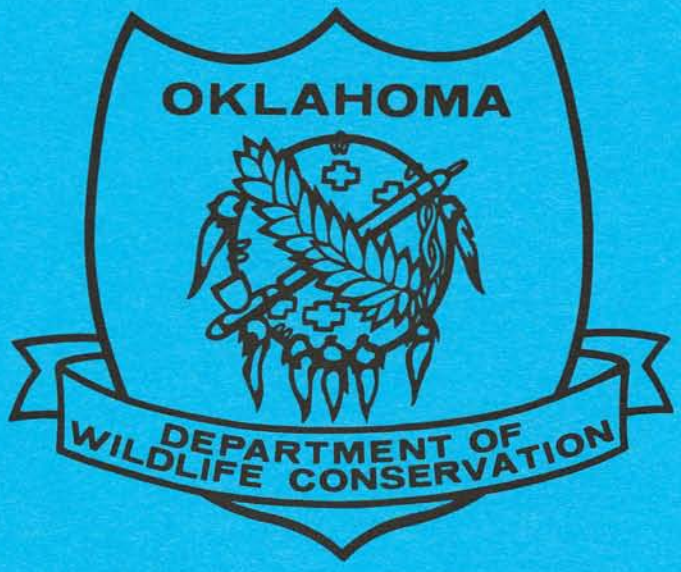
FINAL REPORT



FEDERAL AID GRANT NO. T-28-P-1

OKLAHOMA MAMMALS DATABASE: PREPARATION OF DATA FROM THE SAM NOBLE OKLAHOMA MUSEUM OF NATURAL HISTORY

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

AUGUST 1, 2005 through JULY 31, 2007

FINAL REPORT

State: Oklahoma **Grant Number:** T-28-P-1

Grant Program: State Wildlife Grants

Grant Name: Oklahoma Mammals Database: Preparation of Data from the Sam Noble Oklahoma Museum of Natural History

Grant Period: 1 August 2005- 31 July 2007

Principal Investigators: Dr. Janet Braun and Marcia Revelez

A. Abstract:

An inventory of Oklahoma mammal specimens, including verifying their identifications, in the Collection of Mammals of the Sam Noble Oklahoma Museum of Natural History was completed. Primary (e.g., localities, dates) and secondary/tertiary (e.g., measurements, reproductive information, associated collections such as tissues, karyotypes, etc.) data were captured and verified for all cataloged mammal specimens. Mammal specimen localities were assigned and/or converted into decimal degrees (georeferencing of locality data). As part of the final objective, the specimen data (cleaned and standardized) is being provided to users through the SNOMNH website and through MaNIS (Mammal Networked Information System), a national and international provider of high-quality mammal specimen information. All of the completed objectives were part of the initial implementation of an integrated institutional database management system for all collections (life, earth, and social sciences) of the Sam Noble Oklahoma Museum of Natural History.

B. Objectives:

- Complete the inventory of Oklahoma mammal specimens
- Complete the identification (or verification of identification) of Oklahoma mammal specimens
- Complete the capture/verification of primary Oklahoma mammal specimen data (e.g., locality, date)
- Complete the capture of secondary and tertiary data (e.g., measurements, reproductive information, associated collections such as tissues, karyotypes, or parasites)
- Attribute decimal degrees to the Oklahoma mammal specimen localities without coordinate data
- Convert Oklahoma mammal specimen localities in alternate coordinate systems into decimal degrees
- Register as a data provider for MaNIS

C. Need:

General information is available on the distribution of Oklahoma mammals (e.g., Caire et al., 1989; Oklahoma Biological Survey mammal information at http://www.biosurvey.ou.edu/mammdesc.html and mammal literature at http://www.biosurvey.ou.edu/mlitdesc.html). Additionally, at the initiation of the project only a partial computerized listing of holdings was available for the Sam Noble Oklahoma Museum of Natural History (SNOMNH) (http://www.snomnh3.ou.edu/db/colx_login_1.lasso). In spite of the availability of these resources, no comprehensive, searchable, verified, georeferenced database of Oklahoma mammals existed. Distribution data for Oklahoma mammals currently consists of maps that show distributions only to the level of county based on Caire et al. (1989).

Oklahoma specimens housed in museum collections represent more than 100 years of data on the mammals of the state. They provide representation of every county and most habitats within the state, and the associated specimen and geographic data now is realized as being of major importance. Furthermore, these vouchered specimens are associated with field catalogs and field journals that provide much more specific information about habitat, weather conditions, and species associations. At the initiation of the project, these data were largely inaccessible to workers in conservation and management of Oklahoma resources, researchers, educators, and the general public. Verification and compilation of these records into accurate, georeferenced databases will provide verifiable information on Oklahoma mammals. These data ultimately may be used to develop a digital database and geographic information system (GIS), and internet-related resources, which will provide readily accessible information on Oklahoma mammals for use in managing critical habitat, making informed decisions about species of greatest conservation need, and as a ready resource for Oklahoma citizens interested in wildlife.

