The abundant petroglyphs at this site represent a variety of abstract geometric patterns, bear claws, and designs incorporating rock features, such as fractures and gray-colored inclusions within the pink granite. Because of their proximity to the highway and the popularity of the historic site due to the adjacent transcontinental railroad, the petroglyphs at this location are vulnerable to inadvertent damage from hikers, mountain bikers, rock climbers and other visitors. When we visited the site in 2013, there was significant scarring of the rocks adjacent to the petroglyphs, which had been used for staging heavy road construction equipment, and we observed several hikers walking across the petroglyphs who were oblivious to their presence.

Before the 2013 trip it had been assumed that DStretch wasn’t effective for petroglyphs and would only work on rock art panels made with pigments. For the Style 7 petroglyphs at Donner Pass, however, the contrast between the pecked petroglyphs and the weathered pink rock is sufficient to allow DStretch to enhance the contrasts. The exposed rock at the site has a distinctive salmon pink color and glacially polished surface, with many darker gray inclusions. For those of a geologic bent, it is mapped as the Lake Mary tonalite (Klm) on the California Geologic Survey Map Sheet 60 (2012), a subdivision of the Cretaceous Rattlesnake Creek pluton (dated to roughly 95-120 million years before present).

Photogrammetry uses a series of overlapping images taken from different positions to reconstruct the 3D geometry of objects, terrain, or structures. Photogrammetry provides the capability to make a very accurate model and allows measurements to be taken for monitoring purposes, for example. It also allows very high-resolution photographs to be produced without the effects of lens distortion, called ortho-rectified images or orthophotos. Until recently, this technique was primarily ap-
Photogrammetry and DStretch can be useful for documenting and monitoring petroglyph sites over extended time periods, as a scientific record in the event that damage occurs and allowing detailed comparisons to be made. Another useful computational imaging technique for petroglyphs is Reflectance Transformation Imaging (RTI), which records very detailed images of the surface texture of objects and surfaces. These are important tools to help document and protect cultural heritage sites.

Note: The DStretch plugin for ImageJ, written by Jon Harman, is an easy-to-use application of the mathematical technique of Principle Components Analysis (PCA), which has been used by NASA and other agencies for remote-sensing applications. For certain models of Canon cameras modified with the open-source Canon Hack Development Kit (CHDK) firmware, DStretch can be installed and used to view enhanced images on the camera’s electronic display. It can also be used on desktop and mobile computers. For more information about DStretch and CHDK, visit www.dstretch.com and http://chdk.wikia.com/wiki/CHDK. For more information about photogrammetry, Agisoft Photoscan software, and RTI, see http://culturalheritage-imaging.org/technologies/ and www.agisoft.com.

While there are open-source software methods to perform photogrammetric calculations, the method applied here used a commercial software called Agisoft Photoscan (see note below) to construct a digital 3D model of the Donner Pass petroglyphs.

During the 2013 trip, I captured a sequence of photogrammetry images of a large panel of petroglyphs near the information plaque at the Donner Pass site. I revisited the Donner Pass site on August 23, 2015 and captured additional images of this panel and combined all the images into a single digital 3D model. I then applied the LRD setting in DStretch to the images to “re-texture” the model with enhanced images to produce the orthophotos shown in Figures 1a and 1b.

Further images of petroglyphs using photogrammetry and DStretch were captured in August 2015 during the recent BARARA field trip to Picayune Valley in the Granite Chief Wilderness, west of Lake Tahoe. These may appear in a future newsletter.

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Wollemi (pronounced Wollem’eye’) is the kind of wilderness area where you’d expect to find some long lost tribe of hippies living out in the bush, it’s so wild. In fact it gets even wilder - twenty years ago a bushwalker discovered a pocket of unusual trees in a rugged canyon which turned out to be a holdout from the dinosaur era (the Wollemi pine was thought to be extinct). But surprise! The area is only a 2 hour drive from downtown Sydney. The park is twice as big as Alameda county and is filled with rugged sandstone canyons choked with spiny bushes and vines, and only a few fire trails venture into its fringes. There are bushwalkers like you’ve never met before who bushwhack their way through the terrain using sketch maps that show the ‘passes’ in and out of some of the larger gorges.

