypothesis of our project that the Greater Noctule is in critical state, the breeding range has been decreased in Ukraine and the species need in more high IUCN status than it has now.

We propose three hypotheses of the reason of the species population declining in Ukraine: 1) Low number and outskirts of the species range – the Eastern Europe was the periphery of Greater Noctule and it declines in this area at first; 2) Slow population growth and loss during migration – there was no exact data about number of offspring's if Greater Noctule, population loss during migration on 1,500 & 2000 km could be more that annual population growth; 3) Extinction debt – oak forests were converted by human activity irretrievable (for Greater Noctule) in the beginning of the XX century yet, and records of Greater Noctule in 1930-50 were the remainder of breeding populations.

We think that results of the project and literature review should be appended for such IUCN Red List Criteria in a threatened category (CE, E or V): **B Geographic range – could be classifying as B2.a number of locations (breeding centers) ≤ 10 (Vulnerable) of yet ≤ 5 (Endangered).** **C Population size – the total number of mature individuals could be classifying as $\leq 10,000$ (Vulnerable) of yet $\leq 2,500$ (Endangered), and by C2 (a i) number of mature individuals in each subpopulation in fact less than 1,000 (Vulnerable).** The prognosis for future of the species is unpromising also: 1) the forest habitats are destroyed irretrievable; 2) it is impossible (or very difficult) to raise the species in zoos; 3) great breeding population centers (that could be centers of future re-colonization) are unknown.

We are designing next future steps of research and inventory of the species status: 1) deep study of roost ecology of Greater Noctule in Russia (Samara bend breeding center) with radio telemetry; 2) inventing the species existence in big forest massive in Russia; 3) monitoring by mist-netting will be continued on finding migration point in Ukraine; 4) aligned international collaboration between teams from different countries for research experience change and testing some hypotheses in field; 5) genetic research of Greater Noctule.

Acknowledgement

The project team expresses great thanks to Rufford Small Grants for Nature Conservation Programme, giving us this unique chance to realize our ideas and work in field. We also accord a great thank three referees: Dr. Mateusz Ciechanowski, Dr. Suren Gazaryan and Sergey Shaparenko who credits to our idea in the preliminary step of the project. We thank to our colleagues and friends from Kiev Dr. Lena Godlevska, Dr. Volodymyr Tyshchenko, Dr. Olexander Tsvelykh who worked with us in wonderful Goloseevo forest. We thanks to Dr. Z. Selunina (Chernomorsky Biosphere Reserve) and Viktor Busel (National Nature Park “Velikiy Lug”) for help in organization of research on the territory of this protection areas. We thank to Dr. Sergij Gashchak for help and consultation with BatSound software. Also we great thank to researchers from others countries Dr. Peter Estok, Dr. Anthony M. Hutson, Dr. Dmitry Smirnov, Dr. Ana Popa-Lisseanu for consultation and helping with literature. The particular thanks to Dr. Yuliia Kuznetsova for field assistance and comments to the draft of the report.

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Introduction

Our project was targeted to inventory of one of the rarest and the biggest European bat species: Greater Noctule (*Nyctalus lasiopterus*). The single records of this species are known for territory of the most European country (Dietz et al., 2009; Hutson et al., 2008) and only in the Mediterranean area it occurs frequently (Ibanez et al., 2004). Ecology of Greater Noctule is poor studied especially in the NE part of the species range.

Since 1999 I have been studying bats in the National Nature Park “Gomolshankie lessy” (big oak forest in Kharkov region, NE Ukraine) and have never caught Greater Noctule both by mistnets and from tree roosts (Vlaschenko, 2005; Vlaschenko, Gukasova, 2009a). Nevertheless naturalists of the beginning of XX century caught this species time after time (Migulin, 1915; Lisetsky Kunichenko, 1952; Vlaschenko et al., 2010). The two others species of genus *Nyctalus* (*Nyctalus leisleri* and *Nyctalus noctula*) exist successfully in the NNP “Gomolshankie lessy”. We have lost only one bat species of the local fauna - Greater Noctule for 50 years. The question was stated 2005: “What happened with Greater Noctule, why did it disappear?” Fortune helped us to start Greater Noctule status inventory in all Ukrainian scale: 29–30.07.2009 in Chernobyl Exclusion Zone a young male of Greater Noctule was caught by our team. It was the first record of this species in Ukraine after more than 50 years. In summer 2010 the project “*Nyctalus lasiopterus* in Ukraine: inventory of current status...” was supported by Rufford Small Grants for Nature Conservation and we started realization our ambition plans!

Background for this activity was inventory of all records of Greater Noctule in Ukraine (Vlaschenko et al., 2010). We have analyzed all available data (since 1898 till now) of this species in Ukraine. With our finding in 2009, the number of Ukrainian records (1898-2009) reached to 35 in 19 localities (64 specimens). These records can be divided on two groups: the northern (the breeding part of Greater Noctule’s range) and the southern ones, in the area where species occurs during seasonal migrations.

We separated two points for inventory in the North of Ukraine where more than one record of Greater Noctule was done. We planned also deep study of bat assemblage in the part of Chernobyl Exclusion Zone where we caught this species in 2009. But that location was inventoried during activity on the other Rufford’s project (http://www.ruffordsmallgrants.org/rsg/projects/sergey_gashchak) in July 2010. Three points in the South of Ukraine were separated by the same principle (more than one record of Greater Noctule by year to year). Instead the point in Chernobyl Exclusion Zone we chosen another point in the South of Ukraine cryptic location – Kuchugury islands in the National Nature Park “Velikiy Lug”. These islands are located in the big impoundment Kakhovka Dam Lake on the place of old bottom-land of the Dnepr River. It was known that islands on the Dnepr river were stop point place of migration bats (Abelentsev et al., 1956), and that bat migration direct goes along the Dnepr river (Poluda, Zagorodniuk, 2001).

