

INTRODUCTION

As you have seen today, rock art is actively taking advantage of technological advances to improve recording, but the old methods have not been replaced and are either being used in their original form or morphing into different approaches in response to technological change. As part of rock art recording today, it is not unusual to see one or a combination of methods that include field tracing, field rubbing, freehand drawing with or without reference grids, different methods of computer photographic processing, computer tracing, and direct tracing of photograph prints. Although direct field tracing and rubbing are criticized because of potential impact to the site, the methods have not been abandoned and cannot be ignored as obsolete. Because they are still so common, the methods need to be considered relative to advances in technology and revised with a focus on minimizing site impact while still maintaining the essence of what makes them so attractive that they are continuing as strongly as ever. Likewise, digital processing and computer tracing are sometimes misunderstood by those not using the methods and are thought to be revolutionary advances or unbridled imagination should be considered. How digital processing compares with old methods

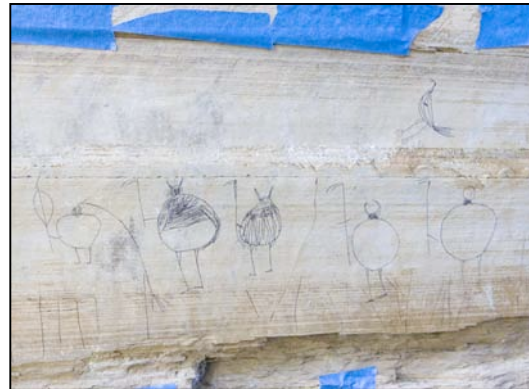
of film manipulation. Today we take a brief look at how these various methods are being used and how they should or should not be modified.

FIELD TRACING



Rock art recording has long been accomplished by tracing figures in the field onto clear overlays. Although there are various nuances to tracing, in its simplest form it is the placing of a flexible transparent sheet over a figure or panel and tracing the image upon it. Because of potential impact to the site from direct contact with the rock, many in the rock art community believe it

should never be used. However, because of its benefits, the method is still widely practiced around the world, including the Plains, and the controversy over its use has resulted in development of pro and con camps. Direct tracing produces a one-to-one copy of the image, which ideally is exactly as the original maker intended it to be and not as perceived by the recorder – a problem of free-hand copying. Tracing has varying degrees of intensity. Should only the figure outline be traced, or should every peck mark and line on the surface be shown. A simple outline may not convey the image properly, but drawing every single peck mark and scratch on the wall



could mean that the figure becomes lost in the details of a hodgepodge of dots. However, today there are other ways to duplicate panels, particularly utilizing computer or manual tracing of enhanced, enlarged photographs that simulates direct tracing. Advocates of direct field tracing point out that other methods cannot completely replace it for accuracy because of the view it affords of the rock art and the ability of the recorder to experience directly the rock contours and other aspects of the environmental context resulting in an understanding of the site from an up-close and personal interaction only possible from being there where the original artist was.

Literature and Internet searches show tracing to be the most common recording method throughout the world -- for pictographs, petroglyphs, floor mosaics, and wall decorations, for example -- and there are many projects that one may join to learn

aspects of the general method. Most recording manuals and many articles provide information on tracing, generally focusing on how to trace and what supplies to use.



By 1998 direct field tracing began to come under attack because of damage to some rock art panels by people touching them. There was a cry for not touching rock art from some factions as part of an increased conservation awareness and recognition that touching fragile rock surfaces can have adverse or even detrimental effects, such as cumulative micro-destruction of the art or the rock surface. The deposition of oils and other organic materials onto the art and the rock could affect important future studies, such as dating or component analysis. The restrictive attitude came about and grew somewhat concomitantly with the development of rock art direct dating, during which previous contamination of rock art by human intervention, and more distantly introduced materials (such as chalk), were found in some cases to be so intense that the figures could not be dated by those developing methods.



Thus, the *no tracing* advocacy was an outgrowth of the *do not touch* philosophy because of its direct contact with the parent rock. The *no tracing* policy was quickly inserted into popular brochures, particularly for land managers trying to reduce tourist impact. The phrase “never chalk, trace, or otherwise touch rock art” is a common theme, although the three activities are hardly

similar. Some groups, such as the Nevada Rock Art Foundation, stress that it is destructive and totally unacceptable as a modern recording method. Our literature review, however, shows that there is no consensus, and views range from tracing being the only way to record to absolutely do not trace, ever. Some recent publications mention that tracing is a specialized method that has information to offer but should be used with caution by trained people. Most rock art researches feel that tracing should not be done by people as a recreational way to view rock art.