Similar searchable and georeferenced databases are being developed by museums, collections, and state and federal agencies as part of the Mammal Networked Information System (MaNIS) project (http://elib.cs.berkeley.edu/manis/). These combined databases from California, Washington, Utah, Illinois, Louisiana, Michigan, Texas, Alaska, Kansas, and New Mexico, among others, provide invaluable information on biodiversity and ecological patterns and processes for mammals. Oklahoma is not or little represented. The MaNIS project was developed with NSF support and is open to participation by institutions dedicated to providing access to high-quality mammal specimen information. The registration process is managed through the Global Biodiversity Information Facility (GBIF); MaNIS currently supports the Distributed Generic Information Retrieval (DiGIR) protocol using the MaNIS version of the Darwin Core 2 conceptual schema. MaNIS will migrate to the use of the Darwin Core 2 when the standard is ratified by the Taxonomic Databases Working Group (TDWG).

The collection of mammals of the Sam Noble Oklahoma Museum of Natural History is comprised of about 36,000 cataloged specimens and about 4,000 uncataloged specimens from Oklahoma, other states in the United States, and other countries of the world. The major emphasis is Oklahoma, the United States, North America, and South America. About 25% or 10,000 specimens were collected in Oklahoma. Although the primary data associated with the SNOMNH specimens had been captured electronically, the verification of these data had not

been completed. Additionally, a comprehensive inventory and the identification and verification of specimen identifications had not yet been completed. Also, the primary, secondary, and tertiary data associated with these specimens, which will allow more accurate depiction of historical and current ranges, determination of habitat associations, and identification of areas of the state that have not been adequately sampled/surveyed, had not been completely captured. Finally, updating of species names to reflect the most recent changes in mammalian taxonomy is considered of major importance as it relates to state, national, and international laws and treaties and in providing the most accurate, up-to-date information to users of the collection, many of which are not mammalian taxonomists or systematists.

The capture and verification of data must first be completed (phase 1) in order to develop a digital database and geographic information system (GIS), and internet-related resources (phase 2). Thus, this project is designed in two phases. The first will complete the objectives listed above. A proposal for the second phase was submitted recently by personnel at Oklahoma State University.

D. Approach:

The following actions, activities, methods, and procedures were used to accomplish the objectives. These adhere to acceptable standards of collection care and management, including the protocols, procedures, and policies of the SNOMNH and the Department of Mammalogy (Documentation Standards, Curatorial Procedures for the Department of Mammalogy, etc.). The SNOMNH is accredited by the American Association of Museums (AAM) and was awarded the 2003 Award for Outstanding Commitment to the Preservation and Care of Collections of the American Institute for Conservation of Historic and Artistic Works and Heritage Preservation. The collection of mammals is accredited by the American Society of Mammalogists.

Procedure 1: Created project protocols (see attached), and hired and trained personnel. The attachment provides a detailed summary of the steps that were taken to examine and verify each museum specimen and electronic record. The example data, used to illustrate the step-by-step process in the attachment, are hypothetical data and do not represent actual specimen records. As a result, some of these examples do not reflect Oklahoma specimens or geography. Funding from this grant was used to assess only those mammal specimens within the Sam Noble Oklahoma Museum of Natural History that had been collected within the state of Oklahoma.

Procedure 2: Physically checked the presence of Oklahoma mammal specimens in the collection against the electronic database and paper catalogs. The specimens that were not located will be considered for deaccessioning.

Procedure 3: Checked and verified the identifications of Oklahoma mammal specimens using the latest taxonomic and nomenclatural information (Wilson and Reeder, 1993, 2005; other publications specific to particular mammal groups). Made changes to specimen tags and bound, archival catalog. Made changes in the electronic database.

Procedure 4: Captured/verified primary data (e.g., locality, date) by visual inspection of each specimen tag, field catalog, and bound, archival catalog, and entered these into the electronic database.

Procedure 5: Captured secondary and tertiary data (e.g., measurements, reproductive information, associated collections such as tissues, karyotypes, or parasites) by visual inspection of each specimen tag and field catalog and entered these into the electronic database.

Procedure 6: Oklahoma mammal specimen localities without coordinate data were georeferenced following the guidelines and protocols developed for the MaNIS Mammal Networked Information System (MaNIS) project (http://elib.cs.berkeley.edu/manis/). These same guidelines and protocols also are being used for HerpNet (reptiles and amphibians) and ORNIS (birds).

