THE RAINBOW ROCK WONDERSTONE SOURCE AND ITS PLACE IN REGIONAL MATERIAL DISTRIBUTION STUDIES

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ABSTRACT

Although Rainbow Rock was a significant source of flaked lithic material for prehistoric Native Americans, it has received little attention in regional archaeological studies. The distinctiveness of some of the material from this quarry at the hand specimen level and the potential for trace element characterization make this a regionally significant material source. This paper includes a description of the site, the lithic material, and a general examination of the regional distribution of this material in the western Colorado Desert and southern California. This source is then placed in the context of other southern California source-distinctive and widely distributed materials. The importance of direct procurement and exchange of such distinctive materials is then examined in contrast to local embedded procurement systems.

INTRODUCTION

The Rainbow Rock Quarry (IMP-6300) represents one of the largest and most intensively used bedrock lithic procurement area in the Colorado Desert. The extensive outcrops of varying types of high quality material have made this an important regional resource that played a significant role in flaked lithic production in the Coachella Valley. The site has been generally neglected in studies of the prehistory of the region although it has the potential to address numerous questions on human behavior. Numerous researchers have mentioned the site but no comprehensive study of the quarry material and its distribution has occurred despite its unusual and intensive nature. The site is significant for the information it can provide on lithic procurement and Native American exchange and mobility. The Rainbow Rock Quarry was not only a significant part of local embedded procurement strategies but it ranks with a limited number of other distinctive materials that were utilized on a regional scale.

LOCATION AND GEOLOGY

The quarry site, IMP-6300, is located at the southeastern end of the Santa Rosa Mountains in Imperial County, California (Figure 1). It is on the western side of the Salton Trough and is north of a major west to east trending wash known as Wonderstone Wash for the distinctive lithic material at the site. The quarry itself is known as Rainbow Rock for the distinctive color gradations of some of the material found there.

The site is located roughly between 100 and 650 feet above mean sea level which is significant because although it is located less than a half mile from the high (40 foot) Lake Cahuilla shoreline, it was never covered by the lake. The site is within ethnographic Cahuilla territory. These two factors distinguish it from the other regional sources of lithic material in the Salton Trough: Obsidian Butte and Cerro Colorado. Obsidian Butte was occasionally inundated by Lake Cahuilla and both Obsidian Butte and Cerro Colorado are within

