Cave Graffiti: The Writing is On the Wall
James R. Goodbar and Val Hildreth-Werker

We've probably all seen it, and some of us have even tried to remove it. Viewed as unsightly and unnecessary, the ugly writing on cave walls is called graffiti. But hidden among the contemporary spray paint may be culturally significant pictographs, petroglyphs, mud glyphs, historic writing, and other markings that should be preserved. Bilbo and Bilbo describe rock art and historic writing in another chapter in this volume (page 99).

Whether one graffito or many graffiti, some are old and some are recent. Some were applied with a candle or carbide lamp. Other types are graffiti nightmares in black enamel paint or the reflective hot pink day-glow stuff. Regardless of how the marks were applied on cave walls, ceilings, and floors, there are basic guidelines for evaluating, documenting, and preserving or removing it. The techniques described in this chapter were developed through firsthand experience over the past quarter century.

Cave environments vary tremendously from region to region—cave conditions in humid areas like the eastern U.S. are very different from the cave environments found in the arid western states. What works well in Kentucky may be ineffective in New Mexico. Methods that work in limestone caves may cause irreparable damage to gypsum caves, and vice versa. Restoration techniques are sometimes developed to fit the needs of specific sites. No technique can be recommended for all caves. Each cave must be evaluated on its own merits and restoration methods must be selected that will best serve each particular cave system.

What Is Cave Graffiti?

The word graffiti, strictly speaking, is a plural form. Graffito is the singular. In accordance with current usage, the term graffiti is used in this chapter—cavers often find multiple incidents of scribbles, signatures, or drawings on cave walls. Collectively, these are called graffiti. (See graffiti sidebar, page 334).

In caves, graffiti can be quite old and provide evidence of historical use by early visitors. It comes in all shapes and sizes and in a variety of media. Graffiti can be drawn or written with ocher, lampblack, or spray paints. It is found

Figure 1. Historic names are lined up on a speleothem. The top name is Jim White, the explorer who conducted the first tours of Carlsbad Cavern. These historic signatures are protected by the National Park Service and remain intact within Carlsbad Cavern.
Graffiti Versus Graffito

Editors' Note: The word graffiti is listed in most contemporary dictionaries as the plural form of graffito. Graffiti is defined as an inscription or drawing made on a public surface such as a wall, or on a natural or cultural surface.

Thus, the plural form, graffiti, indicates several inscriptions or drawings and should be used with plural verbs.

In this volume, if we were following the dictates of perfect English usage, sentences would read: "Graffiti are painted along the walls of Good Grammar Cave. One brightly colored graffiti is inscribed at the remote end of the short passage and reads ‘Have No Fear, Graffiti Rule.’"

However, after much debate among reviewers, we decided to go with common current usage in the pages of this book and we wrote graffiti sentences to reflect the way cavers actually talk about graffiti.

Cavers tend to say, "New graffiti is covering authentic historic signatures in Current Lingo Cave."

...scratched into soft surfaces. Arrows, words, names, dates, cartoons, and pictograph replicas are marked on cave walls with crayon, lipstick, nail polish, and permanent marking pens.

Graffiti, no matter how bad it looks, is a rich part of human history. Before considering removal of any graffiti, a careful historical and cultural evaluation should be conducted. During an inventory of the cave’s artifacts and features, expert archaeologists or historians should provide consultation.

Sources for local expertise may be found by contacting the State Historical Preservation Office (SHPO). (See consult with experts, page 116.) The SHPO personnel are helpful and willing to network expertise and resources. The historian or archaeologist asked to evaluate the cultural material should be knowledgeable in cave resources.

There are also archaeologists, historians, and trained volunteers in the NSS who are good resources for these tasks. Check with the NSS American Speleological History Association <http://www.caves.org/section/asha>.

Following consultation, if the graffiti is deemed to have insignificant historical value, the cave managers may decide on documentation and removal. However, markings deemed historically or culturally significant should remain as they are and should not be removed, touched, or harmed in any way—historic signatures and historic or prehistoric cave art is easily damaged. (See rock art and historic writing, page 99).

