FINAL PERFORMANCE REPORT

FEDERAL AID GRANT NO. T-20-P-1

DEVELOPMENT OF INTER-AGENCY RARE SPECIES DATA SHARING AND EXCHANGE FOR STATEWIDE WILDLIFE CONSERVATION PLANNING

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

June 15, 2004 through November 30, 2010

FINAL REPORT

State: Oklahoma **Grant Number:** T-20-P-1

Grant Program: State Wildlife Grant Program

Grant Name: Development of Inter-Agency Rare Species Data Sharing and Exchange for Statewide Wildlife Conservation Planning.

Grant Period: June 15, 2004 through November 30, 2010

Principle Investigator: Ian Butler, University of Oklahoma

A. ABSTRACT

We created a digital repository of nearly 200 reports and data sets containing information about rare species in Oklahoma. These reports and data sets originated from a variety of sources including biological surveys and research projects conducted by or funded by the Oklahoma Biological Survey (OBS), Oklahoma Department of Wildlife Conservation, U.S. Fish and Wildlife Service, Department of Defense, National Forest Service, National Parks Service and state research universities. These files constitute the initial collection for the Oklahoma Biological Survey Data Catalog, a new, permanent repository for data regarding rare Oklahoma species. The Data Catalog will be accessible over the Internet for anyone to view and will be maintained by the OBS. The Data Catalog archives and serves data in a format that is readily accessible (.pdf files) and can be easily transferred or modified as software evolves. State, federal and non-governmental conservation organizations and biologists will be encouraged to contribute additional data on rare Oklahoma species.

B. INTRODUCTION

Since 1988 the Oklahoma Natural Heritage Inventory (ONHI), a program of the Oklahoma Biological Survey, has maintained a database containing information on the status and distribution of rare species in Oklahoma. This information is widely used by conservation and permitting agencies, businesses, researchers, wildlife conservation planners and others. State and federal regulatory agencies, while themselves collecting rare species data, encourage and even direct permit applicants to ONHI for information on rare and endangered species, but do not consistently pass along their own data to the Oklahoma Natural Heritage Inventory to update and enhance this database.

The ONHI lacks the resources to annually generate new information and occurrences for all of the rare, threatened, endangered and candidate species in Oklahoma. Therefore, when fellow conservation entities do not share their data, the utility of the ONHI database suffers; as does the quality of conservation planning that is dependent on this information.

The Oklahoma Natural Heritage Inventory initiated this project to enhance state wildlife planning efforts by facilitating the sharing and exchange of rare species occurrence data among natural wildlife resource agencies and organizations. These data include reports and data sets as well as the field notes and metadata associated with these. Field notes are of particular importance because these are rarely archived and tend to be lost over time. Data generated from a specific project may become a valuable resource to the collecting individual, collaborators and other investigators long after the initial project is concluded. Unfortunately, most data are eventually lost or rendered worthless over time for a variety of reasons. Data and reports are typically filed away electronically or on paper, but the files may become misplaced, the paper may deteriorate, the electronic files may become corrupted, or the software/media evolves to a point where the electronic files can no longer be read. At some point, the investigator dies or retires and the data are essentially lost. Collectively, these processes have been termed "data entropy." A data catalog is the central component of this project and it is intended to provide a means to conveniently store data electronically and allowing it to be served online in a location that is readily accessible in a medium that will be upgraded as technology evolves.

C. OBJECTIVE

Facilitate state planning for rare wildlife species conservation by providing for and coordinating the disposition of rare species occurrence information already collected by state agencies into a central database.

D. APPROACH

A temporary staff biologist, Bill Dengler, was hired to work with the staff of the Oklahoma Department of Wildlife Conservation (ODWC) and other conservation agencies to identify existing data holdings and to assist in the development of data sharing agreements. Initially, he worked with biologists at the ODWC and Oklahoma Biological Survey to locate completed reports for scanning and digital organization. These were primarily projects which had been funded through Section 6 of the Endangered Species Act (47 grants/projects) and other federal grant programs directed at rare species conservation (151 grants/projects). An Excel database was created to summarize each project's content, and electronic files of reports and data were built by either scanning paper documents or transferring and converting electronic files. Scanned paper files and transferred electronic files were placed into a .pdf format. This format was chosen because it is widely used, easily accessible and should be relatively easy to update and keep current as the software is updated.

