

Documentation and Conservation of Rock Art

Images that have been painted or carved on rock surfaces convey important cultural information, both from prehistoric and historic eras. In the United States, most rock art designs¹ were executed by Native Americans before contact with western civilization. ²However, numerous examples exist of historic rock art that convey important information about the exploration and settlement of North America by Euroamericans. Perhaps the most famous and striking examples are the numerous inscriptions recording the passage of Spanish explorers between 1605 and 17743 on the sandstone at El Morro National Monument, east of Zuni Pueblo in central New Mexico. There, the signatures of individuals from 28 different groups of explorers share the rock surface with images carved or pecked hundreds of years earlier by ancestors of the Zuni Indians.⁴

Rock art images are especially important in understanding the lives of prehistoric Native Americans, who left no written record of their activities. Nevertheless, although scholars in many disciplines, as well as native peoples themselves, have long recognized the importance of documenting and analyzing Native American rock art, it has been frequently neglected.

Documentation of Rock Art

Because it has been so long neglected, the study of rock art is still largely descriptive. Thus, the identification and documentation of rock art is extremely important. Individuals and groups interested in this form of cultural expression, many of them amateurs, have contributed greatly to our awareness of the extent of the resource. For example, professional and amateur members of the American Rock Art Research Association and the Canadian Rock Art Research Associates have devoted countless hours of time to recording North American rock art, and have developed

considerable expertise in conserving rock arts. Yet their documentation techniques are often idiosyncratic and inconsistent. Such techniques have not received sufficient study nor, until recently, has there been an effort toward developing consistent, objective, universally applicable methods of documentation and recording.⁵

- **Site forms.**—An important part of standardizing the recording process is developing site recording forms that are consistent with rock art forms used in other locations and with more general archaeological site forms. Portable computers could make the recording of field data more accurate and complete. The recording form itself can be stored in the computer and appropriate information supplied in response to prompting from the computer.
- **Drawings, photographs and other two-dimensional recording methods.**—Photography is the most common method of documenting rock art today. However, it suffers from the drawback that many shallowly pecked or carved images are difficult to see when the lighting strikes perpendicular to the stone face. Researchers have tried a variety of methods of recording the details of such images, including using oblique artificial lighting, high contrast film, and infrared film.⁷ They have also tried enhancing the images with chalk, water, and aluminum powder suspended in water. None of these latter methods can be recommended because they may damage the rock art design or affect the local environment adversely.⁸

Drawings and paintings have also been used. Faded and eroded pictographs present particular problems of documentation. One important technique for recording such paintings is to reproduce them in watercolors or oils. The Texas artist Forrest Kirkland recorded thousands of painted images in the rock

¹Rock art includes petroglyphs (designs pecked, scratched, abraded or otherwise cut into cliffs, boulders, bedrock, or any natural surface), and rock paintings (designs painted in similar locations). It does not include designs formed by rock alignments on the ground." See Pony Schaafsma, "Form, Content, and Function Theory and Method in North American Rock Art Studies," *Advances in Archaeological Method and Theory* 8, 1985, p. 237.

²For general surveys see, for example, Campbell Grant, *Rock Art of the American Indian* (New York: Thomas Y. Crowell Co., 1967); or Klaus Wellman, *A Survey of North American Indian Rock Art* (Graz, Austria: Akademische Druck und Verlagsanstalt, 1979).

³Even Z Vogt, "El Morro National Monument," *El Palacio* 12, 1922, pp. 161-168.

⁴M. Jane Young, *Signs From the Ancestors: Zuni Cultural Symbolism and Rock Art* (Albuquerque, NM: University of New Mexico Press, in press).

⁵In New Mexico, field schools run by Colonel James Bain over the past two decades have contributed thousands of records of New Mexico rock art, which are maintained at the Laboratory of Anthropology of the Museum of New Mexico. The Massachusetts-based Earthwatch has devoted a number of its projects to recording rock art in North America.

⁶David R. Stuart, "Recording Southwestern Rock Art Sites," *The Kiva* 43, 1978, pp. 183-199.

⁷James B. DeKorne, "How To Photograph Rock Art," *El Palacio* 77, 1970, pp. 14-17; Grant, op. cit., pp. 68-73.