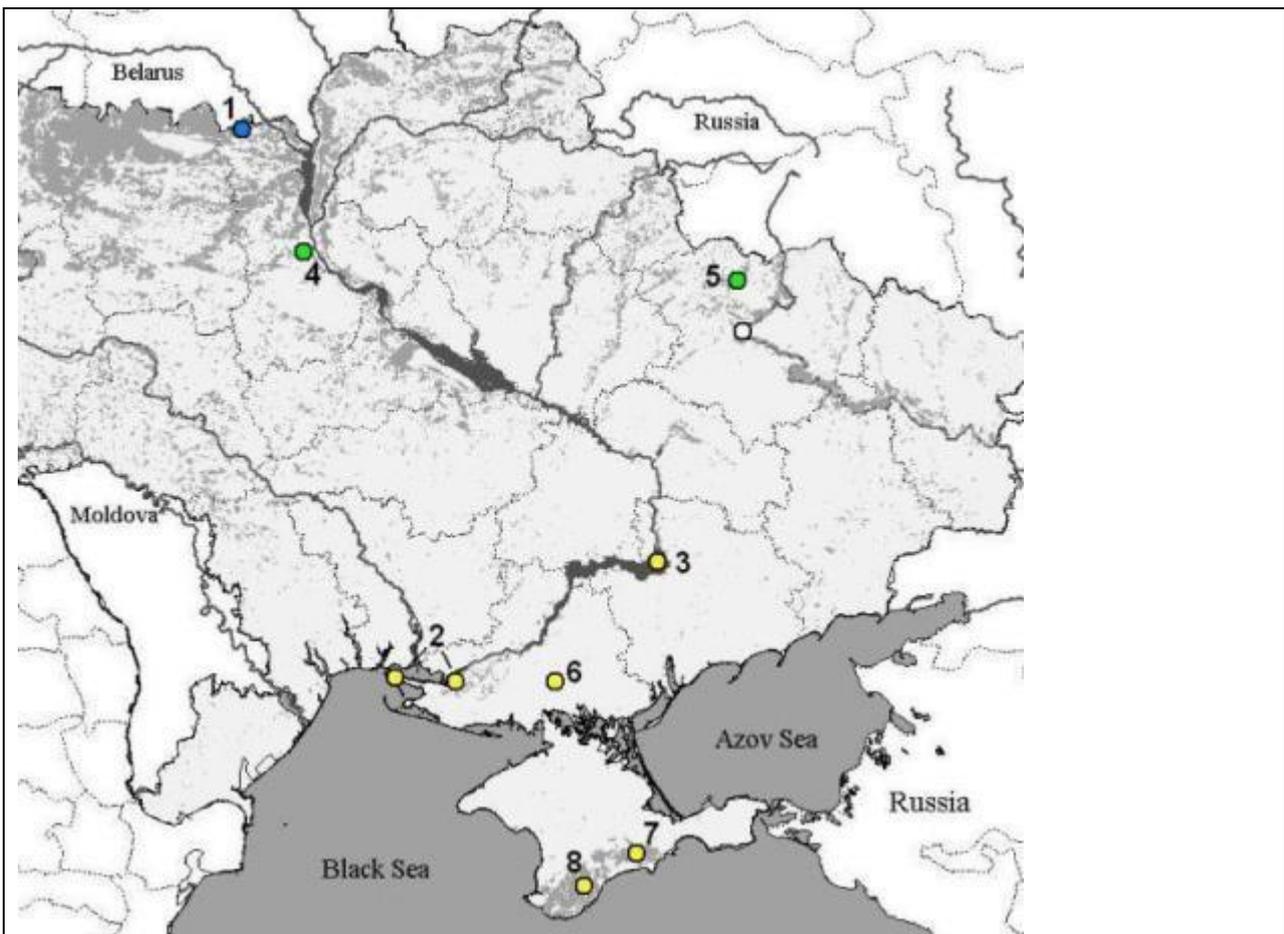
Study points and methodology

The distribution of inventory points on territory of Ukraine is presented in the Map 1. Detailed description of activity is presented below.

Our project activity has taken 14 months (15 August 2010 to October 2011). We started our research activity in August 2010 and used limited reserve of our money. We got money in hand from Rufford Small Grants for Nature Conservation only in November 2010 and two months (September and October 2010) were lost for field research.

Mist-netting was the main method. In current papers (Uhrin et al., 2006; Estok, Gombkoto, 2007) mist-netting was shown as the most effective method to find out Greater Noctule. We used it fully in Kiev and Kharkov forests (map. 1, points 4&5) and a few in the South (map. 1, points 3&7). On those localities where we had not possibility to catch bats we used Time expansion bat detector (Tranquility transect) with digital recorder (Zoom H2) for recording of bat sound. Records were analyzes in software BatSound, version 4.1.

We planned in application to catch as minimum 200-300 bats on each locality. Mist-nets were installed for all night long, each night we tried to erect 2-4 mist-nets on the different distances. In forest areas we also searched colonies in tree-hollows. All roosting trees were described using various parameters. All caught bats were described (species, sex, age, reproductive state, morphometry), ringed and released back.



Map 1. Points of inventory work.

Blue dot – point in Chernobyl Zone current record of GN in 2009 new records were not done.

Green dots – points in the North of Ukraine, oak forests near Kiev (4) and Kharkov (5) cities.

White dot – National Nature Park “Gomolshankie lessy” where GN indeed disappears.

Yellow dots – points in the South part of Ukraine and the Crimean Peninsula.

