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Subject: Comment on the Draft Rangewide Indiana Bat Summer Guidance

To Whom It May Concern:

We appreciate the opportunity to provide comments on the draft guidance for Indiana bat (*Myotis sodalis*) surveys issued by the USFWS, and hope that our comments are helpful in preparing the final draft of the document. Please note that these are not necessarily the only comments from Stantec, as others within the company may provide comments as well.

General Comments

In its shift from mist-netting towards acoustic surveys to determine the presence of Indiana bats, the draft protocol fails to address several advantages of acoustic monitoring while giving up the relative certainty of species identification afforded by mist-netting, as well as the continuity of mist netting datasets. While mist-netting and acoustic surveys are each a type of sampling and are not capable of documenting all bats in an area, each method has associated strengths and weaknesses relevant to our comments on the guidance.

Mist-netting allows for positive species identification except in rare cases, and enables banding bats, and radio-tracking bats to roosts, where emergence counts can more accurately quantify population numbers. However, mist-netting is restricted to certain habitat types and settings where bats are less able to detect and avoid nets. Because not all bats are equally susceptible to being captured in nets, and the effort required to effectively deploy mist-nets limits the number of sites and the length of time that can realistically be surveyed in an area, netting is limited by habitat, is not equally effective among species, and is limited by cost for long-term monitoring. By contrast, acoustic detectors are more versatile in where they can be placed, enable quantification of activity levels and activity patterns, and are well-suited for long-term monitoring. However, species identification is less certain using acoustic identification, as bat species cannot always be distinguished reliably from one another due to similarity of call structure between particular species, namely the Indiana bat and little brown bat (*Myotis lucifugus*). It has also been suggested by automated bat identification programmers that poor quality eastern red bat (*Lasiurus borealis*) calls can often be mistaken for Indiana bat calls. Further, acoustic surveys can also be limited by habitat, as surrounding vegetation can affect call quality and because forested habitats without sufficiently-sized openings cannot be sampled, and have an inherent bias against bat species that echolocate quietly.

A weakness of the draft protocol is that it essentially substitutes acoustic detectors for mist-nets and therefore fails to take advantage of many of the strengths of acoustic sampling. At the same time, it creates the likely scenario that numerous projects will arrive at a situation where one method (acoustic sampling) indicates that Indiana bats are present while another method (mist-netting) fails to detect any Indiana bats, or where two alternative acoustic identification programs disagree on the likelihood that Indiana bats are present.[1]

[1] We acknowledge that under the draft protocol, if Indiana bats are detected using acoustics, then the species is assumed to be present regardless of the results of Phase 3 mist-net surveys. However, if mist-net surveys are

Habitat Assessment

The habitat assessment portion of the protocol includes a vague description of what constitutes potential summer roosting habitat, which appears to consider any forested habitat with trees greater than 3 inches diameter-at-breast height (DBH) as potential habitat warranting acoustic surveys. Although the protocol includes a habitat datasheet (sample site description), it does not specify how many such sample sites are required per area or what the size of the sample site should be. Also, the habitat datasheet includes habitat suitability categories of "high", "moderate", and "low" without explaining what metrics should be used to evaluate the site or requiring justification of a determination of habitat quality. The habitat assessment guidance also acknowledges that while Indiana bat habitat may not be present in the project area itself, suitable habitat outside the project area may require sampling. This presents numerous potential difficulties with access to private lands outside a project area.