⁸Chalk tends to abrade the stone and distort the original image. Water may wash away mud or pigment applied by the artist. Aluminum powder, though it washes off after drying, requires a water rinse that may remove mud or pigment, and then becomes mixed with the local soil.

shelters and caves of Texas.⁹ He chose watercolor, because watercolor board is suitable for pencil drawings and because the watercolor can be applied quickly and easily compared to the original. In addition, watercolor board can be transported and stored relatively easily. Archival watercolor board and paints provide a near permanent record. However, such methods require a skilled artist and are time-consuming. In addition, they do not convey the character and condition of the rock surface, and are not necessarily done to scale. They also do not reproduce the three-dimensional quality of many rock art panels, which is an integral component of the rock art image.

Rubbings and tracings may be used to good effect for petroglyphs under certain conditions.¹⁰ They have the advantage that it is possible to record the roughness of the rock surface, but the disadvantage that such methods are extremely time-consuming. When supplemented with photography, rubbings or tracings can produce accurate and pleasing records of petroglyphs.

Stereo photogrammetry.—This is a superior method that allows the rock art to be recorded in relation to its surroundings.¹¹ Later analysis of the stereo photographic pairs allows three-dimensional reconstruction of a rock art site, which can be critical in interpreting the meaning and function of the images.

Molds.—A number of these techniques have been tried for petroglyphs that are deeply cut, but all are extremely time-consuming, and are therefore generally not satisfactory as a means of recording images. They are also difficult to store. Plaster, wax, or latex reverse molds have been tried on small areas. Such methods are most useful when interpretive displays of rock art are contemplated.

Dating of Rock Art

No methods currently exist for directly establishing dates of rock art images. Methods so widely used for dating archaeological artifacts are generally inapplicable for rock art. For example, traditional radiocarbon dating methods are inappropriate for charcoal drawings because they require too large a sample. Dating the image would destroy it. In the absence of any absolute methods, rock art researchers have therefore relied on a variety of relative methods to date rock

art: differential weathering, relative pagination, superimposition of one image over another, style, content, and the relationship of images or panels of images to datable material.¹² None of these techniques is very satisfactory, for even in relative terms, they provide only a very broad gauge of the age of a rock art panel (i.e., within 50 or 100 years).

Rock art research would gain immeasurably by the development of direct dating techniques. Methods that have been tried include measuring the depth and extent of lichen growth over rock art images, thickness of mineral deposits (so-called desert varnish), and X-ray fluorescence. However, none of these methods have proved successful.¹³

For example, one method that has been tried with inconclusive results is the measurement of the concentration of hydrogen v. depth in petroglyphs. Most newly exposed surfaces of rock bearing silicates will take up water from the atmosphere. The amount of hydrogen is directly proportional to the amount of water in the micro layers of the rock surface. Newly exposed surfaces should exhibit a hydrogen profile (percentage of hydrogen plotted against depth) markedly different from much older surfaces. However, in using a method originally developed to measure hydrogen profiles of lunar rocks, scientists found that the hydrogen profiles they measured from different petroglyph samples were highly variable, "At present there seems little possibility of reliably chronologically ordering prehistoric glyphs using this method."¹⁴

The challenge in dating rock art will be to develop nondestructive methods. New radiocarbon methods that require only minute amounts (micrograms or smaller) of carbon material may eventually be applied to dating images containing organic pigments with success.¹⁵

Information Storage

Currently, efforts are underway to standardize recording forms and procedures so that all of the relevant information pertaining to a rock art site and its images can eventually be stored in a central database. However, such efforts generally assume that rock art imagery can be labeled unambiguously and in terms that transcend cultural boundaries. Recent advances

⁹W. W. Newcomb, jr., *The Rock Art of Texas Indians* (Austin, TX: University of Texas Press, 1967).

¹⁰JPhyllis Hughes, "How To Make Rubbings of Rock Art," *El Palacio* 77, 1970, pp. 18-24.

¹¹The application of this method is described in the report by Solveig Turpin, "Seminole Canyon: the Art and the Archeology," *Texas Archeological Survey Report* 83 (Austin, TX: University of Texas, 1982). See also Solveig Turpin, et. al., "Stereophotogrammetric Documentation of Exposed Archaeological Features," *Journal of Field Archaeology* 6, 1979, pp. 329-337.

¹²For example, in the Southwest United States some rock art panels exist on the canyon wall immediately above the former roof of a ruined Pueblo Indian dwelling. If the pueblo can be dated by means of tree rings or other methods, the archaeologist can estimate the rock art dates.

