



COPPERHEAD
ENVIRONMENTAL CONSULTING

8 March 2013

Mr. Andrew King

Endangered Species Biologist
U.S. Fish and Wildlife Service
620 South Walker Street
Bloomington, IN 47403-2121

Ms. Robyn Niver

Endangered Species Biologist
U.S. Fish and Wildlife Service
3817 Luker Road
Cortland, NY 13045

Mr. Mike Armstrong

Endangered Species Biologist
U.S. Fish and Wildlife Service
J. C. Watts Federal Building, Room 265
330 West Broadway
Frankfort, KY 40601-8670

Re: Copperhead Comments on Range-wide Indiana Bat (*Myotis sodalis*) Summer Survey Guidance Revised Draft.

Copperhead Environmental Consulting, Inc. (Copperhead) has a combined 80+ years of bat survey experience and we appreciate this opportunity to comment on the Revised Guidance. Copperhead issued a similar review of the 2012 Draft Guidance in February 2012 and has discussed the proposed Guidance with several USFWS representatives over the past 12 months. While we acknowledge the USFWS's efforts to address our comments as well as the comments of more than fifty other individuals and organizations, we feel the Revised Guidance still requires significant improvements. Copperhead is also a signatory of the *Collective Response To: USFWS Draft Revised Rangewide Indiana Bat Summer Survey Guidelines*. Although we believe some modifications may be necessary to improve this document and its methodology, we feel the Collective Response is the most realistic alternative to the Proposed Guidelines and Contingency Plan yet put forward, and best meets the USFWS objective "to provide standardized, rangewide guidelines and protocols and to determine whether Indiana bats (*Myotis sodalis*) are present or likely absent at a given site during the summer (May 15 to August 15)." We

encourage the Service to reconsider the implementation of the Revised Guidance in its current form and to use this occasion to issue a comprehensive Indiana bat survey guidance that ensures conservation of suitable habitat and recovery of the species. For any such guidance to be successful, it must:

- 1) Be based on the best available science;
- 2) Set rigorous and achievable standards;
- 3) Require a minimum acceptable level of effort;
- 4) Allow for an efficient transition from current guidance;
- 5) Allow for comparisons and analysis of previous collected data;
- 6) Be cost effective for developers and taxpayers; and
- 7) Have the necessary USFWS resources to implement the guidance effectively and efficiently.

Our most serious concern and comment is in regards to aspect 1 above. The Revised Guidance **is not based on the best available science** and therefore renders the entire document (i.e., guidance) indefensible and unable to meet its objective “*to determine whether Indiana bats (*Myotis sodalis*) are present or likely absent at a given site during the summer (May 15 to August 15).*” We, along with the majority of the 2012 Guidance commenters, have emphatically raised this issue in our formal comments, at each 2012-2013 bat working group meeting in the eastern US, and in countless informal conversations with USFWS personnel (both on and off the committee that created this Guidance). At every eastern bat working group meeting in 2012-2013, professional presentations have been given addressing this aspect of the guidance with the over-all conclusion that acoustic data alone are not suitable to identify Indiana bat presence.

There cannot be any disagreement over the fact that automated acoustic identification programs, in their current form, cannot sufficiently distinguish between the endangered Indiana bat and non-endangered little brown bat (*Myotis lucifugus*) echolocation calls.

There can also be no disagreement that the overwhelming majority of available data and peer-reviewed literature regarding this topic acknowledge that both mist-net and acoustic survey methods have limitations, and conclude that using both is the best way to detect the greatest number of bat species in an area (Kunz and Brock 1975, Kuenzi and Morrison 1998, Murray et al. 1999, O'Farrell and Gannon 1999, Flaquer et al. 2007, Robbins et al. 2008). Despite these data, the Revised Guidance accepts Indiana bat presence solely on acoustic survey methodology, a practice that is not based on the best available science and is, in fact, counter to it. To date, USFWS has never sufficiently addressed this comment at meetings, in the guidance itself, or in any official USFWS written document.

