Land and People: Conserving the Surroundings of Rock Art

Dorde W. Woodruff

We're concerned about conserving rock art, but not so aware of the land around it. The white man with technology and increased numbers brought vast changes to the Southwest. Places not affected or little affected by domestic grazing, or exceptionally wet spring flowering seasons, show us how the desert used to be. Botany and ecology show us cause and effect. We need to be knowledgeable and thoughtful about the impact to the land as we visit rock art, in order to best save what is left, for the Earth, for ourselves and other people, and for our descendants.

Judging from the frequent use of the adjective *pristine* to describe Western lands, laymen don't have an accurate frame of reference for changes to the landscape since settlers of European descent arrived. No place remains pristine, that is, characteristic of the earliest, or an earlier, period or condition; original, still pure or untouched; uncorrupted; unspoiled (Friend and Gusalnik, 1957).

The late linguist Wick Miller interviewed Shoshoni people for their stories (Miller 1972). Rosie Pabwena of Wells, Nevada, said, "Nowadays the white men have fenced in this land. They took away the Indians' land and made it look sad" (Translated, Wick Miller).

We respect the Native Americans' sacred sites; shouldn't we do what we can to keep these places from looking even sadder?

We often hear the myth of making the desert "blossom as a rose." Certainly with irrigation and our culture's farming methods, cultivated land in the West is more productive. But the desert in its own way did blossom, and now even the West's uncultivated land is changed forever.

Utah was not originally the desert that myth would have it. BYU professor Richard Jackson presented a significant study as a lecture in the Charles Redd Western History Series (Jackson 1975). For a description of the Salt Lake Valley when the main body of the pioneers arrived on the 24th of July, 1847, he selected diaries written on that day only, as the most accurate.

Wilford Woodruff, later to be president of the LDS church, wrote, "We gazed with wonder and admiration upon the most fertile valley spread out before us for about twenty-five miles in length and sixteen miles in width, clothed with a heavy garment of vegetation, and in the midst of which glistened the waters of the Great Salt Lake, with mountains all around towering to the skies, and streams, rivulets and creeks of pure water running through the beautiful valley."

William Clayton wrote, "...There is an extensive, beautiful, level looking valley from here to the lake which I should judge from the numerous deep green patches must be fertile and

rich...."

Others wrote, "...the Wheat grass grows 6 or 7 feet high, many different kinds of grass appear, some being 10 or 12 feet high." "After wading thro' thick grass for some distance...[found] a place bare enough for a camping ground the grass being only knee deep, but very thick."

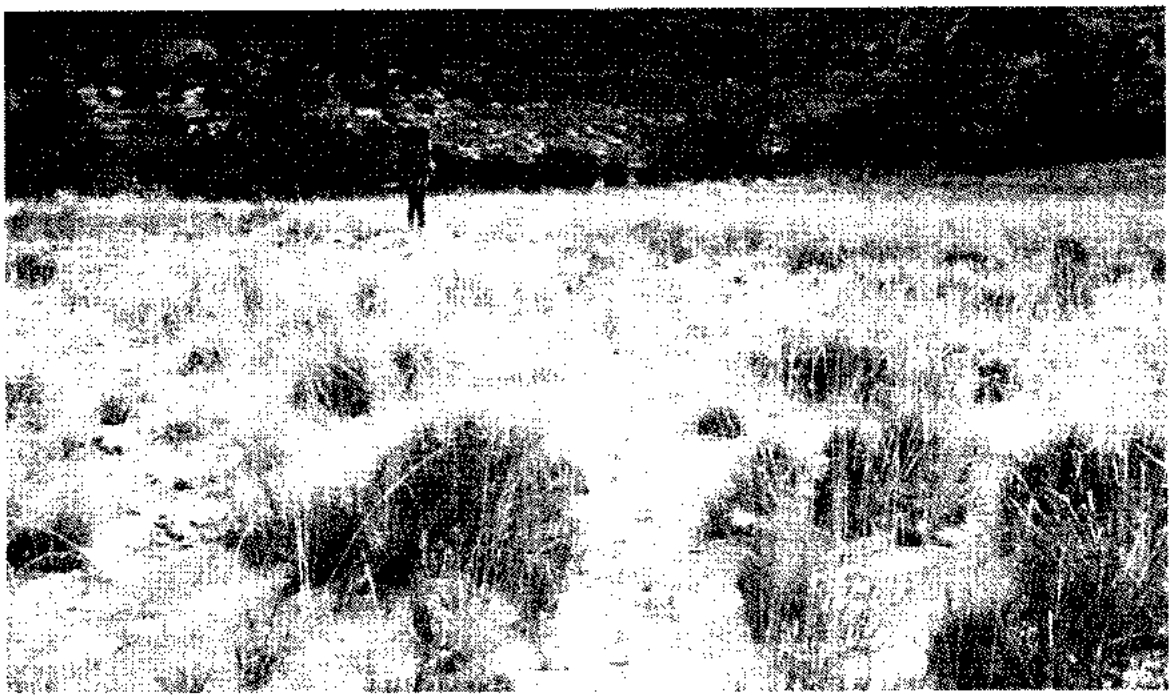
Where they camped the soil was "black" and "looked rich" and "was sandy enough to make it good to work." Grass "grew high and thick on the ground".

