

Timpanogos Cave National Monument



Science & Resource
Management



Briefing Report



Fiscal Year
2005

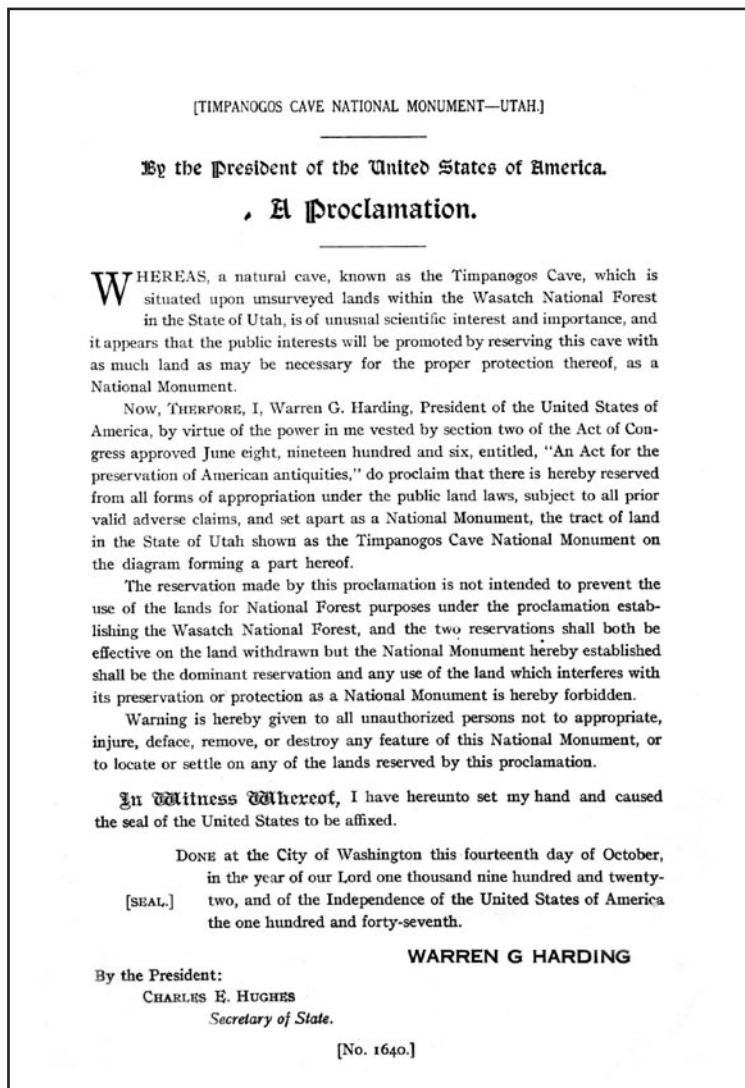
Table of Contents

Science and Resource Management Overview	1
Cave Restoration and Cleaning	2
Cave Environmental Monitoring	3
Cave and Karst Issues	4
Cave Inventory and Research	5
Partnerships	6
Managing Cultural Resources	7
Vegetation Management	8
Graphic Design	9
Public Outreach	10
Budget, Personnel, and Proposals	11
Acknowledging the Crew	12

Science and Resource Management Overview

Science and Resource Management at Timpanogos Cave National Monument follows the park's mission statement, "to preserve the outstanding cave formations, geological processes, and historical values of the Timpanogos Cave System and associated features for the recreational and educational enjoyment, scientific value, and inspiration of this and future generations." Since the cave is our primary resource, most of our activities focus on cave preservation and protection. Significant time is spent on cave monitoring, research, and restoration.

Science and Resource Management, "cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world." We seek partnerships to enhance the understanding and protection of nation's caves and karst resources. Since Timpanogos Cave National Monument is the only federally-operated cave in Utah, we strive to be known as the state's experts in cave and karst preservation, education, and research.



