EPRI Bat Database Feasibility Assessment

Technical Brief — *Endangered and Protected Species*

In March 2020, EPRI's Endangered and Protected Species Program (P195) launched a pilot project to assess the availability and feasibility of aggregating bat data from member companies to create an anonymized bat database. The near-term goal of this effort is to assess the feasibility of creating a data platform for anonymously aggregating and storing bat data from EPRI member companies. The long-term goal is to create a platform to aggregate bat data from EPRI members as well as external stakeholders that could provide information to address large-scale questions that could not be answered by individual, isolated data sets. This technical brief explains the driver for aggregating bat data, characterizes other known bat databases, summarizes the progress that EPRI has made, outlines a vision for an EPRI Bat Database, and reviews next steps.

Industry Bat Data Collection and Bat Risk

The electric power industry conducts wildlife-related studies and monitoring all over North America as part of their ongoing work to support the planning, permitting, operations, and maintenance of their generation, transmission, and distribution assets. Those efforts expend millions of dollars to generate valuable wildlife data that are primarily used for short-term individual project needs and generally are not reused, shared, or aggregated. Isolated, unused data represent a missed opportunity at multiple levels—for individual companies, for the sector, and for bat research and conservation more broadly. Bats are a growing concern for the industry because the list of federally and state-regulated bat species is growing (Figure 1, Table 1). The geographic overlap is increasing between at-risk bat species with electric power activities that might impact bat habitat (e.g., forest clearing for infrastructure and right of way vegetation management) or cause direct mortality (e.g., wind generation).