As early as 1865, the prominent Mormon Orson Hyde noted, "I find the longer we live in these valleys that the range is becoming more and more destitute of grass; the grass is not only eaten up by the great amount of stock that feed upon it, but they tramp it out by the very roots; and where grass once grew luxuriantly, there is now nothing but the desert weed, and hardly a spear of grass is to be seen."

A man stood up at the lecture and recounted how his family had cut wild hay in Cedar Valley west of Provo into the 1870s. Shrubs and weeds grow there now (see left, 1970s).

Much of Utah and the West was originally grassland, such as the Palouse Prairie region of the northwestern part of the state including Salt Lake City. Researchers agree it's the once-luxuriant grass that has suffered the most over the West. And because of this great degradation of grasslands, land managers struggle to improve grazing practices.

When the fall and winter precipitation is especially bountiful, maybe every 25 years or so. in the spring the desert will approximate the original condition of the West. The spring of 1973 was a spring to behold. The grass in Utah's West Desert was so high and thick that it was almost impossible to follow the two-track four-wheel-drive trails. Ralph Holmgren, for many years manager of



the Forest Service's Desert Experimental Range west of Delta, commented that May, "I didn't know there was so much *Stipa comata* [needle and thread grass] in the whole world."

The East Desert of Utah, the Colorado Plateau, was equally beautiful that year. Masses of flowers bloomed near the Miller Canyon road about five miles south of the Rochester Creek rock art site.

Another way to see approximately what the desert should look like is to observe ungrazed areas, those rare places too inaccessible for domestic grazers, or exclosures, study areas fenced from use for various lengths of time, or reserves such as national parks or wildlife refuges where grazing was stopped. See photo at the bottom of page 88 opposite, the lower part of Bullet Canyon in Grand Gulch, Thanksgiving, 1975. Cattle cannot enter from the cliffs above, and evidently in the warm season it's too far from water.

But exclosures by definition are not *pristine*, and even never-grazed areas are no longer *pristine*. Air pollution from cities, from the burning of coal for electricity and from vehicles, has spread all over the area beginning in the 1960s, with the escalating population explosion in the West, and more leisure and tourism. Gone are the hundred-mile views from the tops of mountains or the edges of high mesas, such as could be seen from places like the Virgin Mountains southwest of St. George, towering over the Nevada Desert; Frisco Peak looking out over the West Desert; or the edge of the Wasatch Plateau towards the San Rafael Swell and beyond (Dahms and Geils 1997).

As more coal-fired power plants came online, and so forth, air pollution in the West increased.

In the photo above, the camera couldn't see a hundred miles through the slight haze on this May day in 1970, but the eye could, from the four-wheel-drive road on the summit ridge in the Virgin Mountains on the Utah-Nevada border southwest of St. George.

Weeds can spread even to remote places such as these. For instance, Lincoln Ellison (1954) observed in his study of the Wasatch Plateau that dandelion seeds on their parachutes were floating over the Plateau from the Sanpete valley 500 feet below.

And who knows what global warming will do to the already irregular Western climate, bringing more stress to this fragile desert environment?