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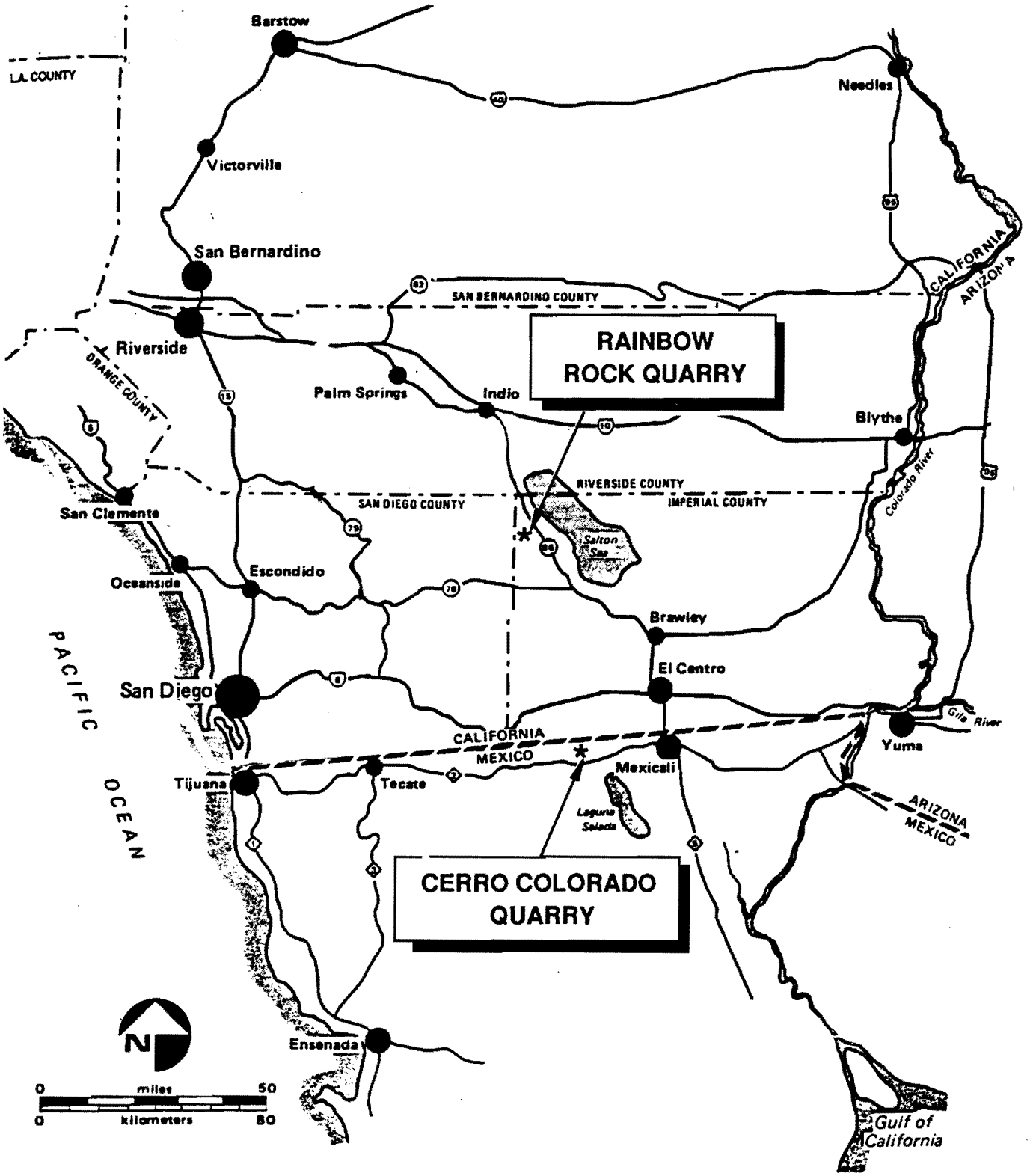

Figure 1. General Locations of Wonderstone Sources in Southern California.

ethnographic Kumeyaay or Kamia territory.

Geologically, the Rainbow Rock Quarry is unusual, giving some of the material found there distinctive attributes at the hand specimen level and providing flaking and color properties that made this material worthy of regional distribution. Only the Cerro Colorado wonderstone source west of Mount Signal in Baja California Norte provides a similar type material within the region.

The area of the Rainbow Rock quarry was originally described as the Truckhaven Rhyolite Formation (Dibblee 1954) and most early discussions of the material refer to it as rhyolite. Weismeyer (1968) conducted a geological study of the quadrangle where the quarry is located and determined it was an area of localized silicified sediments along the Truckhaven fault. The sediments were part of the Pleistocene Palms Springs Formation and Canebrake Conglomerate Formation. This silicified area is exposed for about 1.5 miles along the Truckhaven fault. The fanglomerate sediments of the formations are interbedded with layers of amorphous silica or what is often called chalcedony. The depositional sequence and the presence of fossilized reed-like plants in the silica suggest that the hydrothermal fluids were reaching the surface while some of the last fanglomerate sediments were being deposited. The area has since been faulted and folded so that similar outcrops within the formation are exposed in multiple areas and at different elevations.

The relatively unique geologic history of the site has created a variety of materials ranging from pure chalcedony to fine textured silicified clays to granular or brecciated silicified sandstones and conglomerates. Fanglomerates with large granitic clasts and sandstones that are only moderately altered are also present in some areas.

PREVIOUS RESEARCH

The site was first noted by Malcolm Rogers of the San Diego Museum of Man (Rogers n.d.a). He began the pattern of secondary recognition the site has received by archaeologists in the region. Rogers never actually recorded the site, but only mentions it in his record of site SDM-C-116A located directly east of the quarry. Rogers noted that "just west of this site and above the highest Blake Sea [Lake Cahuilla] level is a large rhyolite quarry which was worked from SD I [San Dieguito I] times down to and including the Desert Cahuilla" (Rogers n.d.a). Rogers' notes on site SDM-C-116A indicate that he felt that "all [the sites] in the region ha[ve] pink rhyolite flaking" from this source (Rogers n.d.b).

