

Bat monitoring along the Drava River (Mammalia: Chiroptera)

DOMBI IMRE

Nature Conservation Foundation of Tolna County,
H-7100 Szekszárd, Szent István tér 10., Hungary, e-mail: imreka@freemail.hu

DOMBI I: *Bat monitoring along the Drava River (Mammalia: Chiroptera).*

Abstract: In the Drava monitoring project bat monitoring has been carried out along the Drava between Órtilos and Babócsa since 2000 with the methods below, three times a year: capture with net and ringing, sampling with bat-detector along a path, point counting in the case of Daubenton's bat and pond bat, survey of building-dwelling colonies. Four sampling areas were chosen: Órtilos - floodplain of Drava, Gyékényes - Lankóci forest, Vízvár - floodplain of Drava and village, Babócsa - Mékus forest and backwater of Drava to carry out monitoring on. 17 species of bats were indicated in the five years of research, three of them are endangered species Barbastelle bat (*Barbastella barbastellus*), Bechstein's bat (*Myotis bechsteini*) and the pond bat (*Myotis dasycneme*). The region is quite abundant in species of which most are vulnerable not only in Hungary but also across Europe. All this indicates the natural status of the sampling areas and marks the importance of the floodplain along Drava in the conservation of the species concerned.

Key words: bat, monitoring, bat-detector, Drava, habitat

Introduction

Danube-Drava National Park Management started the natural monitoring of the upper part of River Drava in Hungary in 2000 with the purpose of monitoring the effects of the hydroelectric power plant planned at Novo Virje, Croatia and prognosticating its probable impact based on records of original state of the area. As a part of this wide-range project, bat monitoring is performed by our Foundation. Samples are taken following the standard monitoring rules of sampling in the same sample area, at the same time, administering the same methods to be able to do any comparisons among results. Four sample areas were chosen: Órtilos floodplain, Gyékényes - Lankóci forest, Vízvár - Drava bank and settlement, Babócsa - Mékus forest and the backwater of Drava.

Material and methods

Sample areas

More features had to be taken into account simultaneously while choosing the appropriate sample areas. Here they follow:

- impact of Drava on the bat colony in the sample area present
- representative sampling in the same sample areas even during the long period - ten years - of monitoring with the possible least effect of the inevitably occurring natural changes.

- true representation of the **bigger range and characteristic** habitats based on the features, characteristics and size of **the chosen area**.

- easy accessibility, secure **identification on map**

Four sample areas were chosen, **respectively**:

- Órtilos - Drava bank, floodplain areas **South from the** railway station, gravel-pit lake

- Gyékényes - Lankóci forest, **old oak forests, Berek** and surroundings

- Vízvár - Drava bank, part of **bank under the village** and the settlement

- Babócsa - Mékus forest and **the backwater of Drava** at Babócsa

According to different sampling methods **more types** of sampling areas were chosen. Consequently, there are point count and linear sampling areas.

Sampling methods

Basically, four methods were **applied**. The **first one** was capturing bats, identifying them in hand, thus data collection. The **second one** was without actually capturing the animals, only observing them on **their hunting area using** bat-detectors. The third method was finding the building-dwelling colonies in their roost-sites and other observations. All of these methods are among **those suggested by NBmR**, but adaptation to local conditions was necessary.

1. Capturing bats with net

The point is to put up nets in **the appropriate areas**, where bats are most likely to fly through during the night and thus **captured**. Then **identification** of the species and data collection, such as age, sex, forearm length (FA), body mass, time of capturing, and net number are recorded. If the animal is **ringed**, the ring number is also written down. Moreover, additional data can be: **condition of breasts** concerning sucking, turgidity of testicles, former scars, other **individual characteristics**, amount of parasites on body, in case of long-eared bats (*Plecotus* sp.) **length of thumb** and claws, width of ear-cap. Capture circumstances are always **recorded as follows**: time of capture, weather condition, net position, temperature and **humidity per hour**. Advantages: precise identification of species, and with the help of **age and sex**, **further data** can be gained on reproduction conditions. During the project **6x3 and 12x3 meters, Polish** 70/2 thread quality nets were used.