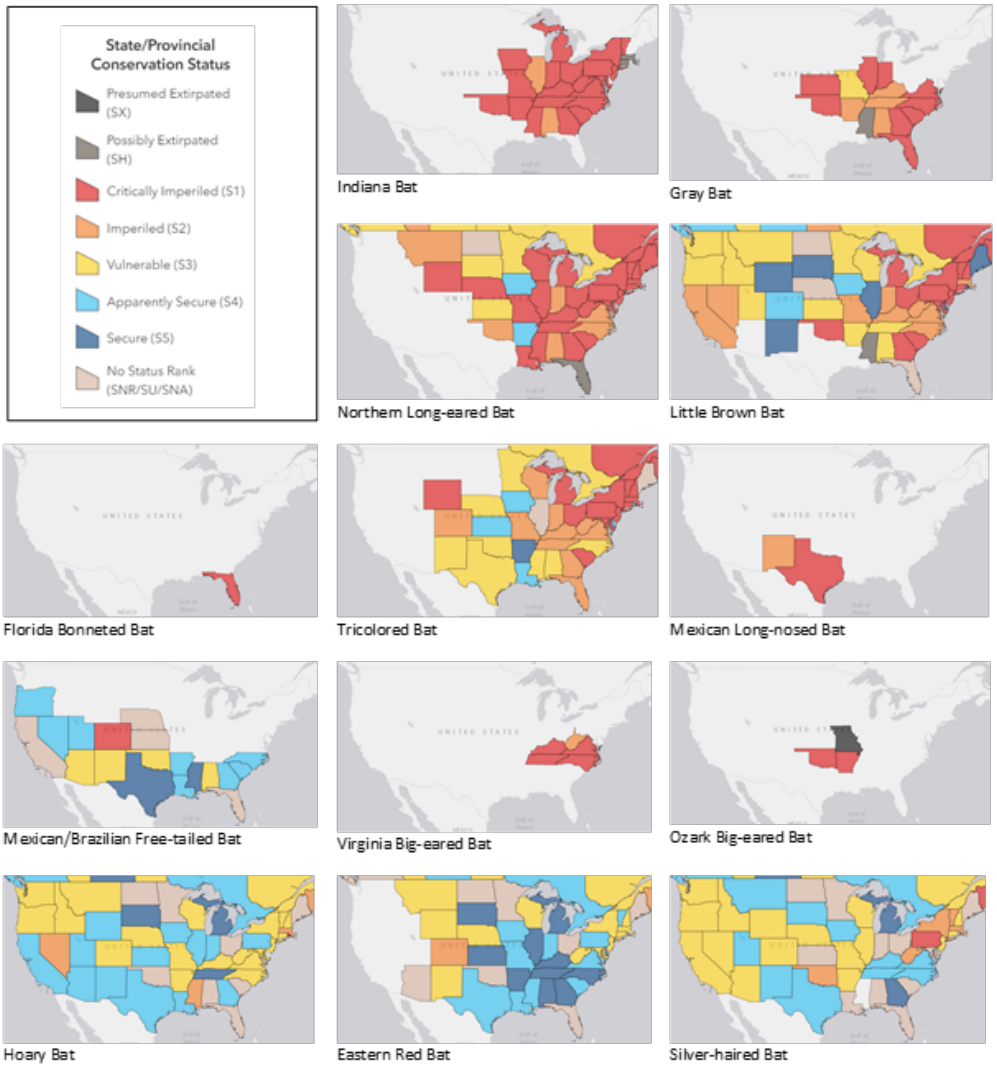

Figure 1. NatureServe Explorer maps of North American at-risk bat species in the United States lower 48 states by state[1]
*Along with multiple federal, tribal, state, university, and nonprofit partners

[1] NatureServe. 2021. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available at: https://explorer.natureserve.org/. (Accessed: October, 21, 2021).

Table 1. North American At-Risk Bat Species

Common Name	Scientific Name	U.S. Federal Regulatory Concern
Indiana bat	*Myotis sodalis*	Endangered
Florida bonneted bat	*Eumops floridanus*	Endangered
Gray bat	*Myotis grisescens*	Endangered
Mexican long-nosed bat	*Leptonycteris nivalis*	Endangered
Ozark big-eared bat	*Corynorhinus (=Plecotus) townsendii ingens*	Endangered
Virginia big-eared bat	*Corynorhinus (=Plecotus) townsendii virginianus*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened
Little brown bat	*Myotis lucifugus*	Under Review by U.S. Fish & Wildlife Service (USFWS)
Tricolored bat	*Perimyotis subflavus*	Under Review by USFWS
Hoary bat	*Lasiurus cinereus*	High fatalities at wind energy facilities[2]
Eastern red bat	*Lasiurus borealis*	High fatalities at wind energy facilities[2]
Silver-haired bat	*Lasionycteris noctivagans*	High fatalities at wind energy facilities[2]
Mexican/Brazilian free-tailed bat	*Tadarida brasiliiensis*	High fatalities at wind energy facilities[2]

It is possible that in the future, every U.S. state will have a bat species listed under the Endangered Species Act (ESA) or state species regulations. Thus, the electric power industry is likely to see expanded bat surveys and monitoring requirements. An opportunity exists for members and the industry to leverage bat data for better decision making by creating an EPRI Bat Database that could be used in isolation or in combination with other applicable bat data sets.

Bat Database Examples

In the United States, there are a number of examples of efforts to aggregate and manage bat data for large-scale data analysis (Table 2).

North American Bat Monitoring Program (NABat) – The USGS NABat program is a public effort to aggregate bat data. NABat was developed as a continent-wide database, collecting bat acoustic data according

Table 2. Primary U.S. Sources of Aggregated Bat Data

Name and Website	Type of Bat Data	Primary Source of Data	Host Organization
North American Bat Monitoring Program (NABat) https://www.nabatmonitoring.org/	Bat acoustic data	Federal and state agencies and researchers	U.S. Geological Survey (USGS)*
Bat Acoustic Monitoring Portal (BatAMP) https://batamp.databasin.org/	Bat acoustic data	Federal and state agencies and researchers	Nonprofit
American Wind Wildlife Information Center (AWWIC) https://awwi.org/about-us/our-work/awwic/	Bat fatality data from post-construction wildlife surveys	Wind industry	Nonprofit
NatureServe and Natural Heritage Programs https://www.natureserve.org/natureserve-network	Occurrence data of bats included in overall species databases	Federal and state agencies and researchers	Nonprofit, government, academic

[2] American Wind Wildlife Institute (AWWI). 2020. *AWWI Technical Report: 2nd Edition: Summary of Bat Fatality Monitoring Data Contained in AWWIC.* Washington, D.C. Accessed October 2021. Available at: https://awwi.org/resources/awwic-bat-technical-report/

to a randomized, spatially balanced design. A grid of 10- x 10-km cells was superimposed across the continent. Participants collect data according to a standard monitoring protocol within assigned cells and submit data to the USGS, which uses the information to build occupancy models to help track species population status and trends on a local, regional, or continental scale.