The site was also given secondary attention during excavations on a terrace just below and west of the Rainbow Rock Quarry. Morlin Childers and Erlinda Burton conducted a field class at the site in 1971. This area was known as the Truckhaven Site. The locally famous Truckhaven Man burial was recovered from below a rock cairn at the site. Although this was originally thought to represent an early man find the burial was radiocarbon dated at approximately 5000 years before present (Breece and Rosenthal 1989). Results of the excavations were never published. Although the burial was probably associated with activity at the quarry site no attention was focused toward the quarry itself.

Hydrothermal fluids often contain concentrated metals and rare elements and recent archaeological activity and site disturbance at the Rainbow Rock Quarry have focused on its potential as a source of gold. LSA, Inc. (Breece 1989) conducted an archaeological survey of lands in the area and later conducted excavations and collection for access roads and bore tests to evaluate the potential for the area as a mine. The survey formally recorded the quarry for the first time. Although the site was described as large, during the survey the complete intensity of use and material variability were not well defined. Efforts appear to have been focused on the top of the quarry while activity along the sides of the mesa-like quarry area were not accentuated.

Testing at the site was conducted in September 1989 to address approximately a mile of pro-

posed access roads and bore holes within the site area (Breece and Rosenthal 1989). Because of the abundance of material, testing focused on the collection of tools and samples of the debitage. Postholes were excavated which suggested that the area under investigation included mostly surface material. Debitage within three sample grids was collected along with the tools that were identified within the road alignments and drill locations. Several areas of intense activity appear to have been largely ignored during testing. The testing sample recovered 40 flakes, 499 fragments of debitage, 4 cores, 24 chipped stone tools, and one hammerstone bringing the total number of artifacts collected to 568.

A second phase of testing at the site was conducted by Imperial Valley College Museum in 1992 (IVC Field Class 1992). This effort focused on clearance for an additional access road and pad in the central portion of the site. Efforts identified an extensive lithic scatter in a desert pavement situation on the flatter portion of the site. A trail was also identified within the site area at this time. The study area for this effort was limited to a 94 m long area of access road and siting area. The area was initially collected in loci but the extensive nature of the deposit soon became apparent and a grid system was established. The total testing effort at this portion of the site produced 7,919 artifacts including numerous cores and tools that were classified into various chronological categories. The tremendous number of cores and artifacts identified within this relatively small study area contrasted strongly with the results of the 1989 test at the site.

The efforts of the Imperial Valley College Museum have not yet been reported on and the LSA survey and testing reports were not widely distributed due to requests from the client (Beth Padon, personal communication, 1994) adding somewhat to the obscurity of the site from the prospective of regional research. The previous work at the site has identified the resource as an intensely utilized quarry with some regional distribution of archaeological material.

THE SITE AND MATERIAL

The site itself is located on a high bench area dissected by several washes emanating from the Santa Rosa Mountains which rise above the site to the north. Although much of the site area was previously identified, additional examination has determined the site is larger and more extensive than previously recorded and an additional area of prehistoric activity associated with the same formation has been identified to the west. This area is at a higher elevation and located on steeper terrain separated from the main site by a major wash, but it contains quarry outcrops of the same materials.

Activity at the Rainbow Rock Quarry has been intensive. The entire site area contains literally millions of artifacts. Within this formation 21 intensive concentrations have been identified as loci. These loci usually focus on reduction of varying material outcrops. Activity at some of these loci is suggestive of Old World obsidian quarries and true talus slopes of debitage have been formed in several areas along the quarry margins. The amount of activity at the site is overwhelming and suggests intensive use of the quarry for an extended period of time.

