

Partners

The U.S. Army Engineer Research and Development Center (ERDC) Construction Engineering Research Laboratory (CERL) is supporting Fort Leonard Wood's execution of this Legacy-funded project. Dr. Michael L. Hargrave is providing administrative and technical oversight of a contract with the Illinois State Museum Society.

The Illinois State Museum Society (ISMS) is conducting the natural and cultural inventory of caves, under the direction of Dr. Steve Ahler. Dr. Ahler is conducting the cultural resource component of this project.

The University of Illinois at Urbana-Champaign (UIUC) is assisting ISMS. UIUC Researcher Dr. Steve Taylor is conducting the natural resource component of the study.

Mr. Joe Proffitt, Natural Resource Specialist, and Dr. Richard Edging, Post Archeologist, are facilitating the cave survey project at MANSCEN & FLW. Mr. Proffitt and Dr. Edging are both affiliated with The Center For Environmental Management on Military Lands (CEMML) at Colorado State University.

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Cultural and Biological Survey of Caves at Fort Leonard Wood, Missouri



Assessing the Suitability of Caves for Military Training

Installation Location and Geographic Setting

The Maneuver Support Center (MANSCEN) at Fort Leonard Wood (FLW) is located in the Ozark Plateau region of south-central Missouri. The Mark Twain National Forest borders the installation on three sides. Geologic features such as rock outcrops, karst topography (caves and sinkholes), and sheer bluffs that commonly rise 200 feet in elevation border narrow, flat, alluvial floodplains. Elevations range from 760 feet above sea level to over 1,300 feet above sea level on hilltops in the southern portion of the installation. Sixty-three known caves occur within Fort Leonard Wood boundaries.

Biologically, FLW is located at the crossroads of several natural biome divisions. This transition area is where the western edge of the eastern deciduous forest meets the savanna tall-grass prairie. The high diversity of life forms is reflected in the flora and fauna documented on the installation. Outside the cantonment, forest covers 44,470 acres (17,996 ha) and 1,552 acres (628 ha) are wetlands.

Installation Primary Mission

MANSCEN is a values-based, multi-disciplined, innovative team that provides the Nation with values-based individuals, leaders, and teams trained in basic combat skills and engineering, chemical, military police, and transportation disciplines that are prepared for success in any future operational environment.

Background

The caves present on a number of Department of Defense (DoD) installations are uniquely important and fragile resources. Dry caves often contain well-preserved, scientifically important prehistoric cultural deposits. Some caves include human remains and ritual items of great cultural value. Caves can also represent important habitat for threatened and endangered species. Cave resources are highly vulnerable to damage by casual visitors, military training, and vandalism.

The proper management of cave resources on DoD installations requires a detailed baseline inventory, thoughtful prioritization, and a monitoring strategy that is tailored to the nature of the resources. Most cultural and natural resource managers at DoD installations lack the specialized knowledge and experience needed to properly manage these unique resources. This project, funded by the Legacy Resource Management Program, was designed to help DoD managers balance the need for military training in caves with responsible management of cultural, biological, and geological resources.



Project Purpose

Recent military actions have intensified the need for realistic military training in caves. Cave training is currently not permitted in at Fort Leonard Wood due to incomplete or outdated cultural and biological inventories, inadequate maps, and safety issues. This multi-year Legacy project will develop a strategy for inventorying, prioritizing, and monitoring the condition of cave resources. The strategy will be tailored for use at Fort Leonard Wood's caves. This project is also producing general guidance that will be useful to those who manage cave resources at other DoD installations.

Goals

- Identify an assortment of caves that will allow the military realistic training scenarios.
- Protect significant biological systems and species, particularly those on the federal Endangered Species List and state of Missouri species of conservation concern.
- Establish an approach for collecting, storing, and using data on biological, cultural, and geological resources in DoD-managed caves.
- Define an effective protocol to protect in-situ or, when necessary, to collect and conserve artifacts from significant prehistoric and historic archeological sites.
- Establish public education programs to increase awareness and appreciation of cave resources.
- Make available general guidance on how to develop and implement an approach for inventorying cave resources on DoD lands.