2. Observations with bat-detectors

It is a method demanding high **technical and professional** knowledge. It is based on the reception and transformation of **the ultrasound sent out** by bats. Differences of echolocation calls among species allow **identification and counting** of individuals. Advantage: mobility, so that observation is **not restricted to a given area**, also bats flying in the surroundings are easily and with a **great probability detectable**. Therefore this method **supplies more data**, than capturing. **identification to species** cannot always be achieved in the field, but by recording the **sound it can be analysed** later on the computer. By all means it is **suitable for measuring the intensity of bat-movement**, and their relative frequency. It is also apt to observe **the different usage of each habitat-type**. The detector is used in two methods:

Point count sampling with bat-detector: at waterside, sampling on one spot, monitoring Daubenton's bat (*Myotis daubentoni*) and **pond bat** (*Myotis dasycneme*).

Line transect sampling: observation is **accomplished along** a pre-determined line.

Equipment used during the monitoring from 2001: **Pettersson D240X** bat-detector and **Sony WMD6C** tape recorder. **Sound-recordings are analysed** using Cool 2000 software.



Fig. 1.: Greater mouse-eared bat (*Myotis myotis*) - Rarefying, house-dwelling species



Fig. 2.: Bechstein's bat (*Myotis bechsteini*) - Endangered, rare species



Fig. 3.: Noctule bat (*Nyctalus noctula*) - Most common species along Dráva river



Fig. 4.: Grey long-eared bat (*Plecotus austriacus*) - Common, house-dwelling bat

3. Surveying building-dwelling colonies

It has a very crucial part in monitoring, since many species live exclusively in buildings. Most of them are parent-colonies, thus keeping track of them well indicates the changes occurring around them. During the project we mainly concentrated on clerical buildings, because previous studies showed that most of building-dwelling colonies live in the towers or attics of churches. Throughout the survey churches are observed and characterised once a year following the same aspects of data collection. The characteristics of the buildings as habitats, the detected species and number of individuals, presence of other species (barn owl, pigeon, mart, etc.), and changes compared to previous years (e.g. locked window) are recorded during the assignment. A total number of 19 buildings were involved in the monitoring

The observed settlements are as follows: Órtilos, Zákány, Surd, Gyékényes, Nemespátró, Porrogszentkirály, Csurgó, Berzence, Somogyudvarhely, Bélavár, Vízvár, Heresznye, Bolhó, Babócsa.

Features of sample areas

1. Órtilos

Reasons for the choice: Drava enters Hungary at this point, so impacts from abroad are noticed the earliest here. Nevertheless at Zákány it leaves Hungary again and flows down in Croatia, where it may face other effects. Therefore the Órtilos part can function as a control-area, where the probable negative effects on Drava River can occur in a different way than at the part below Vízvár.

General classification: Well-confined area. We can meet variable surface features, from the mainstream to the distributaries, from gravel-pit lakes, to railway embankments. The ligneous vegetation mainly consists of middle-aged forests. Older forests are situated only along the distributaries continuously filling-in and above the railway. The main species are white willow (*Salix alba*), poplars (*Populus* sp.), Hungarian ash (*Fraxinus angustifolia*), common oak (*Quercus robur*). Above the railway highland species can also be found, such as beech (*Fagus sylvatica*), sycamore maple (*Acer platanoides*), hornbeam (*Carpinus betulus*). Lack of old stocks is a disadvantage concerning the bats, since the number of roosting sites is restricted. This fact is also proved by the collected data. Because of the lack of tree-holes the bat-stock on the area can only be reported as low based on previous research. The gravel-pit lakes that are filling in are used as a foraging site by those bat species which hunt mostly above water and other open areas, such as the noctule bat (*Nyctalus noctula*), the Daubenton's bat (*Myotis daubentonii*), and the common pipistrelle (*Pipistrellus pipistrellus*). There is a relatively large area with treeless, grove-flora, part of which are covered with reed and other water-indicator vegetation. These are foraging sites, too.