If the goal of the habitat assessment is simply to identify areas with roost trees greater than 3 inches DBH, then we agree that many ecologists, regardless of their Indiana bat knowledge, can provide such an assessment. However, the implications of the Phase 1 habitat assessment are important in that it decides the need for Phase 2 acoustic surveys, and Phase 1 surveys also provide a first glimpse of habitat at a development site. As the outcome of Phase 1 is an assessment of whether habitat is suitable for Indiana bats, it seems that more information could be collected during this Phase by ecologists having demonstrated Indiana bat experience. Suitable Indiana bat roost trees can be highly variable, and it would seem difficult for someone who has never seen this range of roost trees to be able to determine the number of potential roost trees present within the project area as required on the field data sheets. It would also seem important to differentiate between potential alternate and primary roost trees during the habitat assessments, which would require biologists completing the Phase 1 habitat assessments to at least have some knowledge of the summer roost tree literature and personal experience with various types of roost trees. Differentiating between potential alternate and primary roost trees during the Phase 1 habitat assessment would provide valuable data in the event that Phase 2 acoustical surveys identify the Indiana bat, and the developer decides not to conduct Phase 3 mist-net surveys. This information on number of primary and alternate roosts could then be used during formal consultation when estimating the amount of take. In any case, whether the Service implements some type of permitting process for biologists completing habitat assessments, detailed justification of why a habitat is considered high, moderate, or low quality should be required in the habitat assessment report.

Acoustic Surveys

Microphone Type

Limiting acoustic detectors to those with directional microphones makes little sense if the objective is to sample acoustic activity in an open area. Because the protocol does not rely on activity levels (other than documenting proper functioning of equipment), and is instead essentially a presence/absence method, using omnidirectional versus directional microphones should not necessarily affect the results of the survey. Under a presence/absence scenario, surveying the maximum space possible is preferred; this is why the previous Indiana bat survey protocols stated a minimum number of mist-nets to deploy, but biologists often deployed as many net sets as possible in an area to increase the chances of capturing an Indiana bat.

Whereas directional microphones are often placed near the edge of suitable bat foraging habitats, omnidirectional microphones can be placed near the center of suitable habitats, effectively sampling the same air space. The volume of sampled air space will inevitably vary among survey sites even if only one type of detector were used due to the surrounding vegetation. Each type of microphone has useful

conducted and no Indiana bats are captured, this scenario could occur, and could lead to confusion. See further discussion below under "Regulatory Comments".

applications, and the protocol should not limit the type of microphone used. Further, omnidirectional microphones can be made directional through modification by the manufacturer or user (acoustically inert shields, etc.).

Deployment

To ensure that equipment is working properly in the field, the protocol recommends test files be recorded at the beginning and end of each monitoring period. The draft protocol states that, "If timers are used, they should be adjusted so that the deployment of detectors is completed after the start time and pick-up is completed before the end time (i.e., the detector is on while surveyor is present at each site)." However, most detectors, depending on the manufacturer, can be effectively tested when they are not actively recording data. The requirement to generate "setup" and "teardown" files by rubbing fingers together in front of the microphone is unnecessarily detailed, complicates an otherwise efficient process of programming start/stop times to avoid daytime sampling, and will not necessarily guarantee that detectors were working properly in the field. Likewise, annual equipment "tune-ups" are not adequate to establish the proper function of acoustic detectors. Microphones and acoustic detectors can fail at any time spontaneously due to power surges or due to environmental factors, and detectors can stop working properly for brief periods of time yet appear to work properly during testing. Professional judgment will be required to verify that detectors were working properly when deployed and throughout the survey period.

The requirement to collect at least 10 recorded bat call sequences is problematic in that properly functioning detectors will occasionally record no bat calls, and a lack of bats at a site does not necessarily indicate malfunctioning equipment or poorly sited detectors. Particularly in areas where White Nose Syndrome (WNS) has been present, it is not uncommon to record little to no activity even with properly placed, properly functioning equipment. Similarly, the requirement that 40 percent of recorded sequences be identified is problematic, particularly without understanding the level of certainty required by the automated identification program to classify a call. Call quality depends on many factors, including distance between the bat and microphone. A properly deployed detector may record numerous low-quality sequences from bats just within range of the microphone, driving the percentage of identified calls below an established threshold. Indeed, more air space is sampled by volume at this outer limit of detection than closer to the microphone. Does this percentage refer only to sequences classified as bats by the program, or do call sequences not identified by the program but qualitatively identifiable as bats (but not to species) count against this percentage? Can the USFWS provide a citation that achieving 40 percent identification with the automated program is typically possible for datasets passively recorded in the field?

