Supplementary Material

**Supplementary Material Table 1:** **Bat call analysis criteria to assign species/sonotypes**

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| Species/Sonotype | Characteristic criteria for certain assignment of species/sonotype |
| *Nyctalus noctula*    →  Preanalysis in Batexplorer\* | - Regular peak alternation  - Peak <= 21 kHz (QCF)  - End frequency <20 khz (QCF)  - (Addition: when FM-QCF peak and end <22 kHz) |
| *Nyctalus leisleri* | - Softer peak alternation  - Peak 22-26 kHz (Qcf)  - Clear when QCF end-frequency 23-27 kHz  - call length under 11ms |
| *Eptesicus serotinus* | - No peak alternations  - FM-QCF calls  - Clear when high bandwith >30 kHz  - Peak 25- 35 kHz (FM-QCF)  - Clear when end-frequency in FM calls >29khz |
| *Eptesicus nilssonii* – not identified in this study | - No peak alternations  - Peak >28 kHz -31 (Qcf)  - End >27 kHz and >11ms (Qcf)  - Long calls |
| Nyctaloid  (*Nyctalus noctula, Nyctalus leisleri, Eptesicus serotinus, Vespertilio murinus*) | - Irregular peak alternations  - No clear QCF calls  - Peak 22 – 28 kHz in QCF |
| *Pipistrellus pygmaeus*  →  Preanalysis in Batexplorer\* | - Peak 52.1 - 63 kHz  - QCF – FM-QCF  - Clear when end-frequency >52 kHz |
| *Pipistrellus*\_high  (*Pipistrellus pipistrellus, Pipistrells pygmaeus*)  →  Preanalysis in Batexplorer\* | - Peak 51 -52 kHz  - QCF – FM-QCF |
| *Pipistrellus pipistrellus*  →  Preanalysis in Batexplorer\* | - Peak 43< – 50.9 kHz  - QCF – FM-QCF  - Clear when end-frequency 45-50 kHz |
| *Pipistrellus*\_low  (*Pipistrellus pipistrellus, Pipistrellus nathusii*)  →  Preanalysis in Batexplorer\* | - Peak 42 – 43 kHz  - QCF – FM-QCF |
| *Pipistrellus nathusii*  →  Preanalysis in Batexplorer\* | - Peak 34 – 41.9kHz  - QCF – FM-QCF  - Clear when end-frequency <40kHz |
| *Myotis myotis* | - Typical FM-dominated calls and knee around 30 kHz  - Start <90 (100) kHz, end 20 - 23 kHz |
| *Myotis nattereri* – not clearly identified in this study due to strong attenuations. Likely fell into the *Myotis* spp. category. | - Typical rather straight FM-calls with very wide bandwidths.  - Start >100 kHz; end often <21 kHz |
| *Myotis* spp.  (*Myotis bechsteinii, Myotis dasycneme, Myotis daubentonii, Myotis mystacinus / Myotis brandtii, Myotis nattereri*) | - Typical FM-calls with wide bandwiths with shapes including knee and heels |
| *Plecotus* spp.  (*Plecotus auritus/ Plecotus austriacus*) | - Typical FM-dominated call shapes, first and second harmonics visible \*\* |
| *Barbastella barbastellus* | - Alternating call types A and B  - Peaks A: (30) 33-35 (37) kHz; B: (35)39 – 43 (45) kHz |

\* Please refer to Supplementary Material Datasheet S1to see the process of semi-automatic pre-analysis in Batexplorer.

\*\* In the case of *Plecotus* spp., we also counted in the recordings the characteristic and loud low-frequency social calls emitted during hunting flights. Their true function is not fully understood yet and they have a better detection range compared to the very quiet whistle-calls in echolocation (Ahlén, 1981; Skiba, 2009; Murphy, 2012).

Bat call analysis criteria have been summarized from the following sources: Parsons and Jones (2000), Russo and Jones (2002), Pfalzer and Kusch (2003), Obrist et al. (2004), Skiba (2009) and Barataud (2020).

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