Approach

In the initial phase of the project, biological and cultural resource managers worked with military trainers to identify the cave training scenarios needed for each military unit's Program of Instruction (POI). Fort Leonard Wood's Directorate of Public Works (DPW) Natural Resource office then discussed the goals and scope of the project with relevant federal (U.S. Fish and Wildlife Service) and state (Missouri Department of Conservation) regulators. These consultations helped define the biological species and other cave characteristics that should be included in the program.

The FLW DPW Natural Resource Branch is responsible for managing the installation's biological and cultural resources. Prior to this project, numerous cultural resource inventories and National Register of Historic Places (NRHP) eligibility assessments had been conducted in caves impacted by vandalism, but most caves had incomplete (if any) data. Because of the sensitive nature of human remains, it was important to inventory all 63 of Fort Leonard Wood's caves. It was evident that funding outside the normal installation budget would be needed. Because the number and diversity of cave resources at FLW offered an excellent opportunity to develop protocols that could be adapted for use by many DoD installations, FLW DPW requested funding from the Legacy Resource Management Program.

The FLW Natural Resource Branch received Legacy funding for this project in two consecutive years (2002 and 2003). The first year, the overall goal was to develop and field test a protocol for monitoring the nature and condition of cultural and natural resources located within and immediately outside (on the talus slope) of a sample of 13 caves. The monitoring strategy was intended to include brief visits and the development of reliable maps with minimal collection of cultural artifacts.

The second year of funding permitted baseline inventories (as initial monitoring visits) of the remaining caves. Twelve caves were identified as suitable for military training. This will allow three caves for each of the four military training scenarios. Standard operating procedures are being developed for each training scenario, along with safety risk assessments and use/monitoring protocols that the DPW Natural Resource Branch will use to monitor the effects of military cave training units.



Benefits and Products for Fort Leonard Wood

- Increased integration in cultural and natural resource management.
- A field-tested protocol for baseline inventorying and systematic monitoring of cave resources. The protocol will emphasize methods for the proper management of a wide range of cave-dwelling taxa, including relevant threatened and endangered species.
- A protocol for effective consultation with Indian tribes. Effective consultation is essential for the proper treatment of human remains and items of cultural significance.
- A field protocol for management of a wide variety of archaeological deposits not directly relevant to the Native American Graves Protection and Repatriation Act (e.g., fragile floral and faunal remains, basketry, textiles, etc.).
- A GIS database to ensure that baseline inventory data (including maps, digital photographs, and artifact inventories) are readily accessible to the installation resource managers. The database will be designed to facilitate the detection of changes in the condition of the cave resources.
- A prioritization of cave resources, allowing installation resource managers to make effective decisions about allocation of resources.

Lessons Learned

Challenges that confronted the project managers and researchers can be grouped into 3 broad categories.

1. Understanding military training needs: DoD Land managers must work closely with each military unit to thoroughly understand the POI for the cave training scenario. An understanding of what is supposed to happen *and what could happen* in a military training scenario will help both resource managers and military trainers understand why specific cave training protocols are developed.
2. Unpredictability of Cultural Resource surveys: An overconfidence in the reliability of a 1985 cave survey caused some problems for the archaeologists. Cave maps from the 1985 report were often found to be incomplete and incorrect. Before undertaking new cave surveys, it would be wise to spot-check the accuracy of existing maps.

Human remains were discovered in a few caves. Most of these had been disturbed by vandals but one intact burial was found. The presence of human remains required some sites to be surveyed differently, and the NAGPRA consultation and notification process required additional time. If cave surveys are planned for other installations, NAGPRA consultation protocols should be developed before fieldwork begins. This will save time and reduce the risk of delays that could impact military training. Ideally, contingency funds from the cultural resource program should be available in case significant archaeological deposits require mitigation.

3. Slow pace of biological inventory: The amount of time required to identify and classify invertebrate specimens was not anticipated. For many cave invertebrates, identification to the species level requires a detailed, extended examination by a recognized professional. Relatively few specialists are qualified to conduct this work. In areas where few cave life surveys have been conducted, many new state and county records may need to be entered into the biological databases.