The language referring to detector placement within 10 meters of vegetation should be rewritten to simply state that vegetation cannot block the reception pattern of the microphone. In some cases, it is necessary or beneficial to "hide" the detector in vegetation such that the microphone is facing away from the vegetation, which can be done while still obtaining high quality calls. If acoustical detector sites include openings and edges of fields, how might moonlight affect the amount of calls collected, especially those from Indiana bats? Does moonlight affect only bats' ability to avoid capture in mist nets, or does it affect where bats forage (predator avoidance), resulting in underrepresentation at acoustical sample sites? Would this prevent conducting acoustical surveys on well-lit full moon nights?

Weather Conditions

The protocol does not specify where weather conditions are to be monitored, and at what frequency. Whereas certain variables such as temperature and relative humidity can easily be measured using dataloggers, unattended passive acoustic monitoring will not enable collection of real-time precipitation data and accurate wind speed data from each detector location. Would publicly available data from local weather stations be acceptable?

Automated Call Identification

Reliance on acoustic surveys for identification of Indiana bats is a significant shift from how acoustic bat data have been used in most contexts over the past decade. Although the protocol cites a small number of studies indicating that Indiana bats can be identified accurately, it fails to acknowledge the similarity of call structure among several bat species, most notably the little brown bat and Indiana bat. While acoustic bat technology has advanced considerably in recent years, the Anabat system, on which the protocol essentially relies, has remained unchanged for many years in terms of the available data that can be extracted from recorded bat calls. Also, bats themselves have not become any easier to distinguish, and call parameters of Indiana and little brown bats have been shown to overlap even within call libraries of high quality, known reference calls. The call library on which the as-yet unavailable analysis software is apparently based is also over a decade old, so it is somewhat misleading to state, as the protocol does on page 2, that "recent advances in the equipment and quantitative analysis now allows for quantitative analysis of echolocation call data". This statement implies that Indiana bats can now be consistently and accurately identified based on quantitative analysis of call parameters; something that has not typically been done up to this point.

We are unable to provide comment on this time as to the reliability and accuracy of the automated analysis program to be relied upon by the protocol. However, our experience using various publicly available automated analysis programs, all of which include strongly worded caveats regarding the ability to accurately differentiate between Indiana bats and little brown bats, is that the variation in acoustic call sequences often results in misclassification of calls. The advantages of automated, quantitative programs are many, namely consistency, objectivity, repeatability, and efficiency, but to assume that any automated system does not result in false positives is ill advised. In fact, given the known overlap in call parameters between Indiana bats and little brown bats, failure to produce false positives would instead suggest that Indiana bats were being missed by the program.

If more than one of the "numerous potential analysis programs" are used on a particular project, and the programs disagree as to whether Indiana bats are present, how is the USFWS or a project developer to proceed?

Timing of Surveys

If mist-netting must be completed by July 31, any acoustic surveys conducted after this date indicating the presence of Indiana bats will require an additional year of monitoring. This delay will be unfeasible for many projects and effectively limits the window of acoustic surveys to May 15 through July 15 (allowing 2 weeks to conduct mist-netting if acoustic surveys identify Indiana bats). It is unrealistic that the USFWS will have the capacity to review, comment, and provide guidance through the entire process of acoustic surveys and netting during this limited window of time.

Acoustic Survey Recommendations

To better utilize acoustic detectors to their fullest potential, and to adapt the protocols to a wider variety of projects, we suggest that the protocol be modified to include the option of "active" surveys (driving or walking surveys depending on site characteristics) to supplement or replace a portion of the fixed sampling portions in situations where the two-night, fixed point only methodology may be less effective. Whereas passive surveys at fixed points are dependent on detector placement and may either fail to sample certain habitats or record only a small number of bats relative to the larger population using an area, active surveys can allow sampling of all habitat types present and are less susceptible to detector placement. Most acoustic bat detectors can interface with Global Positioning System software to provide geo-referenced results, allowing effective and efficient sampling of large areas, linking bat presence to particular habitat types, and reducing the likelihood that bat species could be missed by fixed-point methods. Further, if active surveys are conducted on foot, a surveyor can move the detector to obtain

considerably higher quality recordings, which can be identified to species more accurately. Also, surveyors' observations while conducting active surveys may help understand bats' use of a project and provide information beyond determination of presence. For large project areas or long linear corridors, driving surveys can produce data comparable to the large amount of driving transect surveys currently being conducted in nearly every state within the Indiana bat's range, providing context for site-specific results. A combination of active and passive acoustic survey methods would make better use of the technology and improve the overall efficiency of the method. While active surveys may not be necessary in all cases, they should be included as an option to supplement and replace a portion of the fixed point surveys when warranted.