With the abundance of data and literature available (and provided to USFWS during the last comment period) to support these facts, we request that USFWS provide a detailed and thorough written response to this concern, supported by peer-reviewed literature and data sufficient enough to counter those provided by commenters over the past year.

General Process

1. The text below was taken from Copperhead's 2012 response to the draft protocol:

The draft protocol states that *"It is well documented that Indiana bats, even when we know they are present, can be difficult to capture using currently accepted mist-netting survey protocols."* Although this may be the opinion of some researchers, such a strong statement should be cited extensively. The citations that do follow this statement are used to support the premise that acoustical monitoring equipment *"consistently detected bat species that*

mist-netting missed.” This idea is carried further throughout the guidance to justify the exclusive use of automated acoustic monitoring to determine presence or possible absence of Indiana bats. However all of the studies cited (Kunz and Brock 1975, Kuenzi and Morrison 1998, Murray et al. 1999, O’Farrell and Gannon 1999, Flaquer et al. 2007, Robbins et al. 2008) acknowledge that both mist-netting and acoustic survey methods have limitations and conclude that using both is the best way to detect the greatest number of bat species in an area. For example, Flaquer et al. (2007): “Different techniques should be used to assess the richness of bat communities and we recommend combining all the methods described above in future bat surveys.” Robbins et al. (2008): “In conclusion, we suggest that the protocol as written may be improved by moving mist nets between night one and night two and by using ultrasonic detectors to supplement mist-netting effort.” Murray et al. (1999): “...the combination of both survey techniques provides the most effective means of determining bat species composition in an area.”

The Revised Guidance does not address these issues, it simply omits the references, and instead, the justification for moving exclusively to acoustic surveys is presented in answer 1 of the FAQs. Answer 1 does not acknowledge the full implications of the above mentioned literature or the fact that acoustic analysis software has changed significantly since their publication. We again suggest that should USFWS wish to implement this specific acoustic approach, full acknowledgement of its shortcomings and limitations should be provided as suggested by Sherwin et al. (2000). To our knowledge there exist no contemporary, peer-reviewed papers suggesting that acoustic surveys should be used exclusively to determine the presence or possible absence of the Indiana bat. While we agree that new techniques should be investigated to provide more effective surveys, we do not feel that

the recent advancements made in automated echolocation call identification are as significant as the USFWS is supposing.

PHASE 1 - HABITAT ASSESSMENTS

2. As no significant changes have been made to this portion of the Guidance, we would like to resubmit Copperhead's original comments from the 2012 Draft Guidance:

The habitat assessment (HA) is the first step in the Indiana Bat Survey Guidance Decision Tree for Phase 1 and data submitted from this process are critical to all subsequent decisions. We feel that this guidance provides clear expectations for a HA and the data sheets found in Appendix A will help standardize these assessments. However, the nature of the data required by the form dictates that a site visit be implemented for all HAs. We feel the protocol guidance should indicate that a site visit is unnecessary for those projects deemed to have suitable Indiana bat habitat as determined by an appropriate desktop review (e.g., aerial photograph analysis, GIS analysis, historical records).

The current method of desktop review is effective at identifying potential habitat, and in worst case scenarios errors on the side of caution, resulting in less suitable habitat being surveyed. The additional time and resource costs needed to survey these less suitable areas pales in comparison to what would be required to perform a HA as described by the new guidance, especially on a large project (e.g., 100 mile linear clearing project). Assuming potential habitat is present based on aerial maps and GIS analysis, will have no negative effect on the species and in fact is more

realistic considering the wide range of suitable habitat described in the draft guidance: “...variety of forested/wooded habitats where they roost, forage, and travel as well as surrounding non-forested habitats (e.g., agricultural fields, emergent wetlands, old fields, pasture).”