Run of the project

Point 1 – location (bridge on the Ilya River) where Greater Noctule was caught by us in July 2009 (Vlaschenko et al., 2010). In July 2010 under realization of the other Rufford’s project (“Fauna of bats as an indicator of the most valuable natural complexes in Chernobyl exclusion zone worthy of legislative protection”) we conducted valid research work of the local bat assemblage. We mist-netted 434 bats by 7 species but not any Greater Noctule. See also report by this project by Dr. S. Gashchak: http://www.ruffordsmallgrants.org/rsg/projects/sergey_gashchak. We were very

disappointed because of we tried to find breeding population of this species in 2009. By this reason in July 2009 we caught an immature male of Greater Noctule

Point 2 – Chernomorsky Biosphere Reserve: Hola Prystan town and “Volyzhin less” plot. In 1935-37 one colony of Greater Noctule and 3 individuals were recorded in Hola Prystan town (Vlaschenko et al., 2010). The records were done from the end of August till October. “Volyzhin less” Chernomorsky Biosphere Reserve plot was noted by Abelentsev (1980) like location with every year mass bat migration especially by genus *Nyctalus*.

We visited this area twice in August 2010 (22-31.08.2010) and for some days in October 2011. Hola Prystan town is located on the bank of the Dnepr river estuary (pic. 1). The main office of Chernomorsky Biosphere Reserve is located in the town, where we lived. In past zoologist noted increase of bat number in period of autumn migration (Abelentsev et al., 1956) in this town. Up to one thousand of Noctule Bat was recorded in the attic of Hola Prystan local church (Zubko, 1937). Our main method in the town was bat acoustic observation (Pettersson D100 and D200 bat detectors) on the bank of the Dnepr River and on streets at sunset and sunrise time. We registered very low bat activity in the town. The more common species was Pipistrellus (probable *Pipistrellus kuhlii*). We spent some nights for searching and found only one mating roost (pic. 2) of Noctule Bat (one male was successfully caught, measured and released at the same night). It was very extreme catching because of the roosting tree located on the central street of the town and it was Ukrainian Independent Day, and a lot of drank young people kept festival there. We inspected the local church also, but the bat activity was low, and we fixed only resident species. We found roosts of colony of *P. kuhlii* in a building and a colony of unidentified species in tree hollow.



Picture 1. Decorative ship on the bank of the Dnepr river in Hola Prystan town. Sunset and beginning of bat census.

Photo by Kseniia Kravchenko.



Picture 2. Anton Vlaschenko caught male of Noctule Bat from mating hollow. The tree on the central street of Hola Prystan town.

Photo by Kseniia Kravchenko.



Picture 3. The salt lake inside Hola Prystan town, place of hunting of some Pipistrelle.

Photo by Kseniia Kravchenko.

The second key point in Chernomorsky Biosphere Reserve was “Volyzhin less” plot where we went after Hola Prystan town. The plot is not big (2000 ha) area of natural steppe, free-saline lake and old oak forest (pic. 5) on the bank of the Dnepr river delta (11 km from the seaside of the Black Sea). The main method of bat identification was acoustic observation (Pettersson D100 and D200 bat detectors) and search of tree hollows (pic. 7-8). We identified only resident species (*Eptesicus serotinus* and *P. kuhlii*) that lived in the buildings of cordon (forestry). The local ranger of the plot said us that in 1970-80 there were big number of artificial bird-boxes and bats used them in migration time. Now the most of these bird-boxes are destroyed (pic. 9) for this time and bats ceased to stop in “Volyzhin less” plot.



Picture 4. Dr. Z. Selunina teriologists of Chernomorsky Biosphere Reserve.
Photo by Anton Vlaschenko



Picture 5. Kseniia Kravchenko on the bank of lake in “Volyzhin less” plot. There is old oak forest of the opposite bank of lake.
Photo by Anton Vlaschenko



Picture 6. The edge of oak forest in “Volyzhin less” plot. Hunting habitat of *E. serotinus* and *P. kuhlii*.
Photo by Anton Vlaschenko



Picture 7. Anton Vlaschenko observed old alder forest plot.
Photo by Kseniia Kravchenko.

We did not register any indicator of bat migration in “Volyzhin less” plot. It was very strange for us and we hypothesized that bat migration in this area should be later.

In 2011 we visited the Hola Prystan town and surroundings again in the beginning of October for some days. It was relatively cold and we didn’t fix any migration bats again.



Picture 8. Anton Vlaschenko on the 300-years-old oak tree in the “Volyzhin less” plot.
Photo by Kseniia Kravchenko.



Picture 9. Reminders of artificial bird-boxes in forest of “Volyzhin less” plot.
Photo by Kseniia Kravchenko.

Point 3 – Kuchugury islands (47°33' N, 35 °12' E) in the National Nature Park “Velikiy Lug”. We chose this location as control point in migration part of range and hypothesized that it should be favorable plot for study the change in bat assemblage from month to month.

Our first visit was in August 2010 (16-22 of August). We stayed for one day on the bank and planned to visit the island for one day. But after our alighting the storm began and we waited for good weather for four days. In spite of strong wind we caught two adult males of *N. noctula* and *P. nathusii*. Still air keeps at inland lakes (pic. 12) of the islands in periods of strong winds and storms on the Kakhovka Dam Lake.



Picture 10. Anton Vlaschenko and Viktor Busel (chief of department of science of NNP “Velikiy Lug”) before shipping.
Photo by Kseniia Kravchenko.



Picture 11. The Kuchugury islands are closed!
Photo by Anton Vlaschenko



Picture 12. Habitats of the islands: a lot of bays and lake inside archipelago with sand-drifts and some trees.

Photo by Anton Vlaschenko



Picture 13. There are some plots of old poplars and white willows at the Kuchugury islands.

Photo by Anton Vlaschenko

We decided that two adult males of migratory species were fine mark, and may be later in the end of August and in September the migration could be at the archipelago.