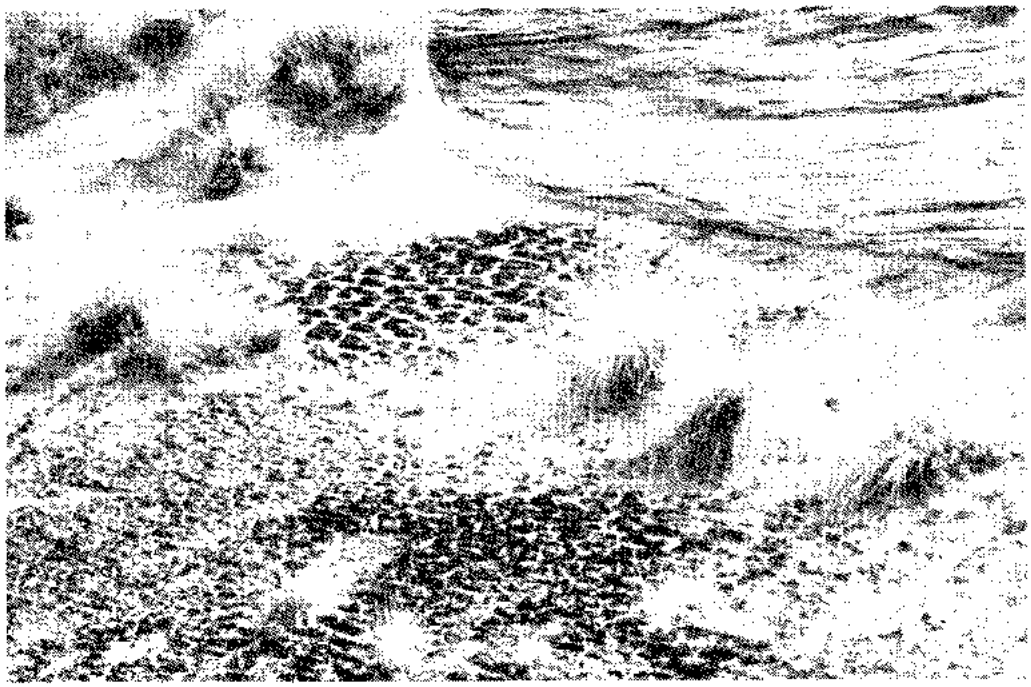
Cryptobiotic Soil

Now to look at arid and semi-arid lands in more detail. A peculiar characteristic of all the world's deserts is cryptobiotic (meaning "hidden life") soil, a crust on top of the ground composed of a mixture of cyanobacteria (formerly called blue-green algae), several different types of algae (Flechtner et al.1998:296), fungi, lichens (which are themselves symbiotic organisms composed of algae and fungi), mosses, and sometimes liverworts or diatoms.

