

Acoustic Bat Identification Software Testing Criteria – Draft January 2013

Software programs meeting all the criteria outlined below and validated by the U.S. Fish and Wildlife Service (Service) (through testing by the U.S. Geological Survey) will be approved for use for analysis of bat calls obtained during summer surveys of Indiana bats. A list of candidate and approved programs will be maintained on the Service's Indiana bat summer survey guidance website: <http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html>

1. The program must be quantitative and automated to ensure repeated consistency in analysis.
2. Any call identification analysis program must be based upon an extensive call library of free-flying bats (see question #27 in the FAQs). Program developers must provide the Service with a copy of their call library, which must indicate the number of calls per species, call recording location and the method of collection (e.g., free-flying bats, hand release, light tag).
3. Each program and/or its supporting materials must explicitly state which species and geographic area(s) it covers.
4. The program must include filtering to remove extraneous noise and non-bat files, as well as feeding buzzes, files with multiple bats, poor-quality passes that are recognizable as a bat but not to species, and medium-quality passes that are only recognizable to genus.
5. The program must include an “unknown” category for classifying calls that are not characteristic of species in the call library to ensure that such calls are not forced to a species identification.
6. Accuracy rates of the program must be derived through cross-validation (e.g., qualitative assessment). Correct classification rates of files identified to individual bats species for the underlying analytical program within identification software, i.e., discriminant function analysis, neural networks, classification and regression tree (CART) or other statistical tests (see #6) must be provided to show the initial basis used for maximum-likelihood estimator calculations. Minimum correct classification rate on the software's training data must be 90% or better for all *Myotis* species that may occur within the range of the Indiana bat.
7. As species identifications are never perfect, all analysis programs must utilize a maximum-likelihood estimator approach to determine species presence at the site rather than relying on a single sequence. Post-hoc maximum-likelihood estimator p-values will be used to determine acceptance thresholds for final identification determination.
8. Results must include file level summaries (e.g., # of pulses, species IDs, unknown species, invalid), site/night analyses (e.g., # of files, # of invalid files, # of files ID'd to species vs. unknown, IDs for each species), and the maximum-likelihood estimator value assignments.