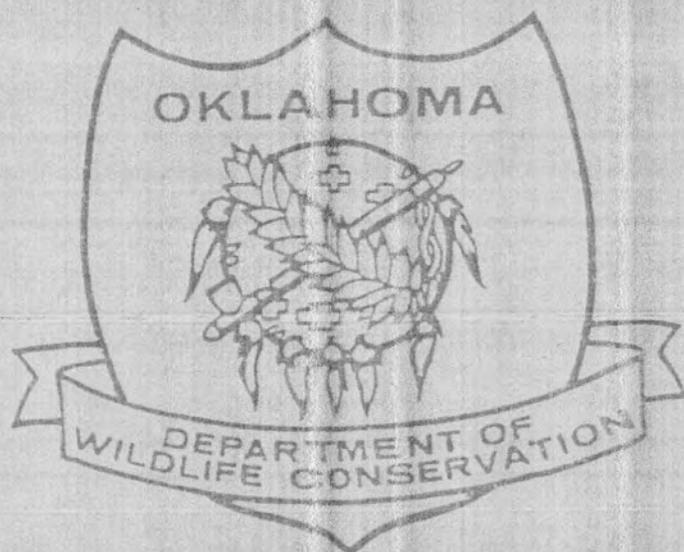


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## FINAL REPORT



FEDERAL AID GRANT NO. T-29-P-1

DIGITAL ATLAS OF OKLAHOMA MAMMALS: DATA CAPTURE AND  
GEOREFERENCING OF OSU COLLECTION OF VERTEBRATES

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

AUGUST 1, 2005 through DECEMBER 31, 2007

## FINAL PERFORMANCE REPORT

**State:** Oklahoma

**Grant Number:** T-29-P

**Grant Name:** Digital atlas of Oklahoma mammals: data capture and georeferencing of OSU Collection of Vertebrates

**Grant Program:** State Wildlife Grants

**Grant Period:** August 1, 2005 – December 31, 2007

**Principal Investigator:** Karen McBee, Department of Zoology, OSU

### **Abstract:**

Museum records of mammals housed in Oklahoma State University Collection of Vertebrates (OSUCOV) were entered into a database for use in development of the Digital Atlas for Oklahoma Mammals (DAOM). The database comprises fifty-two unique data fields for each specimen including details on taxonomy, collection locality, morphological and reproductive data, and collector/preparatory. The OSUCOV collection consists of 12,997 individual mammal specimen records. All records were entered into the database were verified against the original paper catalogue accounts for accuracy, species identification, and geographic location. The database DOAM database contains collections from every county in Oklahoma.

### **Objective:**

The objective of this project is to develop a searchable, georeferenced database of Oklahoma mammals based on specimens housed in the OSUCOV. We will:

- Developed standardized procedures for data entry and verification
- Entered data for specimens housed in the OSUCOV
- Individually verified each record for accuracy of data entry, species identification, and geographic location
- Georeference each locality record

### **Procedures:**

The Digital Atlas of Oklahoma Mammals (DAOM) was jointly developed by workers at Oklahoma State University (OSU) and the University of Oklahoma from records of mammals housed at Oklahoma State University Collection of Vertebrates (OSUCOV) and Sam Noble Oklahoma Museum of Natural History (OMNH).

### ***Development of standardized procedures for data entry and verification—***

The first task at OSU was to design an information system for the DAOM. We used an adaptation of the Digital Atlas of Oklahoma Fishes (DAOF--SWG T-12-P) information system for the DOAM and employed standards established by the American Society of Mammalogists

*Documentation Standards for Automatic Data Processing in Mammalogy, version 2.0* (McLaren et al., 1996). Use of a Microsoft Access and Structured Query Language (SQL) data structures was explored. We decided to develop the data structure directly in Microsoft SQL to facilitate development of the DAOM website. The information system database structure was developed after examining the American Society of Mammalogists protocols. The database was programmed to reduce data entry errors by creating abbreviations for commonly used fields such as preservation type, frozen materials, and states and county names. This was accomplished during year one.

The DAOM eventually will consist of two components, a front-end intranet (internal to OSUCOV) web site and a back-end database. This first part of the DAOM project is concerned with generating the digital database upon which the website will be based. Front-end users of DAOM will be general users (e.g., scientists, managers, students, general public) who will have access to maps and information about mammals of Oklahoma within OSUCOV and SNOMNH collections. These users will not have direct access to the database. Therefore, no changes can be made to the data by general users; however, general users can view details (i.e., selected attributes of the database) for collection locations displayed on the map. Back end users of DAOM are authorized users (e.g., website manager, database manager, museum curator, student technicians) who have access to the data through a user interface. This interface allows the user to add, delete, modify and query the existing data. Only authorized users can have the access to this interface and its functions.