Methods applied: capture, sampling with detectors - point count and line transect and method.

2. Lankóci forest

Reasons for the choice: The area is a bit further away from Drava, however with its old oak and hornbeam forest represents a very precious habitat.

General classification: The old hardwood and softwood stocks offer very good roosting sites for bats. The chosen area is covered with a very versatile vegetation, from the stagnant water sedge and alder-swamp to the oak forests. This high level of diversity can ascertain the different roost demands of each bat species. Diverse vegetation also supplies the animals with a steady and dependable nutrition base. Paths and openings are well utilised by bats during hunting, thus observations having been carried out with

detectors or by capturing the animals well represent the bat-fauna and also the stock-size. Although the forested area is bigger the chosen sampling spots are reliably characterise distinctive habitats.

Methods applied: capture and sampling with detectors - line transect method.

3. *Vízvár*

Reasons for the choice: Drava River enters Hungary above the village again, thus any impact present still in Croatia can be well indicated in the area. Forestation is very good in the region, meaning exclusively willow-poplar groves. Because of the closeness of the settlement, both building-dwelling and forest stock can be well observed on the sampling sites.

General classification: The area is situated right next to Drava, thus its effect is obvious. We can find softwood gallery forest remained in their natural condition with a rich shrub level and undergrowth. The main species are white willow (*Salix alba*), and poplars (*Populus* sp.). The old forests offer the hole-dwelling bats great roosts. Distributaries and temporarily flooded areas supply the bats with very good foraging sites during the whole active period. The attics of buildings and the church in the settlement are the roost sites of the building-dwelling species, which does not usually make up big colonies, but lead a solitary life or live in colonies of only some individuals. These species feed on the floodplains, too. However, the lights in the streets should also be mentioned since they function as light-traps attracting insects that the bats willingly exploit.

Methods applied: capture, sampling with detectors - line transect along the bank of Drava and in the settlement and point counting at the distributary of Drava.

4. *Babócsa*

Reasons for the choice: The Mérés forest is a relict-like, old, hardwood forest that represents a very important habitat due to its island-like features. Because of the collecting effect, many sensitive species are found here in greater or smaller number. The current of the Drava, the changing groundwater level has a great impact on the health, the renewability of the forest that indirectly effects the bats, too.

The backwater of Drava once a river-basin, now one backwater of the river, which is filling up steadily. The old willows in the surroundings offer great habitats for the Daubenton's bat (*Myotis daubentoni*) and the pond bat (*Myotis dasycneme*), as they are strongly related to water due to their life-style.

General classification: Nature-like forest, where the main and additional species of trees are also present. It is at least 500 meters away from the water and takes up 80 ha (~200acres). It is surrounded by big meadows and turfs and offers excellent roost sites. Openings and the surrounding open flooded habitats are good foraging sites. The whole district is heterogene concerning both age-distribution and diversity.

The backwater of the Drava is filling up, it is flooded during high-water, but by the end of the summer it almost dries out completely. The old willows (*Salix* sp.) in the bank-lane give great roost sites and the big open watersurface and the groves offer a good foraging site for the bats.

Methods applied: capture in the oak forest, sampling with detectors - line transect in the oak forest and between the backwater of Drava and point count at the backwater of Drava.

Results

During the 5 monitoring years so far the presence of 17 bat species has been proved in the observed area. It is 61% of the 28 officially recorded as occurring national species that is very promising. Moreover, a new long-eared species, *Plecotus macrobullaris* was also successfully identified. The latter is just a presumption, since identification is not always unequivocal in the field, proof can only be given after genetic examinations. It was indicated as *Plecotus* sp. at the data collection. Identified species are shown in Table 1. indicating the method with which their presence was proved.

