CIRCULAR ROCK FEATURES OF THE LIEBRE-SAWMILL MOUNTAINS:
ARCHAEOLOGICAL INVESTIGATIONS AT THE SAWMILL VALENTINE #03
CACHE SITE, ANGELES NATIONAL FOREST

A thesis submitted in partial fulfillment of the requirements
For the degree of Master of Arts in Anthropology,
Public Archaeology

By

Thalia Alexandria Ryder

May 2014
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California State University, Northridge
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ABSTRACT

CIRCULAR ROCK FEATURES OF THE LIEBRE-SAWMILL MOUNTAINS:
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CACHE SITE, ANGELES NATIONAL FOREST

By
Thalia Alexandria Ryder
Master of Arts in Anthropology, Public Archaeology

Situated within the Liebre-Sawmill Mountains of the Angeles National Forest (ANF), are approximately 64 circular/cluster rock features at 22 site locations. Rock features have posed interpretive problems for archaeologists working in California. Theories surrounding features similar to those found within the study area have suggested uses ranging from resource storage caches to burial cairns. The archaeological excavation of a single circular rock feature was conducted during October, 2012 at the Sawmill Valentine #03 Cache Site. Results from this excavation have provided a better understanding of the function of these unique features, and have helped to place them within the larger cultural chronology of the Transverse Mountain Range.
INTRODUCTION

The information presented within this study consists of the methods, results, and interpretations of an archaeological investigation conducted at the “Sawmill Valentine #03 Cache Site” (FS No. 05-01-53-377) (Huckabee and Ryder 2011), a prehistoric site situated along the east to west trending ridge of the Liebre-Sawmill Mountains, and within the administrative boundary of the Angeles National Forest (ANF), Los Angeles County, California. The site represents one of 22 previously recorded site locations along Liebre-Sawmill ridge that contain similar looking circular/cluster rock ring features. Prior to implementation of the current project, and in an absence of any empirical evidence, it was suggested that the features represented acorn storage caches utilized for the containment of bulk plant foods collected from the surrounding oak woodland. Archaeological investigations conducted during the current project have; however, provided more concrete evidence regarding the intent behind the construction of these features, as well as providing a clearer understanding of the development of complex, logistically organized subsistence behaviors and the sociocultural implications of storage within a hunter-gatherer society.

Project Overview

The field work at FS No. 05-01-53-377 was conducted during the month of October, 2012 by Angeles National Forest archaeologists, along with the assistance of student volunteers from California State University Northridge, and the University of California San Diego. Field data recovery methods included surface examination and recordation of artifacts, systematic excavation of a single circular rock feature (Feature B), and a test-level excavation for the purpose of testing the surrounding soil. Laboratory
methods included phytolith and starch analyses, as well as $^{14}$C dating of carbonized plant material retrieved from sediment in Feature B.

The archaeological investigation determined that the circular/cluster rock features located at FS No. 05-01-53-377 were indeed utilized as food storage features; however, with an absence of any subsurface depth they most likely served as above ground storage facilities, on which granary-type structures made from local plant material were built. Alternately, the stored contents may have been placed directly within the rock ring foundation and covered with soil, pine boughs, and grasses. Phytolith specimens extracted from sediment in the lower concavities of Feature B confirmed the presence of sedge (*Cyperaceae*) tubers including bulrush and tule, ponderosa pine tree (*Pinus*) needles, and a variety of grass (*Poaceae*) seeds (Cummings and Ladwig 2013). Additionally, a single carbonized acorn retrieved from within Feature B was radiocarbon dated and provided a calibrated median $^{14}$C age of 200 ± 30 cal B.P. (Beta Analytic 2013). Based upon the finding of this recent date, it was determined that the carbonized acorn was most likely the product of a passing wildfire and not associated with activities related to use of the feature. Artifacts recovered during excavation efforts included one obsidian pressure flake and over 50 finished and expedient tools made from the locally available granodiorite. A boulder containing 22 cupules, and four pecked grooves, was likewise uncovered within Feature B; however, interpretations as to its function remain uncertain.

The cumulative data retrieved from FS No. 05-01-53-377 suggests that the site was almost certainly utilized by ancestral Tataviam-affiliated groups based at semi-permanent villages along the northern and southern perimeter of the Liebre-Sawmill
Mountains. The site’s logistical function included the storage of highly seasonal plant foods, most likely acorns, which were stored in above ground granaries or caches, as well as the production of a variety of stone tools made from local rock material. The distribution of storage features among live oak and black oak woodland, would have allowed for native people to maintain a more sedentary resource intensification pattern, by maximizing their resource procurement efforts as they moved between areas of seasonally producing plants, while keeping in close proximity to storage locations and more permanent residential sites. With a lack of meaningful data concerning their antiquity, placing these features within the larger cultural chronology of the region becomes exceedingly difficult. Projectile points indicative of later periods, as well as pottery fragments recovered from some of the surrounding village sites, suggest that if contemporaneous, the Liebre-Sawmill rock features may date to the post-Archaic and Protohistoric periods, roughly 2300 to 180 cal B.P.
CHAPTER 1: ENVIRONMENTAL AND CULTURAL CONTEXT

“In any explanation of cultural processes or systems, it is necessary to examine both the synchronic and diachronic environmental change. The environment, which includes such variables as climate, hydrology, soil types, flora and fauna; and in conjunction with social variables, helps to influence the interaction between populations and their cultural adaptations” (McIntyre 1986:5).

Neither society nor the environment are static or exist in isolation. The landscape often holds the history of those who have lived before, just as society is often a channel through which environmental changes are understood. To clearly see the patterns of human existence within the archaeological record, it is important to first closely examine the environmental context under which prehistoric societies lived, as well as the relationship between these variables and human behavior. Such an approach will help to explain the diversification of cultural adaptations among prehistoric populations.

Geographic Context

Many native groups have called the Transverse Mountain Range home. The region known as the upper Santa Clara River drainage or watershed was inhabited by a little-known culture group called the Tataviam. The range of their territory includes what we know of today as the northwest section of the Angeles National Forest, and portions of northwest Los Angeles and eastern Ventura Counties (Johnson and Earle 1990).

The core of Tataviam cultural geography is situated within the Liebre and Sawmill Mountains (King and Blackburn 1978). Liebre-Sawmill, along with Sierra Pelona Mountain comprise the Castaic Mountains; a 35 mile westward running range, which extends from Soledad Pass in the east to Piru Creek in the west. To the southeast of the Castaic Mountains, are located the San Gabriel Mountains, which together with the Castaic, Tehachapi, Santa Inez, Santa Monica, and portions of the San Bernardino
Mountains comprise the east to west trending Transverse Mountain Range that separate the Los Angeles coastal plain and adjacent valleys from the western Mojave Desert (Milburn 2010a:5; Moratto 1984). The Transverse Mountains range in elevation from approximately 1,000 to over 10,000 feet above mean sea level.

**Geology**

The topography of the Castaic Mountains has been characterized as a “late youthful to early mature stage of the erosion cycle, and sharp, rugged ridges and narrow, steep-sided, deeply incised valleys…” (Bailey and Jahns 1954:85). The distinct topographical characteristics present throughout this region are a result of significant tectonic activity, related to a high presence of faults positioned throughout the area. One of the major fault zones within the region, the San Andreas Rift Zone, is located just north of the Castaic Range. Generally speaking, the Castaic region is geologically composed of a crystalline basement complex, including metamorphosed, sedimentary, and volcanic rocks with assemblages of migmatitic gneisses. The Liebre-Sawmill vicinity is characterized by south-facing slopes, mainly composed of pre-Cenozoic igneous and metamorphic rocks (McIntyre 1986:5-7).

**Hydrology**

The Santa Clara River watershed contains a river system which flows westward from the northwest corner of Los Angeles County and into Ventura County. The “coastal flowing streams of the Castaic Mountains, including San Francisquito, Bouquet, Castaic, and Piru Creeks, flow towards the Santa Clara River, which eventually empties into the Pacific Ocean…” (Milburn 2009a:4). A collection of springs and seeps flow from the
north side of the range and into the westernmost portion of the Mojave Desert, also known as the Antelope Valley (Milburn 2009a).

**Paleoclimate**

Available paleoclimatic data suggests that the Castaic Mountains and surrounding biotic zones have experienced fluctuations in rainfall, temperature, and other environmental conditions for thousands of years (Milburn 2009a:30). During the late Pleistocene Epoch, between 11,000 and 10,000 years ago, cool and moist climatic conditions ended throughout the region, and a general warming and drying pattern persisted from about 10,000 to 7500 cal B.P. Between 7500 and 4500 cal B.P, warm drought like conditions associated with the Altithermal (Warren 1984; Warren and Crabtree 1986) most likely influenced the presence of viable resources on the desert valley floors, pushing native groups to higher elevations in search of reliable food sources. During the beginning of the Late Holocene, the onset of the Medithermal at approximately 4500 cal B.P. brought more favorable cool and wet climatic conditions to the region. This resulted in an expansion of viable subsistence resources and a diversification of human settlement patterns (de Barros 1997). Between approximately 1000 to 850 cal B.P. (A.D. 1000 to 1150) and 800 to 750 cal B.P. (A.D. 1200 to 1350), a significant climatic event called the Medieval Climatic Anomaly (MCA) (Raab and Larson 1997) occurred throughout southern California and the Great Basin. A warmer and drier climate persisted throughout the region causing widespread environmental degradation. A period of glacial expansion called the “Little Ice Age” brought cooler and wetter conditions back to southern California around A.D. 1300. Information pertaining to the effects of the Little Ice Age on human populations in western North America is
limited; however, what is known is that the onset of this climatic event severely impacted groups living throughout northern and western Europe (Milburn 2009a). It has been suggested that drier, semi-arid Mediterranean climatic conditions, characterized by warm, dry summers, and cool, wet winters, returned to the region around A.D. 1450. Similar climatic conditions characterize the region today (Earle et al. 1995).

**Flora**

The Castaic Mountains are characterized by several broad scale montane vegetation zones. These include the foothill zones which are predominantly covered with chaparral plant species (3000 feet), lower montane zones containing concentrations of conifer/live oak forests in otherwise chaparral dominated landscapes (3000 to 5000 feet), and desert montane zones located on the northern slopes of the range (6,000 to 3,000). The desert montane zones consist of chaparral/scrub communities at the low desert margins, piñon-juniper woodlands at mid-level elevations, and yellow pine forests at upper elevations (cf. Stephenson and Calcorone 1999:17-22; Milburn 2010a). Dominant plant species located within the Liebre-Sawmill Mountains consist of broad scale vegetation mosaics including conifer, live oak and black oak forests, as well as mixed chaparral grasslands. The following table (Table 1) is a list of predominant plant species located throughout Tataviam territory. This area encompasses the Santa Clara River Valley, and portions of the Castaic Mountains, including the Liebre-Sawmill Mountains.

<table>
<thead>
<tr>
<th>Floral Sub-Life Zones</th>
<th>Dominant Flora</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaparral</td>
<td>Chamise (<em>Adenostoma fasciculatum</em>)</td>
</tr>
<tr>
<td></td>
<td>Black Sage (<em>Salvia mellifera</em>)</td>
</tr>
<tr>
<td></td>
<td>Chia (<em>Salvia columbariae</em>)</td>
</tr>
<tr>
<td></td>
<td>White Sage (<em>Salvia apiana</em>)</td>
</tr>
<tr>
<td></td>
<td>Scrub Oak (<em>Quercus dumosa</em>)</td>
</tr>
</tbody>
</table>
### Table 1: Floral sub-life zones and dominant flora of the Santa Clara River Valley and Castaic Mountains (Munz 1974:4).

<table>
<thead>
<tr>
<th>Coastal Sage Scrub</th>
<th>California Sagebrush (<em>Artemisia californica</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black Sage (<em>Salvia mellifera</em>)</td>
</tr>
<tr>
<td></td>
<td>California Buckwheat (<em>Eriogonum fasciculatum</em>)</td>
</tr>
<tr>
<td>Montane Coniferous Forest</td>
<td>California Black Oak (<em>Quercus kelloggii</em>)</td>
</tr>
<tr>
<td></td>
<td>Digger Pine (<em>Pinus sabiniana</em>)</td>
</tr>
<tr>
<td></td>
<td>Sugar Pine (<em>Pinus lambertiana</em>)</td>
</tr>
<tr>
<td></td>
<td>Ponderosa Pine (<em>Pinus ponderosa</em>)</td>
</tr>
<tr>
<td></td>
<td>Coulter Pine (<em>Pinus coulteri</em>)</td>
</tr>
<tr>
<td></td>
<td>Big-Cone Spruce (<em>Pseudotsogga macrocarpa</em>)</td>
</tr>
<tr>
<td>Pinyon-Juniper Woodland</td>
<td>Piñon Pine (<em>Pinus monophylla</em>)</td>
</tr>
<tr>
<td></td>
<td>California Juniper (<em>Juniperus californica</em>)</td>
</tr>
<tr>
<td>Southern Oak Woodland</td>
<td>Oaks (<em>Quercus sp.</em>)</td>
</tr>
<tr>
<td></td>
<td>Elderberry (<em>Sambucus sp.</em>)</td>
</tr>
<tr>
<td></td>
<td>Sycamore (<em>Platanus racemosa</em>)</td>
</tr>
<tr>
<td></td>
<td>Walnut (<em>Juglans californica</em>)</td>
</tr>
<tr>
<td></td>
<td>Sugar Bush (<em>Rhus ovata</em>)</td>
</tr>
<tr>
<td>Valley Grassland</td>
<td>California Biome Grass (<em>Ranunculus</em>)</td>
</tr>
<tr>
<td></td>
<td>California Biome Grass (<em>Bromus carinatus</em>)</td>
</tr>
<tr>
<td></td>
<td>California Biome Grass (<em>Delphinium</em>)</td>
</tr>
</tbody>
</table>

Fauna

The fauna living within the Castaic Mountains and Santa Clara River Valley include a wide variety of birds, arthropods, amphibians, reptiles, and mammals. Extant species that once inhabited these desert and montane zones such as the jackrabbit (*Lepus californicus*), mule deer (*Odocoileus hemionus*), gray squirrel (*Sciurus griseus*), and grizzly bear (*Ursus arctos*) may have played important roles within the larger prehistoric ecosystem. The following table (Table 2) is a list of predominant fauna (past and present) located throughout Tataviam territory.