We returned to the Kuchugury islands with big team (pic. 14) in September 2011 (17-26.09.2011). We got better equipment Time expansion bat detector, rubber boat and some others.



Picture 14. Shipping in September 2011. Left to right Viktor Busel, Egor Yatsuk & Irina Morozova (Scientific associates of Interdepartmental research laboratory), Andriy Plyga & Bogdan Fesianov (Students-biologists of Kiev National University).

Photo by Anton Vlaschenko



Picture 15. Raccoon dog – aboriginal of the Kuchugury islands.

Photo by Anton Vlaschenko

The Kuchugury islands got protection state since flowage of the Kakhovka Dam Lake (more than 50 years). It is the part of National Park for the last 7 years (pic. 15). There weren't any human activity, only hunting for wetland birds. There is only one little house of fishers at the distant North island of the archipelago. (The fishers told us about some bats in the house in 2010).

In expedition of 2011 we set mist-nets in different part of the archipelago and also recorded bats sounds. But we got only one successful catching near the fisher's house. The most part of mist-netted bats were resident species (table 1), which used houses for roosting (*P. kuhlii* & *E. serotinus*). In detector we recorded some *N. noctula* and the most sounds of *P. nathusii/kuhlii*. We were very disappointed of such results: no bat migration, not a trace of Greater Noctule.

Only one interesting fact claimed our attention. Our team members shook out tent and frightened away some bats from a ventilation gap. These bats could be migrators that took rest in the tent.

Table 1 - Results of bat mistnetting at the Kuchugury islands August 2010 & September 2011

Species	Number of individuals	Reproductive females	Adult males	Immature specimens
<i>M. aurascens</i>	1	-	+	-
<i>N. noctula</i>	1	-	+	-
<i>E. serotinus</i>	2	+	-	+
<i>P. nathusii</i>	4	-	+	-
<i>P. kuhlii</i>	13	+	-	+

Our results suggested the Kuchugury islands were not a stop-point place of bats in migration time and there was an allusion on Greater Noctule.

Point 4 – Kiev city, “Goloseevo forest” National Nature Park “Goloseevskiy”.

It was one of the most successful expeditions in our project (09-20 June 2011). We worked with zoologists from Kiev (pic. 17), and express great thanks for that wonderful collaboration. We caught 204 individuals of 8 bat species (table 2) for the short period of time (the paper about the results is in work now).



Picture 16. Near 300 years-old oaks in “Goloseevo forest”, roosting tree of nursery colony of *P. pygmaeus* and *P. nathusii*.
Photo by Anton Vlaschenko



Picture 17. Near the harp-trap Dr. Lena Godlevska and Dr. O. Tsvelykh take out the Pipistrelle Bats.
Photo by Anton Vlaschenko



Picture 18. The most abundant bat species of “Goloseevo forest” – *P. pygmaeus*.
Photo by Lena Godlevskaya



Picture 19. *Plecotus auritus* – common species in “Goloseevo forest”.
Photo by Lena Godlevskaya

The “Goloseevo forest” is located within the limits of the Kiev city, and we were very surprised to see very old oaks, hornbeams and lime-trees more than 300 years old (pic. 16).

The main method in the Forest was mistnetting, also we searched tree roosts and recorded bat sounds by Time expansion bat detector (Pettesson D240, equipment by Lena Godlevskaya). We found three roosting trees: oaks (DBH: 90, 95 and 47 cm). Two of them were dead trees with nursery colony of Pipistrelle bats in crevices of trunks. The other one was old woodpecker hollow with nursery colony of Noctule bat.



Picture 20. Early morning on a street of Kiev, our team waited for taxi after all-night catching. (Left to right: Alona Gukasova, Kseniia Kravchenko, Anton Vlaschenko, Maryia Sudakova).

Photo by Lena Godlevskaya

The results of bat catching are presented in the Table 2. We can confirm that Greater Noctule does not inhabit the “Goloseevo forest” in summer time.

Table 2 - Results of bat catching in “Goloseevo forest” (Kiev city) 09-20 June 2011

Species	Mist-netted	From tree roosts
<i>M. daubentonii</i>	21	-
<i>N. noctula</i>	7	11
<i>N. leisleri</i>	6	-
<i>E. serotinus</i>	5	-
<i>P. pygmaeus</i>	37	36
<i>P. nathusii</i>	6	66
<i>P. kuhlii</i>	2	-
<i>Pl. auritus</i>	7	-

Greater Noctule was caught in the vicinity of Kiev not only in the “Goloseevo forest” (Abelentsev et al., 1956; Vlaschenko et al., 2010). There were some records in other forests. We hypothesised that zoologists of 1930-1940 found Greater Noctule casually. They had not current bat-research equipment (mistnets, ultrasound detectors, tree climbing systems etc.), and they visited a forest for finding of a tree-bat-roost and some of bats from this roost were Greater Noctules, or they shot some flying bats. Our special bat research gave us result considered the most reliable for current time.

“Goloseevo forest” and Kharkov Lesopark (the next point) are located within the limits of Kiev and Kharkov cities. Nevertheless bats had not been studied there for more than 50 years. Our activity renewed this direct of research.

Point 5 – Kharkov city, Kharkov Lesopark (Woodland Park or Lissopark). It is not big oak forest (2000ha) in Kharkov city. Such location of Lesopark in our native city provided the most bat-education activity just there (pic. 21).