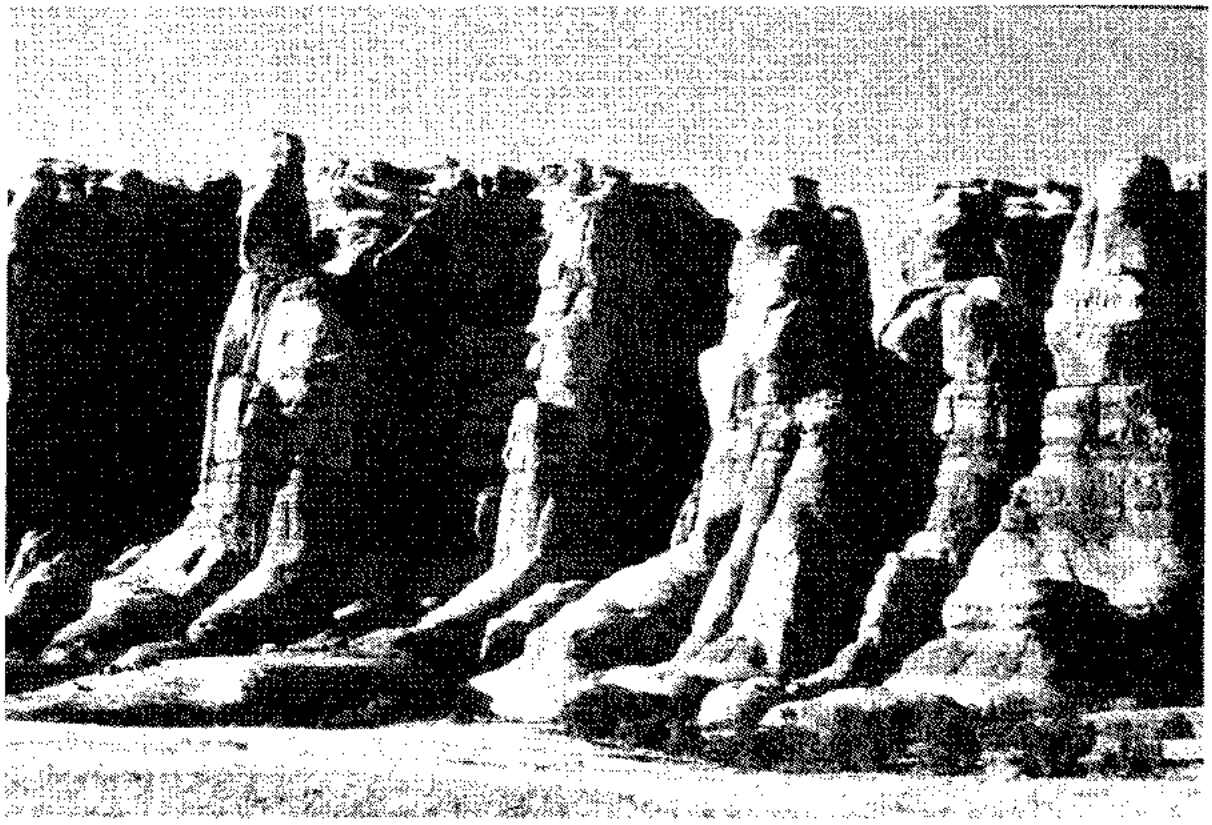
The original name for this mixture of organisms, cryptogamic soil, is from an old botanical term for primitive plants without flowers, cryptogam, meaning "hidden marriage" or "hidden gametes", gametes being the reproductive parts; before microscopes the reproductive phase of these plants was hidden from human view. Other terms used are microphytic, "small plant", and microbiotic, "small life". There is no referee or dictator, so researchers use their favorite term.

Cryptobiotic soil is quite important to desert ecology, yet easily damaged. It's not easy anymore to find a complete cover of cryptobiotic soil between the scattered shrubs, herbs, and grasses of the desert. A good place to see this dark crust is on the steep river terraces of the Colorado and its tributaries, or in rock pockets in slickrock, such as in Seven Mile Canyon, a tributary to Glen Canyon near Bullfrog, below, with a good cover of cryptogams, and ungrazed grasses.

For a long time cryptobiotic soil was overlooked; study of its ecology is fairly recent. The



landmark fieldwork of Ed Kleiner and Kimball Harper in Canyonlands in 1967 and 1968 (Kleiner and Harper 1972) demonstrated basic differences between grazed and ungrazed areas. They compared Virginia Park, a grassy place surrounded by rock walls and accessible only through a unique, steep, rocky tunnel through the sandstone wall, to adjacent Chesler Park which had been grazed for many years in winter by horses, while only deer and no domesticates could get into Virginia Park.



Cryptobiotic cover was about seven times greater in Virginia Park (above), and it was much richer floristically than Chesler, with more grasses and fewer shrubs. Without pressure from domestic grazers, cacti were less spiny. The soil had more nutrients. There was no drainage channel erosion. The vegetation formed a pattern, indicative of diversity and therefore productivity (Siegel 1999). The soil texture was finer. They concluded that the intact cover of cryptobiotic soil contributed to soil nutrients, and stabilized the soil to resist water and wind erosion.

In another landmark study Evans and Ehleringer (1993), using a new and more effective method of measurement, found that cryptobiotic soil was the primary source of nitrogen for desert soil. Some of the organisms of this crust, especially cyanobacteria, can change gaseous nitrogen from the air to a form usable by plants. In deserts water is the most limiting factor to plant growth, but nitrogen is second. Cryptobiotic crusts also increase water infiltration and retention, holding it for use, limiting runoff and its concomitant erosion. They enhance the establishment of seedling plants, and warm the soil (Utah Bureau of Land Management, Monticello, 1999).

These small organisms may look insignificant. They are not.

All this is helpful and even essential to the health of deserts. But cryptobiotic crusts are fragile, and all the more so when it is hot and dry and they are dormant and brittle. When Kleiner and Harper returned to Virginia Park in the second year of their study, they were surprised their footsteps were still so visible. After that they walked in the same paths. People, domestic or wild animals, vehicles, bicycles, and wildfires all impact the crust (Buttars et al., 1998).