<table>
<thead>
<tr>
<th>Fauna</th>
<th>Dominant Fauna (Past and Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>Coyote (<em>Canis latrans</em>)</td>
</tr>
<tr>
<td></td>
<td>Wolf (<em>Canis lupus</em>)</td>
</tr>
<tr>
<td></td>
<td>Dog (<em>Canis sp.</em>)</td>
</tr>
<tr>
<td></td>
<td>Ground Squirrel (<em>Citellus beecheyi beecheyi</em>)</td>
</tr>
<tr>
<td></td>
<td>Opossum (<em>Didelphis marsupialis</em>)</td>
</tr>
<tr>
<td>Mammals Cont.</td>
<td>Birds</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Puma (<em>Felis concolor</em>)</td>
<td>Mallard (<em>Anas platyrhynchos</em>)</td>
</tr>
<tr>
<td>Jackrabbit (<em>Lepus californicus</em>)</td>
<td>Scrub Jay (<em>Aphelocoma coerulescens</em>)</td>
</tr>
<tr>
<td>Bobcat (<em>Lynx rufus californicus</em>)</td>
<td>Black-Chinned Hummingbird (<em>Archilochus alexandri</em>)</td>
</tr>
<tr>
<td>Striped Skunk (<em>Mephitis mephitis</em>)</td>
<td>Acorn Woodpecker (<em>Balanosphyra formicivora</em>)</td>
</tr>
<tr>
<td>Woodrat (<em>Neotoma lepida</em>)</td>
<td>Redtailed Hawk (<em>Buteo jamaicensis</em>)</td>
</tr>
<tr>
<td>California Mule Deer (<em>Odocoileus hemionus californicus</em>)</td>
<td>Anna's Hummingbird (<em>Calypte anna</em>)</td>
</tr>
<tr>
<td>Big Sheep (<em>Ovis canadensis nelson</em>)</td>
<td>Turkey Vulture (<em>Cathartes aura</em>)</td>
</tr>
<tr>
<td>Bush Mouse (<em>Peromyscus boylei</em>)</td>
<td>Raven (<em>Corvus corax</em>)</td>
</tr>
<tr>
<td>California Field Mouse (<em>Peromyscus californicus</em>)</td>
<td>Crow (<em>Corvus brachyrhynchos</em>)</td>
</tr>
<tr>
<td>Gambel's Field Mouse (<em>Peromyscus maniculatus gambeli</em>)</td>
<td>Brewer's Blackbird (<em>Euphagus cyanocephalus</em>)</td>
</tr>
<tr>
<td>Raccoon (<em>Procyon lotor</em>)</td>
<td>Coot (Mudhen) (<em>Fulica americana</em>)</td>
</tr>
<tr>
<td>Harvest Mouse (<em>Rerthrodontomys</em>)</td>
<td>California Condor (<em>Gymnogyps californianus</em>)</td>
</tr>
<tr>
<td>Broad-Footed Mole (<em>Scapanus latimanus</em>)</td>
<td>Bullocks Oriole (<em>Icterus bullockii</em>)</td>
</tr>
<tr>
<td>Spotted Skunk (<em>Spilogale gracilis</em>)</td>
<td>California Quail (<em>Lophortyx californica</em>)</td>
</tr>
<tr>
<td>Cottontail (<em>Sylvilagus audubonii</em>)</td>
<td>Lincoln's Sparrow (<em>Melospiza lincolnii</em>)</td>
</tr>
<tr>
<td>Badger (<em>Taxidea taxus</em>)</td>
<td>Mountain Quail (<em>Oreortyx picta</em>)</td>
</tr>
<tr>
<td>Pocket Gopher (<em>Thomomys bottae neglectus</em>)</td>
<td>Owl (<em>Otus asio</em>)</td>
</tr>
<tr>
<td>Fox (<em>Urocyon cinereoargenteus</em>)</td>
<td>Fox Sparrow (<em>Passerella iliaca</em> sp.)</td>
</tr>
<tr>
<td>Black Bear (<em>Ursus americanus</em>)</td>
<td>Western Meadowlark (<em>Sturnella neglecta</em>)</td>
</tr>
<tr>
<td>California Grizzly (<em>Ursus horribilis magister</em>)</td>
<td>California Thrasher (<em>Toxostoma redivivum</em>)</td>
</tr>
<tr>
<td></td>
<td>Mourning Dove (<em>Zenaidura macroura</em>)</td>
</tr>
<tr>
<td></td>
<td>Western Rattlesnake (<em>Crotalus viridis</em>)</td>
</tr>
<tr>
<td></td>
<td>California Mountain King Snake (<em>Lampropeltis</em>)</td>
</tr>
</tbody>
</table>
Reptiles and Amphibians
Cont.

- Gopher Snake (*Pituophis cantenifer*)
- Red-legged Frog (*Rana aurora*)
- Western Spadefoot Frog (*Scaphiopus hammondi*)
- Sagebrush Lizard (*Sceloporus graciosus*)
- Western Fence Lizard (*Sceloporus occidentalis*)
- Tortoise (*Thoporus agassive*)

Table 2: Past and present fauna of the Santa Clara River Valley and Castaic Mountains (McIntyre 1979:19-20).

Regional Chronology

The regional chronology of the Castaic Mountains is poorly understood. Chronological sequences utilized within southern California archaeology have suffered from “…a striking lack of agreement on taxonomic systems and terminology” (Warren and Crabtree 1986:183). Most cultural sequences use radiocarbon dates associated with changes in projectile point technology to differentiate between various prehistoric time periods. In comparison to other areas of California, the regional chronology of the Castaic Mountains is poorly understood. For the purpose of this research, broad cultural sequences reflective of climatic conditions and corresponding cultural developments at desert and coastal sites will be used (cf. Bettinger and Taylor 1974; Milburn et al. 2009; Warren 1984; Warren and Crabtree 1986).

*Paleoindian Period (13,500 to 10,500 cal B.P.)*

Characterized by the earliest human entry and subsequent dispersal across North America during the Pleistocene, Paleoindian period populations have been traditionally viewed by archaeologists as highly mobile hunter-gatherers, who specialized in big-game hunting, and subsisted primarily on mammoths and other megafauna. Researchers equate the adaptive strategies of this period with the intensive exploitation of extinct Pleistocene...
shorelines and associated estuary and marsh environments. Analysis of faunal assemblages from camps and kill sites in western North America have suggested; however, that although big game hunting was important to Paleoindian people, less mobile populations living in riverine and upland areas practiced a more flexible adaptation to the habitat being occupied, and exploited larger proportions of small and medium fauna (Hill 2007).

It is not known exactly when the first humans utilized the western Mojave Desert and the Transverse Mountain Range. Fluted projectile points (e.g., Clovis) found primarily in the central Mojave Desert and some coastal areas in southern California, are generally viewed as the primary markers of Paleoindian occupation throughout North America (Erlandson and Colton 1991:4; Milburn 2010a:10; Sutton 1996:227-228). A number of fluted points have been recovered from sites throughout California, including one isolated Clovis point recovered from a canyon on the southern slopes of the Tehachapi Mountains in the western Mojave Desert (Glennan 1971, 1987; Sutton 1988:29, 38). Numerous fluted points have also been recovered from the “Witt Site” near Tulare Lake in the southern Joaquin Valley. The “Witt Site” may represent perhaps one of the largest concentrations of fluted points in the United States (Hall 1999). Contrary to the prevailing belief that Clovis fluted points are representative of Paleoindian lifeways, it has recently been suggested that Western Stemmed points found in the Intermountain West, may predate the appearance of fluted points. While Clovis populations may have been the first to inhabit parts of North America, recovery of Lake Mojave, Parman, and Silver Lake points in the Mojave Desert, suggest that Clovis may not have been the first to occupy the Great Basin (Beck and Jones 2010; Milburn 2010a:10).
Along the southern California coast, maritime-adapted Paleoindian groups occupied both the mainland and island environments. Part of a Paleo-Coastal Tradition, these hunter and gatherer populations had a pre-millingstone culture that was adapted to wetland and marsh habitats (Erlandson and Colton 1991; Moratto 1984:104-109). Archaeological evidence suggests that maritime-adapted groups colonized the northern Channel Islands approximately 12,000 to 13,000 years ago (Johnson et al. 2002:541-545). A sparse shell midden stratum uncovered at Daisy Cave on San Miguel Island, produced a date of 12,000 YBP (Erlandson et al. 1996; Erlandson et al. 2005). Another highly significant discovery was that of human bones recovered from Santa Rosa Island in the Santa Barbara Channel. Referred to as the “Arlington Springs Woman”, these human remains have produced a date of 10,960 +/- 80 rcy B.P. and further provide evidence for early Paleoindian seafaring abilities (Johnson et al. 2002).

*Paleoarchaic Period (10,500 to 8,000 cal B.P.)*

Towards the end of the Pleistocene, Paleoclimatic studies indicate that a warming and drying trend generally equated with the conclusion of the Wisconsin glaciation, the last glacial advance of the Pleistocene Epoch, was prevalent throughout the Great Basin. A decline in hunting of large terrestrial mammals and an increased exploitation of small game and plant gathering by Paleoarchaic groups appears to have coincided with these environmental changes. Intensive exploitation of extinct Pleistocene shorelines, including shallow lakes, marshes, wetlands, and streams, provided groups with their primary subsistence needs such as waterfowl, mammals, and plants (Moratto 1984:93; Warren and Crabtree 1986:184).
This period is characterized by widely dispersed, small foraging groups moving throughout residential locations located within larger foraging territories. Located primarily on the valley floors, Mojave Desert sites during the Paleoarchaic period are marked by assemblages consisting of Parman, Silver Lake, Lake Mojave, and fluted projectile points, as well as lunate and eccentric crescents, foliate knives, specialized scrapers, and heavy core chopping tools and hammerstones (Warren and Crabtree 1986:184, 192-193). There is however, a general absence of ground stone milling artifacts during this period at Mojave Desert sites. Obsidian obtained from the Coso volcanic field found at CA-LAN-1304 along Little Rock Creek demarcates the large geographical foraging territory of these highly mobile Paleoarchaic populations living within the Mojave Desert (Milburn 2010a).

Paleoarchaic lifeways along much of the southern California coast and Channel Islands, are marked by a millingstone horizon that appeared by around 9000 cal. B.P. Adaptations include the processing of small hard seeds from grasses and shrubs with metates and manos, as well as hunting of wild game, and shellfish gathering evidenced by large shell middens. This period is characterized by small permanent villages located near ponds or marshes, which often contain mortuary components. Well-made projectile points, bone tools, and shell artifacts are scarce or absent within millingstone cultural deposits (Milburn 2009a:6).

Archaic Periods

Early (8,000 to 4,000 cal B.P.)

Characterized by dryer climatic conditions and a shift to broader subsistence settlement systems within new landscape zones, the early Archaic period in the Mojave
Desert is marked by the development of new technologies for the processing of subsistence resources. Recent excavation data from the Mojave Desert have evidenced the diet diversity of early Archaic populations as consisting of artiodactyls, reptiles, lagomorphs, and freshwater mussels, as well as small seeds, acorns, and other plant foods (McGuire and Hall 1988; Sutton 1993, 1996; Yohe et al. 1991). Archaeological markers of these subsistence activities are evidenced by the presence of manos and metates, roughly fashioned dart points, hammerstones, domed and elongated keeled scrapers, and several forms of drills and engravers. It has been suggested that during this time, rhyolite and quartz may have been a favored lithic material (Earle et al. 1995; Jones et al. 2003).

Desert sites of this time period are primarily located in upland zones, and well above valley floors. Transitioning from a forager subsistence strategy to a more logistically oriented collector strategy, Archaic populations maintained a high degree of seasonal mobility, allowing for the assurance of available resources during dry and wet periods through the exploitation of water and food resources within upland montane zones (Warren and Crabtree 1986). By shifting subsistence foci, groups were able to respond to seasonal climatic changes while maintaining a broad subsistence base (McGuire and Hall 1988; Warren 1984). In southern California coastal areas, ground stone mortar and pestles first appeared between 7000 and 6000 cal B.P. Subsistence strategies turned from shellfish gathering to an increase in hunting and fishing activities (Erlandson and Colton 1991:1-2).

Within the Transverse Mountain Range, recent excavations have provided concrete evidence for the early occupation of this region. In the San Gabriel Mountains and along the Cajon Divide, Archaic occupation is marked by the use of earthen pit oven
and burnt rock midden features near desert margins. \(^{14}\)C ages of charcoal collected from heated rock cooking structures at CA-LAN-3013 and CA-SBR-5568 suggest that desert groups were utilizing resources in upland zones as early as 8000 cal B.P. (Milburn 2004, 2010b; Milburn et al. 2009).

_Late (4,000 to 2,300 cal B.P.)_

The late Archaic period is characterized by cooler and moister climatic conditions which allowed for a more intensified occupation of the Mojave Desert and southern Great Basin. Medium-sized dart points including Elko, Gypsum, and Humboldt Concave Base, exhibit a greater variability in both style and material than previous periods and are commonly found within late Archaic period sites. Although hunting remained an important subsistence activity, the presence of numerous millingstones and handstones suggests that culture groups were becoming even more heavily reliant upon seeds and other plant resources. The use of yucca and milkweed for baskets, sandals, and cordage, likewise indicates the significance of plant resources within the local economy. Trade between desert and coastal communities is evidenced by small amounts of shell beads and ornaments found within late Archaic period artifact assemblages (Warren 1984:414-420).