If an on-the-ground HA is going to be required, we highly recommend that, given the importance to the rest of the decision tree, more consideration be given to the personnel requirements. This protocol can institute a better check and balance system by requiring a Qualified Biologist (as defined in the footnotes of the draft protocol) to review and approve any on-the-ground HA prior to submission to the USFWS. In other words, anyone can perform the HA, but they must have a permitted biologist willing to provide their credibility as to the quality of the assessment. This can be done by simply having a Qualified Biologist affix their signature and permit number to any HA submitted to the USFWS.

Again, we absolutely support the implementation of a step-by-step process for the protocol as it standardizes the approach and leaves no question as to what is required. However, since all subsequent steps rely on the HA, it is imperative that the individual ultimately responsible for the HA be intimately familiar with Indiana bat ecology, habitat requirements, and roost preferences. Individuals that have not acquired the skill set necessary to obtain a recovery permit cannot perform adequate HA, as defined by the draft guidance. An inadequate or inappropriate HA, if not recognized by USFWS in their review, could result in needless take, hampering recovery of the species.

PHASE 2 - ACOUSTIC SURVEYS

3. This phase of the guidance supposes the accurate, automated identification of free-flying Indiana bats from recorded echolocation calls. Again, since the majority of data and literature available do not support this supposition, we feel that the sole use of this technique to determine presence or probable absence of this species is premature. Further, the conservation measures taken for assumed presence of an Indiana bat maternity colony need to be better defined. As mentioned in our 2012 response:

In order to know whether or not to recommend mist-net surveys, project consultants need to inform clients as to what “...*the most conservative measures for the protection of the species*” are going to include and how these measures will impact project timing and costs.

PHASE 3 - MIST-NETTING AND PHASE 4- RADIO-TRACKING/ EMERGENCE SURVEYS

4. We agree with the change from the suggested July 31st (2012 Draft Guidance) mist-net season end date back to the original August 15th date provided in the 2007 Draft Guidance (USFWS 2007). This is a prudent move supported by the majority of bat researchers. However, we still feel that while positive mist-net results (i.e., Indiana bat captures) will certainly provide valuable information regarding bat use of the project area, determining “...*which type of Indiana bat population (e.g., maternity colony or males) is likely to use the project site*” from acoustic data only (as mandated in this section of the Revised Guidance), is unrealistic and arbitrary.

APPENDIX A PHASE 1 HABITAT ASSESSMENTS

PERSONNEL

5. We realize that USFWS cannot require individuals to acquire a recovery permit if they are not handling bats. However, we do not feel that “... a natural resource degree or equivalent work experience...” is enough to qualify an individual to perform the most important phase of this guidance. The FAQ document states, “The Service is planning to offer training courses on various aspects of the summer guidelines in the near future. We anticipate that these courses will serve to certify that individuals are proficient in the skills required in the guidance.” With this statement, it is clear that the Service recognizes the need for these courses and provides yet another reason why the Revised Guidance is premature and should not be implemented. We suggest these courses be made available well in advance of the implementation of the new protocol. In fact, we feel that providing these certifications is in line with the Service’s requirements under section 7 of the Endangered Species Act “...to provide a program for the conservation of such endangered and threatened species ...” (United States Government 1988). To do otherwise jeopardizes the quality of the habitat assessment phase and renders the entire Revised Guidance ineffective.

6. The data sheet used for the habitat assessments needs to better define how many sample sites are needed within a project area. This issue is mentioned in answer 9 of the FAQs but is not resolved: “The number of worksheets completed depends on the size of the project and whether a single worksheet is representative of all habitats present or whether there are multiple habitats or variation of one habitat type to document.” The ambiguity of this statement is

not consistent with the level of detail required on the data sheet, especially for large, non-linear projects.