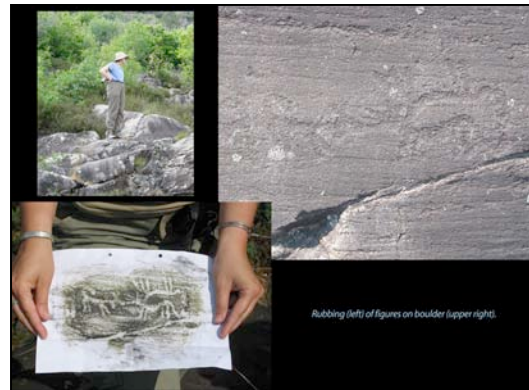
FIELD RUBBING

Field tracing is not rubbing, although the two methods are often confused by people not familiar with them. Rubbing is placing a piece of paper or other material on the rock surface and rubbing over the top of it, usually with a pencil, so that the underlying image appears on the material. This is still advertised as a recreational

way to appreciate rock art in some parts of the world. However, rubbing is regarded by most researchers as more invasive and destructive than tracing, and is only appropriate in extreme cases, such as when rock art had already been heavily impacted by abrasive forces like reservoir inundation and seasonal flooding. Sites in these environmental situations are usually considered to be near oblivion, and the need of immediate recording outweighs concerns of not touching the art.

This past summer while in Italy we saw a different approach to rubbing. The method is being done by local landowners trying to see the rock art on boulders around their homes. As shown in the photos to the right the rubbing is done by placing a piece of paper over the figure, rubbing the entire area with a large chunk of soft graphite (a by-product of local manufacturing), and then rubbing across

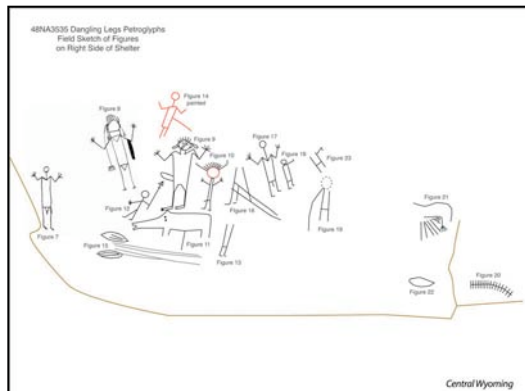
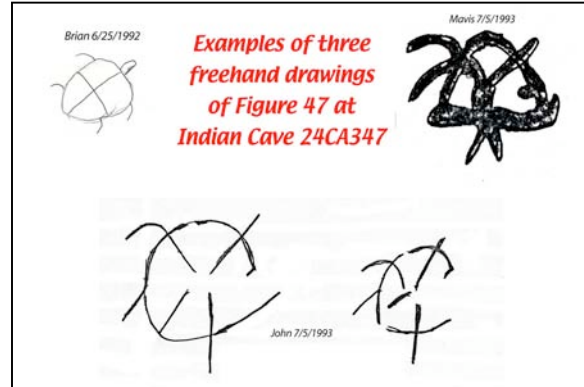
the entire page with soft green leaves, which enhances, fixes, and solidifies the image on the paper. Petroglyphs in this area are engraved into horizontal exposures of very hard schist, and after many years of patination, figures are difficult to see, as shown here in the upper right. Figures have been impact from weather, vegetation, farming, and recreation and are best viewed through the leaf rubbings, as shown in the lower left.



FREEHAND DRAWING WITH AND WITHOUT REFERENCE GRIDS

Many people believe standing in front of a panel and drawing it freehand is adequate when coupled with photographs containing scales, but sometimes the drawings result in simple artistic renditions that resemble the recorder's interpretation

and not the panel. The figure to the right in Indian Cave in central Montana shows the variety that can result when three people draw the same figure. This figure is returned to below as enhanced with the digital processing technique D-Stretch, which further confirms that freehand drawings are good as a reference for general placement of



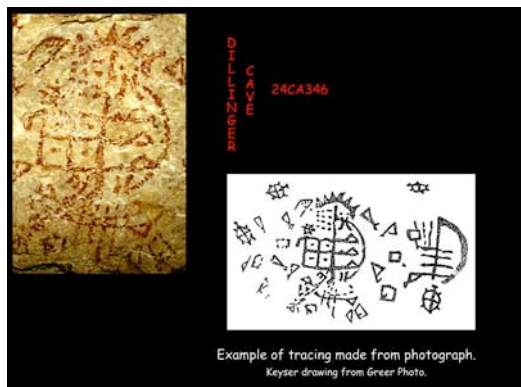
figures on the wall, but they are not always a reliable record of detail.