Due to more favorable climatic conditions, much of the Transverse Mountain Range and coastal areas experienced population increases along with a diversification of technology and subsistence practices. While economic and population expansion occurred, subsistence and settlement shifts are indicated by an increase in seasonal special-use sites, exploitation of resources in a wider range of environmental settings, greater use of mortars and pestles to process plants, and more emphasis on hunting.
Site types indicative of this period include permanent and semi-permanent villages, seasonal camps, multi and single component workshops, rock shelters, and temporary activity locations (Milburn 2010a:12). Major site complexes located within the upper Santa Clara River drainage such as Piru Creek, Castaic Creek, Vasquez Rocks, and Escondido Canyon, contain artifact assemblages consisting of tools and debitage made from Coso obsidian, chlorite schist beads, and numerous projectile point types including corner notched and concave base similar to desert-series points, as well as stemmed and tanged points (McIntyre and Wessel 1985).

Post-Archaic Period (2,300 to 1,000 cal B.P.)

Between about 2300 and 1400 cal B.P., changing climatic conditions brought warmer and drier weather to the Mojave Desert and southern Great Basin. The onset of a harsher climate depressed terrestrial productivity on the desert valley floors, pushing available subsistence resources to higher elevations, and perhaps prompting the westward migration of Takic-speaking Shoshonean culture groups into the region (Earle et al. 1995; Sutton 2009a, 2009b).

It is recognized in most southern California chronological sequences that the replacement of atlatl/dart technology with the bow and arrow occurred around 1500 cal B.P. in the Mojave Desert (Warren and Crabtree 1986:187-189). This transitional period is marked by the appearance of Rose Spring series points, small Cottonwood and Desert Side-notched triangular points, as well as steatite arrow shaft straighteners. Prehistoric groups relied heavily upon bow and arrow technology for hunting, while also utilizing a mortar and pestle technology for the processing of mesquite, acorns, yucca, juniper berry, pine nut, and other plant resources at upland areas and riparian zones (Earle et al. 1995;
Although habitation of large villages is indicated during this period, seasonal camps and resource procurement/processing locations were likely also used when available resources were located some distance from residential bases.

Within much of the Transverse Mountain Range, subsistence activities shifted away from mobile forager strategies to more sedentary logistically oriented collector strategies (Earle et al. 1995). Site types within this region include large permanent villages and smaller camps, single and multi-component workshops, rock shelters, and temporary activity loci (Milburn 2009a:8). Projectile point types including stemmed, tanged, concave base, and corner-notched, as well as tools and debitage made of Coso obsidian are commonly found within artifact assemblages representative of this phase (McIntyre and Wessel 1985:5). While it has been suggested that post-Archaic mortuary practices show evidence of social ranking, many groups had a tendency towards cremation, and information pertaining to social stratification is limited or difficult to discern (Wessel and Wessel 1985:5).

Protohistoric Period (1,000 to 180 cal B.P.)

This period is marked by the elaboration of social, economic, and political organizational processes of southern California native groups. Archaeologically, a wide diversification of material culture is represented, suggesting that native social institutions were becoming increasingly complex. Shifts in trade networks, and new artifact types such as small triangular projectile points, steatite vessels, ceramic pottery, mortars, pestles, and personal ornamentation are indicative of this period (Warren 1984; Warren and Crabtree 1986). At southern California coastal areas and offshore islands, single-piece circular shell and bone fishhooks are commonly found, as well as numerous shell
bead types and elaborately designed pictographs and petroglyphs (Strudwick 1986:266-277). With the establishment of permanent villages, and an increase in hunting and widespread exploitation of acorns, holly-leaf cherry, yucca, juniper berry, pine nut and other storable plant foods, native populations were able to maintain a level of sedentism and sustain population increases by utilizing seasonal camps and food storage locations.

From about 1000-900 cal B.P. and 800-650 cal B.P., severe drought conditions associated with the onset of the Medieval Climatic Anomaly (MCA) depressed terrestrial and marine productivity throughout southern California (Raab and Larson 1997). This extreme climatic event is perhaps reflected in the archaeological record as evidenced by changes in socio-political organization and regional exchange patterns, settlement shifts, site abandonment, increased intensification of resource exploitation, and increased episodes of disease and violence among native groups (Milburn 2010a:13). Between 1000 and 800 cal B.P. permanent villages were established throughout the Transverse Mountain Range and western Mojave Desert. Archaeological assemblages consist of plainware pottery, ceramic and steatite pipes, incised slate or shale tablets, shell ornaments, mortars and pestles, and small desert-series arrow points (Cottonwood-series and desert side-notch points) (Milburn 2010a:14; Smith 1955, 1963). Intensive trade with southern California coastal groups is apparent through an abundance of coastal shell beads found at mountain and desert sites, as well as an increase in the use of fused shale (Oak Ridge glass) from the Grimes Canyon area of Ventura County and a decrease in the use of Owens Valley obsidian (King et al. 1974; McIntyre and Wessel 1985; Warren 1984; Warren and Crabtree 1986). Along the upper Santa Clara River corridor, a shift
from desert influenced adaptations to coastal ones is indicated within the archaeological record by changes in mortuary practices and associated grave goods (McIntyre 1979).

**Historic Period (A.D. 1772 to 1890)**

Early contact with European explorers dramatically influenced the traditional cultural lifeways of Native Americans living throughout southern California. With this meeting of cultures came the Spanish mission system, the introduction of new diseases which decimated native populations, and an attempt to assimilate native cultures into the European cultural system (McIntyre 1986:47). The influence of European and American colonization on California Indians was first experienced in 1772 when Captain Pedro Fages and his soldiers were the first documented Europeans to travel through the Transverse Mountain Range and into the Mojave Desert. By 1797, Mission San Fernando Rey was established in what is now referred to as the San Fernando Valley and many native groups inhabiting the upper Santa Clara River drainage such as the Tataviam were recruited there. Towards the end of 1803, most of the Native California populations living throughout the western Transverse Mountain Range had been taken from their traditional cultural lands and brought into the mission system (King 2003; McIntyre 1986). Following the first discovery of gold in Placerita Canyon in 1842, and later along the East Fork of the San Gabriel River in 1854, a flurry of mining activity inundated portions of the Transverse Mountain Range including the San Gabriel Mountains. By the 1860s, conflicts between prospectors and the remaining native groups was a common occurrence. The Serrano rancheria of Amutskupeat near Big Rock Creek in the San Gabriel Mountains was reported to be one of the last native Californian settlements in the region, and was occupied as late as the end of the 1880s (Earle et al. 1995:2.29).
Ethnohistory of the Transverse Mountain Range

Several Native American cultural groups have called the Transverse Mountain Range home. Ethnographic accounts from expeditions such as that of Gaspar de Portola in 1769, as well as ethnohistoric information collected by Alfred L. Kroeber, and John P. Harrington in the early part of the 20th century, have provided historical documentation pertaining to the prehistoric occupational history of the Transverse Mountain Range.

The project area is situated within the Liebre-Sawmill Mountains, and within ethnographic territory occupied by the Tataviam, a little-known culture group (Figure 1). By the early 20th century, the Tataviam had virtually become extinct as a culture before the inception of systematic ethnographic and linguistic studies (King and Blackburn 1978:536). Discrepancies in historical documentation, as well as incorrect placement of villages and place names add to confusion regarding Tataviam territory and relationships (Johnson 1978). The following summary is a synthesis of the available information, drawing from more well-documented adjacent regions where appropriate.
Tataviam/Alliklik

The Tataviam are described as historically occupying the upper Santa Clara River drainage. The range of their territory covers an area extending from portions of Piru Creek in the west, much of the Castaic Mountains, and to the southwestern fringes of the Antelope Valley (Figure 2). The northern boundary extends beyond the Liebre-Sawmill Mountains, to the San Andreas Rift Zone and La Liebre, and the southern boundary is bordered by the northern foothills of the San Gabriel and Santa Susana mountains (Earle 1990; King and Blackburn 1978:535; McIntyre 1979). Tataviam territory generally ranges in elevation between 1,500 and 3,000 feet above mean sea level; however, in areas
such as the Liebre-Sawmill Mountains, the elevation climbs much higher, between 4,000 and 6,000 feet.

The Tataviam were first identified by Alfred L. Kroeber (1915) and referred to as the “Ataplili’ish,” meaning “easterner”. Later references to this group identified them as the “Alliklik” or “Tallilik” (Kroeber 1925:614) meaning “grunters” or “stammerers”. The Kitanemuk to the north called them “Táta-viam”, a name when translated meant “people where the morning sun hits” (Harrington 1934:56). Although the Tataviam are thought to have spoken a Serran language closely related to the Haminant dialects spoken by the Kitanemuk, and Serrano/Vanyume (Earle 1990; Earle et al. 1995; King and Blackburn 1978:535-536; Milburn 2009a, 2010a), a linguistic barrier existed, inhibiting the understanding of the Tataviam language by neighboring groups. This linguistic divide may explain their designation as guttural sounding speakers.
Subsistence and Settlement Patterns

Little is known in regards to Tataviam subsistence and settlement patterns. It has been suggested that in general, Takic groups “utilized similar patterns of land-use and broad-spectrum subsistence; however, differential distribution of plants and animals within their respective territories resulted in substantially divergent subsistence foci” (Milburn 2009a:5). Based upon this assertion and consideration of previous archaeological investigations conducted throughout the Transverse Mountain Range, it can be postulated that land-use adaptations within Tataviam territory during Archaic periods consisted of highly mobile subsistence strategies, in which groups moved across the landscape following seasonally available resources, while living in short-term seasonal encampments. During the later prehistoric periods, Tataviam land-use was characterized by more sedentary intensification patterns, during which groups occupied large permanent villages on the desert floors, while also utilizing satellite seasonal camps, and specialized resource procurement and processing sites during periods of seasonal movements (Milburn 2010a). The caching of seasonally available foods such as oak acorn and piñon pine nut was oftentimes utilized to allow for the gradual transfer of resources from gathering locations to residential sites (Earle et al. 1995, Milburn 2010a). Tataviam settlements are thought to have ranged in size from 200 individuals living at large residential villages, 20 to 60 people at moderately sized residences, and only 10 to 15 inhabitants at smaller temporary camps (King and Blackburn 1978:535-536). The entirety of the Tataviam population is thought to have numbered no more than 1,000 individuals.
Based upon the geographical placement of available resources within Tataviam territory, it has been proposed that native groups subsisted primarily on vegetable foods and terrestrial animals; although there is some evidence which points to the occasional consumption of marine fish and shellfish found at a few Tataviam sites (Caruso 1988). Vegetable foods such as yucca (*Yucca whipplei*), juniper berry (*Juniperus californica*), holly-leaf cherry (*Prunus ilicifolia*), sage seed (*Salvia* sp.), piñon pine nut (*Pinus monophylla*), and oak acorn (*Quercus* sp.), were relied heavily upon to provide groups with ample amounts of nutrient rich foods. Deer (*Odocoileus hemionus*), hares (*Lepus californicus*), rabbits (*Sylvilagus* sp.), and a selection of other wild game were likewise, important staples of Tataviam dietary habits (King and Blackburn 1978).

**Social and Political Organization**

As with other Takic groups, it has been suggested that the Tataviam were patrilineally organized. Lineage structures are thought to have been divided into moieties, in which extended patrilineal families served as the basic food sharing units within a larger village system. Villages contained as many as six different lineage groups, each of which owned or had access to resources located throughout certain tracts of land surrounding residential sites (McIntyre 1979, 1986, 1990). Mortuary analysis (King et al. 1974) has indicated that Tataviam social organization was characterized by specific class distinctions based upon hereditary or ascribed status. The distribution of resources, ritual objects, and other material goods was often controlled by a chief, who functioned as the overseer of political and social alliances (Caruso 1988:95-96; McIntyre 1979:66).
Neighboring Shoshonean Groups

It is thought that Northern Uto-Aztecan (Shoshonean) speakers underwent a westerly migration into the Mojave Desert around 2300 cal B.P., likely replacing other culture groups living throughout this region (Earle et al. 1995; Sutton 2009a, 2009b). From these native populations, the Takic and Numic language sub-families are thought to have diverged (Moratto 1984:559). Archaeologically, the migration of Shoshonean populations into southwestern California from the Great Basin is controversial (Milburn 1998). It is thought by some, that groups arrived in the western Mojave Desert with well-developed cultural patterns of desert adaptations, easily identifiable in the archaeological record (Robinson 1987). Others suggest that the antiquity of Shoshonean desert adaptations in relation to antecedent developments has not been demonstrated in the archaeological record, and is therefore inconclusive (Milburn 1998). At the time of historic contact, at least three distinct Shoshonean groups inhabited portions of the San Gabriel, San Bernardino, and Castaic Mountains. These include the Gabrielino/Fernandeño (*Tong-vâ*), the Serrano/Vanyume (*Beñeme*), the Tataviam, (a Kitanemuk-derived name, also referred to as the *Alliklik* by the Ventureño Chumash), and perhaps the Kitanemuk (Figure 3). Linguistically similar to their Cahuilla, Cupeño, Luiseño, and Juaneño neighbors to the south, these Shoshonean groups spoke languages of the Takic branch of Northern Uto-Aztecan (Milburn 2009a, 2010a).