Many of the loci are relatively undisturbed. Although some rockhound activity is present and the source has been somewhat popularized (Hilton 1939) the site is largely undisturbed due to limited access. Numerous hammerstones and other quarry tools are present. Most are granitic subangular rocks that were probably collected from Wonderstone Wash. Hammerstones are abundant and range into the hundreds at several loci, contrasting sharply with the underlying sheet of debitage. They included spherical hammerstones along with a variety of other types from pebble knappers to large (35 cm long) breaking tools. Several hammerstones of local chert were also noted along with smaller quartz pebble hammerstones. The variety is tremendous, ranging from perfectly circular to completely angular.

Cores are variable also and may reflect vary-

ing use through time. Biface preforms are present but relatively rare and few have been taken to later stages of reduction. Most of the cores are multifacial and multidirectional but large patterned bifacial cores and lenticular bifacial multidirectional cores are present along with unifacial items that represent morphological scraper planes. No evidence of habitation has been observed at the site. Temporary habitation was probably focussed on terraces surrounding the quarry such as the area where the Truckhaven burial was located. Cleared circles observed by Breece (1989) are indeterminate and ceramics or definite groundstone have not been identified within the main quarry area itself. This suggests that although many of the items represent morphological tools, they were not used as such but represent manufacturing stages or nearly complete tools that have not been used.

Quarrying at the site is intensive in many areas. Several areas, especially along the layers of white chalcedony or chert, appear to have been actually excavated and boulder bases cleared and worked. Evidence of direct bedrock quarrying is heavy in these areas. In other portions of the site, materials occurring in the desert pavement float appear to have been quarried. At the base of some slopes, large chunks of talus have been made into large multifacial multidirectional cores. These varying methods of material extraction reflect the great internal variability within the site.

The lithic materials are what have made this quarry unusual and also somewhat invisible to the archaeological community. Wonderstone is the most distinctive of these materials but not the most intensively or extensively quarried material at the site. Wonderstone is a rock that has been hydrothermally altered so that minerals, particularly iron and manganese, impregnate the rock often forming bands of varying colors. In most cases these hydrothermal fluids bring with them dissolved silica which hardens the rock and gives it a conchoidal fracture. The term wonderstone is generally limited to those silicified rocks that contain color banding, often striking reds, oranges, and purples. As will be mentioned below, other silicified sediments are also present at the Rainbow Rock Quarry.

Outcrops of wonderstone are relatively extensive at the Rainbow Rock Quarry and are limited within the region. The Cerro Colorado quarry in northern Baja California, between Laguna Salada and the Yuha Basin, represents the only other significant source known in the region (Figure 1). Small veins of somewhat similar material are probably present in the Cargo Muchacho Mountains and a small source is known to be associated with gold deposits at Castle Mountain in the Mojave Desert but only Rainbow Rock and Cerro Colorado show evidence of prehistoric use.

The Cerro Colorado source is similar to the Rainbow Rock source in several respects. They both appear to represent silicified sediments and some of the material overlaps at the hand specimen level of examination. A distinctive blue-grey material from Rainbow Rock appears to be lacking at the Cerro Colorado source but much of the red and white material overlaps in color and texture. The Cerro Colorado material appears somewhat different in that much of it occurs as finer clasts within a course silicified conglomerate and often has a very fine black texture that is lacking in material from Rainbow Rock. The geologic differences between the two areas should make them distinguishable at the trace element level although high internal variation would be expected at both areas due to the varying intensities of silicification and variable nature of the sediments. A very limited sample of two material fragments from the Rainbow Rock quarry; one chert the other silicified sandstone, suggests high internal variability between material types within the quarry (Shackley 1992).

Although wonderstone is the most distinctive material from the Rainbow Rock Quarry it was not the most intensively quarried material at the site. This suggests that even identification of wonderstone material at an archaeological site is not likely to present a true representation of material associated with the Rainbow Rock Quarry. Silicified sand and siltstones that lack the red and blue color alteration of wonderstone are the se-

cond most common material utilized at the site while white chalcedony or sinter was the most heavily used resource.

The silicified sandstone and siltstone materials are generally white to grey in color. The fine-grained silicified siltstone materials are dominated by the white side of the spectrum. The material is opaque and often resembles a fine porcelain. The coarser-grained silicified sandstone material ranges from a fine-grained white with a few quartz grains to a sugary grey grainy material resembling quartzite. This grey material often includes brecciated fragments with differing textured inclusions.