Cave Restoration and Cleaning

Due to development of cave trails and approximately 70,000 people a year visiting the caves, cave resources are being degraded from the introduction of foreign debris and altered drainages. This introduction of foreign debris discolors cave features, dries out speleothems, and provides an exotic food source for opportunistic biota. To prevent irreversible damage to cave resources, our annual GPRA goal is to restore 3,000 sq ft of cave surfaces by removing algal growth, lint accumulation, and mud accumulation.

In 2005, the Restoring the Cave's Natural Drainage Project was completed. The project provide funding for solutions to how the cave's flow would deposit large amounts of foreign debris, such as mud and lint, incidentally carried in by visitors. Sediment traps and improved drainage paths along with heavy cleaning and restoration efforts were successfully implemented.



Lint accumulating on Helictites



Cami Pulham using a paintbrush to remove lint



Trap used to catch trail grime



Jason Mateljak using a shovel to remove foreign debris from Middle Cave Lake



Lint and hair being removed from tunnel

Cave Environmental Monitoring

To provide access for visitors after the caves were discovered, the entrances were enlarged, tunnels were blasted, and trail corridors were enlarged and cemented. These modifications have greatly changed the cave's environment. Changes in temperature, humidity, drip rates, and air-flow are studied using various types of dataloggers. Small changes in the cave's stable ecosystem can permanently alter critical habitats and lead to decay of the cave's formations. To mitigate the environmental effects, the cave gates were reconstructed and airlock doors were installed to the cave's tunnels.

Water quantity and quality are being monitored. Drip rates are measured using tipping buckets to quantify recharge rates and to estimate the drainage basin size. Water quality sampling occurs to check for presence of contamination. The only significant contaminant is the presence of coliform counts found in one of the cave's pools.

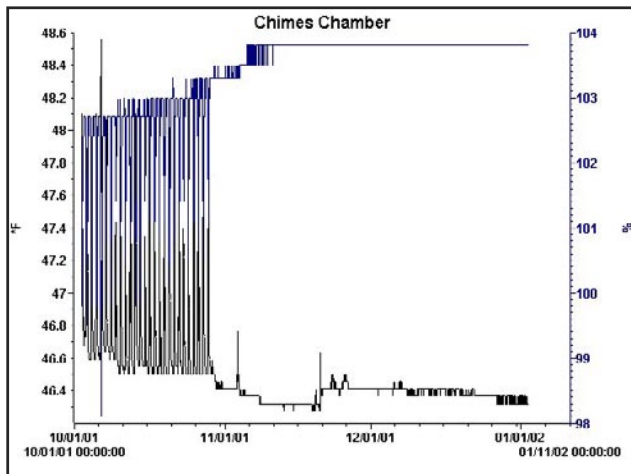
Long-term monitoring of geologic features also occurs through the use of more than 100 patented photomonitoring points. These stainless-steel anchored stations allow replicated photos to be taken over time and analyzed for change.



Cave Photomonitoring Station



Collecting water quality data



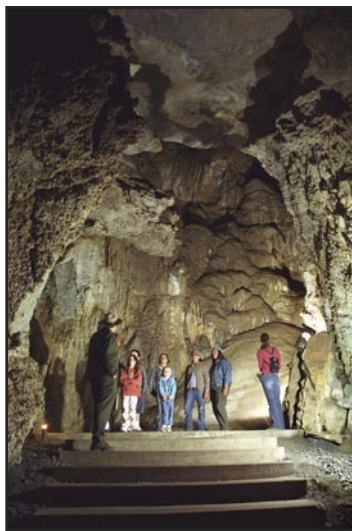
Temperature data showing a 2.5°F fluctuation as the tourist season ends