**Gabrielino/Fernandeño**

The Gabrielino occupied what is now known as the modern-day Los Angeles area and Orange Counties. Their tribal territory extended into the Los Angeles, San Gabriel, and Santa Ana watersheds, throughout the Los Angeles Basin, Santa Monica and Santa
Ana mountains, and as far west as San Clemente, San Nicholas, and Santa Catalina Islands (Bean and Smith 1978a; Kroeber 1925:620-621). Although the Gabrielino have been traditionally classified in literature as simple hunter-gatherers, further analysis has revealed that they were perhaps a more highly complex, wealthy, and powerful culture, who interacted with neighboring groups, such as the Tataviam, through trade and the exchange of ideas and practices (Bean and Smith 1978a). At the time of European contact, the Gabrielino population is thought to have numbered approximately 5000 persons.

**Serrano/Vanyume (Beñeme)**

While it is generally accepted that the Serrano inhabited the San Bernardino Mountains and areas of desert to the east and northeast of the foothills (Bean and Smith 1978b), King (2004) suggests that the range of their territory likewise encompassed the southern fringes of the San Gabriel Mountains, a cultural boundary previously assigned
to the Gabrielino. Throughout much of the late 18\textsuperscript{th} century, the Serrano were referred to as the Vanyume (Beñeme), a name given to them during the Spanish missionization period. This name was used to describe all Serrano groups, until later interpretations categorized them as a “desert division” of the Serrano, as they spoke the same language and intermarried with other branches of the Serrano lineage (Earle 1997:12). Information pertaining to the external relationships of the Serrano with their neighbors is limited. Mission records point to the native communities of the western Antelope Valley as being inhabited by mixed populations of Serrano and Tataviam speakers (Earle 1997:16, 12). This data; however, contradicts ethnographic evidence suggesting that at the time of historic contact these communities were in fact representative of Kitanemuk or Tataviam settlements (Blackburn and Bean 1978:564; Earle 1997:16; King and Blackburn 1978:535-536).

\textit{Kitanemuk}

The Kitanemuk are known to have inhabited much of the western Antelope Valley, including upper Tejon, possibly the northern slopes of the Liebre-Sawmill Mountains, and into the southwestern flanks of the Tehachapi Mountain Range (Sutton 1980). Ethnographically, they have been described as mountain dwellers that moved from higher elevations and into the arid lowlands of the Antelope Valley during cooler months. Interaction with the Tataviam is highly likely, as the Kitanemuk occupied land just to the north, and possibly overlapping with that of Tataviam territory. It has been suggested; however, that external relations with the Tataviam were defined more by hostility than interactions based upon amity (Blackburn and Bean 1978:536). At the time of European
contact, the Kitanemuk population is estimated to have been around 500-1,000 individuals.

Neighboring Hokan Group

Chumash

The Chumash are defined as a highly complex hunter-gatherer group, who occupied territory to the west and northwest of Tataviam settlements. Linguistically different than that of the Tataviam and their Gabrielino, Serrano, and Kitanemuk neighbors, the Chumash language consisted of three different branches, the Cruzeño (Island Chumash), Barbareño, Ineseño, Purisímeño, and Ventureño (Central Chumash), and the Opispeño (Northern Chumash) (Gamble 2008). The scope of external relations between Tataviam and Chumash groups is not entirely known; however, the presence of shell beads and other coastal artifact types at Tataviam sites suggests that perhaps the elaborate Chumash exchange system penetrated through this inland and coastal divide.
CHAPTER 2: THEORY AND METHODS

The study of hunter-gatherer land-use organization is often situated at the forefront of archaeological inquiry. Many of these studies are rooted within an ecological context, examining culture as a means of adaptation (e.g., Bettinger 1980; Steward 1937, 1938, 1955; White 1959). Pertinent to this theoretical framework is the idea that the development of sociocultural systems, technologies, and specific land-use behaviors are ways in which prehistoric native groups coped with the variability of the surrounding natural and social environment. The following study of Tataviam settlement and subsistence is situated within this cultural ecological context, and focus is placed on two main theoretical considerations: the ecological basis for the development of land-use adaptations, specifically in regards to resource procurement and food storage technology, and the sociocultural implications of these complex, and logistically organized subsistence behaviors.

Cultural Ecology and the Study of Hunter-Gatherers

The study of culture change as it relates to the development of hunter-gatherer technology, economy, and social organization, was given relevance through the work of Julian Steward, who studied adaptive processes through which cultures and the environment interact. As a result of his fieldwork with hunter-gatherer groups living throughout the Great Basin, Steward recognized that (1) cultures living within similar environments oftentimes have similar adaptations; (2) adaptations are constantly changing as a result of changing environmental conditions; and (3) the processes by which a society adapt to environmental variability is oftentimes the catalyst for social transformation, thus driving cultures towards evolutionary change (Steward 1938, 1955).
More importantly, Steward’s research suggests that the adaptive culture core – the means by which groups negotiated against the variability of the surrounding natural (and social) environment - was inherently connected with subsistence practices, including resource procurement and food storage. When attempting to reconstruct the most basic component of hunter-gatherer existence - the utilization of landscape for the exploitation of resources - Steward’s theoretical approach suggests that constraints imposed by environmental factors are predictors of the development of cultural adaptations, just as cultural adaptations are developed to cope with the uncertainty or variability of particular environments (Steward 1968:337).

These concepts, as applied to the study of Tataviam land-use, suggest that groups likely adapted to the variability of environmental productivity through the development of distinct resource procurement and food storage strategies, which offset the uncertainties of living within a highly seasonal and spatially patchy environment. Additionally, if one is to further follow in Steward’s ecological theory, it can likewise be assumed that other native groups living within similarly seasonal and patchy environments may display adaptive strategies reminiscent of those found throughout the region of study. By examining these cross cultural adaptations more closely, as well as similarities in patterns of settlement and mobility, the ecological and social mechanisms which drive the development of land-use adaptations, such as that of food storage technology, will likely be identified.

Modeling Hunter-Gatherer Land-Use Organization

While the primary focus for this study is to examine Tataviam food storage technology, a general discussion regarding the theory of hunter-gatherer land-use
organization is likewise necessary to fully understand the role storage played within a broader pattern of settlement, subsistence, and mobility. As aptly noted by Wilke and McDonald:

“The circumstances under which hunter-gatherers cached food and equipment in antiquity are thought to have been intimately entwined in the configuration and working of their overall organizational strategy. By this we mean the full range of choices and decisions that together configure the settlement and subsistence adaptation of a group” (1989:51).

Distinctions between the nature and dynamics of prehistoric land-use, as expressed through patterns of settlement and subsistence, is often described in its simplest form as the difference between mobility and sedentism, and the degree to which groups relied upon processed and stored foods (Winthrop 1993:46). When modeling hunter-gatherer land-use organization, several schemes have been proposed to classify the dichotomy between mobile and sedentary residential patterns (e.g., Binford 1980; Bettinger and Baumhoff 1982; Keeley 1988; Price and Brown 1985; Binford 2001).

Binford (1980) applied the terms “foragers” and “collectors” to describe the modes through which hunter-gatherer settlement and subsistence systems were established. Foragers are described as small, highly mobile egalitarian groups who regularly moved from one resource gathering location to the next (“mapping on”), while engaging in very little storage of seasonally available foods, but instead procuring resources on an “encounter” basis. Collectors on the other hand, are defined as large, sedentary, socially stratified populations, who utilized logistically organized, specialized task groups that traveled from more permanent village locations and into areas of seasonally available resources. In contrast to that of foragers, collector groups more
consistently utilized food storage technology, and storage locations were oftentimes situated within areas far removed from more permanent village locations and near seasonally available resources. The dichotomy of Binford’s forager/collector model lies within two contrasting economic systems: (1) foragers operate under an immediate-return system in which activities are focused on securing settlement/subsistence needs in the present; and (2) collectors operate under a delayed-return system in which settlement/subsistence activities are focused on not only present needs, but also future ones (c.f., Woodburn 1988:32).

While Binford paved the way for inquiry into the dynamics of hunter-gatherer land-use systems, subsequent research expanded on his model of settlement and subsistence. Hunter-gatherers have thus been characterized in various ways, such as travelers/processors (Bettinger and Baumhoff 1982), simple/complex (Keeley 1988; Price and Brown 1985), and mutualists/specialists (Binford 2001). The underlying framework of these models remains ecological in orientation, recognizing mobility, intensive use of resources, and storage, as key elements in dealing with challenges brought about by environmental variability.

The ideas of Binford and the others provide a framework through which patterns of Tataviam land-use can be more fully explored. Differences in mobility, foraging versus collecting behaviors, and immediate versus delayed-return economic systems, demonstrate that hunter-gatherers were not just passive wanderers, but instead “…active participants and strategists in their own survival” (Winthrop 1993:8). There is no doubt that prehistoric populations living throughout the region of study probably participated in these land-use strategies. Empirically, it is expected that their patterns of settlement,
subsistence, and mobility will be reflected in land-use adaptations, such as in the development of food storage technology.

Implications of Hunter-Gatherer Storage

As discussed by Wilke and McDonald (1989), the use of storage by hunter-gatherer groups is thought to have been intrinsically linked with their overall organizational strategy, including patterns of subsistence and mobility. While storage technology appears to have been a critical component in the survival of many hunter-gatherer populations—particularly those living within highly seasonal and variable environments—it is likewise thought to have had larger implication concerning the overall behavioral evolution of hunter-gatherer groups, as seen through increased sedentism, larger population densities, and the development of sociocultural complexity. While the current study is primarily focused on the technical aspects of Tataviam storage, a general discussion regarding the constituents of this technology will likewise be explored.

Environmental Variability and Storage

Storage technology has been explained as a precursor to agriculture, a catalyst for sedentism and the rise of social complexity, and a means for understanding private property and gaining social control (Bender 1978; Bettinger 1999; Price and Brown 1985; Testart 1982; Wesson 1999). While empirical evidence has demonstrated that the utilization of this technology spans over time, space, and throughout geographically distinct hunter-gatherer societies (Morgan 2012:716), placement of this adaptation within
a meaningful context requires an understanding of the relationship between people and the environment in which they live. As Morgan states:

“the relationship between environmental variability and storage has long been noted and hinges on two main ideas, that storage is (1) a delayed-return economic system developed to average seasonal variability in environmental productivity; and (2) an insurance mechanism used to cope with the risks of relying on natural resources when environmental productivity is variable” (2012:717).

The perspectives presented by Morgan suggest that seasonality predicts storage technology, just as the development of this technology comes as a response to environmental variability. Binford (1980, 2001) provides an explanation of this perspective by suggesting that groups living within seasonal and mid-latitude environments most likely collected resources during spring, summer, and fall months, while accessing these food stores during the winter, when environmental productivity was significantly depressed. As discussed by Woodburn (1980), this perspective implies that groups were operating under a delayed-return economic system in which the benefits of procuring, preparing, and storing resources were not experienced until months and sometimes years after labor was invested.

Storage, Sedentism, and Social Complexity

While it is clear that the development of storage technology most likely occurred as an adaptive response to living within a highly seasonal and variable environment, it likewise presents questions of hunter-gatherer mobility and the gradual rise of complex social orders.

Many have discussed the degree to which hunter-gatherers could store food while remaining mobile (Ingold 1983; Rafferty 1985; Rowley-Conwy and Zvelebil 1989;
Testart 1982). While it is widely known that throughout prehistory, hunter-gatherers utilized mobility to cope with and strategize against depletions in resource productivity (seasonal or otherwise), it has likewise been suggested that groups could store small quantities of food while also maintaining a nomadic lifestyle (Ingold 1983:560; Testart 1982:524). The successful relationship between storage and mobility; however, hinges on the assumption that groups employed a set of seasonal rounds in which food storage locations would have been encountered during annual moves (Morgan 2012:718). In opposition to this idea, some have argued that the use of storage binds groups to storage locations, while preventing them from mapping on to new resource procurement locales (Rafferty 1985; Yoder 2005). Also pertinent to this storage versus mobility debate, is the assertion that sedentism arose before there was a need for storage, and therefore storage is a byproduct of increased sedentism (Eerkens 2003; Smith 2001). Pearson (2006) on the other hand, suggests that storage is the cause for sedentism, and therefore storage precedes more sedentary settlement patterns.

Another area for discussion is the relationship between storage technology, population density, and the rise of social complexity. The use of storage in conjunction with population growth is explained by researchers in two different ways: (1) storage is a means by which to cope with increasing population density; and (2) the use of storage technology harbors the growth of populations (Ames and Mascher 1999:127-128; Keeley 1988; Matson 1992). Whether the former or latter explanation is thought to be true, there appears to be a significant link between the use of storage within larger hunter-gatherer groups and a presence of social complexity. As Morgan (2012:718) states “…food storage appears related in many cases to sustaining the population densities
characterizing most complex social orders.” While researchers debate what cultural characteristics point to the presence of social complexity (i.e., sedentism, new technologies, population growth and aggregation, changes in burial practices, increased warfare, elaboration of storage practices), the consensus of their theories lie within two main divisive thoughts, that storage is a marker of complex social orders, or it is an integral component of more complex societies (Arnold 1996; Bettinger 1991; Price and Brown 1985). To explain the rise of new social orders in conjunction with the use of storage technology, researchers have suggested that: (1) storing facilitates differential access to resources and thus contributes to social inequalities; (2) storing may impose new social constraints including concepts of private property; and (3) storage can result in a redefinition of labor relationships and ranking (Bender 1978; Bettinger 2006; Ingold 1983; Testart 1988).