Bat Acoustic Monitoring Portal (BatAMP) – BatAMP provides an online database and tools for users to archive and visualize data sets generated from any type of acoustic detector or species identification process. The goal is to combine a large number of data sets so both prominent and more subtle data patterns can be explored. The objective of this group is to better understand migratory movements of bats and seasonal activity throughout North America.

American Wind Wildlife Information Center (AWWIC) – AWWIC is a comprehensive database of post-construction fatality monitoring data from U.S. wind projects. AWWIC provides wind-wildlife data for scientific analysis by working with industry collaborators to incorporate both publicly available and contributed data while maintaining confidentiality. The AWWIC database contains data from 225 projects and over 340 post-construction studies.

Figure 2. Indiana bat (Myotis sodalis)
Photo Credit: Adam Mann

NatureServe and Natural Heritage Programs – NatureServe is an overarching hub of a large network of governmental and non-governmental programs (known as "natural heritage programs") located in the United States and Canada. Scientists from network programs assess and collect data on rare species and ecosystems. Those data are turned into maps, models, and metrics that document and predict distributions, evaluate threats, assess extinction risks, detail trends, and identify priority conservation areas. NatureServe compiles data using cloud technology, integrated applications, and compelling visualizations to deliver the best available information and expert knowledge needed to maintain species diversity and sustain healthy ecosystems.

The data sets noted above are a powerful example of the success and value of collaborative efforts to compile, analyze, and visualize bat data. Each of the examples focuses on the aggregation of one type of data, and other than AWWIC, the primary data sources are federal and state agencies and researchers. While industry data can be accepted and anonymized to protect company privacy, many companies (based on interviews and discussions with EPRI members) are reluctant to provide their data to these public bat data repositories. Though each company is different and there are interrelated factors, the common **themes** for the reluctance are typically related to the following:

- **Legal Liability** – Electric power companies are obligated to comply with the ESA and equivalent state regulations if their actions impact endangered or threatened species or their habitat. Concerns around legal liability stem from potential ramifications of the timing of the voluntary disclosure of species information rather than the disclosure itself. In general, the presence of endangered or threatened species can result in increased restrictions, delays, and costs for companies to develop, operate, or maintain electric power assets. Voluntary disclosure may reduce their flexibility for future planning, siting, permitting, operations, and maintenance of their assets. They could even be reluctant to undertake projects where they have existing ESA permits because of potential future legal liability if new regulated species are included in their voluntary data sets. Another important factor for electric power companies is that they do not always own or control the land where surveys occur and data are collected. For example, most companies have easements with private landowners under transmission lines rather than owning the right of way lands. In addition, companies enter agreements with private landowners to perform surveys during site or route selection. It is common that many of the parcels of land are not selected or developed and will be outside or adjacent to where a project or asset is eventually permitted and built. Providing data about regulated species in this case may also create a regulatory risk for those landowners. Companies may not be willing to accept the perceived risk of *voluntarily* disclosing information.

- **Mistrust and Lack of Control Over How Data are Used** – This concern is partially related to legal liability but more directly to their data being used in a biased way or without sufficient scientific rigor. Companies have described instances where, in their opinion, environmental data they have provided have been taken out of context or used against them as an industry or for an individual project.

- **Freedom of Information Act (FOIA) Concerns** – Private companies also have a real or theoretical concern about their data becoming accessible at a site-specific level and having it attributed to them from a broad request using a federal or state version of a FOIA. This is related to both the theme of legal liability and mistrust and lack of control over how data are used.

- **Cost and Resources** – Providing data to national and international data sets is voluntary. It is often difficult for electric power companies to provide staff time or financial resources for activities that are not mandatory, even if there are no concerns about legal liability or sharing data. Electric power companies, like most private businesses, are strongly incentivized (for example, by their boards of directors, shareholders, and competition) to keep the overall costs of energy low for the public and consumers. Dedicating resources such as time or money to obtain, organize, and transmit the data can be hard to justify. Like most organizations, staff have competing demands, and dedicating resources for activities that may or may not have direct and near-term benefit to the companies or day-to-day objectives can be challenging. Each company is different, but participation is often driven by motivated staff or supervisors willing to allocate periodic or sustained efforts to provide data.