Installing a new cave gate

Cave and Karst Issues

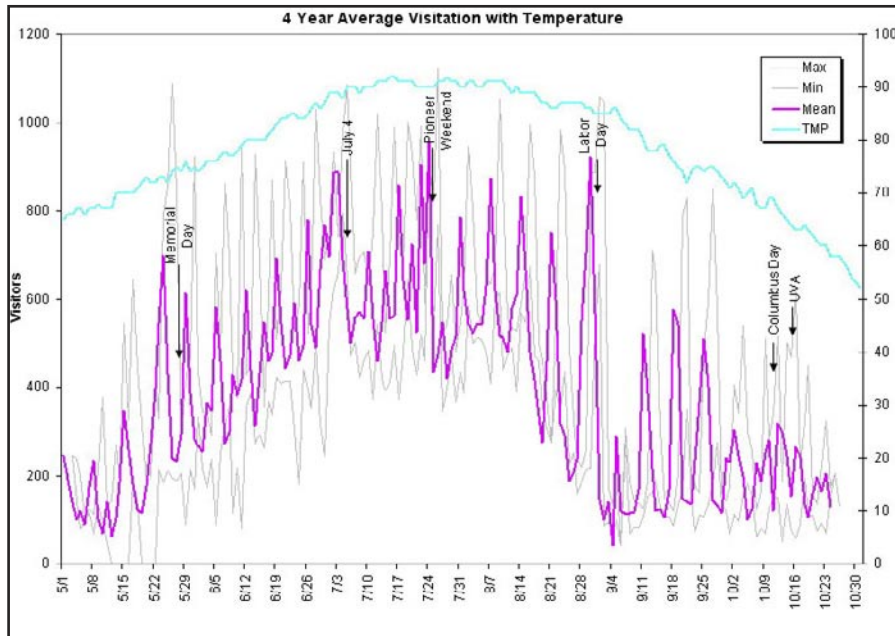
Guiding over 70,000 visitors through the confines of a fragile cave environment during a six month season has created an extreme need for creating a comprehensive Cave Management Plan. For over 80 years, the monument has developed and led tours through the Timpanogos Cave System without any science-based planning. Funding proposals and OFS requests have been submitted to complete a comprehensive Cave Management Plan that will ensure that issues affecting cave resources, such as trail development, trail maintenance, tour sizes, ecosystem health, safety concerns, watershed management, restoration activities, research, and off-trail uses, will be addressed and considered throughout all of the disciplines of the park.



Tour in Big Room of Middle Cave



Tour at Heart of Timpanogos



High visitation days accommodate up 1120 visitors/day during extreme summer heat

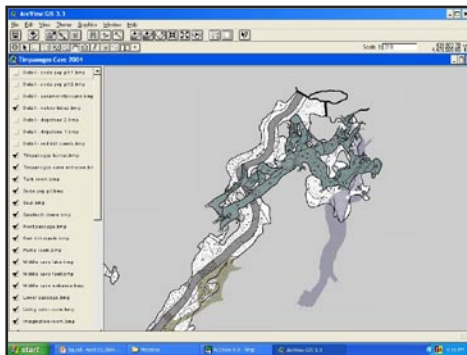
Cave Inventory and Research

One can't manage what one doesn't know. Accurate information is critical to all park managers. A GIS program was implemented to organize long-term geographically data. Professional inventories of the cave's invertebrate and microbial communities were conducted to understand biological make up of the cave ecosystem.

The GIS software was initially obtained through an ESRI Environmental Conservation Grant in 2000. Additional SEPAS GIS funding was awarded to use ESRI ArcPAD and a PocketPC to inventory the cave's significant features . A high-resolution GIS layer of the Timpanogos Cave System was created and features such as cultural resources, rare or unusual formations, water and photomonitoring stations, and lighting systems are being inventoried. GIS technologies are being used to track cave projects in Science & Resource Management, Maintenance, Interpretation, and academic research.

After discussions with monument staff, the I&M Program was convinced of the importance of an inventory of the cave's invertebrates. The Northern Colorado Plateau Network was contracted Dr. Riley Nelson of Brigham Young University to inventory the invertebrates of the Timpanogos Cave System. The fieldwork was conducted in the 2003 and 2004 seasons and the lab work was being finished in 2005.

Another topic being researched is the role of microbes in caves. Caves are unique environments where unique microbial communities can exist. Through a SEPAS grant, PhD Candidate, Megan Porter at Brigham Young University researched the difference in microbial communities from "pristine" and "disturbed" cave locations. This knowledge may allow us to develop a vital sign that indicate ecosystem shifts at the most basic biological level.