Recovery rates are slow. The organisms grow only when wet; summer heat and drought inhibit them. Estimates vary, but ecologist Jayne Belnap thinks that ground left bare is vulnerable for at least

20 years after disturbance (Belnap 1997). If soil is then lost it may take up to 10,000 years to form again. Time for recovery of the different species varies. Cyanobacteria may begin to recover in as little as six months and may be healthy in five years (Allen 1999). But Belnap notes that it may take at least 50 years for nitrogen fixation to completely return. Furthermore, "assuming adjoining soils are stable and rainfall is average, recovery rates for lichen cover in southern Utah have been most recently estimated at a minimum of 45 years, while recovery of moss cover was estimated at 250 years."

Of course, trampling of any kind disrupts or kills other organisms large and small besides the cryptobiotic ones (National Park Service, Arches 1996) but these small crust organisms are less likely to be noticed.

In the photo at left, sand from distrubance blew over these cryptogams and will kill them. Note the micro-topography; the uneven surface helps water absorption into the ground, helping to prevent runoff.

Soil disturbance and compaction

Cryptobiotic crust won't form in soil that is too sandy and thus unstable, or too rocky. In some of the latter, desert pavement develops, which can be quite beautiful, retard erosion, and serve as mulch for plants. This too can be disrupted by traffic. It's well known that motorcycle ruts went through the giant figure near Blythe before the BLM fenced it (left, note track through legs at far end of figure).

In addition to disturbance on or above the surface, traffic of any kind compacts the soil. "Any surface loading creates stresses in the soil which affect soil properties to a finite depth...the greatest increases...occur at a shallow depth instead of at the soil surface." Because of the fact that "soil loosening processes operate most quickly at the surface", this is important.

"Soil infiltration rates...decrease...because of total porosity decreases and changes in the distribution of soil pores...rainfall intensity required to initiate runoff is less in compacted than in undisturbed soils" so less intense rain is required to initiate runoff with more compaction. Also "traffic leads to raindrop crusting",

decreasing infiltration again. "...soils most susceptible to density increases are loamy sand or very coarse, gravely soils with a wide range of particle sizes.... Least affected are sand or clays with evenly-sized particles, though clays will compact when wet. In addition to disturbing stable surface crust with good water-receiving characteristics, traffic can change the ground surface to make runoff more effective. "Ruts running directly upslope greatly reduce the surface's resistance to erosion" (Web and Wilshire 1983).

It's surprisingly easy to create erosion. During the gas crisis of 1973 when I was doing an ecological survey for the Huntington power plant, I bought a small motorcycle. I usually camped at Huntington in the pinyon-juniper on an old, obscure, wood-cutting trail. Once, not yet having any frame of reference for off-highway motorcycle use, I took the bike instead of my four-wheel-drive, and noticed the bike's narrow tires made a deeper rut on the last, steeper pitch.

Now, twenty-six years later, trees have grown up in the trail, a dead tree has fallen into it, and there is no indication vehicles drove here except for the short, rocky erosion gully and adjoining soil deflation I caused with no more than ten passes with my motorcycle (right).

Observing over a Period of Time

Considering how places have changed over the years leads to understanding of *what* can happen, if not always exactly *how*. Repeat photography establishes the facts without the vagaries of memory. "[It] is a simple, inexpensive, and elegant tool for reconstructing past environmental changes and monitoring futures ones; it is particularly well suited for the relatively open landscapes of the western U.S." (Allen et al. 1997.)

If you've been interested in rock art for a few years, you may have noticed change and have the "before" photos to prove it. For instance, in 1982 the road to Rochester Creek just stopped. There wasn't much degradation around it. It was a rough two-track, difficult to find, threatening to erode off into the canyon in places. Now it is a tourist destination, the road signed, wide, graveled, and stable. There is a large bare area at the end of the road, and a rock fireplace full of ashes.

In 1984 there was one road to the delicate Barrier Canyon style panels at Little Wild Horse Canyon. The ranger at Goblin Valley began to tell people about the site. A few months later someone had pioneered another road in an attempt to walk less, from which it was actually more difficult to find the panels.