It is always wise to seek permission from the landowner or cave manager and request assistance in determining whether it is appropriate to remove graffiti and what portions should be left on the cave walls to preserve historical or cultural data.

Laws and Regulations

Laws and regulations also provide helpful guidelines for determining when to preserve graffiti. The Archaeological Resources Protection Act of 1979 sets 100 years for the protection of cultural remains. However, 50 years is generally accepted in the field of archaeology as a date signifying historical importance. (See 50-year “rule”, page 341; historic writing, page 110.)

Within the federal government, each agency has specific regulations that can be cited in the prosecution of known offenders. Generally, those regulations address the Federal Cave Resources Protection Act of 1988 or the destruction of government property. Many states also have cave protection laws that prohibit making new graffiti in caves. (See cave laws, page 217.)

Beyond laws and prosecution, consider the other consequences. If historical or cultural value is in question—no matter how vague the lingering doubts—markings can always be removed later. If removed before the value is determined, it’s gone forever.

Document Content, Style, and Media

Some of the most common media for cave markings include incised or etched material, paint applied by hand, torch mark, candle smoked carbon, carbide soot, pencil, and spray paint. There are poorly understood chronological parameters for each. For example, spray paint is post World War II, and the carbide era is between 1900 and 1970. The same is true of prehistoric natural pigments (Joe Douglas, personal communication 2003). While photographs and drawings record content and style, field notes should thoroughly document the site as well as the media and give insight to the authenticity and importance of markings.

Always photograph, evaluate, and thoroughly document the content,
Figure 2. Historic signatures have been vandalized with contemporary graffiti carved into the walls of Black Cave, New Mexico.

Figure 3. Historic signatures, including Robert Nymeyer's 1934 inscription, are preserved in Endless Cave, New Mexico.

Figure 4. Armed with a stiff brush, a spray bottle of water, and elbow grease, this caver is prepared to eradicate the spray painted arrow marring a cave wall.

Figure 5. Scrubbing with stiff nylon brushes and water eliminates most carbide stains.

Figure 6 (before) and Figure 7 (after). Buzz Hummel used a spray bottle, stainless steel brush, perseverance, and time to make most of this obnoxious arrow vanish.

Figure 8 (before) and Figure 9 (after). After two hours of scrubbing, the big black spray painted arrow was gone.
style, and media of graffiti before deciding whether to remove it. Keep in mind that evidence written in contemporary graffiti may facilitate the identification and prosecution of vandals. Use photodocumentation of offenses to pursue legal prosecution, enhance conservation education, and improve cave management. (See NSS Cave Vandalism Deterrence Award Commission, page 110 and page 224.) Photographs and documentation of media also provide a small measure of protection against loss of historical or cultural data through accidental removal or ignorance. (See photodocumentation, page 204.)

Tools and Techniques

If it is determined that contemporary graffiti should be cleaned off, the type of media and substrate may indicate how difficult it will be to remove the unwanted marks. Enamel spray paint seems to be the worst offender and requires extensive scrubbing, but carbide black can often be sprayed clean with water.

Judicious application of water may help where rough rock with small cracks and declivities make it difficult for brushes to reach. Hard work, perseverance, and specialized tools are the key factors to success. Delicate formations such as helicitites, soda straws, and fragile gypsum formations require special care and treatment.

Scrub Brushes

Most graffiti removal efforts start with scrub brushes, water, and lots of elbow grease. Some brushes cause more harm than good, so it is important to select tools that minimize new problems. Even the softest brush can cause some damage to cave surfaces as well as biota. Removing the slightly weathered exterior surface of the wall may speed up erosion of newly exposed surfaces.

Cavers should weigh biologic, geologic, and aesthetic factors to determine whether the costs are acceptable. It is important to use new, clean brushes for restoration—be careful to never introduce materials from home projects into the cave. Make sure people wear safety glasses and other personal protection devices.

Nylon or Stainless Steel Brushes. Clean nylon and stainless steel brushes are relatively safe for cave use. Be careful not to create bristle grooves or scratch marks. Always assign an experienced graffiti scrubber to test tools. Both nylon and stainless brushes leave few environmentally damaging

Does Graffiti Beget Graffiti?

