



# Microclimate Conditions in Bat Hibernacula in Indiana

## Request for Proposals

### Overview

The Division of Fish and Wildlife (DFW), Indiana Department of Natural Resources is soliciting proposals to characterize microclimate conditions at winter roost sites in bat hibernacula in Indiana. DFW personnel have recorded ambient temperature and relative humidity (RH) in collaboration with multiple partners from 12 caves, often at several roost sites within a single site, for periods ranging from two to 20 years. To date, however, there has been no coordinated effort to assemble and critically examine these datasets.

The objective of this project is to compile, standardize, analyze, and interpret these data for the purpose of furthering our understanding of winter roost use by hibernating bats. Because data have been collected at varying intervals using different models of dataloggers, some effort may be required to manipulate raw data prior to compilation and analysis.

At a minimum, proposals must provide the five outputs listed below. Any that incorporate evaporative water loss should employ vapor pressure deficit (VPD) rather than relative humidity (A. Kurta, 2014, *Acta Chiropterologica* 16:249-254).

1. For each hibernacula, an Excel file that includes RH, VPD, and temperature values, adjusted for drift where possible, with corresponding dates/times at each monitored roost site. The file should also include a visual plot that displays microclimate conditions at each roost site for each year or hibernation period monitored.
2. A descriptive statistical summary of temperature, RH, and VPD values at each roost site.
3. An analysis of thermal stability at each roost site, including the capacity to buffer climatic extremes within hibernation seasons.
4. An analysis of temporal variation at each roost site, including evidence or lack thereof for consistent long-term trend(s) in climatic conditions.
5. A determination of any relationship(s) between roost temperature and external temperature. Surface temperatures were recorded concurrently at most hibernacula. Where lacking, a third-party data source (e.g., NOAA) should be used.

This long-term dataset may also be useful in other investigations of winter roost use such as its potential relationship(s) to population response, hibernation behavior, onset and severity of white-nose syndrome (WNS), and climate change. Winter bat count data would be made available, as needed, to explore relationship(s) between microclimate and population size. Although directed toward specific hibernacula in Indiana, applicants are encouraged to consider the relevance of these data within a broader context to advance management and recovery of cave bats. Other applications may include development of protocols for standardized and/or expanded roost monitoring programs, prioritizing hibernacula for protection and restoration for future recolonization, identifying conditions needed in artificial hibernacula, and verification for airflow/cave cooling modeling as a function of external temperature.

### Duration

The duration for this project will be approximately 12 months, beginning around 1 June 2015 and ending on 31 May 2016.

## **Funding**

Funds up to \$15,000 are available for this project and will be administered through a contractual agreement in compliance with State law. Payments will be made in arrears as work is completed and upon receipt of dated invoices that list expenses incurred as specified in the proposal budget. Payments will be disbursed through direct deposit into a banking account specified and authorized by the contractor.

**Proposal Instructions.** Proposals should be in pdf format, not exceed 12 pages in length, and must include the following seven elements:

*a. Cover Page* – provide a cover page that includes title; project summary that briefly states specific objectives; name, affiliation, and contact information for the project leader and, if appropriate, any project partners; and project budget.

*b. Need* – explain the value of the project and priorities it will address.

*c. Objectives* – state the specific objectives of the project. At a minimum, all proposals must provide the five outputs identified in the Overview. Any additional inquiries or uses of the dataset or recommendations for future applications to advance management and recovery of cave bats, as stated in the Overview, must be clearly stated.

*d. Approach* – describe the methods that will be used to meet each stated objective.

*e. Schedule* – provide a proposed schedule for data compilation, analyses, and project reporting.

*f. Budget* – provide an itemized budget including any funds or services provided in-kind or procured from other sources.

*g. Supporting Material* – a brief biographical sketch demonstrating the capability and relevant experience of the principal investigator must be included. Support materials that aid in evaluating the proposal may also be included.

## **Proposal Evaluation**

Comments on project proposals will be solicited from agency staff and select individuals from the scientific community. Proposals will be judged on the basis of feasibility, efficiency, project objectives and outputs, qualifications of the principal investigator(s), and budget.

The successful applicant must be able to enter into a contractual agreement with the State and be a registered vendor with the State or become registered prior to awarding the contract. Work may not commence until the contract is fully executed, which may be up to eight weeks from initiation. The contractor will be notified when work may begin.

**Proposal Deadline.** Project proposals are due **6 March 2015**. Notification of acceptance will be made by 20 March 2015.

**Proposal Submissions.** Proposals and questions should be directed to:

Scott Johnson  
Division of Fish and Wildlife  
Indiana Department of Natural Resources  
Email address: [sjohnson@dnr.IN.gov](mailto:sjohnson@dnr.IN.gov)  
Phone: (812) 334-1137; ext. 3400