APPENDIX B PHASE 2 ACOUSTIC SURVEYS

PERSONNEL

7. Placement of bat detectors in the field incorporates the same process as selection of proper mist-net sites; it requires knowledge of the species and equipment. The paragraph under personnel in the guidance states: *“Acoustic surveyors must have a working knowledge of the acoustic equipment, analysis tools, and Indiana bat ecology. Surveyors must be able to identify appropriate detector placement sites and establish those sites in the areas that are most suitable for recording high-quality Indiana bat calls. Thus, it is highly recommended that all potential acoustic surveyors attend appropriate training and have experience in the proper placement of their field equipment.”* We assume that the training referred to above would be similar to that mentioned in the *Personnel* section of Appendix A of the Revised Guidance. We would like to again emphasize that if the need for these courses and certifications exists, then the Service should clearly define when and where such courses will be available well in advance of implementing this protocol.

DETECTOR PLACEMENT

8. Paragraphs 1 and 2 of this section present contradictory information and an inaccurate literature citation. Statements “b” and “d” in paragraph 1 state detectors could be placed near *“(b) waters sources”* or in *“(d) blocks of recently logged forest where some potential roost trees remain...”* In paragraph 2

surveyors are instructed to deploy detectors “ at least 49 feet (15 meters) from water surfaces (Johnson et al. 2012)” and “at least 49 feet (15 meters) from known or suitable roosts⁷ (e.g., trees/snags, buildings, bridges, bat houses, cave or mine portal entrances).” We feel these points should be clarified; because no training or certification is required, (see #6 and #8 above) these instructions are likely to be used by surveyors with very little acoustic deployment experience.

The Johnson et al. (2012) reference makes no implications that placing a detector within 15 meters of a water surface is detrimental to the recording of bat echolocation calls. Johnson et al. (2012) does reference Mackey and Barclay (1989) which shows bats may avoid areas of high background noise such as fast moving water sources.

9. Footnote 6 of the Revised Guidance states: “Deployment of detectors in closed-canopy locations that typically are good for mist-netting are acceptable as long as the area sampled below the canopy does not restrict the ability of the equipment’s detection cone to record high-quality calls (i.e., the vegetation is outside of the detection cone).” As mentioned in Copperhead’s 2012 response:

In fact it may be impossible to properly make this assessment as the detection cone is not well defined for most detectors and does vary greatly with weather, weather proofing techniques, and the species producing calls. We again suggest there must be some metric established to determine the area actually surveyed by a detector in order to assess the amount of effort put towards detection of an Indiana bat.

INSECT NOISE INTERFERENCE

10. Please see the statement below from Copperhead's 2012 response:

Although this is not a sub-heading under this guidance, we feel that insect noise interference is a very important topic to address when considering the use of acoustic monitoring to determine presence or possible absence of the Indiana bat. Even if standard tests/adjustments are developed for detectors, levels of insect noise will vary across the species' range. At a certain level, especially when using a zero-crossing bat detector, a significant portion of bat calls will be obscured by insect noise. This is of particular concern in the southern portions of the Indiana bat range and during late summer. We would argue that zero-crossing acoustic data collected in New York during May, for example, would have far greater likelihood of detecting an Indiana bat than similarly collected data from Tennessee during August. Such a discrepancy would result in a large number of false-negatives reported in these southern areas and during the late summer.

WEATHERPROOFING

11. Please see the statement below from Copperhead's 2012 response regarding the statement: *"For directional microphones, the use of a polyvinyl chloride (PVC) tube, generally in the form of a 45-degree elbow the same diameter as the microphone (Britzke et al. 2010) is acceptable."*

Various weatherproofing measures affect a detector's ability to collect good quality calls in different ways. This variation is exaggerated when different types (i.e., brands) of detector are considered. The *"45-degree*

elbow” technique is a specific weatherproofing method used with the AnaBat II bat detector. As the guidance does allow for other types of bat detectors to be used, we feel that establishing this one weatherproofing option as the only currently accepted method will result in significant variation in the number and quality of calls collected.