Others believe that by doing free-hand drawing relative to a string reference grid, the effects of artistic license are removed. This measured-drawing method has gained popularity with the *do not touch* recorders, but the accuracy of drawings pales compared to photographic tracing. Although the field

drawing above of the panel at Dangling Legs is a much more accurate portrayal than simple freehand sketches.

PHOTOGRAPHIC TRACING

There are two main methods of tracing photographs. One is to use physical prints and place a plastic sheet over the photograph and manually trace the photo. This is essentially a laboratory form of field tracing, and manual techniques such as variable stippling are easy to do. If various forms, or



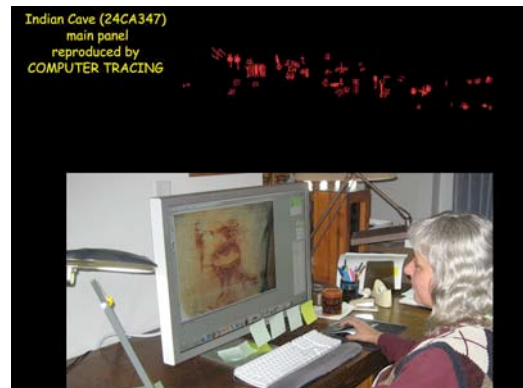
manipulations, of the original photo are printed to the same scale, the plastic overlay can be moved between photos to



produce a composite image with more detail than would be possible from only one variation of the print. The result is a plastic hard copy that then is scanned or otherwise converted to digital form for analysis and publication.

Office tracing can also be done directly on the computer screen. By tracing over a photo on the screen, there is easier control over manipulation of the scale since image size is immediately changed in response to edge details on the photo. Multiple views at different scales can be on the screen, or on multiple displays, at the same time for both detail and overall orientation. Tracing also can be done using a variety of hardware, such as high resolution graphics tablets.

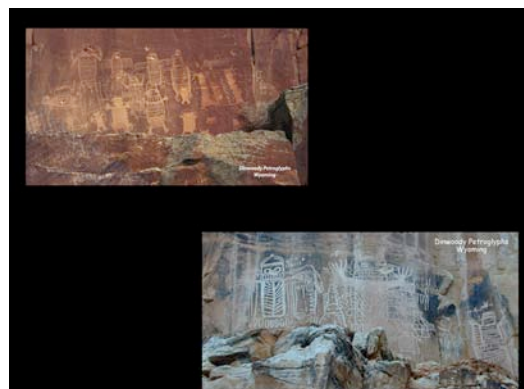
For office tracing on photographic prints or on computer screen, it is possible to use multiple versions of the photo, with different manipulations to bring out different details. Manipulations can be done at the moment, as interpretive questions arise. The process is similar to field tracing but without problems inherent in the field and subsequent



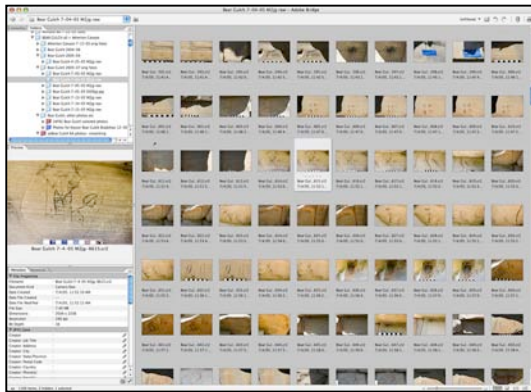
assembly of the images. It is possible to draw each figure separately, and then these are placed within the context of the overall panel. The drawings can be overlaid onto the original photograph, such as the one from Indian Cave in Montana shown on the photo to the left, without distortions from mechanical copying or scanning. Format of the final digital image is easily changed for publication or other uses.

