

TIMPANOGOS CAVE NATIONAL MONUMENT

# Science & Resource Management 2004



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# 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.

The Science and Resource Management Division, "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 the state experts in cave and karst preservation, education, and research.

[TIMPANOGOS CAVE NATIONAL MONUMENT—UTAH.]

By the President of the United States of America.

## A Proclamation.

WHEREAS, a natural cave, known as the Timpanogos Cave, which is situated upon unsurveyed lands within the Wasatch National Forest in the State of Utah, is of unusual scientific interest and importance, and it appears that the public interests will be promoted by reserving this cave with as much land as may be necessary for the proper protection thereof, as a National Monument.

Now, THEREFORE, I, Warren G. Harding, President of the United States of America, by virtue of the power in me vested by section two of the Act of Congress approved June eight, nineteen hundred and six, entitled, "An Act for the preservation of American antiquities," do proclaim that there is hereby reserved from all forms of appropriation under the public land laws, subject to all prior valid adverse claims, and set apart as a National Monument, the tract of land in the State of Utah shown as the Timpanogos Cave National Monument on the diagram forming a part hereof.

The reservation made by this proclamation is not intended to prevent the use of the lands for National Forest purposes under the proclamation establishing the Wasatch National Forest, and the two reservations shall both be effective on the land withdrawn but the National Monument hereby established shall be the dominant reservation and any use of the land which interferes with its preservation or protection as a National Monument is hereby forbidden.

Warning is hereby given to all unauthorized persons not to appropriate, injure, deface, remove, or destroy any feature of this National Monument, or to locate or settle on any of the lands reserved by this proclamation.

In Witness Whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this fourteenth day of October, in the year of our Lord one thousand nine hundred and twenty-two, and of the Independence of the United States of America the one hundred and forty-seventh.

By the President:  
CHARLES E. HUGHES  
Secretary of State.

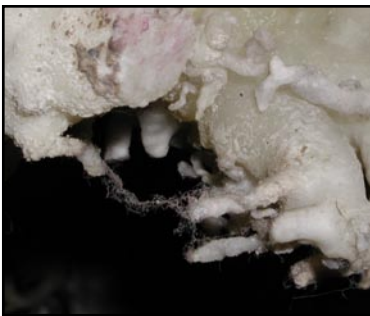
WARREN G. HARDING

[No. 1640.]



# 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 drain-ages. This foreign debris discolors cave features, dries out speleothems, and provides a food source for opportunistic cave biota. To prevent irreversible damage to cave resources, the monument has an annual GPRA goal to restore 3,000 sq ft of cave surfaces by removing algal growth, lint accumulation, and mud accumulation.



Lint accumulating on Helictites



Cami Pulham using a paintbrush to remove lint



Trap used to catch trail grime



Lint and hair being removed from tunnel



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

# Cave Environmental Monitoring

To provide access for visitors after the cave were discovered, the cave's entrances have been enlarged, tunnels have been blasted, and trails have been cemented. These modifications have greatly changed the cave's environment. The monument studies the changes in temperature, humidity, drip rates, and airflow 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 monument has reconstructed the cave gates and installed airlock doors to its tunnels.

Water quantity and quality are being monitored. Drip rates are measured using tipping buckets to quantify recharge rates and 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 the cave's pools. Further research is ongoing.