Small versus Large-Scale Storage

Pertinent to the discussion of hunter-gatherer storage is the topic of scale, and to what capacity was this technology utilized. Cunningham (2011:2-3) discusses large-scale (long-term) and small-scale (short-term) storage among European hunter-gatherer groups and defines the two as: (1) large-scale (long-term) – storing food beyond three months and beyond its seasonal or natural availability, storing a surplus of food that can be used for risk buffering, and storing food for exchange; and (2) small-scale (short-term) – storing food less than three months and within its natural availability, storing a surplus of food for periods of shortage, and storing food for exchange. Both large and small-scale storage was highly effective in relieving issues of transportation, as significant quantities of food could be cached at specific locations such as along travel routes and near
waterways, to ensure its availability during organized seasonal rounds (Dunham 2000:243). While conducting research on the acorn storage behaviors of the Western Mono in California’s Sierra Nevada, Morgan (2012) discovered that they practiced three modes of food storage strategies including; (1) dispersed caching; (2) central-place storage; and (3) dispersed bulk caching. Morgan defines dispersed caching as a more expedient technology which was primarily utilized on a smaller-scale, while central-place storage implies the use of storage facilities located at residential sites. Dispersed bulk caching represents more complex storage behavior, and includes the stockpiling of high-volume resources composed of yearly or multiyear stores, at dispersed locations on the landscape, and oftentimes in and around resource procurement locales.

While research indicates that there is considerable variability in the way hunter-gatherers stored food, the primary intent behind most storage activities appears to have been directed towards the prevention of vermin infestation, spoilage, and protection from theft by animals and other groups (Dunn 1995). While some hunter-gatherers utilized more long-term and complex storage technology (i.e., granaries, caches) others practiced more expedient ways to conceal and protect their food stores by placing them within the crevices and cracks of rockshelters and rock outcrops (Swenson 1984).

Research Framework

The primary aim of this research is to closer examine the temporal and spatial distribution of circular/cluster rock features distributed throughout the Liebre-Sawmill Mountains, thus allowing for their placement within the larger cultural chronology of the Transverse Mountain Range. Specific focus will be placed on understanding the function of these features, as well as to identify, based upon material style as an indicator of
cultural identity, which culture group likely constructed and utilized them. Although
circular/cluster rock features have been documented throughout a variety of contexts
within the study region, the Liebre-Sawmill features appear to be rather unique in regards
to their size, quantity, and placement among the landscape. They do not resemble any
other recorded rock features in the area, and might possess a very distinct and group
specific function. The specific research domains selected for the current project include:
(1) dating and chronology; (2) form, function, and style; and (3) land-use organization.

Questions and Hypotheses

Dating and Chronology

The current investigation will focus on ascertaining the ages of selected rock
features and any associated materials in order to better understand the occupational
history of FS No. 05-01-53-377.

Research Questions

1. What are the ages of the rock features and associated materials at FS No. 05-01-53-377 as indicated by radiocarbon dating of charcoal and/or other dating
   applications?

2. Is there evidence for a long time span of occupation, either spatially or vertically?

3. Do different loci containing rock features reflect different activity areas within one period of occupation or do they represent different periods of occupation?

4. What does the temporal context of archaeological remains at FS No. 05-01-53-377 suggest about the overall human occupational history at the larger
   Liebre-Sawmill Mountain locality, including earliest episodes of habitation, spans of disuse and reoccupation, and final abandonment?
Hypotheses

1. Reflective of the only radiocarbon dated rock features (later determined to be food storage caches) in the Transverse Mountain Range (Milburn 2010a), it is hypothesized that site occupation at FS No. 05-01-53-377 will date to post-Archaic and Protohistoric periods, roughly 2300 to 180 cal B.P. This hypothesis is based on several factors, including radiocarbon dates retrieved from rock features at LAN-2990 (Tom’s Sitting Rock Site”), a plant processing and storage site located in the northern foothills of the San Gabriel Mountains and within Tataviam territory, and the recovery of several projectile points indicative of later periods from surrounding habitation sites.

Data Requirements

1. Radiocarbon ages of carbonized organics retrieved from the rock features.
2. Relative dating of temporally distinctive materials (e.g., projectile points, beads, and obsidian artifacts) indicative of post-Archaic and Protohistoric periods.
3. Identification of plant material indicative of past paleoclimatic conditions.

Form, Function, and Style

Research efforts at FS No. 05-01-53-377 are focused on the examination of the physical characteristics of rock features, as well as the determination of their function. Identification of stylistic variations is likewise an important aspect of this study, as variability in rock feature construction may provide the material correlates of group identity, thus allowing for inferences regarding the identification of their makers.
Research Questions

1. What specific function(s) did the rock features serve at FS No. 05-01-53-377?

2. Are there distinctive stylistic characteristics of rock features and/or associated material remains that signal affiliation with a specific cultural group?

3. Are there similarities between the construction of rock features at FS No. 05-01-53-377 and those examined at LAN-2990 and elsewhere in California?

Hypotheses

1. Consistent with findings at LAN-2990 and additional research regarding rock features throughout other areas of California, it is hypothesized that the rock features at FS No. 05-01-53-377 are perhaps storage caches or granaries, both utilized for the concealment of resources, equipment, or raw materials.

2. Rock features at FS No. 05-01-53-377 represent cairns, likely associated with either mortuary practices, territorial boundaries, trail markers, and/or were constructed with a purpose of marking the landscape to communicate a ritual or social message.

Data Requirements

1. The cache/granary hypothesis would be supported if the rock feature exhibits:
   (a) sub-surface rock-lined concavity with an ash layer below a rock lined floor; (b) above ground rock lined circular structure; (c) the presence of macrobotanical and/or carbonized plant material consisting of known exploitable resources; (d) the presence of artifacts such as tools and tool stone.
2. The cairn hypothesis would be supported if: (a) artifacts associated with burials are present; (b) presence of human remains; (c) an absence of any cultural materials or human remains; (d) the feature exhibits only a surface expression and has no distinguishable sub-surface component.

Land-Use Organization

With little known in regards to the nature of past land-use by groups occupying the surrounding region, it is pertinent to the current study to examine the role of FS No. 05-01-53-377 within a larger system of land-use, including settlement, resource procurement, and mobility patterns.

Research Questions

1. **What is the range of human behaviors indicated at 05-01-53-377? Are resource exploitation patterns indicated? Does it appear that these patterns change overtime?**

2. **What role did the site play in the larger system of prehistoric California land-use within the Transverse Mountain Range?**

Hypotheses

1. Consistent with information concerning prehistoric land-use within the Transverse Mountain Range, it is hypothesized that land-use adaptations within the study area during Archaic periods was largely characterized by highly mobile subsistence strategies in which seasonal movements to temporary campsites located in resource rich areas was common. During later prehistoric periods, regional land-use was characterized by more sedentary resource intensification patterns, with the establishment of large permanent
villages and an intensified focus on a few staple foods often stored near more permanent residential bases.

Data Requirements

1. Information concerning the spatial relationship of the rock features with other archaeological remains, density and diversity of artifact types, floral and faunal remains retained in the site deposit, stratigraphic variations which demarcate differential periods of occupation, and regional ethnographic and historic information.

Investigation Methods

Archaeological investigations at FS No. 05-01-53-377 included a site surface examination, systematic excavation of one circular rock feature (Feature B), and the systematic excavation of an additional data recovery unit. The methods employed during the project consisted of both field and laboratory work. Field data recovery efforts included: (1) systematic site surface inspection; (2) documentation of surface artifacts and features; (3) instrument controlled mapping of artifacts, features, and recovery units; (4) systematic excavation of a selected circular rock feature; and (5) systematic excavation of a data recovery unit. Laboratory procedures included: (1) field processing and recordation of excavated materials; and (2) analysis of ecofactual material, including phytolith/starch analysis, and radiocarbon (AMS) dating.
CHAPTER 3: ARCHAEOLOGICAL CONTEXT OF THE LIEBRE-SAWMILL MOUNTAINS

Archaeological investigations throughout the Liebre-Sawmill Mountains and surrounding regions of the Transverse Mountain Range have revealed a diversity of prehistoric site types and land-use adaptations. Although it is often difficult for researchers to determine the precise ethnic association of certain artifact types and features, the following archaeological research review will focus primarily on settlements, features, and artifacts reported as markers of Tataviam cultural history with an emphasis on significant sites located throughout the Santa Clara River Valley.

Previous Archaeological Research

Inquiry into the prehistory of Tataviam cultural geography is not a new phenomenon. Investigations dating as far back as the late 1800s have produced significant archaeological finds, while more recent studies conducted after the 1970s have broadened our understanding of prehistoric land-use patterns and cultural adaptations. The vast majority of archaeological work completed throughout Tataviam territory has been done under the auspices of the Angeles National Forests (ANF), which encompasses approximately 650,000 acres of federally managed land throughout portions of the Castaic, and San Gabriel Mountains. Archaeological investigations have revealed a wide range of prehistoric site types including large permanent villages, single and multi-component workshops, smaller hamlets and camps, rock shelters, and temporary activity loci (Milburn 2010a). Surveys and excavations conducted at these site locations have produced a variety of diagnostic and non-diagnostic artifacts, as well as different rock feature types including earth ovens, food storage caches, burial cairns, and enigmatic...
circular rock features. Rock art such as petroglyphs and pictographs, although not very common to this region, have been found within large permanent settlements, smaller camps, and in isolated locations far removed from major prehistoric activity centers.

Bowers Cave

One of the earliest reported discoveries and most significant of archaeological finds in the upper Santa Clara River Valley, is that of Bowers Cave. The cave was discovered in 1884 and reported as containing a collection of Native American ceremonial objects and nine woven baskets. Some of the cave contents were acquired by Reverend Stephen Bowers who subsequently sold the items in 1887 to the Peabody Museum at Harvard University where they are housed to this day. The intact cave deposit contained ritual items such as feather caps and capes, bone whistles, stone clubs, and steatite arrow shaft straighteners. During later archaeological work under the direction of Richard van Valkenburgh (1952), excavations within the interior of the cave revealed fragments of basketry, Verde black-on-gray pottery sherds, as well as blue and rose-colored glass trade beads. The cave appears to have been used exclusively as a space in which to store these artifacts, and the presence of glass trade beads suggests that the cache dates to the historic period, around A.D. 1772 or later. It has been suggested; however, that there were two temporally separate depositional events (Elsasser and Heizer 1963). The ethnic association of the artifacts is also uncertain, as the cache is located in a region that may have been used by both Tataviam, and inland Chumash groups. Many of the items point to Chumash occupation; however, with little knowledge regarding Tataviam material culture, these comparisons are equivocal (Elsasser and Heizer 1963). If the ceremonial artifacts are indeed of Tataviam origin, then this
discovery has provided researchers with a rare look into the material correlates of a Tataviam religious system which was virtually eliminated during the time of European contact.

**Agua Dulce Village Complex**

This village complex represents one of the largest social, political and economic centers for Tataviam groups occupying the upper Santa Clara River Valley. Located within Vasquez Rocks County Park, in the town of Agua Dulce, the site is composed of multiple habitation localities, resource procurement and processing stations, mortuary complexes, and various examples of rock art including petroglyphs, pictographs, and cupule boulders. Intensive survey and excavation projects (Allen and Hanks 1970; Hanks 1970; King and Melander 1973; King et al. 1974) have revealed artifact assemblages containing both exotic and local material types, as well as house depressions, midden concentrations, earth ovens, food storage caches, groundstone implements, numerous shell and stone beads, and religious objects such as baked clay effigies, stone pipes, and quartz crystals (King et al. 1974). Associated populations have been characterized as sedentary, logistically oriented collector groups, occupying the area during the late Archaic to Protohistoric period, roughly 4000 to 180 cal B.P. King et al. (1974) suggest that the presence of mortuary complexes and associated grave goods point to a complex society engaged in various degrees of social ranking.

**Elderberry Canyon Village (Castaic Reservoir)**

This site represents one of several Tataviam settlements located at the mouth of Elderberry Canyon and Castaic Creek, where the current Castaic Reservoir now sits. The
site is thought to have been occupied during the late Archaic to Protohistoric period, roughly 4000 to 180 cal B.P., and utilized as a seasonal settlement location. Pedestrian surveys in the 1960s, as well as salvage excavations conducted during the 1970s before the construction of the reservoir, uncovered several large earth ovens, concentrations of dark midden, hearths, house pits, hopper mortars, steatite disc beads, projectile points, and worked bone fragments (Campbell 1965). A cemetery complex containing cremations and associated grave goods similar to those found within the Agua Dulce Village Complex (King et al. 1974) was likewise excavated. Artifact types such as shaped mortar fragments, shell and stone beads, metates, hopper mortars, lithic material, and concentrations of exotic trade items, were uncovered during excavation activities. It has been suggested that the concentration of trade items at particular locations within the cemetery point to the presence of a stratified society in which managerial positions were hereditarily assigned (ascribed) (Brown 1971; King et al. 1974; Loetzerich 1998).

Rowher Flat-Texas Canyon

The results of archaeological investigations conducted within the Rowher Flat-Texas Canyon area suggest that this region may have represented an important social, political, and economic center for Tataviam groups living throughout the upper Santa Clara River Valley as early as 8000 cal B.P. and perhaps as late as 200 cal B.P. (McIntyre and Wessel 1985; Milburn 2009a; Wessel 1990). This conclusion draws evidence from the finding of chronologically diagnostic artifacts such as projectile points and bead types uncovered during multiple years of archaeological survey and excavation activities. Site types within the Rowher Flat-Texas Canyon vicinity are numerous and diverse, and include large permanent villages, resource procurement and processing locations, rock
shelters, temporary activity loci, and mortuaries. Also prominent are the multiple examples of rock art, which include an abundance of pit and groove style cupule boulders distributed throughout prehistoric activity centers and along isolated ridges. Significant studies regarding the prehistoric use of numerous heated rock cooking structures within the Rowher Flat-Texas Canyon vicinity by Milburn (1998, 2004, 2009a), and Milburn et al. (2009), have further provided chronological data supporting the antiquity of Tataviam occupation throughout the Transverse Mountain Range.

Previous Research within the Project Vicinity

The landscape surrounding the project vicinity has undergone only a limited number of archaeological investigations conducted primarily within the last ten years (e.g. Bartoy 2004; Brasket 2006, 2007; Huckabee 2011; Milburn 2009b; Schmidt and Schmidt 2000, 2002; Vance 2004). Less than fifty percent of the region has been systematically surveyed, and the extent of subsurface examinations include only that which was performed during the current research project. Also limiting is the inaccessibility of portions of the northern mountain slopes, as this area is situated where the administrative Forest boundary meets with several private property parcels.