#### ***Data entry and proofreading—***

Once the information system was developed, paper catalog records of Oklahoma mammals from OSUCOV were manually entered into a Microsoft SQL database using a password protected interface. Taxonomic information (genus, species, subspecies) is stored in a separate table that allows users to correct misspellings and address taxonomic changes.

The database was converted from SQL to Microsoft Excel spreadsheets that were separated into three files to allow multiple employees to proofread and edit the database. Verification for accuracy of transfer from paper catalog to computerized database has been completed. Records within the computerized database have been checked against card files and specimen tags and species identifications verified. Files will be converted back to an SQL format as we proceed in building the website in Phase 2. SQL tables can be transferred into Microsoft Access tables, if needed.

#### **Results and Discussion:**

##### ***Development of standardized procedures for data entry and verification—***

The back-end database was created with Microsoft SQL using the database structure we developed to comply with the American Society of Mammalogists standards. The database comprises fifty-two unique data fields for each specimen including details on taxonomy, collection locality, morphological data, reproductive data, and collector/preparatory (Figure 1).

***Data entry and proofreading—***

Data have been entered and proofread against all three volumes of the original paper catalogue for all 12,997 individual mammal specimens currently catalogued into OSUCOV. All specimens have been checked against numerical and taxonomic card files and individual specimen tags. Records for a total of 7,993 Oklahoma specimens were entered into the database and verified against the written catalog entries. Of these specimens, 6,780 had enough detail in locality information to be assigned accurately to Oklahoma ecoregions. This information has already provided much more precise mapping of Oklahoma mammals (Figure 2). Records were verified for 60 genera and 101 species. We now can generate reports on holdings of Oklahoma mammals such as given in Table 2 for numbers of specimens of species that may be of special concern. The oldest vouchered specimen is a *Neotoma floridana* (Eastern woodrat) collected by J. Frank Blair in Sulfur, Oklahoma in 1920.

Figure 3 shows distribution of collecting records. The county with the largest number of records, unsurprisingly, is Payne, but several other counties including Osage, McCurtain, Cimarron, and Harper, show the results of significant efforts of sampling. Approximate distribution of collecting records by the Oklahoma Department of Wildlife Conservation (ODWC) Ecoregion is given in Table 1. As we work on developing the website, mapping capabilities will become more precise, but already areas that merit further investigation might include Western High Plains, Flint Hills, South Central Plains, and Arkansas Valley.

Posters about the DAOM project were presented at annual meetings of the Southwestern Association of Naturalists and the American Society of Mammalogists in April 2007 and June 2007 and an abstract has been accepted for presentation at meetings of the Society for the Preservation of Natural History Collections and the Natural Science Collections Alliance joint meetings in May 2008.

**Significant Deviations:**      None.

**Literature Cited:**

McLaren, S. B., and others. 1996. Documentation standards for automatic data processing in mammalogy, version 2.0. Committee on Information Retrieval, American Society of Mammalogists, Pittsburg, PA. [www.mammalsociety.org/committees/index.asp](http://www.mammalsociety.org/committees/index.asp).