Table 1.: The species of bat fauna with sampling methods

Species	Mist-net	Detector	In building
Daubenton's bat (<i>Myotis daubentoni</i>)	X	X	
Pond bat (<i>Myotis dasycneme</i>)		X	
Bechstein's bat (<i>Myotis bechsteini</i>)	X	(X)	
Natterer's bat (<i>Myotis nattereri</i>)	X	X	
Whiskered bat (<i>Myotis mystacinus</i>)	X	(X)	
Brandt's bat (<i>Myotis brandti</i>)	X	(X)	
Greater mouse-eared bat (<i>Myotis myotis</i>)	X	X	X
Lesser mouse-eared bat (<i>Myotis blythi</i>)	X		
Noctule bat (<i>Nyctalus noctula</i>)	X	X	
Leisler's bat (<i>Nyctalus leisleri</i>)	X	X	
Serotine bat (<i>Eptesicus serotinus</i>)	X	X	X
Sopran pipistrelle bat (<i>Pipistrellus pygmeus</i>)	X	X	
Common pipistrelle (<i>Pipistrellus pipistrellus</i>)	X	X	X
Nathusius' pipistrelle bat (<i>Pipistrellus nathusii</i>)		X	X
Long-eared bat (<i>Plecotus auritus</i>)	X	(X)	
Grey long-eared bat (<i>Plecotus austriacus</i>)	X	(X)	X
<i>Plecotus</i> sp.	X		
Barbastelle bat (<i>Barbastella barbastellus</i>)	X	X	

The table well indicates that the nets or the detector are both very important in identifying different species, as two of them, the Pond bat (*Myotis dasycneme*) and the Nathusius' pipistrelle bat (*Pipistrellus nathusii*) were only identifiable using detectors. Those bats that were difficult to identify with detector [marked (X)] netting was ascertaining.

Table 2. shows the species identified in the different sampling areas.

It is visible that the most number of species was observed in Babócsa and in the Lankóci forest, but the other areas are also very abundant in species. More important is the fact that in all four areas the presence and reproduction of at least two endangered, habitat-specific species were justified. The high number of species and the presence of the rare ones indicate that the habitat features in the sampling areas are very good, their condition is near-natural.

Table 2. : The species identified in the different sampling areas

Species	Órtilos	Lankóci forest	Vízhár	Babócsa
<i>M. daubentoni</i>	X	X	X	X
<i>M. dasycneme</i>	X		X	X
<i>M. bechsteini</i>		X	X	X
<i>M. nattereri</i>		X	X	X
<i>M. mystacinus</i>	X	X	X	X
<i>M. brandti</i>	X	X	X	X
<i>M. myotis</i>		X		X
<i>M. blythi</i>		X		
<i>N. noctula</i>	X	X	X	X
<i>N. leisleri</i>		X		X
<i>E. serotinus</i>	X	X	X	X
<i>P. pygmeus</i>	X	X	X	X
<i>P. pipistrellus</i>	X	X	X	X
<i>P. nathusii</i>	X	X	X	X
<i>P. auritus</i>	X	X	X	X
<i>P. austriacus</i>	X	X	X	X
<i>Plecotus sp.</i>	(X)		(X)	
<i>B. barbastellus</i>	X	X	X	X
Total	12 species	16 species	14 species	16 species

Species reported along River Drava

Daubenton's bat (*Myotis daubentoni*)

Common in the whole country has a strong connection to water; its roosting sites are mostly in the old forests near the water. It hunts above water, for mosquitoes, caddy-flies and may-flies. Important indicator species due to its sensitivity to habitat and nutrition-base. It is well traceable in large numbers in all sampling areas, though in the Lankóci forest it is rarer, because of lack of open water surface.

Pond bat (*Myotis dasycneme*)

Endangered, rare species. So far it has only been indicated with detectors. Its life-style is similar to the Daubenton's bat's (*Myotis daubentoni*), but it is more connected to the old willow forests. It is endangered in its whole habitat (SCHÖBER & GRIMMBERGER. 1987).

In Órtilos and in Vízhár some individuals are regularly detected, in Babócsa at the backwater of Drava several hundreds of individuals were detected in 2001, but since then it has only been seen occasionally.