James R. Goodbar

Perhaps the presence of graffiti invites or encourages new markings.

Some sites have layer upon layer. Contemporary markings often cover important historical or cultural resources. Restorationists try to preserve historic markings. However, contemporary graffiti is generally viewed as vandalism. Usually considered visually obtrusive, contemporary media may be detrimental to historical and cultural markings as well as cave biota. (See graffiti and vandalism, page 110.)
residues or bristles behind. However, because some bristles will fall out and paint flecks will fly, always spread plastic under the work areas and gather the debris at the end of the day. (See restoration brushes, page 419.)

- Stiff, nylon-bristled brushes cause minimal damage to cave surfaces.
- Stainless steel brushes, when used with a light touch, work well for some surfaces. Be aware that any metal brush, stainless steel included, will leave black marks on some surfaces.

Avoid Brass, Steel, or Natural Fiber Bristles. As stated above, nylon and stainless steel brushes are generally best for cave use. Stray bristles made of nylon or stainless steel are less offensive to cave environments than bristles made of other materials.

Even with catchments and careful scanning of the restoration area, some bristles are likely to escape and remain in the cave.

- Brass brushes leave a fine metal sheen on formations and rock.
- Steel wire bristles will leave black marks and break off and oxidize (rust), discoloring the surrounding cave surfaces. Deteriorating steel adds ferric hydroxide and ferric oxide to the cave ecosystem.
- Natural fiber brushes leave bristles behind that can provide nutrients for molds, mildews, and fungi. Natural fibers may disrupt a cave’s ecological balance, providing new food sources for biota and microbiota.

Rotary Brushes, Grinding, and Sanding. Rotary brushes on electric drills are an option, but they have a tendency to scatter paint flakes and bristles over a large area. Rotary brushing or sanding can remove a lot of rock or flowstone in a very short time and this method should be used only if deemed appropriate. For this technique, assign a careful, gentle operator—one with a good light source, exceptional close-up vision, and patient attention to detail. Always plan ahead and prepare adequate catchment procedures.

Scrub Gently. In scrubbing cave surfaces, be careful to avoid removing layers of mineral. The layers uncovered may not be the same color as the layers removed. Scrubbing away mineral layers may result in a well-defined clean area in the shape of the letters just removed.

Water Sprayers
When it is appropriate to remove contemporary graffiti from cave walls, water can help loosen the media and clear paint flecks from the scrubbing area. Clean, chlorine-free water is the best solution. It is usually not detrimental to cave biota and does not harm most speleothems. It is safe for human use, inexpensive, and readily available. (See water sources, page 393.)

For arrows and contemporary markings with the lampblack from carbide lanterns, it is important to note that water alone will usually clean off the black marks. Brushing is rarely necessary on carbide marks. (See carbide removal, page 411.)

Only use new, clean products in cave environments. Always avoid introducing household cleaning chemicals, herbicides, pesticides, or other human-manufactured chemicals. (See anthropogenic chemicals, page 57.)

Hand-Held Spray Bottles. Hand-held squirt bottles are easy to purchase, use, and carry into the cave. They are easily refilled. Adjustable nozzles can be used to spray wide areas or shoot a stream to loosen and remove debris such as lampblack and flakes of paint. (See pressurized water, page 397.)
Garden Sprayers. Garden sprayers, in a variety of sizes up to 5 gallons, are useful tools for some graffiti projects. They commonly include a pump for creating pressure within the container. The resulting water stream is stronger and more continuous than the spray produced from a hand-held squirt bottle. Again, designate new garden sprayers for cave restoration work (used ones may contain insecticides or other chemicals that can wipe out cave communities). Sprayers may also be used to clean mud from speleothems and trails.

Bladder Bags. A close cousin to the garden sprayer is the bladder bag, or backpack pump used for fire fighting. The bladder bag consists of a 5-gallon rubberized canvas bag with shoulder straps. Water is squirited through a hand-held trombone pump attached to the bottom of the bag. Bladder bags are used where moderate pressures and high volumes are required.