Perhaps the most heavily used material at the quarry is a white to pink chert or chalcedony. This material appears to represent pure hydrothermally deposited silica or sinter. It occurs in layers within the formation and has been heavily quarried wherever it is exposed. The vast majority of this material is pure white with irregular solution vugs often lined with a rust colored iron oxide. The material also has less common salmon and pink varieties with the color often emanating along fractures. The vugs in most of this material make it somewhat distinctive from other chalcedony sources.

Overall, the material at the Rainbow Rock Quarry exhibits a tremendous amount of variation. In those limited cases where wonderstone has been identified in archaeological assemblages the other quartzite-like, porcelaneous, and chalcedonic materials have not been considered. Although at the hand specimen level of identification, some of this material can overlap with cherts, some rhyolites, and even some wonderstone from the Cerro Colorado source, a patterned combination of materials matching the range of variation found at the Rainbow Rock Quarry has been identified in nearby archaeological assemblages along with source-distinctive blue-grey varieties of wonderstone. Other sites contain wonderstone but lack the range of material found at the Rainbow Rock Quarry along with what appear to be diagnostic varieties of material. These patterns suggest use of the quarry materials is distinctive from use of various other materials in the archaeological assemblages of the region.

DISTRIBUTION OF MATERIALS

Material that matches wonderstone and some of the other materials within the Rainbow Rock Quarry has been observed throughout a wide range of southern California. Most of the material appears to have been utilized on the western side of the Salton Trough but material was dispersed across the peninsular range to near the coast. A systematic study of its distribution has not been conducted but wonderstone material matching that from the Rainbow Rock Quarry has been observed in San Marcos and Fallbrook. To the north it has been observed in the Hemet area. It has also been observed at the Los Coyotes Indian Reservation and numerous sites just west of the quarry in the Borrego area, Coyote Canyon, Jackass Flats, and Rockhouse Canyon. To the south material may originate from the Cerro Colorado source. Wonderstone material from both sources is locally abundant on the west side of the Salton Sea and Rainbow rock material appears to have been utilized throughout the Coachella Valley.

As part of this study, five site collections were examined to determine specific percentages of material that matched the range of variation seen within the quarry. Two of the sites are from the Toro Canyon area where a small cache of wonderstone material was recovered from a rockshelter (Schaefer and Pallette 1993). These two sites differed greatly in terms of lithic materials with one dominated by materials matching the variability within the Rainbow Rock Quarry and the other containing more quartz and volcanic material; although the portion of the material was smaller the variability matched the Rainbow Rock Quarry. IMP-1349 was dominated by quartz and volcanics with only 11% of the material from the Rainbow Rock Quarry, while IMP-1331 was dominated by chalcedony from the quarry and contained 95% Rainbow Rock materials. These variations may reflect varying embedded procurement

strategies. The abundance of material at IMP-1331, approximately 17 miles from the source, suggests direct procurement.

The third site examined was the Elmore Ranch Site (IMP-6427) which is located within ethnographic Kamia or Kumeyaay territory below the high Lake Cahuilla shoreline (Laylander 1991). The site is approximately 20 miles from Rainbow Rock and 27.5 miles from Cerro Colorado. Although wonderstone was present in the collection in some abundance, the assemblage was startlingly different from those at Toro Canyon. A fine black dustlike texture that appears to be characteristic of the Cerro Colorado source was present on many of the fragments and the range of material variation from the Rainbow Rock Quarry was not matched while the variation within the Cerro Colorado source was present. A complete lack of the white chalcedony and grey silicified sandstones along with the textural match suggests that the assemblage is from Cerro Colorado. No material specifically characteristic of the Rainbow Rock Quarry was identified. Cerro Colorado materials made up 7% of the artifacts. No cores of the material were present in the assemblage.

The apparent focus on the Cerro Colorado source within Kumeyaay territory is supported by the Dry Lake Site (IMP-5260 through IMP-5262) (Eighmey and Cheever 1992). This site is farther from Rainbow Rock (32.5 miles) but closer to Cerro Colorado (17.5 miles) as well as to abundant volcanic gravels on East Mesa. Material from this site matched the pattern at Elmore Ranch suggesting, again, use of the Cerro Colorado source. Cerro Colorado wonderstone made up only 5% of the assemblage and appeared to be limited to specific loci.