Procedure 7: Oklahoma mammal specimen localities with coordinate data in alternate coordinate systems were converted following the guidelines and protocols developed for the MaNIS Mammal Networked Information System (MaNIS) project (http://elib.cs.berkeley.edu/manis/). These same guidelines and protocols are also being used for HerpNet (reptiles and amphibians) and ORNIS (birds).

Procedure 8: Registered as a data provider for MaNIS following the guidelines on "How to become a GBIF data provider" (http://www.gbif.org/DataProviders/HowTo).

E. Results and Discussion:

At the completion of this project accurate, verified, georeferenced data on the mammals of Oklahoma in the SNOMNH collection were accessible to the public, state and federal agencies, and the research community for use in research, management and conservation of, and education about Oklahoma mammals. The PIs (Braun and Revelez) are pleased to have completed this project on the major collection of Oklahoma's mammal fauna during the state's centennial year.

Specifically, this project allowed, for the first time, the mapping of the Oklahoma distributions of mammal species of greatest conservation need (listed, proposed, and candidate species) based on known museum records. To date, this information has been unavailable, difficult to obtain, or in a non-user friendly form. Understanding the historical and current distributions and ranges of these species is integral to making informed decisions regarding species and habitat management, both now and in the future.

The preparation of a computerized, georeferenced database was the first critical step in providing to the scientific community and general public primary information on specimens, localities, deposition (repository), and secondary and tertiary associated data such as reproduction and habitat. The real potential of the data, especially for those mammal species of greatest conservation need, now will be realized as it is integrated into comprehensive local, regional, and

national networks. This project was part of an initiative involving the Collection of Vertebrates, Oklahoma State University; future plans include extending the initiative (partnering) to other universities and institutions with holdings of Oklahoma mammals to increase the coverage and completeness of the database.

The inventory of specimens (Procedure 2) in the Mammal Collection of the Sam Noble Oklahoma Museum of Natural History began in October 2005 and was completed by July 2006. Procedure 3 (verification of identification and updating of taxonomy) was completed for all but a few taxa in July 2006; the verification of identification for these taxa was completed in December 2006. Primary, secondary, and tertiary data were captured and verified for all specimens (Procedures 4 and 5). Endangered Species Act and CITES designations were updated for specimens by December 2006. Museum staff will complete the review and updating of the national and international status of each species annually. Final updates to the database, field catalogs, and archival catalog (Procedures 4 and 5) were completed by December 2006. The final checks for discrepancies and the finalization of records were completed in July 2007. During the project, approximately 2,500 uncataloged specimens were inventoried, verified, and cataloged. An estimated 36,000 specimen records were reviewed during the project twice - an initial and final review. Procedure 8 (registration as a MaNIS data provider) was completed in August 2006 and all data were placed on MaNIS (Mammal Networked Information System) in September 2006; updates are scheduled to be uploaded every 6 months until the museum becomes a data provider later this year.

At the end of the project, the PIs coordinated a supplemental project funded by the SNOMNH to conserve and database the early collection and museum catalogs and field catalogs. Although many of the specimens noted in these documents were destroyed in several fires during the early 1900s, the data recorded in these catalogs and field notes are some of the only information available mammal species that are now rare or extirpated in the state. Catalogs and field notes were copied onto archival quality paper creating user copies; the oversized, multi-volume "all-vertebrates" catalog was disassembled and the 520 pages were individually encapsulated in mylar, and a user copy currently is being made. The incorporation of additional specimen information from documents in the museum archives will continue beginning in January 2008.

F. Significant Deviations:

Administrative problems in listing the position for the IT (Informatics) Specialist and the quality of the applicant pool, resulted in our being unable to begin the georeferencing component (Procedures 6 and 7) of the project within the one-year grant period. To meet the objectives associated with the georeferencing, an additional year was needed. A one-year no-cost extension was requested in order to complete Procedures 6 and 7; the request was approved and the project was extended to 31 July 2007. The delay, however, would have provided us with the opportunity to utilize new, more efficient software, which was previously unavailable, to georeference the locality data, but the software has been problematic in its release.

The original budget provided funds for the purchase of computer equipment consisting of a server and tape backup. After the grant funds were awarded, it was determined that this

equipment would duplicate newly purchased equipment existing in the museum's IT department. The PIs requested the use of these funds to update the computer hardware being utilized to complete the grant project objectives; this request was approved.

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H. Date: 30 August 2007

I. Approved by: _____
Alan Peoples, Wildlife Division Chief
Oklahoma Department of Wildlife Conservation

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John Stafford, Federal Aid Coordinator
Oklahoma Department of Wildlife Conservation

J. Literature Cited:

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