We worked in Lesopark in May (01-19.05.), in June (04-05 & 21-23.06.) and in August (27-28.08.) 2011. The most part of field work was conducted in May, since on the first of May we visited the forest by night and as from the 10th of May we founded field camp in deep central part of the forest (pic. 23-24). 35 persons passed through our standing field camp, they were: high school pupils from two circlets of young naturalist (Kharkov Zoo & Biological faculty of Kharkov National University (pic. 28), undergraduate and postgraduate students of Kharkov National University (pic. 24, 27), some students of others Kharkov universities, people from NGOs of Kharkov (Green Front). We also needed in some security, because the Lesopark is the resort for picnics for townspeople. Noisy and drank parties travel in the forest time to time.



Picture 21. Field lessons about bats in Lesopark with ecological activists from NGO “Green Front” and some students (not biologists).

Photo by Maryia Sudakova



Picture 22. *P. pygmaeus* – was demonstrated as the smallest bat species of Kharkov region.

Photo by Anton Vlaschenko



Picture 23. Our standing field camp in Lesopark (beginning).

Photo by Maryia Sudakova



Picture 24. Our standing field camp in Lesopark (current). Left to right on the further timber: Maryia Sudakova, Anton Savchenko, Kseniia Kravchenko, Alona Gukasova; back to us Eugene Nagorny.

Photo by Anton Vlaschenko

Unfortunately our scientific results in Lesopark in May were not such high like educational ones. We had big number of people who could work with bats professionally, and we worked hardly: set up 2 or 3 mist-nets, in sunrise time combed the forest with bat detectors (searching for roosts), recorded bat sounds in sunset time etc. During 19 days of May we caught only 19 bats of 5 species

and did not find any roosts (table 3). We got 15 mist-netting-nights and only 19 bats it was almost one bat per one night in one mist-net. We were in shock!



Picture 25. Anton Vlaschenko & Alona Gukasova set up a mist-net on the forest edge. Photo by Maryia Sudakova



Picture 26. Alona Gukasova recorded bat sounds by Time expansion bat detector. Photo by Anton Vlaschenko



Picture 27. The night near a mist-net. Left to right: Anton Yermolenko, Maryia Uzhitchak, Kiril Poprygun and Maryia Sudakova. Photo by Anton Vlaschenko



Picture 28. The night near a mist-net. Two asleep bodies on the front - young naturalists from circlet of Kharkov Zoo; in deep, Elena Hudyakova – theirs teacher. Photo by Anton Vlaschenko

The situation changed the better in June when 5 roosting trees of *N. noctula* were found (pic. 29-32). There were oaks with DBH 38-42 cm. We tried to inspect all of these colonies because of single Greater Noctules were found in colonies of Noctule bats (Vlaschenko et al., 2010) in 1930th in the forest.

The main surprise with bats in Lesopark was in August. Kseniia Kravchenko and volunteers caught using mist-nets more than 200 bats in the same place, where we caught one-two bats in May. It was very important record of mass bat migration.

Table 3 - Results of bat catching in Kharkov city Lesopark (May, June & August 2011)

Species	Mistnetted May-June	From tree roosts June	Mistnetted 27-28.08.2011
<i>M. daubentonii</i>	13	-	-
<i>N. noctula</i>	1	25	201
<i>E. serotinus</i>	3	-	-
<i>P. pygmaeus</i>	1	-	1
<i>P. nathusii</i>	3	-	-

<i>Pl. auritus</i>	1	-	-
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Picture 29. Egor Yatsuk helped us to climb bat-tree-roost.

Photo by Anton Vlaschenko



Picture 30. Nursery colony of *N. noctula* in old woodpecker hollow in oak.

Photo by Anton Vlaschenko



Picture 31. Anton Vlaschenko made a photo of hollow with colony of Noctule bats. The camera was bought by the project.

Photo by Egor Yatsuk



Picture 32. Adult female of *N. noctula*.

Photo by Egor Yatsuk

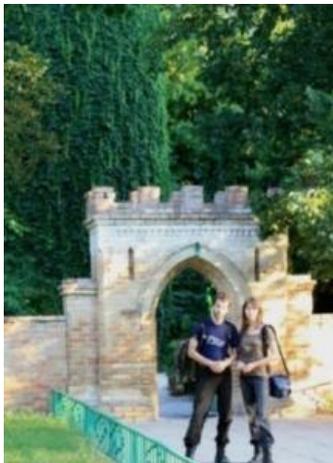
We did not find Greater Noctule again. But our record of increased of bat number in August is very interesting and important. The bats mist-netted in Lesopark in August were born in another areas, maybe in the North (from Russia). The latest record of Greater Noctule in Kharkov Lesopark was done on 24 September (1936). We hypothesized there is a little chance to catch Greater Noctule within inter-migration-groups of Noctule bat. The mist-netting of bats during migration time in Lesopark will be continued.

Point 6 Askania-Nova Biosphere Reserve.

We got some problems with administration of this Reserve. Long-term parley did not get positive results for us. We had not the permission to handle bats in the area of the Reserve. We visited the Ackania-Nova Reserve incognita (pic. 33) and recorded bat sounds by Time expansion bat detector and in dendropark (arboretum) inspected old trees (without climbing), and counted bats departure from hollows in the evening also. We visited the Reserve twice in August (17-19.08.) and in October (01-03.10). In the first and in the second visit we recorded a lot of bats and relatively increase in number to October. In August we record sound very similar to Greater Noctule

ultrasound noise. We sent the file to Peter Estok (Hungary), but he disproved rating the sound to Greater Noctule. The other recorded sounds were made by Noctules and Pipistrellies.

Yet we were very surprised to record the mass migration in the dendropark of Askania-Nova Reserve. It is known bat stop-point since the end of 1920th. There are no any new data about migration of bats there.