COMPUTER PHOTOGRAPHIC PROCESSING

Turning now to photo processing, photographs have never been meant to result in a complete and accurate portrayal of what actually exists. Some rock art people talk about a *real photograph*, meaning what they get when they send 35mm film in for slides or prints. The outcome of traditional prints is dependent on



dozens of effects, particularly initial selection of the film, characteristics of the camera and lens, processing techniques, and presentation. Films all have different characteristics and display colors, saturation, balance, and resolution differently. There is variation in chemicals used in processing, and how they are applied. Dark room work, of course, is based on individual, custom variation, particularly of exposure and contrast. It is fair to say that there has never been a pure photograph reflecting a natural scene with no manipulation. Indeed, that is what professional photography is all about.



Scanning software and graphics applications transferred photographic processing from the physical to the virtual darkroom, and continual upgrading of digital cameras and software has now made possible more and better darkroom techniques than ever before. All traditional techniques are still available, but easier, faster, and more powerful; and more

techniques are now possible or at least easier to apply. These include various ways to alter color, control shadows, sharpen, correct perspective, and put together component pieces into composite photos, including overlays.

There is a wide variety of available cameras, but professional quality digital models with high-resolution full-size sensors, combined with professional multi-coated optics, produce the best quality photos and allow the widest range of processing possibilities. Photos are best recorded in RAW format, an uncompressed, unprocessed data file captured by the camera's image sensor before any in-camera processing has been applied. In this sense, the image is the digital equivalent to the exposed but unprocessed film negative and can be processed with various kinds of software with seemingly unlimited variation. The most popular application for post-processing is Adobe PhotoShop. It is perhaps the most powerful program that allows one to do almost anything.



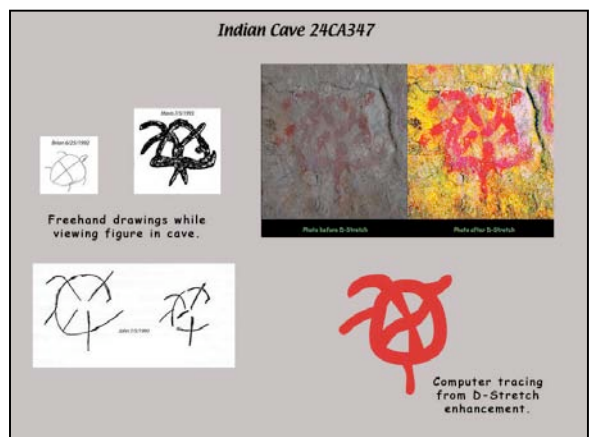
Another application is Image-J, a graphics program used especially in the medical profession. A special Image-J plug-in is D-Stretch, written specifically for pictograph enhancement using a variety of selectable color spaces. This program is, without a

doubt, able to bring out colors, and thus figures, that are not easily visible with the human eye, if at all. Colors are often seemingly distorted, but resulting images can be further modified to correct the colors, then combined with other layers in Image-J, or transferred to Photoshop for further enhancement of the image. These processes can make images visible that are not reproducible any other way.

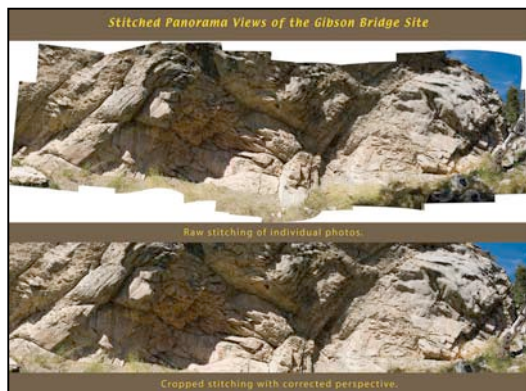
One use of D-Stretch, particularly, is to photograph areas of wall that might be painted but on which no figures are presently visible or recognizable. With a couple of quick clicks, it is possible to survey the surface and see if there was ever a painting in that area, particularly in red or yellow paint. If figures are identifiable, those parts of the wall can be rephotographed in greater detail. The author of the software continues to add new color spaces with characteristics to bring out and enhance specific colors and hues.



An example from Indian Cave in Montana in the photos to the right shows use of D-Stretch to bring out details of a pictograph easily mistaken during initial field recording. In the lower photo it is compared with the previous free-hand drawings discussed above.