The Britzke et al. (2010) paper used to justify this technique as the accepted method states: *“Results of this study should not necessarily be applied to other modifications of these weatherproofing options, but instead should illustrate the potential impacts of orientation and weatherproofing.”* The paper goes on to say: *“The impacts of the orientation and weatherproofing options likely vary with local site conditions and the bat community present.”* Additionally, Gruver et al. (2009) found that the use of a reflective plate resulted in significantly more bat passes recorded than when the PVC elbow technique was used. The reflective plate method is also preferred by the instructors of some Anabat techniques workshops (Livengood Consulting 2010). Our goal is not to endorse one technique over the other and we agree with the USFWS’s intentions to incorporate other weatherproofing methods *“...provided they show that call quality and the number of calls recorded are comparable to those without weatherproofing.”* However as stated earlier, we are confident that weatherproofing will be used intensively and we feel that not enough peer-reviewed evidence currently exists on this matter to properly address it in this guidance.

12. The draft guidance already establishes both the quantity and quality of data required to meet USFWS standards. As such, researchers should be free to use any weatherproofing techniques they deem appropriate to meet those standards. By requiring “preferred” and/or “accepted”

weatherproofing techniques, the guidance thwarts advancement of these techniques. Researchers are unlikely to experiment on how to better weatherproof equipment since the protocol will not accept the methodology. As written, this guidance implies that collected acoustic data that may meet the quantity and quality standards of this guidance may be rejected if weatherproofing techniques that “are not currently accepted” were used. Additionally, data presented at the 2013 Southeastern Bat Diversity Network Meeting by the inventor of the AnaBat system, Chris Corben, showed significant variation in the zone of detection depending on the specific brand and design of the PVC 45°-elbow. This indicates that if the Service wishes to standardize this aspect of acoustic monitoring, more detailed instruction must be provided.

WEATHER CONDITIONS

13. Although we agree that all the weather factors mentioned in the guidance are important, we feel a more in-depth description of how these data are to be collected is necessary. In other words, if the detectors are to be left out unattended for the entire night, how will these weather parameters be observed and recorded? The use of a general NOAA National Weather Service station area weather report (as suggested by the Revised Guidance) will not reflect the conditions at individual detector sites on the scale and precision required by the guidance (e.g., 30 minute precipitation events or sustained wind speeds greater than 4 meters/second). Additionally, these weather minimums were developed for 5-hour mist-net surveys, as the Revised Guidance requires a full night of acoustic sampling; we feel these minimums should be scaled to reflect this change.

14. Also, as recommended by the Copperhead 2012 response:

USFWS should revisit weather parameters for conducting bat surveys as they pertain to wind energy projects. Wind projects specifically target sites that have higher sustained winds. In order to properly document bat activity in these conditions and provide data that could be crucial to curtailment strategies or mitigation measures, we recommend setting specific wind speed standards for surveys on wind energy sites based on current literature.

MINIMUM LEVEL OF EFFORT

15. As in our response to the 2012 draft:

We believe more work on this subject is necessary and that there are a myriad of factors that may affect Indiana bat acoustic detection probabilities (Yates and Muzika 2006). One obvious factor is weather. To truly standardize acoustic surveys and thus detection probabilities, the impact of environmental factors such as temperature and humidity require detector calibrations on a nightly basis (Sherwin et al. 2000). We feel this topic requires further research and peer-reviewed documentation before it is implemented in any guidance.