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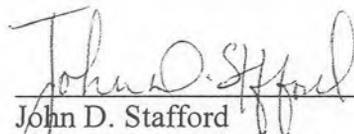
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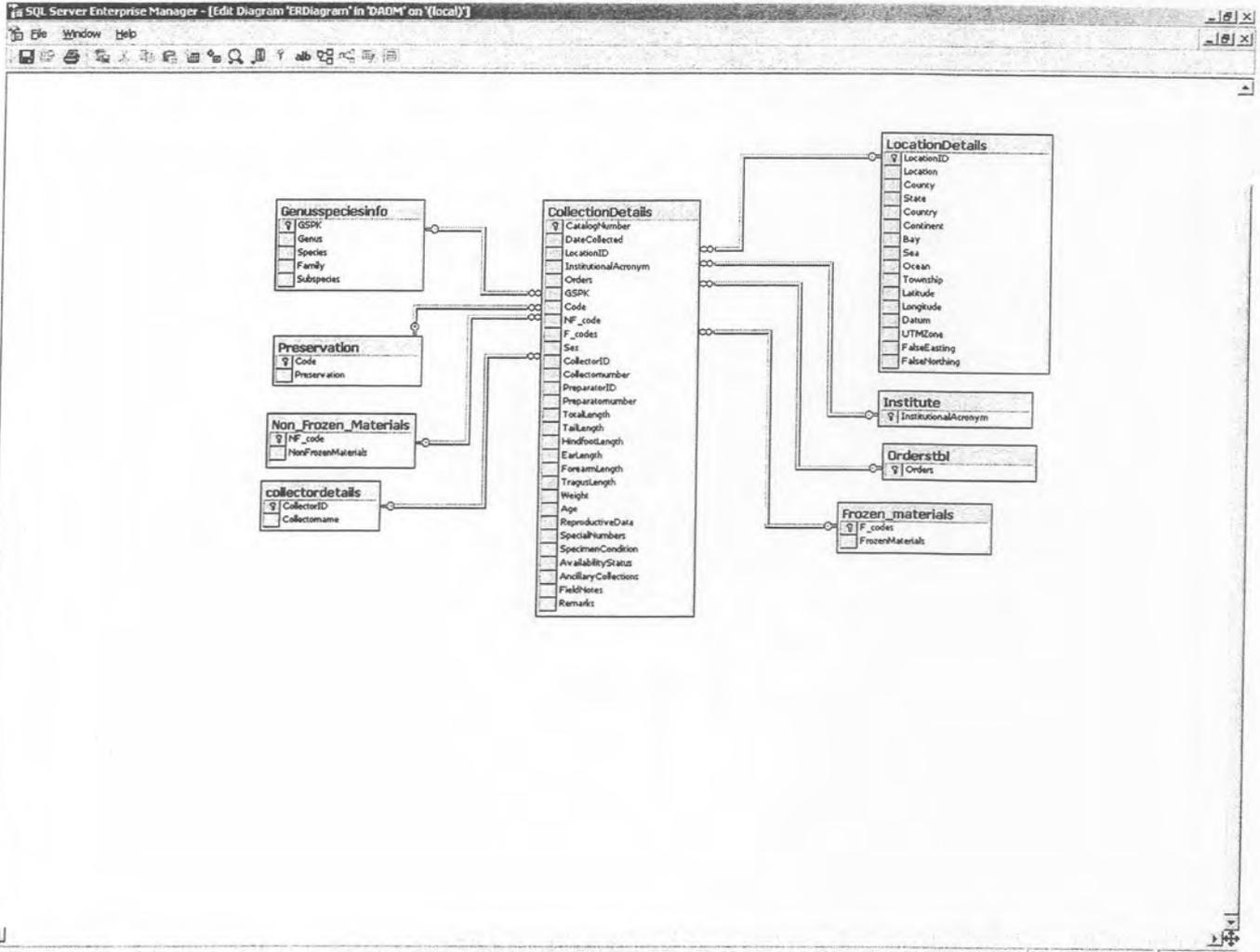
**Table 1.** Number of verified specimens that could be assigned to ecoregions listed in the Oklahoma Department of Wildlife Conservation, Oklahoma's Biodiversity Plan. This table does not include specimens for which specific locality data could not be verified or specimens that were captive reared or introduced species.

ECOREGION	VOUCHERED SPECIMENS
Black Mesa	361
Western High Plains	40
Southwestern Tablelands	200
Central Great Plains	2014
Flint Hills	104
Central Irregular Plains	343
Central OK/TX Plains	3027
South Central Plains	0
Ouachita Mountains	352
Ozark Highlands	290
Arkansas Valley	49

**Table 2.** Number of vouchered specimens of federally endangered species and state species of special concern of Oklahoma mammals in OSUCOV database.

Scientific Name	Common Name	Number of Specimens
<b>Endangered Species</b>		
<i>Myotis grisescens</i>	Gray bat	70
<i>Myotis sodalis</i>	Indiana bat	7
<i>Corynorhinus townsendii ingens</i>	Ozark big-eared bat	3
<b>Species of Special Concern</b>		
<i>Notiosorex crawfordi</i>	Desert shrew	8
<i>Myotis keenii</i>	Keen's myotis	40
<i>Myotis leibii</i>	Small-footed myotis	13
<i>Myotis austroriparius</i>	Southeastern myotis	11
<i>Corynorhinus townsendi pallescens</i>	Western big-eared bat	71
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared bat	9
<i>Lasiurus seminolus</i>	Seminole bat	1
<i>Tadarida brasiliensis</i>	Mexican free-tailed bat	436
<i>Cynomys ludovicianus</i>	Black-tailed prairie dog	65
<i>Marmota monax</i>	Woodchuck	8
<i>Reithrodontomys humulis</i>	Eastern harvest mouse	4
<i>Oryzomys palustris</i>	Rice rat	0
<i>Zapus hudsonius</i>	Meadow jumping mouse	0
<i>Dipodomys elator</i>	Texas kangaroo rat	1
<i>Bassariscus astutus</i>	Ringtail	4
<i>Lontra canadensis</i>	River otter	2
<i>Conepatus mesoleucus</i>	Hog-nosed skunk	0
<i>Mustela frenata</i>	Long-tailed weasel	3
<i>Vulpes velox</i>	Swift fox	6
<i>Felis concolor</i>	Mountain lion	5

**Figure 1.** The organization of the DAOM database in SQL Server depicting the relationship between collection details and the supporting tables, which provide additional information about each Catalog Number.



**Figure 3.** Number of collections from Oklahoma counties deposited in OSU Collection of Vertebrates and entered into DAOM database.