Picture 33. Anton Vlaschenko & Kseniia Kravchenko near the entrance to dendropark of Askania Nova Reserve.
Photo by Stanislav Viter



Picture 34. Anton Vlaschenko near very old tree in dendropark of Askania Nova Reserve. Bats use hollows in such tree for roosting in migration time.
Photo by Photo by Stanislav Viter



Picture 35. The artificial pond in dendropark of Askania Nova Reserve. We recorded very similar to Greater Noctule sound there.
Photo by Anton Vlaschenko

We hope that we will get the permission for mistnetting bats in Askania-Nova and continue this important research.

Point 7 Eastern Crimean Mountains (Belogorsk district)

We had the similar situation with the Crimean Natural Reserve like Askania-Nova Reserve. We had long-term talks with administration of this Reserve. But the problem was otherwise. The Reserve is subordinated to Administration of President of Ukraine and time to time people from Ukrainian government visited this territory. The July and August is hot time in the Reserve and ingress is denied. On this reason we tested other locality in the Crimean Mountains (with the same habitat – old beech forest Kurasu stream 44°55'N, 34°41'E). We pass a range of the Crimean Mountains on 20-29 of August 2011 (pic. 34-39).



Picture 36. Vicinity of Belogorsk town. The Crimean Mountains from the North side.
Photo by Stanislav Viter



Picture 37. Went in the Crimean Mountains. Left to right: Anton Vlaschenko, Alexander Klochko and Alona Gukasova.
Photo by Stanislav Viter



Picture 38. Alona Gukasova on the top of a mount in the Crimean Mountains.
Photo by Stanislav Viter



Picture 39. The Kurasu stream our – mistnetting place.
Photo by Stanislav Viter

We did some captures (mist-netting nights) in foothills but we targeted to get Kurasu stream in the old beech mountain forest. At the same time when Kseniia Kravchenko mist-netted bats in Kharkov Lesopark the other part of our team mist-netted bats at the Kurasu stream (pic. 40; table 3).



Picture 40. Greater Horseshoe Bat in our mistnet instead of Greater Noctule, at the Kurasu stream.
Photo by Stanislav Viter

We have caught near 150 individuals of 12 species (table 3). The most abundant species were Leisler's bat and Noctule bat. We hypothesised that “we caught real bat migration!” We will need some more expedition to confirm this hypothesis. The other idea if this is point of migration of two others species of genus *Nyctalus*, the third one – Greater Noctule could be also caught there also.

Table 3 - Results of bat catching in the Crimean Mountains (join data from foothills and beech forest) August 2011

Species	Number of individuals	Adult females	Adult males	Immature specimens
<i>Rh. ferrumequinum</i>	1	-	-	+
<i>M. aurascens</i>	1	-	+	-
<i>M. brandtii</i>	1	+	-	-
<i>M. nattereri</i>	1	+	-	-
<i>M. emarginatus</i>	1	+	-	-
<i>N. noctula</i>	50	+	+	+
<i>N. leisleri</i>	79	+	+	+
<i>P. pipistrellus</i>	3	+	+	-
<i>P. nathusii</i>	1	+	-	-
<i>B. barbastellus</i>	3	+	-	+
<i>V. murinus</i>	2	-	+	-
<i>Pl. auritus</i>	5	+	+	-

Point 8 Crimean Natural Reserve

We visited the Crimean Natural Reserve in the beginning of October (2011). But the other sudden problem is happened in our project direction! It was forest fire in the territory of the Reserve, and ingress was denied again. We tacked this problem the same like in Askania Nova: did a lot of records of bat sounds by Time expansion bat detector around the reserve area.



Picture 41. Anton Vlaschenko on the Eastern border of Crimean Natural Reserve.

Photo by Sergey Saprykin



Picture 42. Sergey Saprykin studied a map. We recorded bats.

Photo by Anton Vlaschenko



Picture 43. It was run high during recording bat sounds. The Yalta town on the seaside of the Black Sea.

Photo by Anton Vlaschenko

Conclusion of our project activity

We did not find Greater Noctule in the North of Ukraine, in the breeding part of its range. It confirms our hypothesis that population of Greater Noctule is in critical state in the North-eastern part of its range. Survival of this species is really critical and current IUCN status does not reflect the status of this species.

We did not catch the species in Chernobyl Exclusion Zone in 2010 where it was caught in 2009. We tried to explain this fact below.

It is difficult to catch Greater Noctule on the South of Ukraine in migration time, but not hopeless (we hope). We will continue catching bats in points of migration found out during our project. There are the Kurasu stream in the Crimea peninsula and Lesopark in Kharkov city. The third perspective point is dendropark in Ackania-Nova Reserve (if we get the permission).

It is the other direction of bat research and conservation – “bats in migration time”, and Kseniia Kravchenko will develop this direction.

We underworked in the Crimean Natural Reserve, and mountain beech forests remain unstudied. We discussed with administration of the Reserve about future collaboration. But they set us the strange condition: “it is impossible to stay in the Reserve area in night time!” We will think how to change this situation.

Hypotheses why this species dramatically decreased in the Eastern Europe and background of change the species status in IUCN Red Data Book

In the North part of Ukraine (breeding part of Greater Noctule range) the last documented records were done in 1955 (Abelentsev et al., 1956; Vlaschenko et al., 2010), and the species was found again in 2009. But in forests where Greater Noctule disappeared Noctule Bat is common or mass species and Leisler’s Bats common or rare, but occurrence also. Our first question is what is the principle difference in ecology of Greater Noctule compared to two others species of this genus? The summary of this species life history is widely presented in literature (Abelentsev et al., 1956; Kuzyakin 1980; Deitz et al., 2009; Ibanez et al., 2004) and we will not repeat it. In Table 4 we summarized the main aspects of ecology of these three species (Kuzyakin 1950; Abelentsev et al., 1956; Panytin, 1969; Deitz et al., 2009; Strelkov, Ilyin, 1990; Vlaschenko 2006; Vlaschenko, Gukasova, 2009b).