Also in 1982, the road south from the Cleveland-Lloyd Dinosaur Quarry road to the many panels in Dry Wash was easy to follow. The meadow there was a pleasant place. This year there were so many new roads that though I stayed overnight, I never did find the right one to the

Left: at the end of the road at the Rochester Creek rock art site in 1983, with much less visitation than today. Cryptogams were missing but plant cover remained. Below, the same area in 1999. Note the same juniper tree on the left. Plants are gone in a wide swath around the end of the road. Sand is packed and tracked, and there are some leftover rock fireplaces and trash. More camping now will make it even worse.

panels. The meadow was scarred with tracks, fire rings, and broken glass; it had evidently become a favorite party place. Repeat photography at such places would be good documentation for land managers.

Weeds

Nature can cope with a certain level of disturbance. There have always been floods, windstorms, volcanic eruptions, and the like. Buffalo roamed and Native Americans prospered. But our culture is doing it harder and faster. Land is left bare. Soil is lost. Arroyos are cut. Wetlands dry up. And the big danger which land managers are worried about now is weeds.

Usually (though not always) weeds move into areas of disturbance. Native weeds are relatively benign, even useful or pretty. Globe mallow, *Spheralcea* species, now beginning to be used as an ornamental, can act as a fireweed, a plant that comes in first to cover a burned area, or in red-orange flowery masses on other disturbed sites. The plant called fireweed, *Epilobium angustifolium*, is now most often seen on road cuts. Far from being toxic, these two are valuable medicinal herbs. Common sunflower, *Helianthus annuus*, the same species as cultivated sunflowers with their valuable seed crop, is so hardy that it was one of the pioneer plants around the huge crater from the Sedan thermonuclear test at the Nevada test site. It's tolerant to the dangerous

cesium and strontium isotopes produced (Goetz 1997).

Competition and native diseases and insects that prey on them keep indigenous weeds from getting out of hand. As a group our older imported weeds are relatively benign, because many if not most of them were brought deliberately as food, medicine, or forage. But with increased population and easy travel, the most noxious, aggressive weeds of the whole world have an unprecedented opportunity to stake out new territory, free from natural enemies, unasked and unwanted.

For years cheat grass, *Bromus tectorum*, from Eurasia, has been the scourge of the West. Animals can eat it in the spring, but it soon turns dry and inedible. The ripe awns can injure animals, and are the despair of sock-washing mothers. To control it botanists are working on a parasitic smut related to corn smut, the *toloache* the Aztecs ate. But it's tricky; the kind of smut has to match the particular genotype of the local cheat grass.

The task is urgent because worse scourges are waiting to move into bare spots or take over from cheat grass before it is eradicated and land replanted. One of the most vicious is the Eurasian perennial leafy spurge, *Euphorbia esula*, which shoots its seeds for 15 feet around it, and is so deep-rooted it's very difficult to get rid of. It can kill cattle that eat it, and has sap that can cause permanent blindness. It's carcinogenic; before they learned to wear gloves, weed controllers in Idaho where it has caused millions of dollars worth of land degradation lost finger joints from pulling it barehanded.

Or jointed goatgrass, *Aegilops cylindrica*, a Mediterranean winter annual, another type of plant which does well in our climate. It breaks up into many little fertile pieces, and is so close to wheat genetically that it can't be eradicated from wheat fields by weedkillers. (Susan Meyer, personal communication 1999.) And there are many others.

Again, observation over time is a good teacher. I've owned my land in Salt Lake County for 44 years. Once grazed and part of it cultivated, it had the traditional weeds of the area: red root pigweed, edible; sunflower, cheery; ragweed, useless but not vicious; cheat grass, not nice, but in a limited area you could stop it by mowing before it set seeds. And so forth. The native grasses were gone but there were wildflowers and sage.

With population growth and more weeds coming into the Salt Lake Valley, or moving around in it, I've seen weeds disperse onto my property year after year. Weeds came with my topsoil, with neighbors' topsoil; seeds blown from the old neighbor's pasture reseeding; seeds blown from the freeway property bulldozed then neglected for years; from bird excrement; from squirrel burial; from a gift of sod; in baled

Right, the weedy native milkweed, *Aesclepias latifolia*, is not only fairly benign but pretty and useful. It attracts butterflies, is edible and is medicinal.