Despite these restrictions, survey and excavation conducted during the current project, as well as information attained from previous archaeological inquiries suggest that the availability of a diverse community of flora and fauna perhaps attracted prehistoric populations to this area, while mild terrain and more moderate and predictable weather patterns allowed groups to move freely among the landscape. For example, J. P. Harrington (1986) noted the significance of the Liebre-Sawmill Mountains as a major
acorn producing region, and prime gathering location for Tataviam groups living throughout the surrounding low-lying desert communities.

Cultural resources found within three miles of the project location are reflective of a variety of prehistoric land-use behaviors, including resource procurement and processing, tool production, habitation, and ceremonial or religious practices. Archaeological markers for these activities include several large permanent villages located along the low-lying northern and southern perimeter of Liebre-Sawmill Mountain, as well as temporary campsites, and resource procurement/processing sites located throughout higher elevations and near areas of seasonally available plant foods. Artifact assemblages found in association with these sites are composed of a variety of tool types including scrapers, reamers, arrow shaft straighteners, and projectile points (cottonwood triangular series), as well as edge modified flakes, cores, shell disk beads, and ceramic pottery sherds. Lithic materials consist of exotic stone types such as obsidian, chert, fused shale, and basalt, while more local materials include quartzite, quartz, rhyolite, chalcedony, steatite, schist, and granodiorite. Dark midden soil is present at many of the more permanent village locations, as well as heated rock cooking structures, and portable milling implements such as manos and metates. Bedrock milling features including mortars and grinding slicks are also prevalent, as the processing of vegetable foods such as yucca, juniper berries, oak acorn, piñon pine nut, and various seeds and roots appear to have been relied heavily upon by native groups inhabiting the area. Pit and groove style cupule boulders similar to those found at other Tataviam sites including the Rowher Flat Texas Canyon vicinity, and along Sierra Pelona Ridge to the
east, are also present at many of the Liebre-Sawmill sites. The following table (Table 3) is a list of the prehistoric archaeological sites within three miles of FS No. 05-01-53-377.

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Vegetation/Elevation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-LAN-433</td>
<td>Multi-functional</td>
<td>Oak, yerba santa, chamise,</td>
<td>Seasonal campsite consisting of midden soil, bedrock milling features, a mano fragment, and a sparse lithic scatter. Material types include rhyolite, chalcedony, chert, and fused shale.</td>
</tr>
<tr>
<td></td>
<td>Habitation</td>
<td>willow 3757 feet</td>
<td></td>
</tr>
<tr>
<td>CA-LAN-1137</td>
<td>Multi-functional</td>
<td>Chamise, sage, piñon pine 3620</td>
<td>Seasonal campsite consisting of metate fragments, a projectile point mid-section, edge modified flakes, waste flakes, and fire affected rock. Prominent material type is rhyolite, with chalcedony, chert, fused shale, and obsidian also present within the deposit.</td>
</tr>
<tr>
<td></td>
<td>Habitation</td>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>CA-LAN-1378</td>
<td>Food Storage</td>
<td>Scrub oak, grasses, manzanita 5590</td>
<td>9 granitic circular rock ring features ranging in diameter from 1-2 meters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>CA-LAN-1379</td>
<td>Food Storage</td>
<td>Scrub oak, chaparral, grasses 5450</td>
<td>2-3 granitic circular rock ring features ranging in diameter from 1.5-2.5 meters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>CA-LAN-1948</td>
<td>Multi-functional</td>
<td>Oak woodland: mixture of oak</td>
<td>Seasonal campsite consisting of bedrock milling features including mortars, cupules, and slicks, cores, edge modified flakes, waste flakes, and fragmentary bone. Material types include obsidian, fused shale, chert, and chalcedony.</td>
</tr>
<tr>
<td></td>
<td>Habitation</td>
<td>species, grasses, buckwheat,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ceanothus 3940 feet</td>
<td></td>
</tr>
<tr>
<td>CA-LAN-2308</td>
<td>Food Storage</td>
<td>Black oak, live oak, scrub</td>
<td>9 granitic circular rock ring features, measuring approximately 1.85-4.5 meters in diameter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oak, grasses, ceanothus, wild</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>onion, and miner’s lettuce 5260</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-138</td>
<td>Multi-functional</td>
<td>Primarily oak woodland and</td>
<td>Habitation site with bedrock milling features, and lithic artifacts.</td>
</tr>
<tr>
<td></td>
<td>Habitation</td>
<td>seasonal grasses, with sycamores and cottonwoods 3900</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-139</td>
<td>Multi-functional</td>
<td>Scrub oak, yerba santa, miner’s lettuce, willow, sycamore 4000 feet</td>
<td>Village site consisting of lithic scatter, cottonwood projectile point, pottery, burnt bone fragments, bedrock milling features including cupules and mortars, marine shell and red ocher. Material types include</td>
</tr>
<tr>
<td></td>
<td>Habitation</td>
<td>feet</td>
<td></td>
</tr>
<tr>
<td>FS #</td>
<td>Activity</td>
<td>Location</td>
<td>Description</td>
</tr>
<tr>
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<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>FS # 05-01-53-140</td>
<td>Resource Processing</td>
<td>Scrub oak, yerba santa, miner’s lettuce, willow, sycamore 3840 feet</td>
<td>Bedrock milling complex with approximately 19 mortars and 2 slicks.</td>
</tr>
<tr>
<td>FS # 05-01-53-186</td>
<td>Multi-functional Habitation</td>
<td>Chamise, sage, bunch grass, Manzanita, yucca 3400 feet</td>
<td>Village site including midden soil, fire affected rock concentrations, basalt bowl fragment, sandstone mano, shell bead, and a lithic scatter. Material types include fused shale, chert, quartzite, obsidian, basalt, chalcedony, and rhyolite.</td>
</tr>
<tr>
<td>FS # 05-01-53-253</td>
<td>Stone tool production</td>
<td>Black oak, live oak 5400 feet</td>
<td>Sparse lithic scatter consisting of flaked chert.</td>
</tr>
<tr>
<td>FS # 05-01-53-298</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 3 granitic circular rock ring features, measuring approximately 2 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-289</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 1 granitic circular rock ring feature, measuring approximately 2-2.5 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-300</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 8-9 granitic circular rock ring features, measuring approximately 2-2.5 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-301</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 3 granitic circular rock ring features, measuring approximately 2.5 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-311</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 8 granitic circular rock ring features, measuring approximately 2-4 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-304</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 3 granitic circular rock ring features, measuring approximately 2-3 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-305</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 3 granitic circular rock ring features, measuring approximately 2-3 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-308</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 2 granitic circular rock ring features, measuring approximately 2-3 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-309</td>
<td>Food Storage</td>
<td>Oak woodland: black oak, live oak, scrub oak, grasses 2 granitic circular rock ring features, measuring approximately 3 meters in diameter.</td>
<td></td>
</tr>
<tr>
<td>FS # 05-01-53-327</td>
<td>Multi-functional Habitation</td>
<td>Oak, scrub oak, holly, yerba santa, miner’s lettuce 3800 feet</td>
<td>Seasonal campsite consisting of lithic material and bedrock milling features including cupules and mortars.</td>
</tr>
<tr>
<td>FS #</td>
<td>Food Storage</td>
<td>Live oak, black oak, scrub oak, buckwheat, grasses</td>
<td>1 granitic circular rock ring feature, measuring approximately 3 meters in diameter.</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td># 05-01-53-361</td>
<td>Food Storage</td>
<td>Live oak, black oak, scrub oak, buckwheat, grasses</td>
<td>1 granitic circular rock ring feature, measuring approximately 2 meters in diameter.</td>
</tr>
<tr>
<td># 05-01-53-362</td>
<td>Food Storage</td>
<td>Live oak, black oak, scrub oak, buckwheat, grasses</td>
<td>2 granitic circular rock ring features, measuring approximately 2-3 meters in diameter.</td>
</tr>
<tr>
<td># 05-01-53-378</td>
<td>Food Storage</td>
<td>Live oak, black oak, scrub oak, buckwheat, grasses</td>
<td>5 granitic circular rock ring features, measuring approximately 1-2 meters in diameter.</td>
</tr>
</tbody>
</table>

Table 3: Prehistoric archaeological sites within three miles of FS No. 05-01-53-377.

Circular/Cluster Rock Feature Sites

Pertinent to the current research project are approximately 64 circular/cluster rock features distributed throughout 22 site locations along Liebre-Sawmill ridge, in an area encompassing four square miles (Figure 4). It has been suggested that these rock features may represent prehistoric food storage caches utilized for the concealment of acorns collected from the surrounding oak woodland. Before the implementation of the current research project; however, no empirical data had yet been collected to validate this claim. The quantity of features present within each individual site range from 1 to 9 circular rock rings, and appear to be in various stages of preservation (Figure 5a-d). The features range in diameter from 2 to 4 meters, and some contain large concentrations of piled granitic cobbles rising above the ground 10 to 30 centimeters. Many of the features exhibit concavity depressions at their centers that extend as much as 30 centimeters below the ground surface. Additionally, several of the features have mature oaks growing from within the center of their rings (Figures 5e and 5f). Although it is evident that the features are cultural in nature, prior surface investigations have produced only one artifact found in association (Huckabee and Ryder 2011).
While circular/cluster rock features have been documented throughout a variety of contexts within other areas of the Transverse Mountain Range, the Liebre-Sawmill features appear to be rather unique in regards to their size, quantity, and placement among the landscape. They do not resemble any other recorded rock features in the area, and perhaps possess a very distinct and group specific function. By further examining the function of the Liebre-Sawmill features, the dynamics of Tataviam land-use practices may be more fully understood.
Figure 5: Liebre-Sawmill circular/cluster rock features. (a) Two features, one displaying a slight concavity depression; (b) One feature showing a circular formation of piled granitic cobbles (all photos by author 2013).
Figure 5: Liebre-Sawmill circular/cluster rock features. (c) Feature showing concavity depression in center; (d) Feature in poor state of preservation (all photos by author 2011).
Figure 5: Liebre-Sawmill circular/cluster rock features. (e) Mature black oak growing from within center of feature; (f) Young black oak growing from within center of feature (all photos by author 2011).
CHAPTER 4: ROCK FEATURE STUDIES

Circular/cluster rock features represent a very diverse and unique feature type within the archaeological record of California and the Great Basin. They possess a distinct variability in size, shape, and placement among the landscape, and have the potential to provide researchers with information concerning prehistoric land-use patterns, social organization, adaptive strategies, and the relationship of people to their environment. Although circular features have been documented in a variety of contexts, interpretations as to their function and temporal placement among prehistoric native societies remains a topic poorly understood.

Form, Function, and the Importance of Rock Features

There has been a general lack of interest with regard to the interpretation of rock features (La Pierre 2006; Wilke and McDonald 1989). Most attention has primarily been given to the recovery and analysis of portable artifacts while rock features, in a sense, have become disassociated from other archaeological remains. Theories surrounding circular rock features similar to those found within the area of study have historically been rooted in very general descriptions, often lumped together with one overarching explanation as to their function (Blair and Fuller-Murillo 1997:8). Blair and Fuller-Murillo (1997) suggest that the misidentification of rock features throughout archaeological literature is most notably due to inconsistencies in recordation and interpretive techniques, in which the extent of research efforts are focused solely on the documentation of either rock feature measurements, construction material, or placement on the landscape, but rarely with consideration of the larger cultural and environmental context in which the features are found. Also adding to the confusion is the noticeable
absence of diagnostic artifacts and organic materials found in association, making determination of age often difficult (Basgall and Delacorte 2003; Hunt 1960; Simms 1989; Wilke 1983). More recent studies (Basgall and Delacorte 2003; Blair and Fuller-Murillo 1997; James 1995; Morgan 2008, 2012) have provided information concerning the variability in circular/cluster rock feature types found throughout California and the Great Basin, and suggest that they cannot be explained as the remains of any single prehistoric activity, but rather represent a wide range of cultural behaviors spanning a complex temporal sequence of human occupation.

In definitional terms, “circular/cluster rock features” is a general referent for rock ring concentrations, typically measuring between 2 and 4 meters in diameter. Many features contain concentrations of local rock material piled at their centers, while others exhibit concavity depressions, or are void of any sub-surface expression. Although the current project is specifically focused on the analysis of circular/cluster rock rings believed to be that of prehistoric food storage features, the following examples were selected because they demonstrate the variability of rock features types found throughout the region of study. The following overview is; however, only a small sample of what has been identified in California and the Great Basin.

Cairns

Cairns are a common rock feature identified throughout many regions of California and the Great Basin. They are described as consisting of piled stacks of rocks placed in a circular formation or stacked rock columns (Haynal 2000; La Pierre 2006). Cairns have been documented throughout a variety of contexts and most likely served many different functions. Their use in mortuary practices has been documented among
many native populations, in which piles of rocks were used to cover the dead, while similar practices involved placing the individual inside of a circular pit and stacking rocks on top (Wilke 1978; Halford and Carpenter 2005). Cairns have been utilized as trail markers, and for ritual purposes such as during an individual’s participation in vision questing and other ceremonial or initiation practices (Haynal 2000:172).

**Living Structure Outlines**

Circular rock features have been interpreted as the remains of living structures when they exhibit a depressed center, cleared interior, and a clearly defined rock ring foundation on which a brush structure might have been placed. Associated habitation debris is also commonly found near these features, as well as midden if site occupation occurred throughout an extended period of time. Most living structures are situated in areas suitable for habitation, such as in the vicinity of water, subsistence resources, and on a level ground surface (Blair and Fuller-Murillo 1997:56-57).