Gravity Fed Water Delivery Systems. Gravity fed systems are often efficient, but first consult local cave scientists and evaluate the ecosystem before introducing significant quantities of water into a cave system. Runoff water should always be controlled. (See cautions described in restoration runoff, page 339; also see capture runoff, page 396.) If deemed appropriate, a new garden hose with a trigger nozzle is run from a water supply at the entrance. Depending on the gradient, a substantial head of water is produced and special caution must be exercised to avoid damaging delicate areas. Check that all couplings and gaskets are in good condition to prevent leakage.

Avoid Delicate Speleothems. Be careful when using high-pressure water devices in areas of delicate speleothems. The pressure combined with a larger volume of water can easily break or damage fragile cave formations.

Protect Invertebrates and Biofilms. While it is efficient to use large quantities of high-pressure water to help remove graffiti, there are drawbacks. Cave habitats may become flooded. Also pressurized spray can harm invertebrates and blast away microbiota. Thin biofilms of microscopic organisms living in moist or wet areas should not be sprayed or scrubbed. Pressure blasting can damage communities of microorganisms—microflora and microfauna are often impossible to see with the naked eye. (See biofilms, page 68.)

Where Should We Get Water?

For cave graffiti projects, it is generally acceptable to use clean, fresh water with no chlorine and commercial chemicals. For some cave systems, distilled water may be an option, if minimal amounts are applied with short contact duration.

No single recommendation is best for all caves. In caves with active streams and annual flooding, water from the cave may be the best choice for graffiti cleaning. However, be careful not to use water from isolated cave pools that are slowly refilled over geologic time. Carefully avoid cross-contamination within a cave—transporting cave water from an isolated passage to a different chamber may destroy local indigenous microbial populations.

Consult with scientists, cave owners, land managers, and knowledgeable cavers before cleaning, and select the least damaging water source for any cave restoration project. (Water sources for restoration projects are discussed in depth, page 393.)
Always Catch Restoration Runoff Water

Always collect the runoff water from graffiti efforts, regardless of where the project is located in the cave. Never allow runoff to contaminate cave pools, streams, or water sources. Use large sponges, lint-free towels, environmental remediation “pigs”, or shop vacuums to soak up or contain restoration water. Vacuuming devices must be used cautiously to assure that natural loose materials and biota are not sucked away. (See shop vacs, page 358.)

When restoration water is scarce, runoff is sometimes strained and filtered back into a bucket for reuse. However, be careful—used water may contain flecks of paint or lampblack that should not be left in the cave. (See filtering restoration water, page 415.)

Runoff water may also contain lint and debris that should not be washed elsewhere in the cave. Be very cautious about deciding to introduce large quantities of water with hoses or pressure washers. The runoff is difficult to contain and pressurized methods generally cause graffiti byproducts, lint, and loose sediments to be redeposited elsewhere. (See restoration runoff, page 396.)

Weigh the Ecological Costs

Scrubbing layer upon layer of contemporary graffiti made by cave vandals is frustrating, irritating work. Understandably, innovative volunteers want to speed up the process with mechanical devices. However, assist from powered tools is often inappropriate for cave habitats.

On the other hand, a few caves that are heavily trafficked party sites are also playpens for graffiti vandals. The natural ecosystems and surface textures in these caves have already been severely altered. Often, the damage has occurred over many decades. Carefully evaluate the environmental costs before embarking on projects that will significantly change cave surfaces and diminish populations of the current biological communities.

Several authors and reviewers of this book have tried the following methods, realize the pitfalls associated with each, and hope that advanced technology will introduce new, less destructive alternatives.

Avoid Using Heat on Cave Walls

Application of direct heat inside caves is not recommended. Heat damages limestone surfaces—the rock heats up and spalls off along with the paint.

Heat should never be used on gypsum or speleothems. Direct application of heat to gypsum drives off water. Direct heat changes transparent selenite to white powder and destroys the crystals. Though it seems an easy solution, propane torches and other surface heating devices are not appropriate for cave walls and toxic fumes may harm cave-dwelling communities. (See fumes, page 40; also see logistics, page 155.)