¹³Schaafsma, op. cit., p. 243.

¹⁴R.E. Taylor, "Potential Use of Hydrogen Profile Analysis To Date Petroglyphs at the Hedgepeth Hills Site: A Feasibility Study," in J. Simon Bruder, "Archaeological Investigations at the Hedgepeth Hills Petroglyph Site," *Museum of Northern Arizona Research Paper* 28, app. IV.

¹⁵Christopher Chippendale, "Radiocarbon Comes of Age at Oxford," *New Scientist*, July 21, 1983, pp. 181-184.

in optical disk technology may make it possible to store and retrieve the actual image rather than a label describing it.

Interpretation of Rock Art Images

Many early attempts to interpret rock art failed because investigators lacked broad additional knowledge of the cultures from which it derives. In addition, rock art had not yet been widely documented. However, research during the last decade has demonstrated the importance of rock art studies to understanding prehistoric cultures in the United States. The evidence provided by rock art has, among other things, demonstrated the prehistoric movement of religious ideas along the Rio Grande from Mexico to northern New Mexico,¹⁶ provided insights into Native American astronomical methods,¹⁷ and furnished evidence of prehistoric amputation practices.¹⁸ In California, studies of Chumash Indian rock art have led to a much deeper understanding of Chumash philosophy and sacred practice.¹⁹

Stereophotogrammetry can provide the accurate environmental context for rock art sites; the cultural context must be provided either by ethnohistorical or archaeological research. In the case of Native American rock art, tribal commentary on recent images is crucial to understanding and interpreting them. It is particularly important that Native American cultural attitudes towards the landscape be included in this interpretive process.

Public interpretation is especially important as greater awareness of the fragility of rock art and of the role this cultural resource can play in understanding Native American culture can lead to more effective conservation.

Conservation and Protection

U.S. rock paintings and carvings, like the cave paintings of Lascaux, France or Altamira, Spain, are subject to many different destructive agents (table B-1 and table B-2). Individuals have used a variety of meth-

Table B-1.—Agents Contributing to Rock Art Deterioration and Destruction

Natural agents:

Bacteria

Direct contact with water

Exfoliation of stone (water, salts, changes of temperature, and humidity)

Insects

Joints and cracks

Lichen

Surface accretion

Vegetation

Wind abrasion

Human agents:

Development

Vandalism:

Bullet holes

Etched graffiti

Paint graffiti

SOURCES: Office of Technology Assessment and Constance S Silver, *The Rock Art of Seminole Canyon State Historical Park: Deterioration and Prospects for Conservation* (Austin, TX: Texas Parks and Wildlife Department, February 1985).

ods in attempts to conserve and protect rock art. Such efforts are aided by a generally supportive attitude on the part of local residents. However, slow deterioration through weathering and quick destruction from vandalism or local development remain serious threats. In some areas, fences or gratings have been used to prevent observers from reaching rock art. Yet such devices would be much too costly for most areas, and inappropriate for others. Most are unsightly.

In addition, some threatened sites are still visited regularly by Native Americans for religious purposes. The Zuni Indians, who live in New Mexico, for example, "regard many of the rock art images on their tribal lands as a link with their mythological past, as 'signs from the ancestors'; hence, they are particularly worried about vandalism and the deterioration of images through time."²⁰ Other sites, though they are no longer visited, may have played an important role in Native American history and are therefore considered sacred. In designing policies to protect such sites, it is crucial to consider how preservation efforts fit within the Native American cultural context.²¹

¹⁶Polly Schaafsma, *Indian Rock Art of the Southwest* (Albuquerque, NM: University of New Mexico Press, 1980), ch. 8; Polly Schaafsma and Curtis F. Schaafsma, "Evidence for the Origins of the Pueblo Katchina Cult as Suggested by Southwestern Rock Art," *American Antiquity* 39, 1974, pp. 535-545.

¹⁷See, for example, Arlene Benson and Tom Hoskinson, *Earth and Sky: Papers From the Northridge Conference on Archaeoastronomy* (Thousand Oaks, CA: Slow Press, 1985); or Ray A. Williamson, *Living the Sky: the Cosmos of the American Indian* (Boston, MA: Houghton Mifflin, 1984).