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



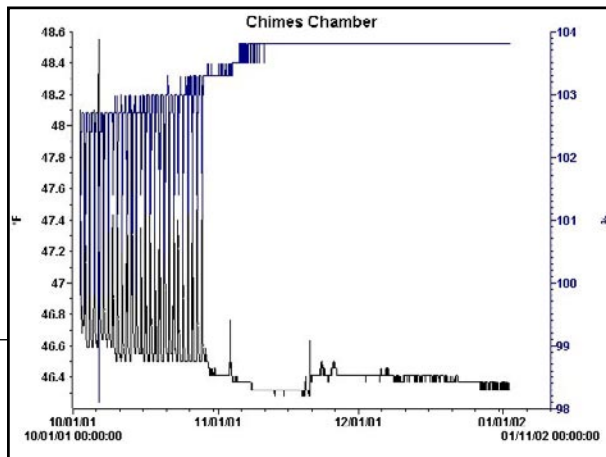
Cave Photomonitoring Station



Collecting water quality data



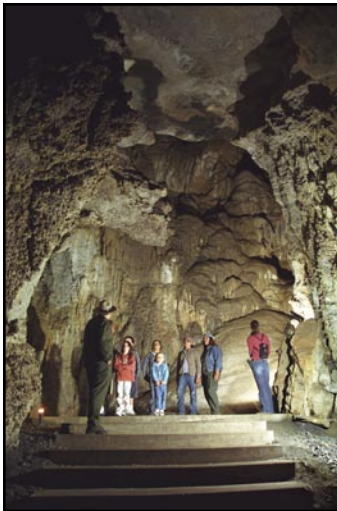
Installing a new cave gate



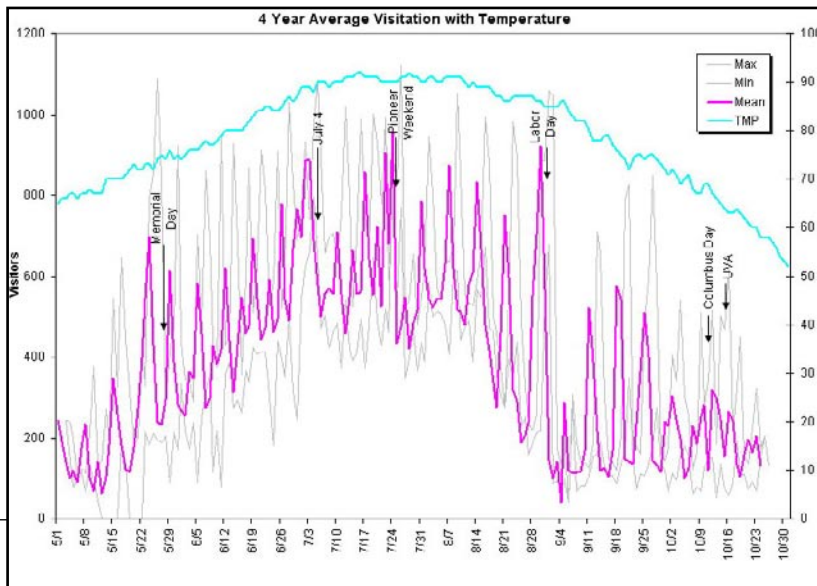
Temperature data showing 2.5°F fluctuation during tours

# 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



High visitation days accommodated up 1120 visitors/day

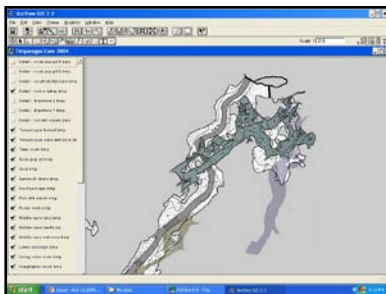
# Cave Inventory and Research

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

The GIS program was established through ESRI Environmental Conservation Grants in 2000. Additional SEPAS GIS funding to use ESRI ArcPAD and a PocketPC to inventory the cave's significant features was awarded. 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. We are also using GIS technologies to track cave projects in Resource Management, Maintenance, Interpretation, and academic research.

Because of discussions with monument staff, the I&M Program included an inventory of the cave's invertebrates. The Northern Colorado Plateau Network contracted with Dr. Riley Nelson of Brigham Young University to inventory the invertebrates of the Timpanogos Cave System.

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



Cave map in ESRI ArcView GIS



Microbes grown from Hershey's Kiss



Cave crickets collected during the invertebrate survey

# Partnerships

Timpanogos Cave National Monument is taking a leading role in providing expertise and experience in cave management to other federal agencies. Assistance is being provided to the Salt Lake BLM office with the gating and management of Crystal Cave. Upon completion of the EA, Timpanogos Cave National Monument staff will be leading the installation of the BLM's gate. The Utah Division of Fish and Wildlife contacted us about assisting in a statewide bat survey with our Anabat detector expertise. University of Utah's Natural History Museum is using our cave expertise in designing an exhibit on Utah Caves. The exhibit will educate people on proper caving techniques and ethics, as well as, special interests of Utah Caves. The exhibit will be opening in the spring of 2005. We are also working with Chuck Acklin, National Speleological Society (NSS) Youth Group Liaison, to produce a Safe Caving Program for Scouts. This program is trying to change the Nutty Putty Cave technique for scout caving - no helmets, no instruction, no training, and insufficient lights.



Unprepared Nutty Putty Cave visitors



Teaching cave vertical techniques



Formation repair at Crystal Ball Cave



Chuck Acklin teaching scouts safe caving



Cami Pulham giving a caving program to Girl Scouts



# Managing Cultural Resources

Several projects to preserve the park's history are ongoing. Over the next 2 years, the cataloging all of the backlog museum items will be completed. The project will add over 1200 items to our collection and allow our yearly museum GPRA goal to catalog 100 items to be exceeded.