Bechstein's bat (*Myotis bechsteini*)

Endangered, rare species. Nowadays it is vulnerable all around Europe, in our country it was only known from the mid-mountains. Hence its presence in the plains is fairly remarkable! It is closely related to old, mixed, hardwood forests. Its nutrition consists of moths and mosquitoes. Except for Órtilos it was caught everywhere and its reproduction

was confirmed. It seems to have a steady stock in the Lankóci forest and in the Mérus forest in Babócsa. In Vízvár only one old female was captured that assured the reproduction of the species.

Natterer's bat (*Myotis nattereri*)

Not a common species. It prefers mountainous homeranges, it only has sporadic data in the plains. The reason for this is the disappearance of old, hardwood forests in the floodplain and its roosting sites with them.

Along the Drava it is present and its reproduction is proved in the Lankóci forest, in Vízvár and in the Mérus forest in Babócsa. Its presence indicates good, natural habitats, but its stock is most probably vulnerable.

Whiskered bat (*Myotis mystacinus*)

Not a common species. It prefers mountainous homeranges, it only has sporadic data in the plains. It is due to the disappearance of the old, hardwood forests in the floodplain, hardwood mixed and grove forests.

Along the Drava its presence and reproduction is known in the floodplain of Drava next to Órtilos and Vízvár, in the Lankóci forest, and the Mérus forest in Babócsa. Its presence indicates good, natural habitats, but they are most probably vulnerable because of the shrinking homerange.

Brandt's bat (*Myotis brandti*)

Not a common species. It prefers mountainous homeranges, it is rather rare in the plains. Its habitat demands are rather lesser-known, but based on its occurrence data so far, the best living space for the species is the old hardwood, the hardwood mixed and mosaic-like forests. Because these areas have become rather scarce recently the species is vulnerable.

Along the Drava its presence and reproduction is known in all sampling areas. Its presence indicates good, natural habitats.

Greater mouse-eared bat (*Myotis myotis*)

Rarefying species. In the summer it lives in buildings in the winter it draws in caves. Females make up big parental colonies, while the males remain lonesome, or live in colonies of a few individuals. Depending on the level of disturbance the colony may use more suitable buildings. Strangely enough, a considerable part of its nutrition are beetles, moreover mostly from the ground beetles, family Carabidae, since it often feeds from the ground.

In the sampling area its 150 individual-colony was found in the Catholic church in Babócsa, and a 40-50 individual-colony in the Protestant church in Somogyudvarhely. Occasionally it occurs in the Catholic church in Berzence and in Bolhó and in the Lutheran church in Nemespátró.

Lesser mouse-eared bat (*Myotis blythi*)

It lives in buildings and caves. Its life-style is similar to the greater mouse-eared bat (*Myotis myotis*), they often create mixed colonies.

Along the Drava the species did not have any data until July 2005. Colonies were not found in any of the buildings, so the turning-up of its three individuals from the Lankóci forest is quite outstanding and interesting.

Noctule bat (Nyctalus noctula)

Common, generally wide-spread species. It lives in tree-holes, and can make up a 100-individual-colony. It is not connected to special habitats, but in old forests and diverse areas it is present in a larger number. Building-dwelling colony is not known from the sampling areas neither from the surroundings. It feeds on mosquitoes to maybeetle, its nutrition-spectrum is very wide.

It is indicated in great numbers in all sampling areas along the Drava, it is the most common species. It is indicated mostly with detectors.

Leisler's bat (Nyctalus leisleri)

Rare species. Nowadays it is in the mountains, but it was reported from the plains and floodplains, from Gemenc and Béda-Karapanca (DOMBI 2003). Its roosting sites are exclusively in tree-holes. It is demanding concerning its habitat, it only occurs in old, natural, mixed forests. It has small 20-30 individual-colonies. It feeds on mosquitoes and moths. Its hunting areas are forests, forest edges and flooded areas.

On the Drava only some individuals turned up in the Lankóci forest and the Mérys forest in Babócsa, which proved reproduction. Unfortunately, the species has not been captured in none of the areas since 2001, it has only one datum with detector from the Lankóci forest in 2004.