Table 4 - Ecological peculiarities of three species of genus *Nyctalus* in conditions of the Eastern Europe

	<i>N. leisleri</i>	<i>N. noctula</i>	<i>N. lasiopterus</i>
Status	long distance migrant; never occupied buildings and towns in migration time	long distance migrant; frequently occupied buildings and towns in migration time	long distance migrant; never occupied buildings and towns in migration time
Phenology	emerges to the North in the beginning of May – migrates to the South in August till the first days of	emerges to the North in the middle of April migrates to the South in September-October	emerges to the North in April migrates to the South in September

	September		
Sex ratio in adult bats in breeding part of the range	usually females (very rare males to the West form the Dnepr river)	normal 10% of adult males	adult males occur
Mating area or roosts	mates in the South of the species range	mates in the North of the species range also: August-October	unknown (maybe close to Noctule Bat)
Roost cites (breeding)	exclusive tree roosts	primary tree roosts, but attics and houses also	exclusive tree roosts
Number of breeding colonies	30-60 forms single species colonies	20 up to 100 forms single species colonies	most often 1-3, some cases 7, 8, 13 and the numerous one 20, usual fit into other species colonies
Number of kids	indeed 2	indeed 2	probable 2

The Leisler's Bat demonstrates different strategy compared to Noctule Bat. The first species flies in late spring, births offspring and is one of the first bat species returned to the South where adult males stays and comes mating. Noctule Bat has some adult males in the North part of range and mating begins here. The last 10-15 years this species started to hibernate in the North Ukraine cities and it is the numerous bat species in winter now. But Greater Noctule like Leisler's Bat never gets in migration of hibernation groups in cities. Greater Noctule principle differs from Leisler's Bat that longer lives in the North and has adult males there (maybe mating system close to Noctule Bat). The principle difference of Greater Noctule from Noctule Bat is exclusive using of tree roosts.

Now we analyze only data from the Eastern Europe, but we know that Greater Noctule in West part of range can eat little birds. If it is the same feeding strategy in the East or not we don't know. We do not know also if Greater Noctule uses aggregation of little birds in autumn for eating in the South of Ukraine and Crimea peninsula.

On the base of data show above we can formulate some hypothesis:

1) Low number and outskirts of the species range

At the web site of IUCN Red List (<http://maps.iucnredlist.org/map.html?id=14918>) and in all European bat books (Deits et al., 2009) Greater Noctule range in the East is filled through all Ukraine to Kostroma and Kirov regions of Russia. But in the West part of the species range (the West and the South Europe) is spotted. In Table 4 we resulted that in the Eastern Europe Greater Noctule did not form numerous single colonies. At the same time in Hungary it forms colonies up to 50 (Estok, 2011) individuals and in Spain about 80 (Deits et al., 2009). The cover range in the Eastern Europe could deceive us that the "heart" of this species is in the East. But the real "heart" is in Balkans and in Mediterranean region. The Eastern Europe is the far outskirts where numbers of Greater Noctule was very low and limited the species to form individual colonies.

We know only two breeding centres of Greater Noctule where bats were caught form year to year for the last 5 years: in Matra Mountains in Hungary (Estok, 2011) and in Samara bend in Russia (Smirnov, pers. comm.). The distance between these two points is 2100 km (we do not take into account record in Chernobyl Exclusion Zone). Greater Noctule disappeared from the East part of the old-species-range, because this species newer been numerous there.

2) Slow population growth and loss during migration

There is no collective point of view about number of offspring's in Greater Noctule (Deits et al., 2009). All long distant migration bat species have two babies. If Greater Noctule has not two offspring's per female always it means that death during migration could be more that every year population growth. We know only two records of death Greater Noctule during migration (Gazaryan, Bakhtadze, 2002; Karatas et al., 2007) per contra hundreds of Noctule Bats death every autumn in Ukrainian cities (Vlaschenko, Gukasova, 2009b; Godlevska, Kondratenko, 2004). Just the same numbers of Noctule Bats does not decline.

3) Extinction debt

Radio telemetry of Greater Noctule shows that this species could move up to 90, 130 km per night (Popa-Lisseanu et al., 2009) between roosts and roosting and hunting habitats. At the same time this species demands high requirement for foraging habitats. One colony of 100 females need (minimum) in 30 tree roosts per summer (Popa-Lisseanu et al., 2008) and such colony covers home range 1000-2000 km² on the base of data from Spain (Popa-Lisseanu et al., 2009). The deforestation could be critical factor for Greater Noctule in the North and Eastern Ukraine. If we hypothesise: 1) Greater Noctule needs in more specific roosting trees than others Noctules for forming the single-species nursery colonies; 2) Greater Noctule could move to big distance (tens kilometres) every night and could switch roosts on such distance. The records of Greater Noctule in oak forests in Ukraine in 1935-1955 were the remainders of breeding populations of this species. The degradation of oak forests began in big scale in the middle of XIX century and got peak in the period of the Civil War and October Revolution (1917-1920). The main impact in that period was decrease of square of old natural forests. Since the 1925-30 the Soviet forestry has changed and next impact on forests was to change the structure of forest stand. The old natural forests were interchanged by monocultures of pine, ash and rarely oak. We hypothesise that after significant degradation of oak forests in the North and Eastern Ukraine Greater Noctule is unable to exist successfully there. The concept of extinction debt shows the same situations with the other species in forest landscapes (Hanski, 2010). Greater Noctule existed some time later in critically transformed landscapes in oak forests and we have records of 1935-1955.