The Revised Draft has increased the number of required acoustic nights per site from 2 to 6 detector-nights but makes no reference to how this number was determined. We assume from Answer 20 of the FAQs document that this decision is based on one preliminary study conducted at Fort Drum, New York. Since the Service acknowledges that *no automated software programs for identifying Indiana bats (or other eastern U.S. bat species) have been*

peer-reviewed and published in the scientific literature yet (FAQ number 30) we question how positive acoustic detection of Indiana bats for the above mentioned study was even determined. While we certainly would not argue that as bat populations decline, detection effort (acoustic monitoring or mist-netting) should increase, the increase to 6 detector-nights will have an immense impact on timing and costs of projects and deserves further study across the species' range. Such an important decision should not be based on one unpublished study conducted at one site in an area so heavily impacted by WNS. In fact, a recent peer-reviewed report specifically addressing this topic found even a six night sampling period was not sufficient to detect Indiana bats in areas not heavily impacted by WNS (Romeling et al. 2012). This study found that four weeks of consecutive recording was necessary to detect Indiana bats at a 95% confidence level. This result further illustrates the problems inherent in the reliance on acoustic monitoring alone to determine presence/possible absence of Indiana bats, and that the minimum level of effort (as outlined in the Revised Guidance) needs further review.

ANALYSIS OF RECORDED ECHOLOCATION CALLS

16. The Revised Guidance no longer contains the following sentence: *“Previous research has shown the ability to accurately identify bats by their echolocation, including the Indiana bat (Britzke et al. 2011).”* However, it is clear that USFWS continues to base the Revised Guidance on this questionable statement. As noted in our Introduction above and demonstrated by the majority of data, literature, and professional presentations, automated acoustic analysis cannot sufficiently distinguish between endangered Indiana bat and non-endangered little brown bat echolocation calls. As the

entire Revised Guidance relies so heavily on an unproven science, it fails to provide a method to accurately identify Indiana bats.

A frequent response to this comment by USFWS personnel is that captured bats are often visually misidentified by individuals permitted to work with and identify Indiana bats. The implication of this declaration being that USFWS is simply exchanging one source of error with an equivalent error of another methodology. Although we fully acknowledge that visual misidentifications do occur, we are not aware of any studies that have determined an actual error rate associated with visual identifications. However, several studies have demonstrated error rates associated with various automated acoustic identification programs. If USFWS mandates an exchange of one methodology for the other, they must demonstrate (through peer-reviewed literature) that the error rates justify the exclusive use of acoustic monitoring in establishing presence/probable absence of the Indiana bat.

17. While we agree with the answer provided by FAQ number 28 requiring call analysis software to be independently evaluated by the U.S. Geological Survey, we feel a more detailed description of this evaluation is necessary. For instance, what type of call library is going to be used to evaluate the programs, an existing library of clean calls, or a library of free flying calls collected in the field? Also, we are confused and concerned by FAQ answer 30 which states: *“To our knowledge, no automated software programs for identifying Indiana bats (or other eastern U.S. bat species) have been peer-reviewed and published in the scientific literature yet. However, several programs have been informally used and “beta-tested” using field-collected calls recorded by interested users throughout the species’ range. Nonetheless, acoustic analysis*

through the earlier discriminate function analysis (DFA) has been used for several years as a research tool that has been accepted as authoritative and accurate for assigning habitat use/preference relative to bat activity as identified by species (Ford et al. 2011, Corcoran 2007, Schirmacher et al. 2007, Britzke et al. 2002, Parsons and Jones 2000). Even though DFA is often considered as “best science” at present, the change of its use as an investigative tool to a regulatory assessment tool requires additional scrutiny to better understand its accuracy rates, risk, and probabilities in this new context.” **This is precisely the argument we are making against the premature release of the Revised Guidance. The Service cannot acknowledge and print these issues in one publication (FAQs) while failing to address them in others (Revised Guidance and Contingency Plan).**

18. The Revised Guidance still fails to address the following issue outlined in our 2012 response:

The guidance allows for the use of a variety of detectors and software analysis programs. Consequently, the guidance needs to address how conflicting identifications of Indiana bats on a single project site from these different methods will be considered. This scenario has occurred in the past and should be addressed considering no standard methodology exists for establishing call libraries and “*large call library*” is not defined by the guidance.