**Hunting Blinds**

Hunting blinds have been described as circular or semicircular rock enclosures, usually located atop elevated points of land where a clear view of the surrounding landscape is possible. Associated lithic debris is oftentimes found in the vicinity of these features, as tool production in conjunction with hunting activities was common. It has been suggested that during periods of warfare, hunting blinds may have served as “look-out points” for groups concerned with impending danger (Blair and Fuller-Murillo 1997:67).
**Thermal Features**

The identification of a thermal feature is usually determined by its size, shape, and the presence or absence of charcoal, ash, or fire affected rock. The degree to which rock material used in the feature’s circular or rectangular construction is embedded in the surrounding soil, as well as if the feature exhibits a cleared or stone lined center, are also determinates of its function as a thermal feature. Thermal features are commonly found in association with villages and campsites, and are oftentimes situated within or close to resource procurement locales (Blair and Fuller-Murillo 1997).

**Caches**

Throughout California and the Great Basin, cache features are known to exhibit a unique variability in size, method of construction, and function of use. With the intent to conceal and protect resources, the use of this feature by native populations has been explained as either for subsistence resources (i.e. foodstuffs) (Binford 1980), equipment (i.e. tools), or raw material (i.e. tool stone) (Blair and Fuller-Murillo 1997:37; Wilke and McDonald 1989:50-51). Variations seen in cache feature construction are most likely due to the diversity of resources stored within these features. Cache feature types include subsurface, circular rocked-lined pits in which stored contents are placed inside and covered by layers of rock or plant material, while other examples include above ground circular rock feature construction, utilizing a covering of rock, plant material, and/or soil to conceal the cached contents (cf. Wilke and McDonald 1989). Caches are usually found in clusters, situated within resource rich locations, along trail routes, and in areas of exposed bedrock or similar dry environments where the threat of exposure to insects, rodents, and moisture is minimal (Blair and Fuller-Murillo 1997:33-43). The proper
identification of a circular rock feature as a storage cache should largely be based upon analysis of environmental and geographical factors including elevation, landform, soil type, surrounding vegetation communities, and geomorphic zones. These, in conjunction with constructional attributes and identification of the maker’s cultural affiliation should help to determine the presence of, and function for this type of circular rock feature (Blair and Fuller-Murillo 1997).

Granaries

Native populations living throughout regions of California are ethnographically documented as utilizing granaries as a highly effective method for the storage of plant foods, including acorns, tubers, and seeds (cf. Kroeber 1925; Kroeber and Hooper 1978; Sparkman 1908). Similar to that of the cache, logistical considerations regarding the construction of granaries is largely dependent upon the local environmental context (e.g. arid or wet), in which the features are built. At least four different granary types have been documented as being utilized by native groups, all of which were designed to protect the contents from destructive aggregates such as insects, animals, and moisture. Most construction methods utilized a cylindrical “birdnest” type structure manufactured out of locally available plant material, such as willow, the boughs and bark of trees including redwood, cedar, and pine for example, and a variety of grasses and brush. Granary structures were sometimes placed upon circular rock foundations to prevent contact with ground moisture, hung from trees, placed atop supporting poles as to be elevated above the ground surface, or put upon a built platform or large boulder (Barrett and Gifford 1971:339-340; Bean 1978:578; James 1995; Kidder 2004). Granaries have been documented within village sites, as well as in areas far removed from permanent
residences and in close proximity to resource rich areas where storable foods are gathered.

Rock Features and Storage in the California Context

The use of storage technology by prehistoric populations has been documented throughout a variety of contexts within both archaeological and ethnographic studies. Throughout areas of California and the surrounding deserts, researchers have reported on the use of a variety of storage feature types, including above ground granaries and subsurface rock-lined storage pits, in which seasonal plant resources were protected and stored. While it appears that there are considerable variations in the size, technological characteristics, types of cached contents, and placement of food storage features throughout the California landscape, archaeological studies have demonstrated that the use of this technology was often dictated by the seasonal movements of hunter-gatherer groups in conjunction with fluctuations in the availability of key resources throughout the year. The following discussion is a brief synthesis of archaeological studies regarding hunter-gatherer food storage technology. These few examples were selected because they closely resemble the types of rock ring features found throughout the region of study.

Research regarding Tataviam food storage technology is rather limited. Only a handful of features known to be that of food storage facilities have been recorded throughout Tataviam territory, and are primarily located within the administrative boundaries of the Angeles National Forest. The only example of a prehistoric rock-lined storage feature excavated and radiocarbon dated in the Transverse Mountain Range, comes from a 2002 archaeological investigation conducted at CA-LAN-2990 (“Tom’s Sitting Rock Site”), a plant processing and storage site located in the northern
foothills of the San Gabriel Mountains (Milburn 2010a). During this study three granitic circular rock features measuring between 3 and 5 meters in diameter were excavated, and found to be subsurface cache pits (Figure 6) used for the bulk storage of plant foods, including juniper berries (*Juniperus californica*), manzanita berries (*Arctostaphylos* spp.), and piñon pine nuts (*Pinus monophylla*). The caches were constructed in such a way that a stone floor and stacked stone sidewalls were designed to keep burrowing rodents and other animals out. Woody fuels had been burned below the stone-lined floor creating an ash layer to presumably exclude insect larvae. Radiometric dating of charcoal specimens taken from the cache features indicate that they were constructed approximately 1150 cal B.P. and 555 cal B.P.

Additional storage sites throughout California and within other culturally distinct regions have likewise been identified as containing subsurface, rock-lined cache pits. One
example is the Indian Hill Rockshelter (CA-SDI-2537), a plant processing and storage site located on the eastern slopes of the Peninsular Ranges of San Diego County, and within the ethnographic territory of the Kamia. As reported by Wilke and McDonald (1989) eleven rock-lined cache pits or cists were found in the lower levels of a two meter deep archaeological deposit within the shelter (Figure 7). While it appeared that the cached contents had been removed prior to discovery of the features, their interior form remained intact and rock-lined sidewalls and paved floors were visible. It was noted during excavation activities (Wilke et al. 1986) that the features were constructed in three general ways, presumably with the intent of keeping burrowing animals out. These constructional attributes include the placement of slabs in a mosaic fashion; overlapping slabs; and millingstone fragments and other irregular rocks placed tightly together. The nature of this cache construction suggests that the stored contents were not placed directly into the interior of the feature, but rather put into bags or baskets and then placed within the pit and covered by bunchgrass and rocks.

Other examples of rock-lined cache pits include those found throughout the Coso Range and within the ethnographic territory of the Panamint Shoshoni (Wilke and McDonald 1989:63). These reports of storage features come from two sites, Chapman Rockshelter No.1 (CA-INY-1534A) and Resurrection Shelter (CA-INY-2844). The four storage features located at Chapman Rockshelter No. 1 were primarily constructed using basalt rock slabs, with metate fragments also incorporated into their structure. The features were lined with plant material such as bunchgrass, Joshua tree fiber, buckwheat, tule matting, and twined basketry, and ranged from 75 to 95 cm. in diameter and from 45 to 60 cm. in depth. At Resurrection Rockshelter one rock-lined cache pit measuring
approximately 2 meters in diameter and 40 cm. in depth was excavated. The interior of the feature was lined with bunchgrass, as well as the bark from a Joshua tree. Traces of piñon pine nuts were detected within the interior of the cache structure, thus suggesting its use as a storage facility primarily for small seeds and nuts.

Other reports of rock-lined subsurface storage pits come from California’s Providence Mountains, Twentynine Palms region, and Coachella Valley (Wilke and McDonald 1989:64). While the environmental context of their location varies, the features exhibit many similarities including structural attributes, subsurface depth, and types of foods stored. Many of these features exhibit similar rock-lined floors and stone sidewalls, with interior linings often composed of bunchgrass and other pliable plant material. The caches generally range in diameter from 1 to 2 meters, with an average depth of between 15 and 30 cm. The stored contents sometimes consisted of the cones and seeds of piñon pine nuts, juniper berries, manzanita berries, and a variety of other...
small seeds and nuts suitable for storage. Wilke and McDonald 1989:69-70) suggest that the distribution of cache features throughout the California landscape can be described in the following ways: (1) temporary cache of surplus foods which will be consumed by foragers during seasonal rounds and reoccupation of temporary campsites; (2) temporary cache utilized during harvesting activities in which logistically organized collector groups later transport contents back to residential bases; and (3) a cache utilized by collectors who annually exploit resources within a collecting radius of more permanent residential bases.

While subsurface rock-lined storage pits are present throughout a variety of contexts within California’s archaeological record, additional rock feature studies have indicated other modes through which hunter-gatherers could effectively conceal and store resources. Of primarily interest to the current study are numerous circular rock ring features located throughout California’s southern Sierra Nevada Mountains, and within the ethnographic territory of the Western Mono. While conducting extensive research on the storage behaviors of the Mono, Morgan (2008, 2012) discovered that the features were utilized as storage facilities, designed for the bulk storage of acorns. Historically, the Mono are documented as inhabiting large permanent settlements at lower elevations during winter months, traveling to higher elevation camps during the spring and summer to hunt, while harvesting and caching black oak acorn (*Quercus kelloggii*) in the fall (Morgan 2008:248). Archaeologically, this behavior has left a distinct signature on the Sierran landscape in the form of over 300 rock ring acorn storage foundations (Figure 8) dispersed throughout higher elevations and among black oak groves. The storage features range in diameter from 1 to 2 meters in size, are primarily situated in isolated locales far
Three storage features are visible in the frame, and are located on top of a large granite outcrop. removed from other cultural materials, and are constructed out of granitic cobbles which are placed in a circular formation creating a rock ring substructure. Ethnographically it has been reported that a woven grass superstructure would have been placed on top of the rock ring foundation in which bulk quantities of acorn could then be stored (Figure 9) (Fresno Bee 1936). The acorn storage features are primarily located on large, open, south facing slopes, atop large granite outcrops, and are usually associated with at least two to four other ring foundations (Morgan 2008:249).
Figure 9: Historical photograph of Mono rock ring acorn storage features (dated 1936). To note is the cylindrical granary-type structure positioned on top of a rock ring foundation (Fresno Bee 1936).
CHAPTER 5: THE EXCAVATION

The Sawmill Valentine #03 Cache Site (FS No. 05-01-53-377) (Huckabee and Ryder 2011) was first identified by Angeles Forest Archaeologists in 2011 during a reconnaissance survey along the east to west running ridge of Liebre-Sawmill Mountain (Huckabee 2011). The site is situated on a relatively flat nob, amongst several small granitic outcrops, and surrounded by large groupings of live oak and black oak trees, at an elevation of 5700 feet above mean sea level (Figure 10). It was initially recorded as containing 5 granitic stone circular features (Features A-E), ranging in diameter from 2 to 4 meters, with no known associated artifacts. Two of the features have black oak growing from within the center of their rings, and several other features exhibit slight depressions at their centers. The site was revisited approximately six months after its initial recording and a single rhyolite scraper fragment was discovered on the ground surface, less than 10 centimeters away from Feature B. Due to the significant amount of bioturbation at the site, it was evident that the artifact was brought to the surface during rodent activities.

Surface Examination and Feature Documentation

During the initial phase of the project, one rock feature (Feature B) was selected to undergo a systematic excavation (Figure 11). The feature was chosen partly due to its close proximity to the location of the previously recorded rhyolite artifact, as well as its appearance as an intact feature. Before implementation of excavation activities, a systematic surface inspection was conducted to confirm site attributes previously reported by Huckabee and Ryder (2011) and to record any additional artifacts exposed on the surface. The features appeared to be as they were previously reported and no new artifacts were observed.
The feature designated for excavation, Feature B, was instrument mapped using a Trimble Geoexplorer 3™ global positioning system (GPS) receiver (sub-meter accuracy). The surface elements of Feature B were photographed (Figure 12b), and then mapped using string grids, and measuring tapes, and a detailed plan map was drawn (Figure 12a). A primary datum, comprised of a piece of rebar, was established on a high point near the southwest corner of the feature.
Figure 11: Sketch map of FS No. 05-01-53-377 showing location of Feature B (Huckabee and Ryder 2011).
Figure 12: Feature B. (a) Plan view map of surface configuration; (b) Overview photo (drawing by author, Joanna Huckabee, and Robert Ryder; photo by author 2012).
Subsurface Examination

The main objective during the subsurface examination was to expose half of Feature B in order to view its internal structure, as well as to determine the presence or absence of associated artifacts. Feature B was divided into four evenly spaced quarters, referred to herein as quadrants 1 through 4. For the purpose of this excavation, quads 1 and 4, which make up the western extent of the feature were excavated, while quads 2 and 3 or the eastern extent of the feature were left intact. Additionally, a 1x1 unit was placed 2 meters to the east of Feature B for the purpose of testing the surrounding soil. Digging was accomplished in arbitrary levels using pointed and margin trowels, ice picks, brushes, and dustpans. Excavated material was screened through 1/8 inch wire mesh screens and any additional material retained in the screen was visually sorted. Upon completion of excavated levels, field notes and unit records were prepared, as well as the use of the Munsell soil color chart for sediment identification. Archaeological materials recovered from within the excavation units were cataloged relative to their vertical and horizontal provenience. Charcoal specimens were stored in aluminum foil bags, while soil/sediment samples were placed in fabric soil sample bags.

The initial excavation consisted of trowel scrapes within quads 1 and 4 to determine the outer perimeter of the feature. The soil was cleared to expose underlying layers of granitic cobbles (Figure 13), some of which were found to be both finished and expedient tools made from the locally available granodiorite (Figure 14a-d). After the furthest extent of the western edge of the feature was determined, the cobbles deposited on the surface of the feature were removed in quads 1 and 4. Several formed tools such as scrapers, reamers, choppers, and several large cores were exposed when the first level of
Figure 13: Feature B, view of quad 1 with upper layer of cobbles and soil removed. Photo view is to the south (photo by author 2012).