Cave map in ESRI ArcView GIS



Cave's microbial growth from Hershey's Kiss wrapper



Cave crickets collected during the invertebrate survey

Partnerships

Science and Resource Management, “cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.” Science and Resource Management is taking a leading role in providing expertise and experience in cave management to other federal agencies.

In 2002 to 2004, the cave gates on 3 entrances of Timpanogos Cave was replaced. Since the project’s end, we have shared our ability to construct cave gates with other agencies. We have completed the Crystal Cave gate for Salt Lake BLM and gate an unnamed cave for the Ely BLM. We are working with St. George BLM and Utah State Trust Lands to gate and manage the 2 most visited caves in the state of Utah - Bloomington Cave and Nutty Putty Cave.

Our mapping expertise partnered with cavers from the local grottos and federal agencies to complete maps of Logan Cave on Wasatch Cache NF, Bloomington Cave on St. George BLM, and several caves in the Tony Grove area Wasatch Cache NF. These maps will be one of the basic tools for these agencies to properly manage their cave resources.

We are one of the founding members of the Great Basin Bat Cooperative (GBBC). This organization represented by the Utah DWR, US Fish & Wildlife, BLM, USFS, Utah State Parks, Kennecott Mining, Hill Air Force, Utah State University, and NPS cooperatively researches the bats of Northern Utah. We provide our expertise on how to manage bats in caves and mines.



Teaching the unprepared Nutty Putty Cave visitors



Completed Crystal Cave Gate



Cami Pulham handling a Hoary Bat

Managing Cultural Resources

Several projects to preserve the park's history are ongoing. A comprehensive administrative history, *Heart of the Mountain*, has been drafted. This manuscript covers the park's prehistory, designation, and history of the all the divisions. It tells an accurate tale of how and why the park has become what it is today.

In 2005, the cataloging all of the backlog museum items was completed. The project added over 4600 items to our collection and allow our yearly museum GPR goal to catalog 100 items to be greatly exceeded.

A future projects are to continue the recordings of oral histories from aging individuals that have made significant contributions to the park's history and to convert as much of the museum's holdings into an easily accessible digital forms.



A soda pop bottle sold at the cave around 1930. Now this still full bottle is housed in the museum.



A historic photo showing soda pop being sold at the cave

CHAPTER III

Middle Cave & The Monument

The discovery of the new cave led to quick action by the Forest Service. The hole reported at the cave from mining and general business was a concern of the Service and began to prepare for managing the site.

Dan Weston visited with Forest Supervisor Dan Parkinson, Arthur Embler, photographer Edna Padden, and surveyor Wally Manning to explore the cave the following day. They returned to the second house, spending much of their time setting traps with carrying equipment and taking photographs. Despite only exploring one half the cave, they were amazed by its contents, describing them to the Service as Park Caves as exceeding the beauty of the main cave. They continued to describe the new cave as having "three miles and hundreds of rooms filled with tables and endpapers" and that this cave "is complete with everything but an axe and pick."

Before climbing back down the canyon, Parkinson and the group discussed the necessary future action of the Forest Service. They all agreed that cave was in need of protection so that future generations may enjoy its splendor. They also agreed that an immediate should be posted to restrict the cave's preservation, a large fence should be constructed and the entrance to the cave in the vicinity of the entrance, and that improvements such as cave lighting and a new trail to the cave were necessary to make the cave accessible to the public. Another brother

In order that the business of the cave may be preserved for the benefit of the public and national parks, immediate action should be taken to restrict the cave from mining or other uses that may be of the benefit of the public. The cave is a natural resource and should be preserved for the benefit of the public. The cave is a natural resource and should be preserved for the benefit of the public. The cave is a natural resource and should be preserved for the benefit of the public.

