

Request for deposition of bat specimens resulting from human-mediated mortality

The *Kansas Bat Working Group* includes scientists, contractors, NGOs, and federal, state, and private agency personnel who are collectively interested in enhancing knowledge of Kansas bat biology. We strive toward effective conservation of rare species, maintenance of common species, and management of all species, informed through scientific research, that facilitates sustainable populations, and collectively promotes health of wildlife, humans, and ecosystems.

Biological specimens – recently deceased animals that are intentionally preserved and made available to the broader scientific community – provide a scientific foundation for informed conservation and management. Specimens provide the physical samples used to address diverse scientific questions in ecology, evolution, and environmental biology, among other disciplines. While holistic, field-based sampling of wildlife is the gold standard for obtaining high-quality, maximally extensible scientific specimens, timely collaboration between wildlife biorepositories and other stakeholders can increase specimen collection and deposition for the mutual benefit of humans and wildlife science. Wind farm casualties and biomedical collections for disease screening, for example, represent valuable wildlife samples that could be more effectively accessed and used if permanently archived in a museum. Such alliances would ensure preservation of specimen mortalities associated with human-related activities, that would otherwise be discarded due to a lack of established pipelines. Even damaged or semi-decomposed specimens can increase our understanding of bat biology.

As such, we urge all parties that may encounter bat specimens, whether associated with industry, human or wildlife health, pest control, or other activities, to preserve these materials for scientific research, by depositing specimens within long-term biorepositories.

Options for specimen deposition include (contacts below):

1. Wildlife biorepositories: Sternberg Museum (Fort Hays State University), Kansas State Biorepository, University of Kansas Biodiversity Institute, or other natural history museums
2. U.S. Geological Survey “Renewables-Wildlife Solutions” Initiative: To develop science-based tools to understand impacts for wildlife affected by renewable energy facilities
3. Kansas Department of Wildlife and Parks (KDWP): for distribution to established museum collections and official agency purposes

Wildlife mortalities are an unavoidable consequence of human activities. While minimizing incidental loss is a priority, we recognize that some impact on biodiversity is inevitable. We wish to emphasize how donation of such specimen resources towards scientific advancement can benefit all stakeholders, including industrial development, human healthcare, and wildlife professionals. Select examples of mutual benefits to be realized from community-built specimen resources include:

1. Testing and monitoring the spread of wildlife diseases (i.e., those that increase morbidity and mortality of wildlife directly) – especially for bats, emerging disease is still a leading cause of mortality and major focus of ongoing conservation efforts (e.g., white-nose syndrome).

2. Testing and monitoring for zoonotic diseases (i.e., those capable of being transferred between animals and humans) – bats are known to harbor zoonotic diseases harmful to humans (e.g., coronaviruses). Salvaged specimens could fuel ongoing research on zoonotic transmission and human health outcomes.
3. Quantification of ecosystem services provided by aerial insectivores – the role of bats in food security through both pollination and control of insect densities is well established, but the relative importance of different species remains to be explored.
4. Assessment of genetic diversity and connectivity of bat populations – bat populations nationwide are experiencing significant declines with unknown ecological or evolutionary consequences. Tissues from salvaged carcasses can be sequenced to assess changes in genetic diversity over time.
5. Improvement of industry best practices – generation of long-term temporal data from bat mortalities, including which species are impacted, seasonality, and periodicity, can guide or refine best practices in wind energy use.
6. Baseline population monitoring and migratory investigations – baseline data are critical for establishing the biological condition of a species at a given point in time, and from which future data collection can be assessed for inferring trajectories and rates of change. Incidental mortalities are a primary method of detection and monitoring for species that otherwise are rarely procured for science or difficult to catch. Most species of bats within Kansas remain data deficient.

Use of biological specimens preserved in biorepositories is steadily increasing as new technological advances emerge. Recent requirements implemented by federal agencies (e.g., National Science Foundation, CHIPS and Science Act) include development of a Specimen Management Plan in federal proposals. This ensures that specimens sampled for research are deposited within established museum collections, allowing for reproducibility, validation, and extension of the original research, outreach, and education applications. Our petition for specimen deposition from Kansas stakeholders represents a mutually beneficial enactment of these values towards positive societal outcomes.

Signatories:

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Jocelyn Colella – (colella@ku.edu), Curator of Mammals, Biodiversity Institute & Natural History Museum, University of Kansas, Lawrence, KS 66045.

Zackary Cordes – (zackary.cordes@ks.gov), Ecologist, Kansas Department of Wildlife and Parks, Pratt, KS 67124.

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Contacts for specimen deposition:

Kansas State Biorepository, Kansas State University, 116 Ackert Hall, Manhattan, KS 66506.

Contact: Andrew Hope, ahope@ksu.edu.

Sternberg Museum of Natural History, Fort Hays State University, 3000 Sternberg Dr., Hays, KS 67601. Contact: Lorelei Patrick, lepatrick@fhsu.edu.

University of Kansas Biodiversity Institute & Natural History Museum, University of Kansas, Dyche Hall, 1345 Jayhawk Blvd., Lawrence, KS 66045. Contact: Jocelyn Colella, colella@ku.edu.

Renewables-Wildlife Solutions Initiative, Forest and Rangeland Ecosystem Science Center, U.S. Geological Survey, 230 N Collins Rd., Boise, ID 83702. Contact: Todd Katzner, tkatzner@usgs.gov.

Kansas Department of Wildlife and Parks, 512 SE 25th Ave., Pratt, KS 67124. Contact: Zackary Cordes, zackary.cordes@ks.gov.

Appendix A – Guidelines for storage and transport of specimens.

Wildlife specimens have value for science and education. The ideal museum specimen is a fresh (e.g., recently expired), immediately frozen, and complete carcass, although salvaged specimens are often incomplete or of lower quality. We emphasize that parts of a specimen (e.g., skull, leg, tissue sample) and decomposed materials can also be effectively preserved and used for scientific investigations. We ask collectors to store samples frozen, each in a separate plastic bag (e.g., zipper locking bags) with as much associated data as is available or allowable.

At a minimum, data should include: **Specific locality** (as detailed as is allowable, and where possible including latitude and longitude coordinates), **Date** of death and/or collection, **Collector** (individual and/or institution). Additional data may include **Species** (if known) or **Specimen number** (if associated with ancillary specimen data that can be retrieved from donor), and any additional anecdotal information.

Donors are encouraged to reach out to the contacts listed above. This is a cooperative petition for materials, and all institutions are willing to accept specimens or help redirect materials to a partner institution.