¹⁸Klaus F. Wellmann, "New Mexico's Mutilated Hand: Finger Mutilation and Polydactylism in North American Indian Rock Art," *Journal of the American Medical Association* 219, 1970, pp. 1609-1610.

¹⁹Campbell G rant, *The Rock Paintings of the Chumash: A Study of a California Indian Culture* (Berkeley, CA: University of California Press, 1965).

²⁰M. Jane Young, "Images of Power and the Power of Images: The Significance of Rock Art for Contemporary Zunis," *Journal of American Folklore* 98, 1985, pp. 3-48.

²¹The managers of Kakadu National Park, in Australia, have achieved considerable success in involving the Aborigines in designing the park, and have adopted a set of management principles that "recognise the special relationship that Aborigines have with their land. For them it is an ordered and named landscape full of mythological significance and spiritually dangerous places where delicate religious associations can be disrupted if someone unwittingly trespasses into such sacred sites." See Clive Gamble, "The Artificial Wilderness," *New Scientist*, Apr. 10, 1986, p. 51.

Table B-2.—Weathering Agents Found in Deserts and Cities

Kind of weathering	Desert	Cities
Damaging agents:		
Moisture from condensation.	present	present
Moisture from fog.	fog in winter	frequent
Moisture from ground	high	high
Salts, origin of salts.	desert floor, residual	groundwater, stone
Temperature contrasts.	high	high (on walls)
Damage to stone:		
Abrasion by wind action	strong	some, near street level
Desert varnish and stains	hard brown crusts	light-brown stains
Efflorescence	strong	moderate but common
Flaking by heat and moisture	very strong	moderate
Frame weathering, casehardening	common as pebbles	hollow common
Frost action.	occasional	high
Solution	very slow	very rapid in polluted atmosphere
Subflorescence	strong	moderate to strong

SOURCES: Constance S. Silver, *The Rock Art of Seminole Canyon State Historical Park: Deterioration and Prospects for Conservation* (Austin, TX: Texas Parks and Wildlife Department, February 1985) and E. Winkler, *Stone: Its Properties and Durability in Man's Environment* (New York: Springer-Verlag, 1975)

Many of the processes active in deterioration of rock art are similar to those causing destruction of stone in urban environments: condensation of moisture, dissolution and recrystallization of salts, and the effects of wide temperature swings as a result of solar heating. For example, Silver²² has found that many of the processes leading to deterioration of limestone (and therefore to the paintings on the limestone base) in Seminole Canyon State Historical Park are identical or analogous to those found in urban environments. The conservation of rock art can therefore benefit from more general stone conservation efforts. In addition, the conservation of American rock paintings can benefit from the research that has been applied to the cave paintings in Europe,²³ and to Aboriginal paintings in Australia.²⁴

In spite of the extent of this resource, no conference primarily devoted to the conservation of rock art has ever been held in the United States. Efforts to share information on conservation have largely occurred on an ad hoc basis.

Because not every rock art panel or image can be preserved, some effort should be devoted to deciding which areas have the most critical need. One of the difficulties in making such choices is that until more research is done, it will be impossible to determine which rock art panels have the greatest significance. One of the critical areas for attention to the preservation of rock art are the rural fringes of urban areas. As urban development spreads out into the countryside, it has begun to affect the preservation of rock art in some areas.²⁵

²²Constance S. Silver, *The Rock Art of Seminole Canyon State Historical Park: Deterioration and Prospects for Conservation* (Austin, TX: Texas Parks and Wildlife Department, February 1985).

²³P. Mora, L. Mora, and P. Philippot. *La Conservation des Peintures Murales* (Rome: International Center for Conservation, 1977).

²⁴J. Clarke "conservation and Restoration of Painting and Engraving Sites in Western Australia," *Conservation of Rock Art* (Canberra: I. C. C. M., 1978).

²⁵For example, rock art on the West Mesa west of Albuquerque, NM, is threatened by housing development. Concerned individuals have formed a group named Friends of the Albuquerque Petroglyphs (FOTAP) to protect an estimated 10,500 petroglyphs, executed on basalt outcroppings. In addition to calling attention to the problem in the media, FOTAP has organized educational tours of the threatened rock art, and is documenting all of it. See "Save the Petroglyphs" (editorial), *Albuquerque Tribune*, Apr. 17, 1986, p. A-14.