September 21, 1921. West to Thompson Cave

September 21, 1921. West to Thompson Cave

September 21, 1921. West to Thompson Cave

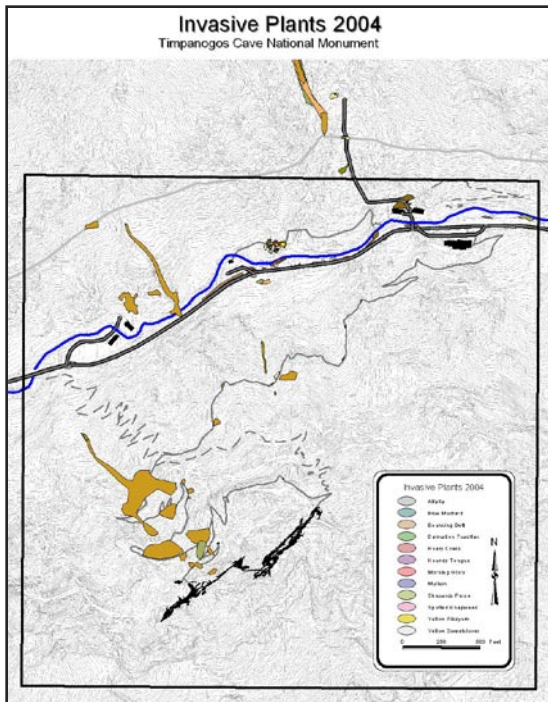
Draft layout of Administrative History

Vegetation Management

Invasive plants choke out native vegetation and create a great threat to the park's ecosystem. In the past 3 years, the monument staff has begun to combat its invasive plants. At least 22 invasive plants have been identified within the monument's 250 acres. Our annual exotic plant GPRA goal is to treat 5 acres of invasive plants and revegetate 1 acre with park-grown native plants. Our efforts have reduced amount of Toadflax and Spotted Knapweed by over 50%.

A small greenhouse has been established to grow native plants to revegetate disturbed areas. Last year our greenhouse yielded about 500 plants (Penstemons, Rabbitbrush, Sagebrush, and native grasses) that were grown from seeds collected by monument staff.

A draft of a Vegetation Management Plan was completed and is currently under review. The plan outlines the long-term plan for controlling invasive plants, revegetation of disturbed areas, and Environmental Assessment (EA).



Map showing the distribution of invasive plants



Native Plants growing in the park's greenhouse



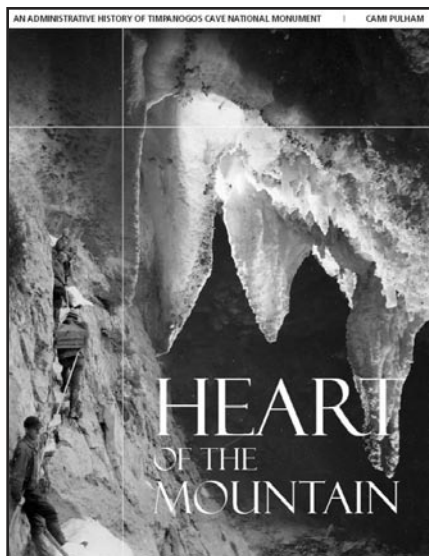
Before and after photo showing the reduction in Dalmatian Toadflax



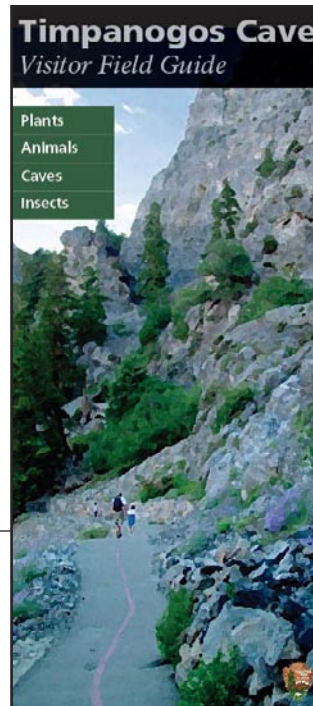
A truck load of weeds

Graphic Design

The Science and Resource Management Division continually looks for ways to enhance the quality of its publications. Each year we have increasing the quality and quantity of our publications. Some of our new publications are the annual *Timpanogos Reflections* canyon newspaper, *Heart of the Mountain: An Administrative History*, a canyon trail guide, a wildflower guide, the new cave “safety” ticket, Science and Resource Management website, new VC exhibits, and a detailed cave map and atlas.