Common pipistrelle (Pipistrellus pipistrellus)

Generally common species in the whole country. It turns up mainly in urban areas. Due to its size it feeds on mosquitoes and plant-lice.

It is present in all sampling areas along the Drava, but not in the same number as the soprano pipistrelle bat (*Pipistrellus pygmeus*)

Soprano pipistrelle bat (Pipistrellus pygmeus)

It was only recently separated from the common pipistrelle (*Pipistrellus pipistrellus*) based on genetic and acoustic researches. It is a forest-dwelling species, its roosting sites are tree-holes. Its national occurrence is not clarified yet, but it is most probably not rare. Its nutrition-base is similar to the related species.

It is present in all sampling areas along the Drava. It is not common anywhere, but neither rare.

Nathusius' pipistrelle bat (Pipistrellus nathusii)

It prefers the plains. It is characteristic in floodplains and habitats close to water, it lives in holes. Its hunting areas are on flooded or near water habitats, where it feeds mostly on mosquitoes.

In all sampling areas we only managed to indicate it with detector. One building-dwelling colony is known from the parish in Berzence.

Long-eared bat (Plecotus auritus)

It is usually common in the midlands, but data from the hills and plains were also reported. By the latter we mean exclusively old, hardwood (oak-ash-elm gallery forests), or hardwood mixed forests. It feeds mostly in the forests on moths.

It was indicated in all four sampling areas along the Drava. Its presence indicates good, natural habitat.

Grey long-eared bat (Plecotus austriacus)

It is common and wide-spread in the whole country, mostly in human settlements and

in the near surroundings. Restorations of buildings and lack of knowledge can cause its decrease in number. Its hunting areas can be found around the settlements.

It is present in all four sampling areas along the Drava. Its traces and colonies of few individuals were found in all checked buildings. Significant colonies are known from Surd, Somogyudvarhely, Bolhó, the largest of them is of 25-30 individuals.

Serotine bat (*Eptesicus serotinus*)

It is common and wide-spread in the whole country, it occurs in settlements and in their close surroundings. Restorations of buildings and lack of knowledge can cause its decrease in number. Its hunting areas can be found around the settlements.

It is present in all four sampling areas along the Drava. Its traces or colonies of few individuals were found in almost all the checked buildings. But only one significant colony was found in Zákányfalu that consists of 40-80 individuals.

Barbastelle bat (*Barbastella barbastellus*)

Endangered, rare species. It has already disappeared from most part of Europe, so the national stock should be treated with particular care (BIHARI 1996). Its most powerful stock is in the mid-mountains, but is also has data from the plains. There it finds its demands in old hardwood grove forests, sometimes in castle-parks, so that their disappearance or fragmentation leads to the extinction of the species.

Along the Drava in all sampling areas its presence and also reproduction was proved. In Vizvár one lactating female turned up only in 2005, beforehand we did not know about the species!

Results of different sampling methods

The number of captured and tagged bats between 2000 - July 2005 is shown in Table 3. except for the small species (*Pipistrellus* sp., *Myotis mystacinus* and *Myotis brandtii*) all the individuals of all the species were ringed. Several years' of recaptures have proved how much the long-eared bat (*Plecotus auritus*), the grey long-eared bat (*Plecotus austriacus*), the Barbastelle bat (*Barbastella barbastellus*) and the Bechstein's bat (*Myotis bechsteini*) depend and insist on their territories and habitats.

The capture data do not reliably reflect the ratio of the stocks of different species. The low number of captures in case of the otherwise very common noctule bat (*Nyctalus noctula*), common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle bat (*Pipistrellus pygmeus*) can be explained with their life-style and the circumstances of the captures. Those bats hunting high in the forests are captured rather rarely during a net capture method in the paths and openings. In case of the other species the ratios are approximately realistic, which are also backed up by the data gained through the bat-detector observations.