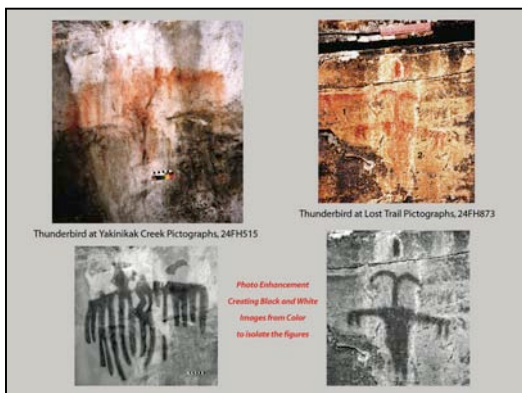
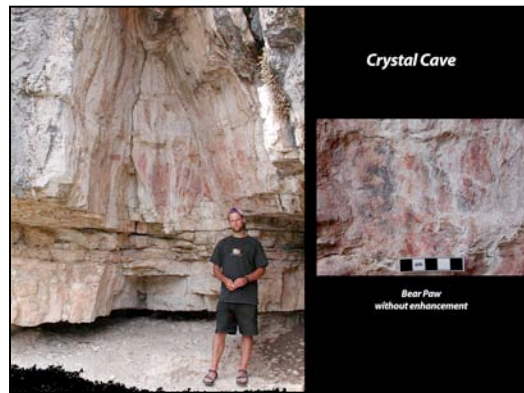
Some graphics applications do specialized stitching of component photos into a larger image. These can produce a composite of rock art on a wall that clearly show all



the figures of a panel, but with figures done as high-resolution images put together as a single photo, rather than an original wide-angle photo with its inherent problems of edge distortion or degrading of resolution due to photo enlargement. It can also produce a panorama of an entire site and surrounding country that otherwise would not be possible.

Stitched photos can sometimes create a better feel for the panel or site. The panorama of the Gibson Bridge pictographs shown on the previous page was created from 30 individual photos. Some panoramas are left with the jagged edges of the composite photos, as shown in the top photo, but they also may be cropped as a finished, formatted photograph, such as the one on the bottom.

Although there seem to be some unrealistic attitudes toward computers and graphics applications, digital processing cannot create something that isn't there. What is possible, however, is to bring out details that either are not visible or are not immediately recognized during field visits. In the example to the right from Crystal Cave in Montana, the bear paw was not seen until photo enhancement brought out the black color. But once enhanced, when we later returned to the cave, we were able to see the black bear paw because we knew where to look.



To conclude, controversies surrounding rock art recording focus on the degree of site impact, on when effect from tracing or rubbing outweigh speed and accuracy, and when computer enhancement crosses the line from accuracy to artificial creation. We have limited this brief review and have not included laser recording, which has already been discussed today, or a number of other approaches. The

methods considered here all have their strong points.

Field tracing produces highly accurate recording probably faster than other methods, even considering processing time of scanning and producing composite images, which can be done very effectively with a high resolution digital camera and using stitching software. Care should be taken to evaluate effect on the parent rock, and tracing is not possible in all cases. This method is perhaps ideal on hard, stable surfaces but generally should not be used on unstable or friable surfaces. At some sites destined for destruction, the information to be gained outweighs any possible adverse effects. Simply attempting to outlaw tracing is not universally justified, and obviously is not

acceptable by rock art researchers around the world. Literature, including brochures and manuals, could discuss use of specialty materials and how to minimize impact.

Field rubbings are very fast and produce images sometimes with details overlooked with other methods (except perhaps laser recording).

Freehand drawings, even with reference grids, are generally fairly fast and produce no impact to the wall. But they have essentially none of the quality of other methods and are much slower than detailed field photographic recording.

Photographic tracing, either on prints or on the computer screen, produces results comparable to field tracing, or more accurate and detailed. The process is generally slower and is dependent on high quality field photos, which are not always possible or as accurate as direct observations in the field.

Computer photographic processing is now available to everyone and has essentially unlimited potential. Results are only as good as the input, and are not magic, but images not recognizable or at least noticed by field researchers can be made visible and presentable in ways not previously possible. Computer processing is the basis for some recording methods and should be fully integrated with any approach to record rock art.