The Fallbrook site (SDI-10158), located approximately 60 miles west of the source, contained only four fragments (.06%) matching the variation within the Rainbow Rock Quarry. The site is west of the peninsular range and is characteristic of larger sites within Luiseño territory. This limited study of distribution data suggests that Rainbow Rock material was distributed at least in the Late Period throughout ethnographic Cahuilla and Luiseño territory. The focus of material use from this quarry appears to have been the Coachella Valley which is generally limited in natural amorphous silica sources (Schaefer, personal communication, 1994). Materials were probably exchanged or occasionally brought into Luiseño territory west of the peninsular range. Wonderstone use in Imperial Valley and northern Baja California appears to have focused on the Cerro Colorado source.

Numerous trails are associated with the Rainbow Rock Quarry, and its location along a major wash and on the western edge of Lake Cahuilla make it an excellent location from which to redistribute material. The multiple trail segments at the site largely travel east-west in the direction of Wonderstone Wash. Schad (1986) has identified what appears to have been a major prehistoric trail leading west from the site. This trail has numerous camps with wonderstone debitage suggesting heavy movement of material along this route. The trail leads west from Wonderstone Wash avoiding the badlands and numerous deep washes while providing access to Clark Valley and other areas in the Borrego region. Another important trail is recorded along the Lake Cahuilla shoreline that would have passed by the site providing access for material to the Coachella Valley as well as the western side of Lake Cahuilla to the south. The location of the site along two major trails as well as numerous smaller ones probably allowed easy distribution of the material from the quarry.

Chronologically, the quarry has probably been used throughout the prehistoric occupation of the region due to the outstanding nature of the reddish formation on the landscape and fact that the abundance useable material within the formation would be hard to miss. An Elko-Pinto side- notched point of the grey slightly brecciated material from the quarry has been identified in the Domenigoni Valley region, and the Truckhaven Man date of approximately 5000 BP suggest early use of the site. Late Period use appears to be intense based on the amount of material associated with the later

phases of Late Period Lake Cahuilla sites as well as sites below the high Lake Cahuilla shoreline.

POTENTIAL FOR PROCUREMENT RESEARCH

Recognition of Rainbow Rock material as well as Cerro Colorado material should have a significant effect on archaeological research throughout the region. Both of these materials appear widely and extensively distributed and can address significant issues of mobility and exchange. The presence of 95% matching material in a site at Toro Canyon suggests that the Rainbow Rock Quarry was part of a regular foraging or collecting strategy for some groups. The sparse distribution on the western side of the peninsular range suggests the material was part of irregular long range collecting trips or exchange relationships. Recognition of these materials in regional archaeological assemblages can help identify these relationships. A focus on Cerro Colorado material as far north as Elmore Ranch suggests that in the Late Period cultural boundaries may have had a significant effect on material distribution. An apparent paucity of Cerro Colorado material in East Mesa where other material is abundant suggests that local procurement focus and embedded strategies can also be examined through the absence of wonderstone material.

Finally, these resources are important because they represent an upper rank on the continuum of prehistoric resource significance. With Coso and Obsidian Butte obsidian at the top of the scale due to their wide archaeological distribution, Rainbow Rock and Cerro Colorado represent a second rank of regionally important resources in southern California along with Piedra de Lumbre chert and Grimes Canyon fused shale. The geographic scale of distribution from these sources can allow us to look at interaction on levels beyond locally limited resources.

CONCLUSIONS

The Rainbow Rock Quarry was a major center of prehistoric activity and appears to have been a major flaked lithic material source within the region. Its unusual geological character make some of the material distinctive in archaeological assemblages creating an opportunity for an examination of mobility and exchange in the region. The site was probably part of local embedded lithic procurement strategies as well as part of a larger regional exchange or distribution system. The quarry is one of a limited set of regionally significant lithic sources that can be used to examine broad patterns of human relationships with the geologic environment as well as human relationships with the regional geographic and cultural environments.

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