A great advantage of bat-detector observations is the greater number of individuals spotted and that we receive data on the relative frequency of those species hard to capture with net. Its disadvantage is the problems with identifying species. Sometimes individuals are only possible to be identified to genus level, but it happens that even that is hard to tell for sure. As an example Table 4. shows the results of the 2004 bat-detector observations.

The great proportion of noctule bat (*Nyctalus noctula*) is clearly noticeable showing the real frequency of the species. The great number of detection of the three *Pipistrellus* sp., and the serotine bat (*Eptesicus serotinus*) is also apparent. These species can actually be considered as quite common, and they can be indicated more easily from a greater

Table 3. : The number of captured and tagged bats between 2000 - July 2005

Species	Sampling area				Total (ind.)
	Örtilos	Lankóci forest	Vízvár	Babócsa	
<i>M. daubentoni</i>	20	12	23	41	96
<i>M. bechsteini</i>		20	1	6	27
<i>M. nattereri</i>		1	1	4	6
<i>M. mystacinus</i>	3	21		18	42
<i>M. brandti</i>	9	16		3	28
<i>M. myotis</i>		3		17	20
<i>M. blythi</i>		3			3
<i>N. noctula</i>		3		4	7
<i>N. leisleri</i>				2	2
<i>E. serotinus</i>		7		2	9
<i>P. pygmeus</i>	1		1	1	3
<i>P. pipistrellus</i>	1	3	8	11	23
<i>P. auritus</i>	11		4	3	18
<i>P. austriacus</i>	8		13	2	23
<i>Plecotus sp.</i>	22		6		28
<i>B. barbastellus</i>	7	5	1	21	34
Total (ind.)	82	94	58	135	369

Table 4.: The results of the 2004 bat-detector observations

Species	Number of detections in the sampling area				Total (ind.)
	Örtilos	Lankóci forest	Vízvár	Babócsa	
<i>M. daubentoni</i>	21	2			23
<i>M. bechsteini</i>		1		1	2
<i>M. mystacinus/brandt</i>	2	2		5	9
<i>N. noctula</i>	26	21	90	13	150
<i>N. leisleri</i>		1			1
<i>E. serotinus</i>	1	57	6		64
<i>P. pygmeus</i>	6	5	6	5	22
<i>P. pipistrellus</i>	4	5	56		65
<i>P. nathusii</i>	6	14	6	10	36
<i>B. barbastellus</i>	1	2			3
<i>Plecotus sp.</i>	5				5
<i>Myotis sp.</i>	10	12		1	23
<i>Chiroptera</i>	7	26	7	9	49
Total (ind.)	89	148	171	44	452

distance, too. The small ratio of *Myotis* sp., *Plecotus* sp. and *Barbastella* sp. can be due to their rarity and also their hard detectability. Neither species, nor genera were identifiable in 11 % of all cases.

Point counts sampling of the Daubenton's bat (*Myotis daubentonii*) and pond bat (*Myotis dasycneme*) was carried out in Órtilos, Vízvár and Babócsa. Data showed great fluctuation comparing the years. In some cases it can be explained with the drastic change of environment, for example in Babócsa the dry conditions of backwater of the Drava in August, or the migration of parts of colonies. According to the data collected so far the best sampling area is the backwater of the Drava in Babócsa. Also the pond bat (*Myotis dasycneme*) was detected the most often here, which fact justifies the good habitat features of the area. The species was detected the most numerously in July 2002 (200 ind. within 1 hour). The situation is the worst in Órtilos. The number of Daubenton's bat (*Myotis daubentonii*) is the smallest here and the pond bat (*Myotis dasycneme*) only occurs rarely, too. The reason for that seems to be the small number of prey due to the great current of the river.

