FIFTY YEARS OF DATA COLLECTING: THE MISSOURI SPELEOLOGICAL SURVEY'S CAVE DATABASE

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Abstract

The first statewide cave "catalog" for Missouri was published in 1952. After the publication of J Harlen Bretz's *Caves of Missouri* in 1956, the Missouri Speleological Survey was organized. Acting in cooperation with the Missouri Geological Survey, the MSS began actively adding to the list of caves. By the late 1960's this listing was computerized, originally as simple text lines. By 1990 a better system was needed and new platforms were developed. Today the Missouri Cave Database exists as a functional and flexible dataset written on a FileMaker Pro platform. A history of data collection in the state is presented with a description of the database and how it interacts with other digital data, physical cave files, cave maps and other sets of information.

Key words: cave database, cave geography, data security, Missouri Speleological Survey

Introduction

The first statewide cave "catalog" for Missouri was published in 1952. After the publication of J Harlen Bretz's *Caves of Missouri* (1956), the Missouri Speleological Survey was organized. Acting in cooperation with the Missouri Geological Survey, the MSS began actively adding to the list of caves. By the late 1960's this listing was computerized, originally as simple text lines. By 1990 a better system was needed and new platforms were developed, including Microsoft Access®. Today the Missouri Cave Database exists as a functional and flexible dataset written on a FileMaker Pro platform. A history of data collection in the state follows with a description of the database and how it interacts with other digital data, physical cave files, cave maps and other sets of information.

The state of Missouri contains over 6,200 known caves of all shapes, sizes, and kinds. While this is remarkable in itself, no less remarkable is the history of how these caves have been documented over the years, as well as the process, methodologies and philosophy by which information is gathered today.

History

In the 1800s and early 1900s Missouri caves received occasional mention by geologists writing reports for the Missouri Geological Survey. In the 1930's, Willard Farrar, a Survey geologist, compiled a list of caves in the state. Farrar was killed in World War II but his "Partial Catalog" of the caves became the resource base for J Harlen Bretz as he began assimilating data for his landmark *Caves of Missouri* (1956). Bretz's book was more than a listing of caves in the state; it was a tome on the origin of caves in the Ozarks, which supported Bretz's geomorphologic theories. The excitement generated by the publication of the book resulted in the formation of the Missouri Speleological Survey (MSS), also in 1956. Particularly cave enthusiasts recognized that hundreds of caves were not listed in the publication, and they sought to document these additional sites. The MSS was organized as

a survey, not a society, whose primary purpose was to gather data, rather than act as a social group. That purpose has been continuous now for over 50 years.

With the additional interest in caves, the Geological Survey hired Jerry Vineyard to update the list. Eventually it was conceded that perhaps it was not in the best interest of the caves to have lists available for purchase by the general public. Thus, the responsibility for actually publishing the catalog was handed over to the MSS, and the first major revision of the catalog was published in 1964 by the MSS.

Along with the development of good lists, a high priority was the writing of detailed descriptions of the caves and creating quality cave maps. Missouri has long been a leader in both of these areas. These descriptions and maps began to be published in *Missouri Speleology* and the appearance of these issues inspired more people to take part in the process.

The cave list was computerized beginning in the late 1960s. Bulky, slow, and costly, one list eventually would be printed out on multilith masters and copies were printed and bound. This process was performed twice before faster printers made it possible to actually print out a catalog on demand. Eventually the antiquated software and hardware needed to run it became hard to maintain. Further, as Geological Survey workers had less time to deal with incoming data the data process began to slow. As output suffered, so input was affected and contributions slowly began to decline. Finally the state was not able to support the software, and the MSS alleviated the problem by moving the data to a more accessible platform. A new front end, written in Microsoft Access®, was utilized for a while beginning in the late 1990s. While detailed and thorough, this system was fairly hard for ordinary users to operate, and it was relatively inflexible. Eventually the data were ported over to FileMaker Pro, a stand-alone, run-time database. For a few years the data were kept in both formats before the Access format was abandoned. Since 2000, the data have been kept in the FileMaker Pro database, rechristened The Missouri Cave Database (MCD), and is maintained by the MSS and its cooperators.