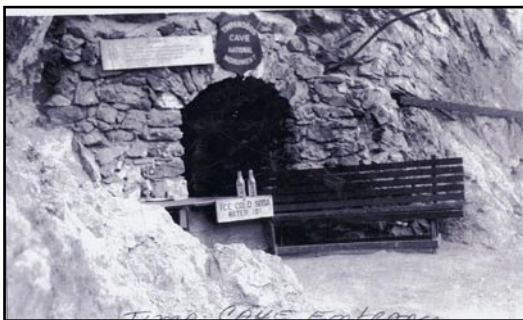
Additionally, the writing of a comprehensive administrative history has been initiated. This publication will cover the park's prehistory, designation, and history of the all the divisions. A future project is expanding our recordings of oral histories from aging individuals that carved this park.



The museum's 1930 soda pop bottle



Arlo Shelley has worked 55 years at Timpanogos Cave NM



A historic photo showing soda pop being sold at the cave

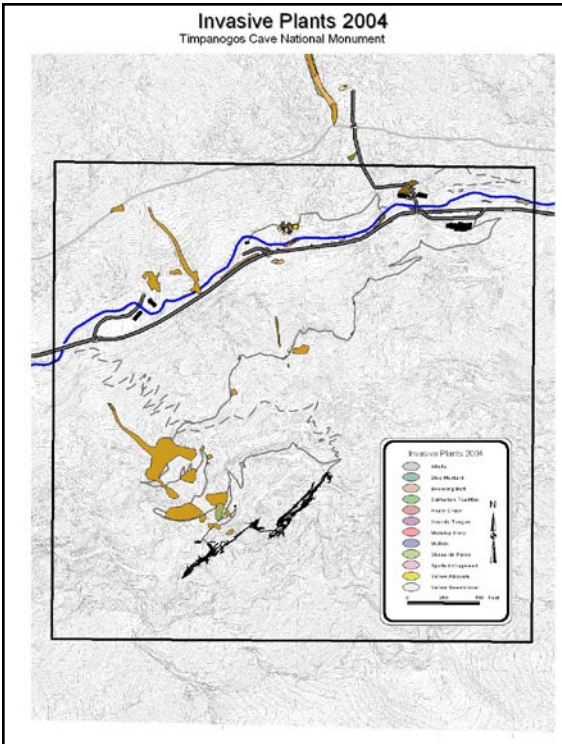


Sharlene and Alan Walker receiving an award for donations to the monuments history

# 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 has begun to combat its invasive plants. At least 22 invasive plants have been identified within the monument's 250 acres. Our GPRAs exotic plant goals are to control 5 acres of invasive plants and revegetate 1 acre each year. Our effort has reduced Toadflax and Spotted Knapweed by over 50%.

During this winter, we completed a draft Vegetation Management Plan. The plan outlines the long-term plan for controlling invasive plants, revegetation of disturbed areas, and Environmental Assessment (EA). The plan should be ready for review by the end of the fiscal year.



Map showing the distribution of invasive plants



A truck load of weeds



Before and after photo showing the reduction in Dalmatian Toadflax

# Public Outreach

The Science and Resource Management Division continually looks for ways to enhance its outreach capability. This year we have been increasing the quality and quantity of our publications and presentations. Some of our new publications are the Resource Review newsletter, Timpanogos Reflections canyon newspaper, a wildflower guide, the new cave “safety” ticket, Resource Management website, and the new cave map and atlas.

Most all of our staff has been giving professional public presentations. Jon gave a presentation on *Portable Cave GIS* and *Restoring a Disturbed Cave* at the Cave Management Symposium in Gainesville, Florida. Jon and Brandon gave presentations at the National Speleological Society (NSS) Convention in Marquette, Michigan. Jon presented with Megan Porter on the results of the microbial survey that won the award, “Best presentation on a Show Cave,” and Brandon presented on cave photography techniques and cave mapping shortcuts.



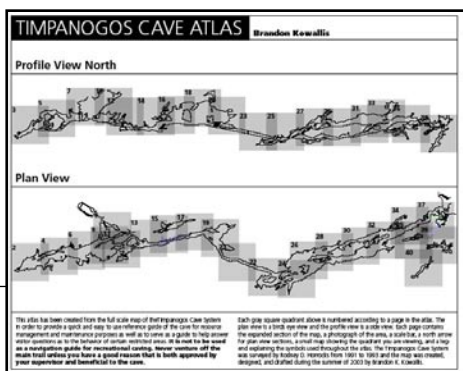
The joint NPS/NFS canyon newsletter



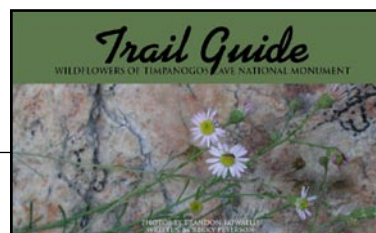
The new cave “safety” ticket



Science and Resource Management Newsletter



Timpanogos Cave Map Atlas



Wildflower trail guide

# Fire Management

In the summer 2000, a fire broke out in the neighboring community of Alpine from a refuse burn. This fire ran up to the top of the mountain within hours. The leading fire's edge was located just above the Administrative Office. The fire created a heightened awareness for the continuing need of Fire Management.