The confirmation of the hypothesis 3 is the current records of Greater Noctule in big forests massive: current records in Hungary – old beech forest more than 35 km in diameter (Estok, 2011); record in 2009 Chernobyl Exclusion Zone – edge of big various-habitat forest more than 100 km to the North-West (Vlaschenko et al., 2010); late records of the end of 1980-th the Brianskiy less Reserve (70-35 km) (Sitnikova et al., 2009) and Okskiy Reserve (more than 80 km in diameter) (Ivancheva, Ivanchev, 2000); current records in the Samara bend (40x35 km and involve islands on the Volga river (Smirnov per. comm.); late records from Caucasus – all-over forest on the North hillsides (Tsytulina, 1998; Gazaryan, Bakhtadze, 2002).

IUCN species status

The current position of Greater Noctule in IUCN Red List classification Near Threatened it means: “A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.” The results of our literature review, before realisation the project, showed that the species is in critical state in Ukraine. The breeding colonies disappeared on the area had near 200 000 km² for the middle of XX century. The realized project confirmed this hypothesis.

We think that results of the project and literature review should be appended for such IUCN Red List Criteria in a threatened category (Critically Endangered, Endangered or Vulnerable) (Guidelines, 2011):

A Population reduction – it is the fact that the species disappeared from the territory of the North and the North-Eastern Ukraine. But it happened in longer period that it was classified by IUCN criteria. The declining was happened for 50-60 years but in criteria it could be 10 years or 3 generations (three generation of *N. lasiopterus* it could be 21-30 years).

B Geographic range – on the one hand the species is wide distributed in Europe (from the Atlantic coast to the Ural Mountains), but on the other hand the most of these records are single individuals. In fact we know only three out of four current breeding centers of the species (in Spain, in Hungary and in Russian). This situation could be classified as **B2.a number of locations (breeding centers) ≤10 (Vulnerable) of yet ≤ 5 (Endangered)**.

C Population size – the total number of caught bats in Hungarian breeding center (Estok et al., 2007; Estok, 2011) is up to 200 and in Spain (Seville breeding center) to 500 (Fortuna et al., 2009), in Russia (Samara bend breeding center) – some tens of Greater Noctule (Smirnov, per. comm.; Smirnov, Vekhnik, 2012) the most of other current records are single individuals (for example: Caucasus – Tsytulina, 1998; Gazaryan, Bakhtadze, 2002; Turkish – Karatas et al., 2007; Parsuz, Ozkan, 2011; Slovak – Uhrin et al., 2006; Ukraine in 2009 – Vlaschenko et al., 2010; etc.). The total number of mature individuals could be classified as **≤10,000 (Vulnerable) of yet ≤ 2,500 (Endangered)**, and by **C2 (a i) number of mature individuals in each subpopulation in fact less than 1,000 (Vulnerable)**.

D & E it is very difficult to estimate the future chances of Greater Noctule. We have only one fact on recent (for last 10-15 years) decline of one local breeding population of the species in Hungary (Estok, 2011). It is difficult to estimate the past of the species and more by token the future. But it is clear that there are no backgrounds for revival of Greater Noctule: the forest habitats are destroyed irretrievable, it is impossible (or very difficult) to raise the species in zoos, great breeding population centers (that could be centers of future re-colonization) are unknown.

Future project steps, future research

For exact evaluation of the species status we need do some more research and observations.

1) To test the hypothesis 1 we need in deep study of roost ecology of Greater Noctule in Russia (Samara bend breeding center) with radio telemetry. We will get data about single or multispecies colonies the species has in the East, and specific characteristics of tree-roosts.

2) To test the hypothesis 3 we will invent the species existence in big forest massive (Oksky and Brianskiy less Reserves). Locations were Greater Noctule was in 1980th.

3) Three other locations where this species was recorded in past (more than once or breeding colonies) will be checked in Russia (Nizhny Novgorod, Voronezh Reserve and Caucasus).

4) Future monitoring by mist-netting will be continued on finding migration point in Ukraine.

5) International collaboration will be aligned between teams from different countries for research experience change and testing some hypotheses in field.

6) The other important direction of future research Greater Noctule is genetic research. We want to understand the degree of isolation of breeding population and to estimate the gene flow between the populations.

Financial report

Item	Budgeted Amount	Actual Amount	Difference	Comments
Food and accommodation in field	2400	1890	+510	We planned to spend 4£ per 1 person for food per each field day but the real cost was bigger – 5£. We planed 120 field days, but in real we have 88 f.d. including: 8 f.d. per 2 persons; 22 f.d. per 3 persons; 13 f.d. per 4 persons; 26 f.d. per 5 persons; 19 f.d. per 6 persons.
Stay in hotel	-	250	-250	10£ per 5 persons per 5 days.
Rent of a car	1750	660,5	+1089,5	Full rent a car for expedition to the South Ukraine 16@35£ = 560£. Taxi for moving inside cities 10 travels per 5, 5£ = 55£ and 7 travels per 6, 5£ = 45, 5£.
Train tickets	300	450	-150	Train and bus tickets = 322£; Public transport for moving inside cities 58£; Fuel for boat = 70£.
Digital camera	500	817,5	-317,5	Digital camera (Canon D1000) + camera lens (Canon compact macro) = 504, 5£; and ring-flash (Metz 15 MS-1 digital) = 283£; coffer = 30£. We should buy all assemblage of this equipment to get necessary quality of bat photos.
Batteries for headlamp and ultrasound detectors	100	100	0	
Headlamps	50	50	0	
Climbing rope	150	150	0	
Tree climbing system	-	150	-150	
Rucksack	-	100	-100	
Sleeping-bags	-	120	-120	3 sleeping-bags per 40£ for each
Telescopic fishing rods	-	120	-120	We used them for mistnetting, 4 rods per 10£ and 2 rods per 40£.
Bat ring (Aranea Poland) 2500	-	400	-400	We critically needed in bat rings.
Maps, notebook, paper etc.	35	35	0	
Medicine	40	40	0	
Total	5325	5333	8	

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