Features of the Database

FileMaker Pro is the largest-selling, stand-alone database for small applications and yet it is powerful, while easy to use and customize. For the MCD application, the power lies in the ability to import and export different types of data while also being able to cull out sections of data for remote data entry. Further, by utilizing run-time versions the data can be distributed to users without requiring the additional purchase of stand-alone units. Finally, the program is cross-platform and can be used with a variety of operating systems.

The field structure of the MCD is not terribly involved. There are three tables and a variety of views or forms, which are easy to access. The main table with 63 fields contains the bulk of the location and attributes data. The location fields include UTMs, latitude/longitude and Public Land Survey System (PLSS), using township, range and section. The bulk of the cave locations were in PLSS, but this is slowly being refined into point location data, preferably in UTM, NAD 27 (Universal Transverse Mercator coordinate system, North American Datum 1927). Locations in any format are accepted and recorded with conversions into other systems. Additionally, a text field includes a description of and directions to the cave entrance. Attribute information includes the host rock, basic hydrology, length, and other information. Lastly information relating to the management of the cave, including owner, status, and classification is included.

A cave maps table includes 10 fields. This part of the database is actually maintained by the Geological Survey, in an Access format, and records those cave maps that are actually on file. This data are periodically imported into the MCD.

A reports table contains 13 fields, including a text field, and is used for including text reports on the caves. This section of the data can be worked on separately and imported into the MCD. A database design report is available from the author.

Data Overview

At the date of this writing (2007) the database main table contains 6,266 records, which represent the entrances of caves. Some caves have multiple entrance records although this is not necessarily the norm. The maps data contains 3,095 records which represents the number of cave maps on file at the Missouri Geological Survey. The reports table currently contains over 1,500 records, a number that is rapidly growing as this table is utilized

and populated more frequently. A sampling of the database reveals that there are over 60 "bear" caves (caves with "bear" as part of the name) squeezing out "bat" caves which number about 40. Over 500 caves have "spring" as part of their name, while 170 have "bluff" (Ozark for cliff) in their name. There are nearly twice as many "little" caves (115) as there are "big" caves (59). Over 300 caves are noted as "closed" with another 225 as "restricted." Perry County, in southeast Missouri, leads the state with 659 caves, followed by Shannon County, in the southeast Ozarks, with 578 caves. Greene County, in southwest Missouri, has 369, closely followed by central Missouri's Pulaski County with 358.

Information Flow, Policies and Restrictions

Material flows into the database from a variety of sources through a variety of media. Much information, probably the bulk, comes from emailed text messages. Others write more formal reports and send those in. Some location submissions are in the form of simple GPS output while others are exported from DRG (Digital Raster Graphics of scanned topographic maps) programs, such as National Geographic's Topo! program.

The data in the MCD are restricted. That said, the information is available to those who need it, have a valid use for the data, will add to the data and agree to provide security for the data. A committee is called to consider requests that are beyond the norm of simple approval or disapproval. If need be, the MSS board is consulted. Data printouts are no longer provided; the information is exported in either FileMaker run-times, text files, or Excel format. Data exports are easily tailored for the needs of the recipient and to insure data security.

The Missouri Cave Database is a cooperative project. While the MSS is the organizing and administrative body, the effort is supported by a number of government agencies including the National Park Service's Ozark National Scenic Riverways (OZAR), the U.S. Forest Service's Mark Twain National Forest (MTNF), the Missouri Department of Conservation (MDC), the Missouri Department of Natural Resources (including both the Geological Survey and the Division of State Parks), The Missouri Department of Transportation (MoDOT) as well as the Department of Defense's Fort Leonard Wood and Army Corps of Engineers. Most of these are major cave owners as well: MTNF has over 560 caves on its lands, while OZAR has 300 and MDC about 260. These agencies share their data, support the gathering of data and get data in return. OZAR, MTNF, and MoDNR use FileMaker run-times as their data standard with exported data used in GIS (Geographic Information System) and other applications. Cave Research Foundation supplies database software, hardware and developmental costs to the project.

The Missouri Speleological Survey's data-gathering mission continues into the rest of its first century with a well-developed and supported mission.

Literature Cited

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