A Fire Management Plan for Timpanogos Cave National Monument has just been completed. Due to the high use of the canyon, all fires will be suppressed and prescribed burns will not be practiced. The monument has a Fire Cache to support about 12 firefighters.

This summer, to improve the overall fire safety, many trees were trimmed or removed around the monument's facilities to create defensible space.



Fire approaching Timpanogos Cave NM



Trimming to create defensible space

# Budget, Personnel, and Proposals

Over the last four years, the Science and Resource Management Division has shown tremendous growth and results due to the success in proposal writing. 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 without a permanent position. No long-term programs can exist without making a permanently funded division. Can the park succeed in its mission without a division committed to monitoring, managing, and restoring its resources?

## Funded Proposals

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 \$10,000

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

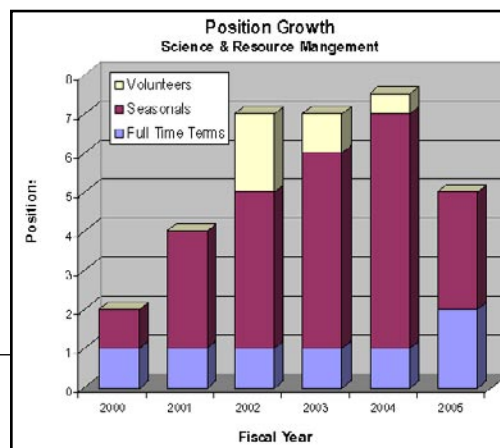
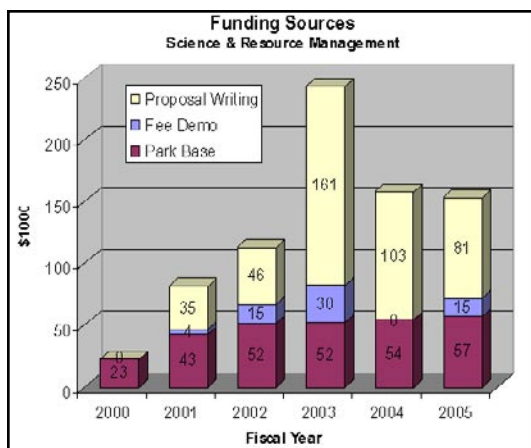
Controlling the Spread of Invasive Plants  
Project Years 2002 to 2003; SEPAS \$10,000

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



# Acknowledging the Crew



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



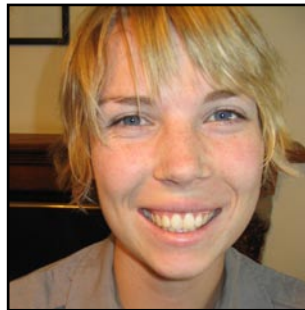
Jon Jasper, Resource Management Specialist, is the field leader. He takes his field experience to writing proposals, and then takes the proposals and makes finished products.



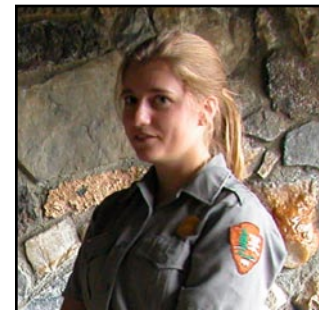
Cami Pulham, Cultural Resource Specialist, is the park lead for preserving the monument's history. She is the museum curator and working to finish the monument's Administrative History and Oral History.



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 with museum cataloging.



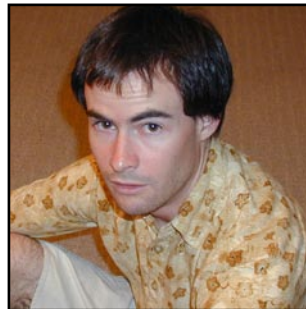
Bridgett Dart, Fire Ecologist, has been working on finalizing the Fire Management Plan, upkeep of the Fire Cache, and the trimming of trees for defensible space.



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



Tim Barnhart, Technology Specialist, has provided many gadget fixes. He has strong GIS and computer support interest. When help is needed, we go to Tim.



Brandon Kowallis, Publication Specialist, has had involvement in all of the division's publications. He has created the map and atlas for Timpanogos Cave, helped complete the canyon newspaper, created templates for division's newsletter, designed the new tour ticket, created layout for the wildflower guide, and helped Interpretation create new VC displays.

[www.nps.gov/tica/RMweb](http://www.nps.gov/tica/RMweb)