- **Data Availability** – Electric power companies usually only have the final reports with supporting appendices that may include data tables/field sheets unless data collection is done in-house. Companies generally contract out the surveys to consultants, who have the raw data or data in the format for databases. Typically, companies do not ask for the data when projects are complete because they do not have the dedicated internal resources to manage the data, and as discussed previously, the final report or the permit is the goal for individual projects and surveys. In general, there is no significant driver for companies to retain data from surveys. Additionally, for historical data, companies would need to request the data from consultants, which is most likely "out of scope" for the contracted services and might require amending a contract or setting new agreements to provide the data. This would require additional company resources and time for what amounts to a voluntary effort. Finally, contractors and consultants may or may not have data stored and managed centrally, particularly if data are old or contractors do not have overall data management systems.

This project has not documented how each initiative in Table 2 addresses the themes outlined above, but it is highly likely that they have mechanisms to address themes of legal liability, mistrust, lack of control over how data are used, and FOIA. Cumulatively, these themes likely remain barriers for obtaining electric power industry applicable bat data. The AWWIC database is an example where many of those barriers have been overcome, but it was developed specifically for the wind industry and only for fatality data collected as part of voluntary adherence to the *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*.[3]

[3] *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*. March 23, 2012. Available at: https://www.fws.gov/ecological-services/es-library/pdfs/weg_final.pdf.

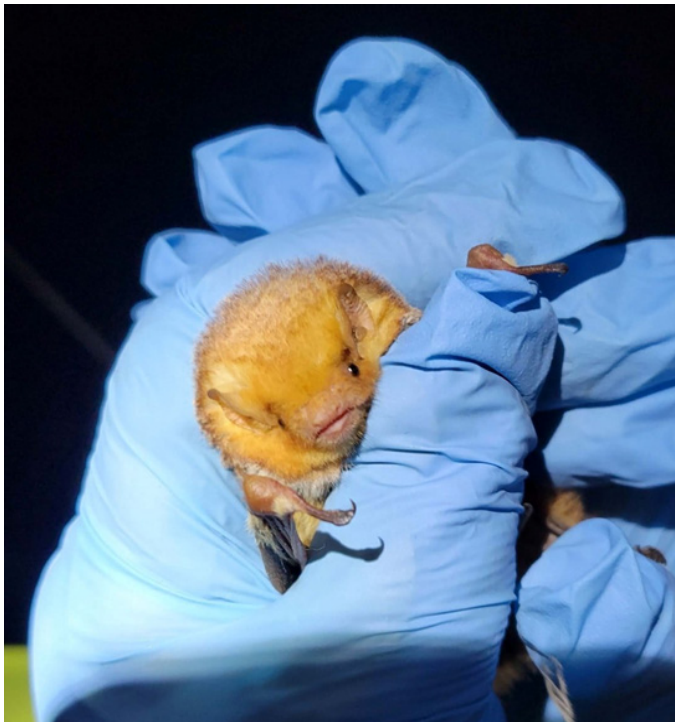

Figure 3. Red bat in the hand
Photo Credit: Donald Solick

Progress to Date and Current Vision for EPRI Bat Database

2020 – EPRI circulated a questionnaire among P195 members requesting information on what types of bat data they had, the ease of obtaining it, and the interest they had in submitting their data to a database.

May 2021 – Based on responses to the questionnaire, EPRI interviewed members that represented a cross section of the industry in terms of available data and willingness to participate. The goal of the interviews was to identify the most pressing questions and concerns that members had about participation.

July 2021 – EPRI produced a two-page fact sheet to describe the goal of the EPRI Bat Database and address the main questions and concerns raised by members during interviews. EPRI also drafted a universal data sharing agreement and presented these documents to members for review.

September 2021 – EPRI met with members collectively to discuss the fact sheet and data sharing agreement. Recommendations were made and a revised data sharing agreement was circulated based on the suggested edits.

Based on efforts to date, EPRI proposes creation of a database that combines all types of bat data sets across EPRI members and geographic locations. Member data will be stored on EPRI's data science platform where data sets are encrypted, access controlled, audited, and governed. The platform has been funded by EPRI's Artificial Intelligence (AI) Initiative and