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hay; from the neighbor's manure used as mulch; stuck on bicycle tires or soft shoe soles; in mud on tires or feet; by underground roots from neighbors; in play sand. Weeds will come if they can.

What We Can Do: Tread Lightly

By now you're probably thinking, what does this mean for us, the rock art community? Consider what you can do to keep from making the Indians' land look more sad than it does from the damage already done to it.

There's a retired highway patrolman who lives at Moroni and likes to camp. Every year he would get mad because all the camp spots in the forest were so trashy, never enjoying his stay. Now he spends some time in the spring going around to a few sites and cleaning them. Then he cleans each site he camps at, spends a little time and is happy for the rest of his stay.

We shouldn't camp at over-visited sites like Rochester Creek any more, making it more bare and degraded. A better practice is to camp at a maintained public site, or one like the areas near, not at, the Swasey's War Camp rock art site near Price, Utah, areas that are already bare, packed sand (left: denuded area around tents and cars) and will not deteriorate further. Both field trip leaders and participants need to think about conservation of the surroundings of rock art.

Record keeping is important. Not only for your own use, but if it's possible that you would ever take friends to a site or lead a trip, take note of exactly where it is, what roads to take, and where cars could turn around without excessive damage. Would the road rut if wet? How many people should go?

On the other hand, in the case of a last short stretch that you don't want to take a herd of vehicles into, could you take one car with disabled people without causing too much damage? Let people know about how far it is to walk, so they can be prepared.

Something as simple as a 3x5" card file that lives in your SUV, or a notebook with a page copied from the 7½-minute map and marked for each site is handy. With the USGS maps finally completed, notebook computers, GPS instruments, and CDs of maps, locating a site is easier than ever before.

Things happen, leaders get sick, the weather turns bad. But with increased visitation, it becomes ever more important to respect the land. If you're taking people in, scout out your trip beforehand if it's been awhile. Don't try to find one last site with your group hot on your heels, since this could lead to errors in judgment. Maybe we can't see so many sites in a day.

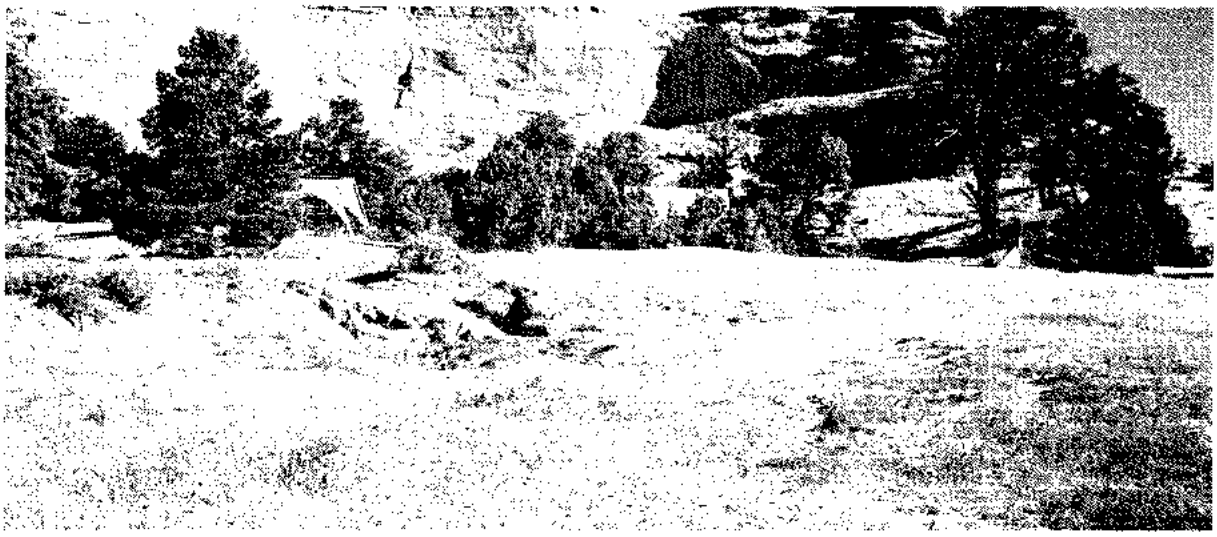
Be sure you're familiar with URARA's guidelines. Give our URARA Rock Art Site Etiquette handout to members of the public and to new members. Let people know you expect them to stay on the trail and not walk on cryptobiotic soil.