18 clerical buildings of 14 settlements of the research area are monitored. Bats live or lived in all observed buildings. Five species were indicated. According to their frequency, they are respectively: serotine bat (*Eptesicus serotinus*), grey long-eared bat (*Plecotus austriacus*), greater mouse-eared bat (*Myotis myotis*), Nathusius' pipistrelle bat (*Pipistrellus nathusii*), common pipistrelle (*Pipistrellus pipistrellus*). Four steady colonies are known, in the other places bats are only present in small numbers and just occasionally. The most significant colony that is of greater mouse-eared bat (*Myotis myotis*) is in the Catholic church in Babócsa, but the number of its individuals unfortunately decreased from 150 to 70-80. Hopefully, it is only about migration to another site, since an increase was recorded in the other significant colony at Somogyudvarhely at the same time. Here there are 40-50 individuals. The grey long-eared bat (*Plecotus austriacus*) rarely has a big colony, though it was detected almost everywhere. A 25-30 individual parent colony lives in Surd. The biggest colony of the serotine bat (*Eptesicus serotinus*) with 60-80 individuals can be found in Zákányfalu in the Catholic church.

Discussion

The monitoring project having been carried out since 2000 revealed the fact that the Drava between Órtilos and Babócsa has a very significant bat-fauna. 17 species of bats were indicated in the four sampling areas that takes out 61 % of the national bat-fauna. The detection of three endangered species Barbastelle bat (*Barbastella barbastellus*), Bechstein's bat (*Myotis bechsteini*) and the pond bat (*Myotis dasycneme*) with strong reproducing stocks are of special importance. All the European stocks of the three species are crucially endangered, because the old forests having served as their natural habitats are extinct. Since reproducing colonies live along the Drava the protection of their habitats is a cardinal duty. Interesting, but so far not proved the appearance of a new species in our country which is likely to be *Plecotus macrobullaris*. During the survey it is registered as *Plecotus* sp., and it was detected in Órtilos and Vízvár.

During the monitoring it became clear that all our chosen methods should be applied simultaneously to receive accurate and reliable data on the bat colonies and to trace any changes. None of them on its own provide enough data neither in quality, nor in quantity concerning all the species. The other lesson that we learned is that still a lot of intense research years are needed even to gain result on the original state, since after five years new species occurred in the given sample areas.

It is unpredictable for the time being what effects the would-be hydroelectric power plant should have on the bat-fauna in the Drava region. Recently the most threatening factor is the timbering in the natural forests along the river.

Acknowledgements

The author would like to express his sincere thanks to Somogyvári Orsolya, Görföl Tamás and many voluntary helps for letting the program come true.

Literature

- BIHARI, Z., 1996: Denevérhatórozó és denevérvédelem. Magyar Madártani és Természetvédelmi Egyesület, Budapest pp. 1-49.
- SCHOBER, W., GRIMMBERGER, E., 1987: Die Fledermäuse Europas. Kosmos, Stuttgart pp. 1-222.
- DOMBI, I. 2003: Denevér-faunisztikai kutatás az Alsó-Dunavölgyben. Élet a Duna-ártéren - természetvédelmi sokszemközt konferencia kiadványa, DDNPI, BITE pp. 133-142.

Denevér-monitoring a Dráva mentén (Mammalia: Chiroptera)

DOMBI IMRE

A Dráva természeti monitoring keretében 2000 óta végezzük a folyó Őrtilos - Babócsa közti szakaszának denevér-monitoringját az alábbi módszerekkel évi három alkalommal: hálózásos befogás és gyűrűzés, denevérdetektoros útvonalbejárás, vízi és tavi denevér pontszerű számlálás, épületlakó kolóniák felmérése. Négy mintaterületet választottunk ki, ezek a következők: Őrtilos - Dráva ártér, Gyékényes - Lankóci erdő, Vízvár - Dráva ártér és falu, Babócsa - Mérs erdő és Holt-Dráva végzünk monitoringot. A kutatás öt éve alatt 17 denevérfajt mutattunk ki, köztük három fokozottan védettet. Ezek a pisze denevér (*Barbastella barbastellus*), nagyfülű denevér (*Myotis bechsteini*) és a tavi denevér (*Myotis dasycneme*). A terület igen fajgazdag, és közülük soknak veszélyeztetett nemcsak a hazai, de európai helyzete is. Mindez mutatja a mintaterületek természetes állapotát és jelzi a Dráva ártér fontosságát a fenti fajok fenmaradásában.