Cover Design for the Administrative History



Fully Illustrated Trail Guide



American canyon newspaper is a joint publication of the NPS/USFS



Draft of new VC exhibit panel

Public Outreach

Public outreach allow us rise public appreciation and support for preserving our natural and cultural resources. Our expertise are often requested by caving enthusiasts, museums, educators, and researchers.

University of Utah's Natural History Museum used our cave expertise in developing an exhibit *The Dark Zone: Exploring Utah Caves*. The exhibit educated museum visitors on proper caving techniques and ethics, as well as, the special features and history of Utah Caves. Our staff actively involved in every step of the development, research, and advertising. Our staff also provided many media interviews and cave-specific presentations to promote the exhibit.

In 2005, we created many presentations on cave management and conservation topics. Several presentations were given at local caving clubs. For the Hutchings Museum, a presentation on caves was given. For Sundance Ski Resort Environmental Programs routine programs were given on bats. For the Salt Lake City's Geological Society of America (GSA) convention, a field trip, the *Unique Geologic Features of Timpanogos Cave*, was conducted. Also, 10 presentations were given at the National Speleological Society (NSS) Convention and 2 presentations were given at the Cave Management Symposium.

In 2005, our staff made several appearances in the local media as cave experts trying to improve cave safety and conservation practices. The coverage was for successes in a graffiti removal project in Bloomington Cave, management actions at Nutty Putty Cave, our involvement in the Utah Natural History Museum caving exhibit, and the 4 drownings in a Provo cave.



Utah Museum of Natural History's *Dark Zone* Exhibit



Cami's museum exhibit twin



Cami Pulham giving a caving program to Girl Scouts



Volunteer Chuck Acklin teaching scouts safe caving techniques



Grotto member teaching cave vertical techniques

Budget, Personnel, and Proposals

Over the last 5 years, the Science and Resource Management Division has shown tremendous growth and results. By acquiring grants, the division has been able to double their total budget. As the funding has increased, so has the staffing, training opportunities, quality equipment, and the complexity of projects, and reputation.

However, the division is still lacks permanent funding and support. Long-term success can't exist without long-term commitment. Can the park succeed in its mission without being committed to its Science and Resource Management?