Most of all, rather than follow a lot of hard and fast rules, consider the situation. Does it make sense when camped near a wash with plentiful driftwood, or where there's been woodcutting with

abundant trimmings remaining, to use fossil fuel? Or you could bring wood from home, and haul out at least as much ash as you produce. I enjoy using a well-built fire-ring left for me, but I carry garbage bags or a plastic pail and clean it up. Like the retired patrolman, I'm happier with a clean camp. Though there may not be any studies on the subject, the consensus is that most people will respect a clean area.

The National Outdoor Leadership School in partnership with the Forest Service, the BLM, the National Park Service, and the U.S. Fish and Wildlife Service, have thoughtful suggestions on their *Leave No Trace* website. Though, as we have seen above, *leave no trace*, like *pristine*, is not accurate, leaving very little trace is good.

I hope this paper has given you the beginning of an idea what the Indians' land was like, more beautiful than today and closer to its natural condition. It can only touch lightly the study of Western landscapes and their conservation, which comes from many disciplines. Even on the single subject of cryptobiotic soil, papers are found in many different journals. Should you wish to study further, the Internet is a good place to begin, and websites will get you into the literature.



Outfitter's camp at the Head of Sinbad area in the fall. This popular camp spot near the Red Warrior pictograph was trashy and had several firepits and a big hole. The outfitter cleaned it up and left one big firepit for people to use. Every fall thereafter, when the outfitter was there for a month, it was cleaner than the year before, never returning to the former state though visitation may be assumed to increase rather than decrease. Removal of cryptogamic cover and grama grass by grazing and human use led to the erosion gully in the center, from runoff from the cliff during thunderstorms. Patches of grama grass remaining were tall and healthy due to good rain that year in summer and early fall.

Acknowledgements: Thanks to Dr. Jayne Belnap and co-workers Sue Phillips and Michelle Schmidt of the National Park Service's Southeast Group in Moab for the loan of some of the slides used in the oral presentation of this paper.

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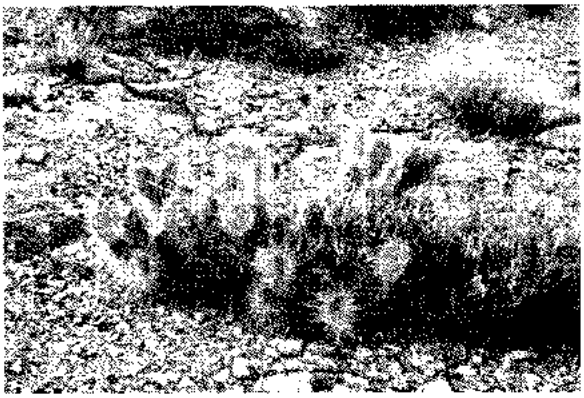

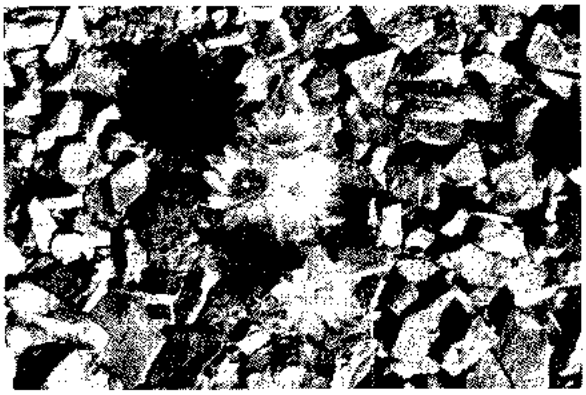

Above left, the east end of Nine Mile Canyon. Runoff from an intense summer thunderstorm makes a yellowish ephemeral waterfall full of silt from the disturbed mesa above. Right, different kinds of desert pavement. Top: unevenly-sized granite gravel, Beaver Dam Wash in the southwest corner of Utah. Bottom: small chunks of limestone surround a rare miniature cactus above Marble Canyon of the Colorado.

Below, four-wheel-drive tracks in desert pavement above Three Canyon in Labyrinth Canyon of the Green in 1972. Once remote and seldon seen, now you can get GPS coordinates on the Internet to this route across the mesa to June's Bottom. What would a present-day comparison show has happened to this scene?