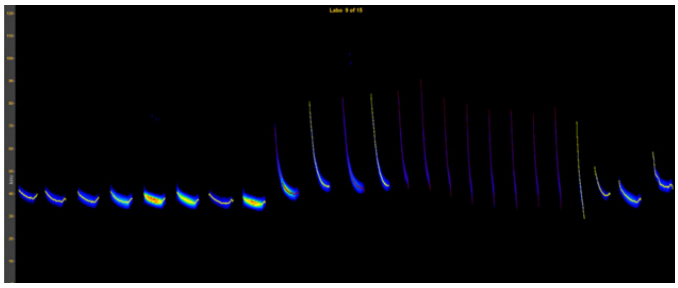

Figure 4. Echolocation sequence of a red bat, rendered in SonoBat software
Photo Credit: Donald Solick

builds off the EPRI10, a collection of high-value data sets being used to accelerate the industry's use of data and AI to transform operations. The data science platform enables only EPRI employees or EPRI-approved research contractors to work with data sets in a controlled manner with on-premises infrastructure and geographic replication for disaster recovery. All data will be anonymized, and geographic information will only be displayed at the county level if needed. Access to the data set for research and development projects will be governed by the data sharing agreement and applicable non-disclosure agreements. As a private not-for-profit enterprise, data housed by EPRI is immune to FOIA requests.

Each member will have access to their own data at any time through an encrypted, user-friendly portal. Storing this vast amount of data in a single location would 1) greatly improve member efficiency for storing, accessing, and working with their own data; 2) provide a gold mine of backlog legacy data for analyses of bat populations, distributions, and movements; and 3) potentially lead to industry standards of data collection that would facilitate future surveys.

EPRI is interested in obtaining any and all bat data that have been collected by members, though most will fit into the categories listed in the table. Across these categories of data, members can submit two main types of data (Table 3): **data summaries** such as reports and spreadsheets, which should be relatively easy for members to locate and transmit, and **raw acoustic and video files,** which are more cumbersome. EPRI plans to make a user-friendly data portal available to members for submission of data summaries and to make hard drives available for submission of raw acoustic and video files.

The types of analyses that EPRI and EPRI-approved research contractors can perform with member data will largely depend on the data submitted. Likely applications, however, include the following:

- Determining the distribution and population trends for bat species
- Identifying migratory corridors and timing of bat movements
- Testing new technologies and methods (including video analysis programs and activity models) for minimizing bat fatalities while maximizing wind energy production
- Evaluating habitat models
- Building predictive siting tools
- Cross-validating other studies
- Building machine learning tools to automate data analysis
- Establishing best practices and data collection standards for the industry moving forward

Plans Moving Forward

Bats are and will remain a significant challenge for the electric power industry as anticipated future ESA listings expand the geographic scope of regulated bats. Therefore, P195 plans to continue moving forward to create an EPRI Bat Database. During the winter of 2021/2022, P195 will obtain sample data sets from participating members and from bat-related projects funded by EPRI. The data will be ingested into EPRI's data science platform, and P195 will work with EPRI's data scientists to create the database and perform data quality assurance and control. During the spring and summer of 2022, P195 will have a webinar to demonstrate the working database and develop potential research applications based on the data received.

P195 will continue to engage with members to understand and address the various themes of concern to reduce the barriers for members and increase the value of contributing data to the EPRI Bat Database. If P195 is successful in creating a pilot EPRI Bat Database, EPRI plans to work beyond P195 members and expand to other EPRI members, electric power utilities, and bat research stakeholders. The goal will be to feature a robust bat data set for the electric power industry that can be leveraged with other public bat databases.

Table 3. Categories of Bat Data of Interest

Capture surveys • Demographic information (species, age, sex, reproductive condition)	Acoustic • General activity rates • Presence/absence • Species inventories • NABat
Telemetry • Roost locations • Foraging habitat • Long-distance movements	Thermal • Emergence data • Wind turbine interactions • Drone surveillance
Roost characteristics and counts	Hibernacula counts

NOTE

For further information about EPRI, call the EPRI Customer Assistance Center at 800.313.3774 or e-mail askepri@epri.com.

The Electric Power Research Institute, Inc. (EPRI, www.epri.com) conducts research and development relating to the generation, delivery and use of electricity for the benefit of the public. An independent, nonprofit organization, EPRI brings together its scientists and engineers as well as experts from academia and industry to help address challenges in electricity, including reliability, efficiency, affordability, health, safety and the environment. EPRI also provides technology, policy and economic analyses to drive long-range research and development planning, and supports research in emerging technologies. EPRI members represent 90% of the electricity generated and delivered in the United States with international participation extending to nearly 40 countries. EPRI's principal offices and laboratories are located in Palo Alto, Calif.; Charlotte, N.C.; Knoxville, Tenn.; Dallas, Texas; Lenox, Mass.; and Washington, D.C.

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