Funded Proposals

Restoring Cave Soundscape
Project Year 2007; SEPAS \$9,897

Inventory Park Features
Project Year 2007; SEPAS \$9,940

Restoring Cave Resources
Project Years 2005 to 2006; SEPAS \$38,500

Creating Orientation Videos
Project Year 2005; SEPAS \$12,000

Restoring Cave Drainages
Project Years 2003 to 2005; SEPAS \$114,000

Complete Catalog Backlog
Project Year 2004; SEPAS \$23,900

Monitoring Cave Water Quality
Project Years 2003 to 2004; SEPAS \$19,980

Inventorying Cave Features
Project Year 2004; SEPAS \$9,200

Writing a Vegetation Management Plan
Project Year 2004; SEPAS \$10,00

Administrative History
Project Year 2003; SEPAS \$35,000

Installing Cave Handrails
Project Years 2002 to 2003; SEPAS \$20,000

Installing Cave Gates
Project Years 2002 to 2003; SEPAS \$10,000

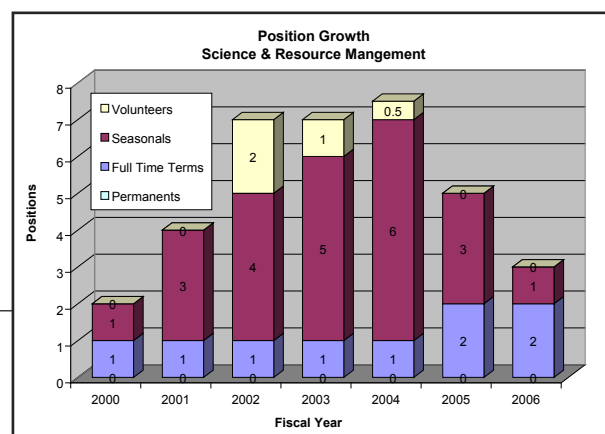
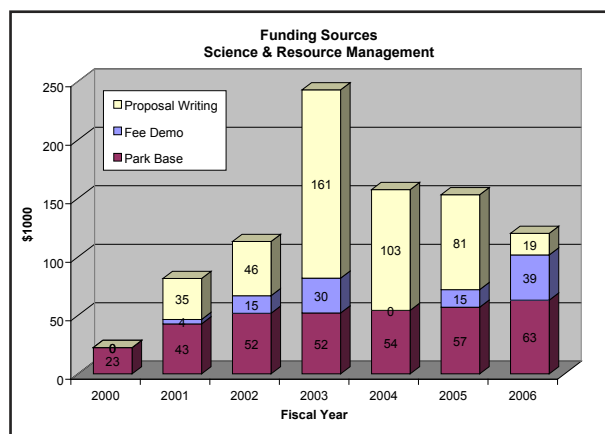
Controlling the Spread of Invasive Plants
Project Years 2002 to 2003; SEPAS \$10,000

Monitoring Microbial Diversity
Project Year 2003; Funding through SEPAS \$9,940

Writing a IPM Plan
Project Year 2003; Funding through SEPAS \$10,000

Interpreting Bat Calls
Project Year 2002; WPMA \$6,916

Cave Restoration
Project Year 2001 to 2002; SEPAS \$10,000



Graphs showing how the positions and funding are moving to more full time positions from park-based funding.

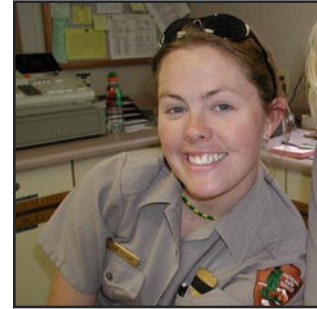
Acknowledging the 2005 Crew



Mike Gosse, Chief Ranger, directs all divisional issues, projects, staffing, and funding. Mike also oversees VUA operations and all of the park's emergency responses.



Jon Jasper, Resource Management Specialist, leads most all of the field intense projects. Leads the division's activities in cave management, inventory, and research projects.



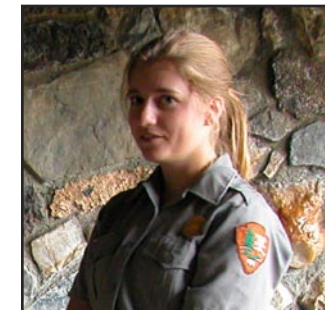
Cami Pulham, Cultural Resource Specialist, is the park lead for preserving the monument's history. She is the museum curator and the lead for finishing the monument's Administrative History and Oral History.



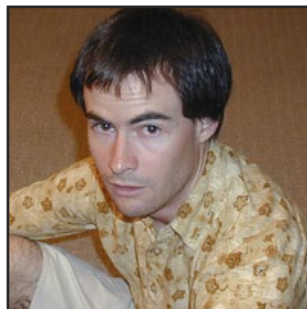
Anita Pulham, VIP Coordinator, leads the Behind-A-Tour-Specialist (BATS) and Senior Ranger volunteer programs. Anita follows her interest in the history of the canyon by helping historical research.



Jason Mateljak is a complete "go getter." He loves both being exposed to both physical and mental challenges. Great employee to have to get the results. His efforts are seen in our successful handrails, gates, and GIS projects.



Becky Peterson, Vegetation Management Specialist, has been working to finish the Vegetation Management Plan. She has valuable expertise for invasive plant control and revegetation efforts.



Brandon Kowallis, Publication Specialist, has had involvement in all of the divisions' publications. He has created the map and atlas for Timpanogos Cave, the canyon newspaper, trail guide, a wildflower guide, and new VC displays. He has also added several professional quality cave and wildlife photos to the park's archive.

www.nps.gov/tica/RMweb