The Standing Dead – important roosting sites of tree-dwelling bats

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ПРЫРОДААХОЎНЫ ПРАЕКТ ДЛЯ
БЕЛАВЕЖСКАЙ ПУШЧЫ
BIELAVIEŽSKAJA PUŠČA CONSERVATION PROGRAMME

BACKGROUND

Worldwide species density of bats is highest in forests ecosystems. European primeval forests are now reduced to a few small and isolated patches since **almost all forests are subject to management**.

But for the development of tree cavities as potential bat roosting sites **natural processes** are a driving factor. Within managed forest stands those **potential roost trees** are generally removed in order to protect the stand's health, produce timber of high quality, provide road security and reduce fire risk.

Therefore, knowledge about bats in ancient and near-natural forests in Europe is scarce.

STUDY OBJECTIVE

In the well-preserved forest stands of the Belovezhskaya Pushcha National Park in Belarus we studied the **bat community** (1), the presence of maternity colonies and their **preference in tree roost selection** (2) and **parameters of roost trees** used by forest dwelling bats (3).

METHODS

- Surveying took place within the strictly **protected zone of Belovezhskaya Pushcha National Park** (Figure 1) in the years 2014-2017.
- We investigated **bat species composition** and **bat habitat use** by automatic acoustic surveys, mist-netting and radio-tracking.
- **Acoustic surveys** ran automated with batcorders (*EcoObs*, Nuremberg) throughout the active season.
- **Mist-netting** sessions (*N*=22) were limited to early June each survey year.
- Female bats (*N*=23) of 9 species were equipped with radio transmitters (*Holohil*, Canada) and tracked to their maternity roosts by **telemetry**.

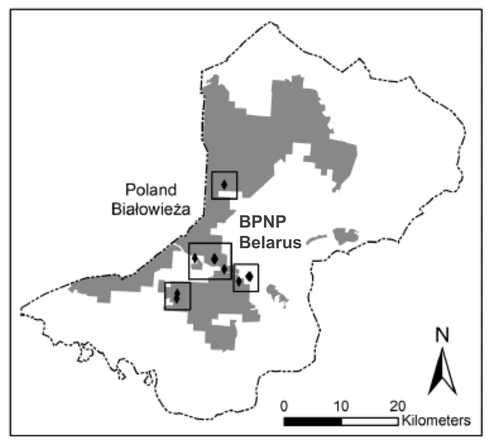

Figure 1 Study areas in Belovezhskaya Pushcha National Park (BPNP), Belarus.

RESULTS

SPECIES COMPOSITION

- In total, we found **13 out of 17 bat species** confirmed for the whole of the national park (Table 1). These could be distinctively identified by mistnetting and acoustic surveys.
- During mistnetting **96 individuals belonging to 12 species were caught**. Through the acoustic survey the Common pipistrelle could be additionally identified.
- Acoustic survey results suggest additionally the **presence of three further species**, but these need to be verified: pond bat *Myotis dasycneme*, the Alcathoe whiskered bat *Myotis alcathoe* and the greater noctule *Nyctalus lasiopterus*.

Table 1 Bat community in the large forest complex of Białowieża and Belovezhskaya Pushcha and species detection in 2014-2016.

No.	Species	Detection in recent study		
		Mist-netting	Acoustic	Maternity roost
1	*Barbastella barbastellus*	X	X	X
2	*Myotis alcathoe*		X	
3	*M. brandtii*	X		
4	*M. daubentonii*	X	X	X
5	*M. dasycneme*		X	
6	*M. nattereri*	X		X
7	*Plecotus auritus*	X		X
8	*P. austriacus*			
9	*Nyctalus leisleri*	X	X	X
10	*N. lasiopterus*		X	
11	*N. noctula*	X	X	X
12	*Eptesicus nilssonii*	X	X	X
13	*E. serotinus*	X	X	X
14	*Vespertilio murinus*	X	X	X
15	*Pipistrellus nathusii*	X	X	X
16	*P. pygmaeus*	X	X	X
17	*P. pipistrellus*		X	X

- The majority (76%) of individuals caught during mist-netting sessions were adult females.

HABITAT PREFERENCES FOR MATERNITY ROOST SITES

- In total, 41 roosts were located.
- **Barbastelle** *Barbastella barbastellus*: roosts were predominantly behind loose bark and in narrow crevices; largely coniferous, **older than 80 years and decaying trees**.
- **Soprano pipistrelles** *Pipistrellus pygmaeus*: behind loose bark of **old, decaying broadleaved trees**.
- **Brown long-eared bat** *Plecotus auritus*: behind loose bark and within crevices of both, broadleaved and coniferous trees.
- **Natterer's and Leisler's bats**: hollows caused by woodpeckers or branch break-offs within vital broadleaved trees (mainly oaks) aged **120 years and older**.

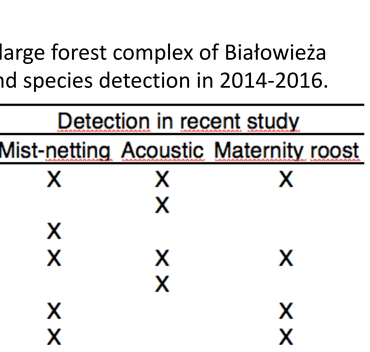

Figure 1 The majority of roosting trees was over 120 years old.

Figure 2 Examples of maternity roost trees discovered by radio telemetry in Belovezhskaya Pushcha. Top left: dying coniferous trees with peeling bark (maternity roosts of *B. barbastellus)*; Top centre: fissure and loose bark of a pine tree (➢ *B. barbastellus)*; Top right: loose tree bark of an oak tree (➢ *B. barbastellus*); Middle left: woodpecker hole in an oak tree (➢ *N. leisleri*); Centre: large old oak with a lightning crevice (➢ *N. leisleri*); Middle right: branch break-off in a birch tree (➢ *M. nattereri*); Bottom left: dying spruce stands (➢ *P. auratus*): Bottom centre: fissure in an aspen tree (➢ *P. pygmaeus*); Bottom right: maternity roost of *P. pygmaeus* behind bark in the canopy of an old oak destroyed by lightning.

CONCLUSION

- **All tree-dwelling bat species are highly dependent on natural processes** within forests that allow the formation of roost sites.
- **Natural aging process of trees as well as the consequences of natural disturbance, should be permitted**. This should extend beyond the protected zones of National Parks.
- Sanitary cuttings decrease habitat suitability for forest-dwelling bats.
- Finally, our results indicate that the forest complex of Belovezhskaya Pushcha and Białowieża is **one of the most important bat areas in Europe**.

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