19. Both the Revised Guidance and the FAQ document omit the previous requirement of retaining acoustic files for 7 years. We feel that this is still an important issue that should be addressed. The protocol needs to specify

how long files need to be retained and who is responsible for storing these data sets (e.g., consultant, regulatory agencies, permit applicant).

20. The protocol also needs to address how advances in acoustics technology will be applied to retained files. Although this issue is addressed in FAQ answer 29, we feel more information is needed. Simply stating that “...we may recommend reanalyzing existing acoustic data for various sites on a case-by-case basis” leaves much room for interpretation. We would argue that as the Service is required to use the best available information for decision making, **when** advances are made in acoustic identification technology, reanalyzing would have to be required. This will obviously lead to a variety of legal issues (Titus 2009) we feel have are not adequately considered by the Revised Guidance or any accompanying documents.

Resource Allocation

21. Although not addressed by any of the documents submitted to the Federal Register, Copperhead is seriously concerned about the lack of resources USFWS has in place to implement this Revised Guidance. At this time, coordination with the agencies is limited to a pre-season consultation to discuss projects, submittal, review and concurrence of study plans, and submittal, review, and concurrence of final reports. Additional consultation is also necessary within the season if Indiana bats are captured. Despite proactive efforts by both consultants and USFWS, significant delays still occur. Many USFWS personnel have commented on the fact that they do not have the time and resources necessary to meet deadlines as the process stands now.

The Revised Guidance requires additional steps to the consultation process that would seem to place an additional consultation burden upon the USFWS. For example, the Habitat Assessment is much more in-depth and will require a report, review, and concurrence from USFWS. A study plan must then be submitted to conduct acoustic surveys. Considering the likelihood of “false” Indiana bat acoustic identifications, the actual survey process will take much longer than in the past due to an increase of “in-season” consultations. Should a project proponent decide to conduct mist net surveys after acoustic surveys, consultants must submit the acoustic report and another study plan (mid-season) and await concurrence from USFWS to begin the mist net and radio telemetry surveys. Once complete, another report must be submitted and reviewed by USFWS to ensure concurrence. Considering the delays that already occur during the consultation process for current Regulatory Guidelines, it would seem the Revised Guidance has the potential to delay projects (possibly a full year) and significantly increase costs.

CONCLUSION

While we acknowledge that the USFWS has made several changes that were suggested by respondents to the 2012 Draft Guidance, we do not feel those changes significantly improve this Revised Guidance. The Revised Guidance continues to base all actions and decisions on the ability to accurately and consistently identify free flying Indiana bats through the use of acoustic surveys and automated identification software. Again, the peer-reviewed literature (i.e., best available science) does not support the premise of the Revised Guidance. We feel that the USFWS needs to adequately address this issue to ensure this proposed Revised Guidance protocol does not inhibit recovery efforts. Copperhead considers itself among those who strongly support the

development of a standardized acoustic monitoring protocol. Therefore, we highly recommend that the Service acknowledge and incorporate all of the recommendations of the literature provided in the Revised Guidance, along with the additional references provided herein. Copperhead also believes that at this time, automated acoustic identification technology, by itself, is not adequate to detect Indiana bats, especially in areas highly impacted by WNS. Indeed, as the literature suggests, a combination of the two methods should be used to ensure as much high quality data as possible are collected to sufficiently determine the species presence or probable absence at surveyed sites. As with any significant change in science, when sufficient testing and peer-reviewed publications of acoustic survey and automated identification methods present enough evidence to support the Revised Guidance, we will fully endorse those protocols.

We sincerely thank the Service for this opportunity to comment on this very important guidance and will make ourselves available at your convenience to discuss and/or clarify any comments we have provided.

