Acoustic Validation of Indiana Bat and/or Northern Long-eared Bat Maternity Colonies on Proposed Mitigation Sites
USFWS Indiana Field Office

Step-wise criteria for acoustic documentation of Indiana bat or northern long-eared bat maternity colonies based on a weight of evidence approach. The Indiana Field Office's (INFO) goal for mitigation on northern long-eared bat summer habitat is to ensure that opportunities to protect extant northern long-eared bat maternity colonies are not missed. Therefore, INFO will weigh the evidence presented in Step 3b for potential northern long-eared bat summer mitigation sites with more flexibility than potential Indiana bat summer mitigation sites.

Step 1: Baseline Criteria:

If the proposed mitigation site meets this criterion, move on to Step 2. If not, then we are unable to conclude that Indiana bat or northern long-eared bat are present at this site.

Forested site suitable for maternity colony presence. Specifically, sites must be predominately deciduous forest (not contain more than 10% coniferous forest and other non-forest cover types like emergent wetlands, open water, etc.) and should not be located within 1 mile of a known hibernaculum. Sites must contain trees suitable for maternity roosting. For northern long-eared bats, clusters of cavity-containing snags and senescing live trees located on ridge tops are favored (Carter and Feldhamer 2005, Ford et al. 2016, Johnson et al. 2012, Silvis et al. 2012, 2015*b*, 2016).

Step 2: Historical Records:

If the proposed mitigation site meets this criterion, move on to Step 3a. If not, then move on to Step 3b.

Proximity to known historical and current use areas. Females of both species are known to exhibit maternity site philopatry of at least 5 years (Kurta and Murray 2002, Perry 2011, Silvis et al. 2014, Silvis et al. 2015*b*, 2016). Therefore, sites within close proximity to female/juvenile capture or roost records no older than 20 years may be considered likely to support a maternity colony. For northern long-eared bats, a site would be considered in "close proximity" to known use areas if it is within 3 miles of a capture location or within 1.5 miles of a known roost tree. For Indiana bats, a site would be considered in "close proximity" to known historical use areas if it is within 5 miles of a capture location or within 3 miles of a known roost tree. Additionally, sites without movement barriers (e.g. divided highways, agricultural openings that require bats to traverse non-forested areas greater than 1,000 feet, urbanization or other development that fragments forest or produces significant artificial light and noise) may be considered more likely to be occupied.

Step 3: Acoustic Surveys

At a minimum, acoustic surveys must follow the protocols described in the most current Range-wide Indiana Bat Survey Guidelines[1], and should be coordinated with INFO prior to initiation. As specified in that guidance, all positive acoustic detections (based on MLE results) must be confirmed using qualitative acoustic analysis (manual verification of bat calls). The use of acoustic surveys to confirm

[1] https://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html

Indiana bat maternity colony presence is not valid within the swarming range of known hibernacula (i.e. 10 miles for Priority 1 & 2 and 5 miles for Priority 3 & 4). Confirmation of presence in these areas requires mist net surveys capturing reproductively active females or juvenile Indiana bats.

Step 3a: Where known records (e.g., captures of juveniles or reproductively females, or roost tree identification) exist and are less than 20 years old, any positive acoustic detection of an Indiana bat or northern long-eared bat will be sufficient evidence that a maternity colony of that species is present at the proposed mitigation site.

Step 3b: In the absence of known records, we will use a weight-of-evidence approach to determine if there is probable presence of a maternity colony at the proposed mitigation site. At a minimum, potential sites must meet the following three criteria:

Multiple calls of target species recorded. Although it currently is impossible to tell individual bats apart using acoustics, and therefore if activity represents one bat or many, recording large numbers of calls indicates a relative concentration of activity. If ≥15 Indiana bat or ≥5 northern long-eared bat calls are recorded at an individual detector during a single night, and particularly if repeated on additional nights, and not at sites known to concentrate bats (e.g. not over water sources, but within forest interiors), INFO will assume maternity colony presence (Ford et al. 2011). INFO may also consider additional factors that would suggest multiple bats rather than an individual lingering at a detector site including the temporal distribution of activity over the night. Specifically, ≥10 Indiana bat or ≥5 northern long-eared bat calls at roost emergence, and ≥8 Indiana bat or ≥5 northern long-eared bat calls spread over the course of a night suggest a collection of individuals, whereas concentrations of activity within small timespans (e.g., 30 min.) outside roost emergence are more consistent with concentrated foraging activity by an individual bat (Johnson et al. 2011, Johnson et al. 2013).

Calls at multiple detector sites on the same night. Given that maternity colonies are aggregations of bats that occupy distinct spatial footprints (Patriquin et al. 2010, Silvis et al. 2014, Silvis et al. 2015*a*), and that males do not typically form large social groups away from hibernacula areas or utilize highly concentrated areas, it is unlikely that detections across multiple detectors will represent detections of males. Therefore, detection of the species across multiple detector sites across a proposed mitigation area on the same night may be used to document presence of maternity colonies. Detector sites should typically be spaced at least 656 feet (200 m) apart.

Calls spread over multiple nights. Individual male and female bats are known to switch roosts frequently (Silvis et al. 2016). However, maternity colony trees may be occupied a substantial proportion of the time even as some bats move in and out of the tree. Therefore, repeated detections at a detector site over multiple nights are more likely to occur where female bats (i.e. a maternity colony) occupy/use the detector site.

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