In 2009, the discovery of the Eagles Reach rock art cave in the Wollemi wilderness changed the whole perception of rock art in the Sydney area with the notion of an Eagle totem – and the location of the Wollemi pine along with the Eagle’s Reach cave are probably the most closely guarded secrets in Australia.

Thankfully there are more accessible Wollemi rock art caves, most notably the Dingo cave where its approximate location is a testament to the power of the internet. I.e. a bushwalker’s bulletin board back in the early days of the net recorded a discussion between 2 bushwalkers that gave an approximate locality - and this kind of lapse hasn’t been repeated since.

Even with the approximate location known it took three separate tries to find the site, which has impressive charcoal drawings of dingos on a cave wall next to a small creek. It seems so remote; but not shown in the photo (figure 1) there’s added figures and a bit of graffiti. Hence the reason the Eagle’s Reach location is so secretive.

Another recorded site described in Jo McDonald’s prolific Dreamtime Highway publication is the Boorai creek site on the periphery of the Wollemi. Jo was a relatively recent visitor to a BARARA meeting, and this cave shows an interesting roo tail stencil (yes that’s Aussie talk for kangaroo). The figure was obvious when we located it on an overnight walk in. However, after emailing the photo (figure 2) to Walter, it took a few days of analysis and a further sketch (see ‘tail here’ and ‘roo bottom’ here) until it took on meaning. There was also a large boomerang and numerous faint red hand stencils in the shelter.

There are more and more new sites being discovered deeper in the wilderness area; but their locations go into the black hole of the National Parks Service (NPS) aboriginal heritage register. Thankfully there are numerous sites in the surrounding pastoral land adjacent to the park where their locations are easier to find. These sites were recorded in field surveys before the NPS register was created back in the early 90’s.

The Devil’s Lair Cave (figure 3) is one such shelter in which the above photo shows stencils of weapons (a shield, boomerangs and stone axe), and of course the ubiquitous stencilled hands. And (figure 4) a cave on nearby Wheelbarrow ridge that gradually leads down to the Hawkesbury river system contains numerous shelters and carvings scattered along the ridge.

Travel through the Australian bush whether it be by modern day bushwalkers or traditional indigenous Australians is/was accomplished by the same means – walking along ridge tops to avoid the thick scrub in the gullies.

While rock art in northern Australia from Kakadu and the Kimberley overshadows Sydney art in terms of complexity, vividness and imagination; Sydney rock art tells a simpler story like: We caught a roo here! Or, ‘We hung out here and here’s our dogs’; and ‘Here’s our hands and yes, this is us.’
The wonders of the French caves are many—and in retrospect I was struck by the diversity of the techniques and styles we experienced while there for two weeks in July. I would have thought that there would be a lot of similarity, and of course, thematically there was—but the technical approaches to the imagery and the site specific conditions were very different in every cave we visited. The French control their sites very strictly—the up side to this is comprehensive preservation of the caves and the art—but on the other hand, we always led and supervised by official guides. Also, no photography is allowed, for many good reasons—primarily that photography is disruptive to the viewing experience.

The Replicas

The French government protects the most vulnerable caves by shutting them and making copies, lending a bit of a themepark flavor to the experience. We started at the newly opened Grotte Chauvet-Pont d’Arc in southern France. This replica site, meticulously reproducing the Chauvet cave rediscovered in 1994, depicts the 36,000 year old imagery of felines, wooly rhinos, mammoths, and bison. These large mammals make appearances in many of the caves, reflecting the Ice Age fauna that roamed in the dry, cold climate the people inhabited. The educational value is high at this site, and it very thoughtfully experienced while there for two weeks in July. I would have thought that there would be a lot of similarity, and of course, thematically there was—but the technical approaches to the imagery and the site specific conditions were very different in every cave we visited. The French control their sites very strictly—the up side to this is comprehensive preservation of the caves and the art—but on the other hand, we always led and supervised by official guides. Also, no photography is allowed, for many good reasons—primarily that photography is disruptive to the viewing experience.

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Founded in 1983 by Dr. Paul Freeman and Leigh Marymor, BARARA attracts like-minded individuals who are committed to exploring rock art all over the world, preserving and conserving it, providing education, and studying rock art in creative and interesting ways. Members enjoy access to field trip information and receive a newsletter that is published twice a year.

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