In addition to incorporation of active acoustic survey methods, we suggest that protocols could allow monitoring for longer periods of time (5-7 nights for example) at fewer sites in certain cases, particularly when active surveys are also in use. Such a modification could enable acoustic data to provide information on bats' use of particular habitats within a site rather than simply establishing presence. Also, lengthening the survey period at particular locations would increase the likelihood that acoustic results are representative of species present, and could enable a better determination of whether Indiana bat "hits" represent consistent presence or potentially a single anomaly, more indicative of a false positive rather than likely presence of the species. If active surveys are also used, the tradeoff in conducting passive surveys at fewer sites should not limit effectiveness of the method.

Mist-netting Effort

Presumably, mist-netting effort should be based on the amount of habitat present in addition to the patterns of acoustic results, as the amount of forested habitat in an area can influence mist-netting capture rates (with higher capture rates often occurring in fragmented habitats versus heavily forested areas). If the suggested amount of netting is conducted in the vicinity of acoustic detection without capturing an Indiana bat, then Indiana bats should not be considered present. This would encourage developers to attempt to conduct mist-netting, would make formal consultation more straightforward, and would allow for a greater level of validation of the accuracy of the acoustic identification methods.

Regulatory Comments

A pitfall of the draft protocol will be for situations in which acoustic survey results indicate presence of Indiana bats and subsequent mist-netting surveys fail to capture any bats, in which analysis programs disagree as to the likelihood of presence, or in which no follow-up mist-netting occurs. Because acoustic data cannot be a base for population estimates, formal consultation will be very difficult and based on highly uncertain assumptions, particularly if greater detail regarding primary and alternate roost trees is not collected during the habitat assessment. It seems necessary for the protocol to incorporate a gradation of certainty for assuming presence based on acoustic results, taking into account the number of nights and sites on which Indiana bats are determined to be present. Consistent, high likelihood of presence at a site among survey locations should presumably be considered differently than one site-night with presence out of a large set of negative samples. The protocol, as written, appears to make no distinction between these scenarios.

At a minimum, the protocol should acknowledge an inevitable level of uncertainty surrounding positive acoustic results. Because this type of uncertainty does not occur with positive mist-netting results, it seems necessary for the USFWS to develop additional options for addressing acoustic survey results. It would seem unjustifiable to assume presence in cases where follow-up mist-netting is conducted and fails to capture Indiana bats. Instead, as stated earlier, the follow-up mist-netting should be relied upon to determine presence/probable absence. Otherwise, if formal consultation with the USFWS is still required even if no Indiana bats are captured, there will be very limited incentive to conduct mist-netting following positive acoustic results.

The accuracy of acoustic surveys to correctly identify sites where Indiana bats are present, and the ability to use acoustic data alone to modify projects such that impacts to the species are avoided and minimized, depend on a protocol that takes advantage of the strengths of the technique while also acknowledging its limitations and the uncertainty surrounding acoustic identification of Indiana bats. The draft protocol could therefore be improved by including some element of active surveys, allowing longer-term acoustic monitoring at a smaller number of sites if conditions warrant, creating multiple levels of likelihood of presence based on the number of sites and nights on which Indiana bats are identified, and relying on appropriately designed mist-netting survey results to establish presence or probable absence if conducted following acoustic surveys. To move away from mist-netting quickly, without better understanding how mist-netting and acoustic survey results compare, would sacrifice the opportunity to better interpret acoustic survey results moving forward.

Sincerely,

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