Once reports were identified, an introductory letter was sent to the principle investigator(s) associated with each project explaining the data sharing project. Bill Dengler followed up by contacting the principle investigators and offering to meet with them to discuss the data sharing catalog and to encourage them to make their field notes

and raw data available for archiving. These meetings met with mixed success. In some cases, data entropy already had occurred and field notes and data were incomplete, entirely lost or unavailable. In other cases, principle investigators were reluctant to share raw data and field notes because of the sensitive nature of these data or because investigators wished to use these for future publications. However, some meetings were successful and copies of data were obtained for archiving. Additionally, some meetings led to other reports and data sets.

Both Bill Dengler and Ian Butler made presentations at state conferences and spoke with biologists at meetings about the data sharing project and on-line data catalog. The intent was to gauge the scope of available data and the interest in data sharing among practicing biologists and conservationists.

Concurrently with report and data acquisition, we began efforts to define an Internet-accessible data catalog and web application capable of delivering data and documents. We upgraded the data catalog server hardware and provided a backup service for the project. We researched and evaluated several options for providing web access for the data catalog and offering multiple levels of data security for the users.

After working with several applications, we determined that a "Web-based Distributed Authoring and Versioning" system or WebDAV would be a cost effective, relatively low-maintenance and relatively easy to use system. We worked on the development of a WebDAV repository with encrypted authentication and data transmission over the Internet. A WebDAV is an application that allows users to collaboratively edit and manage files on a remote server and it provides these users with the ability to store files and access documents. WebDAV can be used for storing files on the web with relatively good security, as long as sessions are encrypted. Relevant features of WebDAV are that it can provide overwrite prevention for documents, users have the ability to query files and information about the authors, and it allows files to be organized into collections of related files. Additionally, most current operating systems provide support for WebDAV, which makes the access and use of files on WebDAV servers readily available to a wide range of users.

During the course of the grant, we developed and tested an initial version of a more complex, web-based Data Catalog application. It is capable of providing some features normally found on Content Management Systems (CMS) for storing and accessing data. Our application would permit authors to store sensitive data in restricted locations, secured and hidden from general users, but would also permit authors to release data to specifically authorized users. In time, these data could be made available to a wider range of users at the author's discretion. However, as a result of our security and bug testing, we concluded that we would be unable to significantly reduce the potential for major Internet security problems in the application, if we deployed it as scheduled. Resolution of security problems within the grant time frame was not possible without additional funding, beyond the level we had anticipated. As a result, we suspended development and testing of the Data Catalog Web application until we can obtain another funding source for continuing code development.

The current data sharing catalog provides for "Web-based Distributed Authoring and Versioning" or WebDAV repository with encrypted authentication and data transmission, over the Internet. More detailed information about WebDAV systems can be obtained at http://en.wikipedia.org/wiki/WebDAV. WebDAV can be used for storing files on the web with relatively good security, as long as sessions are encrypted.

E. RESULTS AND DISCUSSION

An assessment was undertaken of all project files located at the OBS (since the early 1970s) and the ODWC (since the early 1980s) that pertained to rare or sensitive species. We also talked to numerous biologists and researchers around the state at five state meetings, and individually met with 36 of these to ask for data contributions.

Reports for 198 projects pertinent to the data catalog were scanned to .pdf format, and a file containing the Project Information was developed. Project Information consists of the pertinent dates, publication notes, an abstract, and other information that describes the project. Abstracts were written for more than 100 projects that lacked abstracts in their final reports. These digital data have been archived in the WebDAV data_catalog. Electronic backup copies were made for the initial set of project files and these are stored in four separate locations – two on the University of Oklahoma campus, one at the Oklahoma Biological Survey and one at the Oklahoma Department of Wildlife Conservation. The paper reports and files were boxed and consolidated into one OU storage facility that was deemed to be the safest location we have available.

The OBS WebDAV application will be deployed for restricted write access (requiring a username and password). Read permission will be open to all users. The URL is www.biosurvey.ou.edu/data_catalog. Sensitive data such as the precise locations of rare or endangered species are incorporated into the ONHI database but generally are not made available to the public via the WebDAV site to protect those populations or individuals.

F. SIGNIFICANT DEVIATIONS:

None

G. COST: $ 208,053.30

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I. DATE: January 14, 2009

J. APPROVED BY: _____
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