Avoid Using Commercial Chemicals in Caves

Historically, cavers have tried everything from oven cleaners, hot solvents, and acids, to citrus-based cleaners, soybean products, and biodegradable magic pastes. Some products will remove paint, but should not be used on cave walls—commercial chemicals and acids can damage cave life as well as the people applying them. The fumes are harmful to humans and wildlife in the enclosed spaces of caves. Natural airflow carries toxiis throughout the cave, disrupting or harming bat colonies and other fauna. (See materials and toxins, page 171.)

Some products that claim to be environmentally safe simply do not work and labels often overstate their benefits. When analyzed in the laboratory, products commonly do not live up to their advertised claims of environ-
Use dental tools to gently pick and scrape off graffiti painted on difficult surfaces. This effective technique works well on gypsum bedrock and soft formations.

mentally safe content. Even if a product is truly biodegradable, it may provide an unusual food source for biota that depend on the cave’s natural ecosystem. (See anthropogenic chemicals, page 57.)

It is always best to avoid changing the natural processes that sustain life within caves. Some forms of cave life are able to recolonize a restored cave, but not all. (For example, certain microbes may not exist beyond the pool where they currently live. If the ecosystem of that pool is destroyed by chemical contamination, that colony of organisms may be gone forever.) Usually, the safest substance to use is water. (See sources for restoration water, page 393.)

**Dental Picks for Gentle Tasks**

Use dental tools to gently pick and scrape off graffiti that is painted on difficult surfaces. This effective technique works well on gypsum bedrock and soft formations. It is labor-intensive but the results can be impressive.

Pat Jablonsky and Andrea Goodbar used stainless steel dental tools to remove day-glow hot pink names from gypsum wall crusts in Endless Cave, New Mexico. Names were etched off with dental picks and the dry paint chips were collected from the gypsum with a hand-held, battery-powered, dust-buster vacuum. The color of the gypsum underneath was a sparkling white compared to the light tan of the surrounding gypsum crust.

For a more natural look, they took crushed gypsum from around the trail

![Figure 13](image13.jpg)  **Figure 13.** Pat Jablonsky uses a dental pick to etch off the graffiti spray painted on gypsum crust in Endless Cave, New Mexico.

![Figure 14](image14.jpg)  **Figure 14.** A make-up brush and tan-colored gypsum powder serve to camouflage the white sparkling crust where spray paint was removed. Application of the gypsum dust helps match the restored site to surrounding surfaces.

![Figures 15](image15.jpg)  **Figures 15 (before)** and **Figure 16 (after).** These two photos display the before and after of tedious dental pick techniques for restoring graffiti-covered gypsum surfaces.
and used a make-up brush to apply the gypsum powder to the restored area. They achieved a well-matched wall color and a cave passage that no longer invites new graffiti.

What About Camouflaging Cave Graffiti?

When all else fails, cover it up. Small amounts of dirt or mud from the cave floor will generally blend with the color of a cave wall if there are naturally occurring muddy surfaces. This technique can be used as a temporary measure until more volunteer time is found or a better method is developed. A lightly applied natural poultice sometimes loosens the medium for easier removal during the next restoration effort. (See Crockett's Cave, page 116.)

Camouflaging techniques are not recommended for speleothems. Dirt or mud will not stay on active formations. The crystalline micropores will become clogged. Camouflaging soil is almost always a different color than the speleothem and generally looks as bad as the graffiti.

The Summary and Conclusion Is Simple

Contemporary cave graffiti may be removed only after professional site analysis and careful documentation. If there are no issues involving historical or cultural preservation, low-impact removal techniques may mitigate the negative impacts of graffiti. Cave biota, habitat, and all other system conditions or concerns should always be carefully evaluated before planning restoration projects.

Nylon-bristled brushes and water are the safest tools for graffiti projects. Vigorous scrubbing with stiff nylon brushes along with judicious application of water generates the least negative impact on caves. More aggressive techniques increase adverse impacts to the cave and its ecosystem.

Additional Reading

There is an obvious lack of published material on both the techniques and philosophies concerning graffiti and cultural markings in caves. The speleological community needs continued research and publication on these significant conservation and preservation issues.