Sincerely,

Mark Gumbert
Principal Biologist/CEO

Jeff A. Hawkins
Biologist

Chris Leftwich
Biologist

Jeff H. Schwierjohann
Biologist/COO

Price Sewell
Biologist

Piper Roby
Biologist

Josh Adams
Biologist

Gregg Shirk
Biologist

Steve Samoray
Biologist

LITERATURE CITED

- Britzke, E.R., K.L. Murray, J.S. Heywood, and L.W. Robbins. 2002. Acoustic identification. Pages 221-225 *In* A. Kurta, and J. Kennedy, eds. *The Indiana Bat: Biology and Management of an Endangered Species*, Bat Conservation International, Inc., Austin, Texas.
- Britzke, E.B., B.A. Slack, M.P. Armstrong, and S.C. Loeb. 2010. Effects of orientation and weatherproofing on the detection of bat echolocation calls. *Journal of Wildlife Management* 1(2): 136-141.
- Britzke, E.B., J.E. Duchamp, K.L. Murray, and L.W. Robbins. 2011. Acoustic Identification of Bats in the Eastern United States: A Comparison of Parametric and Nonparametric methods. *Journal of Wildlife Management* 75(3): 660-667.
- Flaquer, C., I. Torre, and A. Arrizabalaga. 2007. Comparison of sampling methods for inventory of bat communities. *Journal of Mammalogy* 88:526-563.
- Kuenzi, A.J., and M.L. Morrison. 1998. Detection of bats by mist-nets and ultrasonic sensors. *Wildlife Society Bulletin* 26(2):307-311.
- Kunz, T. H., and C. E. Brock. 1975. A comparison of mist nets and ultrasonic detectors for monitoring flight activity of bats. *Journal of Mammalogy* 56:907-911.
- Livengood Consulting. 2010. Anabat Techniques Workshop. Carrolton, Kentucky. September 20-23, 2010.

- Mackey, R.L., R.M.R Barclay. 1989. The influence of physical clutter and noise on the activity of bats over water. *Canadian Journal of Zoology* 67: 1167-1170.
- Murray, K.L., E.R. Britzke, B. Hadley, and L.W. Robbins. 1999. Surveying bat communities: a comparison between mist nets and the Anabat II bat detector system. *Acta Chiropterologica* 1(1):105-111.
- O'Farrell, M.J., and W.L. Gannon. 1999. A comparison of acoustic versus capture techniques for the inventory of bats. *Journal of Mammalogy* 80(1):24-30.
- Parsons, S., and G. Jones. 2000. Acoustic identification of twelve species of echolocating bats by discriminant function analysis and artificial neural networks. *Journal of Experimental Biology* 203:2641-2656.
- Robbins, L.W., K.L. Murray, and P.M. McKenzie. 2008. Evaluating the effectiveness of the standard mist-netting protocol for the endangered Indiana bat (*Myotis sodalis*). *Northeastern Naturalist* 15:275-282.
- Romeling, S.R., C.R. Allen, and L. Robbins. 2012. Acoustically detecting Indiana bats: how long does it take? *Bat Research News* 53(4):51-58.
- Sherwin, R.E., W.L. Gannon, and S. Haymond. 2000. The efficacy of acoustic techniques to infer differential use of habitat by bats. *Acta Chiropterologica* 2(2):145-153.
- Titus, R.W. 2009. Animal Welfare Institute, et al. v. Beech Ridge Energy LLC, et al. memorandum opinion. United States District Court For the District of Maryland. 76p.

United States Government. 1988. Endangered Species Act of 1973, as amended through the 100th Congress. U.S. Department of the Interior.

USFWS (US Fish and Wildlife Service). 2011. Indiana bat survey guidance for Kentucky. U.S. Fish and Wildlife Service, Kentucky Field Office, Frankfort, KY. 35 pp.

USFWS. 2007. Indiana Bat (*Myotis sodalis*) draft recovery plan: First revision. US Fish and Wildlife Service, Fort Snelling, MN. 258 pp.

Yates, M.D. and R.M. Muzika. 2006. Effect of forest structure and fragmentation on site occupancy of bat species in Missouri Ozark Forests. *Journal of Wildlife Management* 70(5):1238-1248.