Figure 14: Selected artifacts from FS No. 05-01-53-377. (a) Rhyolite scraper fragment; (b) Granodiorite scraper; (c) Granodiorite edge modified flake; (d) Granodiorite chopper (photos by author and David Peebles 2013).
cobbles was removed. Additionally, a large boulder, broken in two was discovered in quad 1. The portion of the boulder facing upward contained 22 cups or pits, sometimes referred to as cupules, ground into the surface of the rock (Figure 15a and 15c).

Examination of the underside of the rock revealed four incised or pecked grooves running across the length of the rock (Figure 15b and 15d).

Figure 15: Cupule Boulder. (a) Upward side containing 22 cupules; (b) Downward side containing four pecked grooves; (c) Drawing of cupule side; (d) Drawing of groove side (photos by author; drawings by author, Joanna Huckabee, and Robert Ryder 2012).
A north/south oriented trench was dug through quads 1 and 4 (Figure 16). The trench was excavated in arbitrary levels corresponding with the courses of rocks within the feature. Additional granodioritic stone tools consisting of scrapers, choppers, reamers, and several core tools were recovered from within the trench. The trench was dug approximately 106 centimeters below datum at which point it was discovered that the subsurface extent of the feature had been reached. The feature was constructed on top of a decomposing granitic outcrop and excavation was terminated (Figure 17).

Figure 16: Feature B closing photo, view east. View is of the east wall profile of Feature B. The feature has been bisected and the excavation trench is visible in front of the feature. A subsurface granitic outcrop exposed during the excavation is visible in the lower left portion of the frame. The 1x1 test unit is located behind Feature B, in the upper center of the frame (photo by author 2012).
Figure 17: Feature B, east wall profile.
Laboratory Procedures

During and after completion of the excavation, soil/sediment samples (1A and 1B) were collected from within Feature B. Sample 1A was recovered at a depth of 75-83 centimeters below datum, while Sample 1B was collected at 83-106 centimeters below datum. Samples 1A and 1B were submitted to Paleo Research Institute, Golden, Colorado, for phytolith and starch analysis (Cummings and Ladwig 2013) (see Appendix A). A discussion regarding the results of these analyses is included in the following chapter. Additionally, a carbonized acorn was collected from within Feature B and submitted to Beta Analytic, Inc., Miami, Florida for $^{14}$C dating analysis (Beta Analytic 2013) (see Appendix B). Results of this analysis are likewise included in the following chapter.
CHAPTER 6: ANALYSIS AND CONCLUSION

This thesis set out to describe the methods, results, and interpretations of an archaeological investigation conducted at the “Sawmill Valentine #03 Cache Site” (FS No. 05-01-53-377), as well as to examine the temporal and spatial distribution of circular/cluster rock features located throughout the Liebre-Sawmill Mountains. Results of the excavation have provided empirical data suggesting that the features were utilized as food storage facilities, in which seasonal resources such as oak acorn likely were stored. While little is known in regards to the history of past land-use within the region of study, the dynamics of Tataviam settlement, subsistence, and mobility patterns appear to have been intrinsically linked with distinct food storage strategies, developed to cope with the variability of environmental productivity. The specific research domains selected for this study, which will be further addressed in detail below, include: (1) dating and chronology; (2) form, function, and style; and (3) land-use organization.

Dating and Chronology

One of the prominent goals for this project was to establish a temporal range for the distribution of circular/cluster rock features throughout the region of study. Focus was placed on obtaining the age of Feature B through radiocarbon dating of recovered charcoal specimens, in order to determine a time frame in which site occupation could be explained. A single carbonized acorn was extracted from an upper level of Feature B and submitted for $^{14}$C dating analysis (Beta Analytic 2013). The results of this testing provided a calibrated median $^{14}$C age of $200 \pm 30$ cal B.P., thus suggesting some sort of firing episode between approximately 280 cal B.P. (A.D. 1670) and 170 cal B.P. (A.D. 1780). Due to the stratigraphic placement of the specimen and the results of a more recent
radiocarbon date, it is thought that the acorn likely fell from one of the surrounding oak trees, and was later burned during a wildfire, unrelated to any prehistoric activities associated with Feature B. While the excavation did not produce any additional carbonized plant material, and the chronological placement of Feature B remains currently unresolved, phytolith and starch analyses of soil/sediment samples 1A and 1B (Cummings and Ladwig 2013) did produce traces of microcharcoal, which are likely associated with the use of heat prior to or during feature construction activities. It should be noted; however, that Feature B showed no indication of use as a thermal feature, and therefore the microcharcoal appears to have been deposited either prior to or during the initial phase of feature construction.

Artifacts recovered during the excavation of Feature B included over 50 finished and expedient tool types made from the locally available granodiorite. None of the artifacts were; however, diagnostically distinct and therefore unable to provide additional information concerning the overall chronology of the site. Stratigraphically, their distribution throughout every excavated level of the feature, down to its furthest extent at 106 centimeters below datum, suggests that perhaps the artifacts were initially associated with at least one previous episode of site occupation, prior to construction of the feature and their incorporation into the framework of its structure.

The excavation of a 1x1 test unit, produced additional expedient and finished granodioritic tools, including several edge modified flakes, scrapers, and a drill. One obsidian pressure flake was likewise collected from within the unit at a depth of 40 to 50 centimeters below datum. While obsidian is a rarer discovery within the archaeological record of the region, its presence in the deposit can be regarded as a temporal marker for
prehistoric activities perhaps associated with site occupation. With no known obsidian sources throughout the Castaic and San Gabriel Mountain Ranges, it is thought that the obsidian debitage most likely originated in the Coso Volcanic Field of the southern Owens Valley, and was later obtained by the Tataviam through trade with surrounding desert groups. While the cultural chronology for the region suggests that prehistoric populations were actively engaged in the trade of exotic goods, such as Coso obsidian, throughout the late Archaic (4,000-2,300 cal B.P.) and post-Archaic (2,300-1,000 cal B.P.) periods, the recovery of only one diagnostic artifact and the inconclusive results of radiocarbon dating have left an absence of empirical data to confirm any particular temporal sequence relating to site activity. Future radiocarbon analysis of the microcharcoal detected within the bulk soil/sediment samples will hopefully provide more concrete data regarding the temporal sequence of the Sawmill Valentine #03 Cache Site, thus allowing for its placement within a larger regional chronology.

Form, Function, and Style

Another important aspect in the archaeological investigation of Feature B was the examination of its architectural form with the intent to define a technological function, as well as to determine if distinct stylistic traits are indeed markers of Tataviam cultural identity. While prior research regarding Tataviam food storage technology includes only that which was conducted at CA-LAN-2990 (“Tom’s Sitting Rock Site”) in the northern foothills of the San Gabriel Mountains, it was suggested that perhaps the Liebre-Sawmill features were likewise indicators of the same Tataviam food storage technology.

Results of the archaeological investigation of Feature B were not consistent with the findings at CA-LAN-2990, nor did they suggest that the feature was utilized as a rock
cairn associated with mortuary practices, territorial boundaries, or as a marker of ritual or social meaning, as had been hypothesized within the original research framework for this project. After completion of a systematic excavation it was determined that the feature consisted of the remains of an above ground storage facility, on which a cylindrical granary-type structure made from local plant material would most likely have been placed (Figure 18). Alternately, the feature could be explained as perhaps representing an above ground storage cache in which food was placed directly within the rock ring foundation and covered with soil, pine boughs, grasses, and other plant materials. It was discovered during excavation activities that the feature did not exhibit any significant subsurface depth, nor did it contain an ash layer of burned woody fuels at its base. The feature was constructed out of granitic cobbles collected from the surrounding landscape, which were placed in a circular formation on top of a naturally occurring granitic outcrop. Comparable to that of a subsurface layer of ash as seen in the construction of cache features at CA-LAN-2990, the granitic outcrop would have provided a similar defense against the intrusion of insect larvae and the potential destruction of the food stores inside.

While the test results were negative for the presence of starch within the soil samples retrieved from the lower cavities of Feature B, phytolith analysis of the same sediment confirmed the presence of a variety of plant species, consisting of sedge (Cyperaceae) tubers including bulrush and tule, ponderosa pine tree (Pinus) needles, and a variety of grass (Poaceae) seeds (Cummings and Ladwig 2013). The plant specimens are consistent with vegetation types still in existence throughout the region today; however, their inclusion within the soil matrix suggests that they either represent the
types of food stored within the feature, or that they were incorporated into the framework of a granary structure, or alternately, used as a natural covering to conceal and protect resources placed inside of a cache. In a discussion regarding the storage capabilities of Mono acorn granaries, Morgan (2012:724-725) states that approximately half of each granary structure was filled with pine needles to keep the acorns dry and the vermin out, while also accommodating a storage capacity of approximately 725 kg of acorns. While the volume of storage needed to conceal the types of plants found within the sediment samples are not consistent with the volume potential of Feature B, they do suggest; however, that Feature B may have held large quantities of acorns similar to that of the storage facilities found throughout Mono territory.
Another important find during excavation activities was the discovery of a boulder containing 22 cupules and 4 incised grooves. Theories surrounding the production of cupules vary from one region to the next. They have been documented in the vicinity of important prehistoric economic locations, as well as in more isolated ritual locals, far removed from permanent settlement sites. They have been associated with astronomical events, reproduction, and the control of weather (Parkman 1986). It has likewise been suggested that during ecological transitions when access to resources may have become restricted, native cultures might have intensified rituals associated with the production of this style of rock marking. The shape of the marked boulder, as well as the presence of cupules and grooves on both of its sides, suggests that perhaps the rock might have at one time, stood upwards as if some kind of monument marking the landscape before it was incorporated into the framework of the feature. An alternate explanation is that it served some utilitarian purpose, such as a platform on which to hold or shell acorns (i.e., cupule), or perhaps sharpen or shape tools (i.e., incised grooves). Unfortunately, with little else than theories to go by, interpretations as to the function of the marked boulder remain unresolved.

Land-Use Organization

While little is known in regards to the history of past land-use by prehistoric populations living throughout the region of study, prior archaeological investigations conducted within the project vicinity have indicated that Tataviam groups inhabiting lowland areas of the northern and southern perimeter of the Liebre-Sawmill Mountains were engaged in a variety of distinct settlement and subsistence activities, likely dictated by the seasonality of surrounding resource availability, and fluctuations in environmental
productivity. Although the excavation of Feature B did not provide conclusive data regarding the temporal placement of the Sawmill Valentine #03 Cache Site within a broader system of land-use throughout the Transverse Mountain Range, examination of surrounding archaeological sites in relation to patterns of resource exploitation, storage, and mobility, have helped to define the role of the Liebre-Sawmill rock features, as well as to place them within a relative regional chronology.

As was previously discussed, archaeological site types surrounding the Liebre-Sawmill features are reflective of a variety of land-use behaviors, including resource procurement and processing, food storage, tool production, habitation, and ceremonial or religious practices. Several large permanent village locations are situated less than two miles from the Liebre storage features, while temporary resource procurement and processing camps are dispersed throughout higher elevations and in areas of seasonally available subsistence resources, including near black oak and live oak trees. Many of the surrounding sites, including both permanent villages and temporary camps contain bedrock milling features, suggesting that groups were actively engaged in the processing and consumption of oak acorn. While radiocarbon testing of carbonized plant material has not been conducted at any of the surrounding site locations, diagnostic artifacts found throughout archaeological deposits suggest a range of human occupation spanning from the post-Archaic to Protohistoric periods, roughly 2300 to 180 cal B.P.

The use of food storage technology by Tataviam populations appears to have been prevalent throughout distinct periods of their occupational history, when settlement, subsistence, and environmental factors likely prescribed the need for this insurance-oriented land-use strategy. Post-Archaic period (2,300 to 1,000 cal B.P.) sites located
near the area of study suggest that early Tataviam populations participated in highly mobile subsistence strategies, in which groups regularly moved from one resource procurement area to the next, while living in short-term seasonal encampments. It is thought that these native populations operated under an immediate-return economic system, in which the ability to remain mobile during a set of seasonal foraging rounds, left the Tataviam less dependent on the use of storage technology, as their nomadic lifestyle provided a means by which to cope with depletions in resource productivity (seasonal or otherwise). During later Protohistoric periods (1,000 to 180 cal B.P.), archaeological data suggests that Tataviam land-use shifted away from more mobile foraging strategies and towards more sedentary collector ones. With the establishment of these new sedentary resource intensification patterns, site types representative of this period suggest that Tataviam groups collected seasonally available resources situated at high elevation procurement locales, while likewise maintaining more permanent habitation sites at lower elevations and on the valley floors. To average the uncertainty of environmental productivity, and to facilitate a more sedentary lifestyle, it is thought that groups employed a delayed-return economic system in which the long-term storage of seasonal plant foods, such as oak acorn, was utilized to insure group survival during periods of depressed environmental productivity, primarily during the winter months when access to resources located above the snowline were seasonally restricted.

Conclusion

Stepping back into the theoretical context provided by Julian Steward who looked to the development of sociocultural systems, technologies, and land-use behaviors as intrinsically linked with the processes by which societies adapt to changing
environmental conditions, it is evident that the Tataviam, like so many other hunter-gatherer groups living within variable environments, adapted to their ecological surroundings through the development of specific resource procurement and food storage behaviors. Archaeologically, these activities have left a distinct mark on the Liebre-Sawmill landscape in the form of over 50 circular/cluster rock features, which likely represent the remains of acorn storage granaries. While the excavation of only one storage facility has not provided significant information concerning an overall temporal sequence for the greater complex of the Liebre-Sawmill features, it has provided empirical data regarding Tataviam settlement, subsistence, and mobility.

It is thought that the use of the Liebre-Sawmill storage features was characterized by the movement of ancestral Tataviam-affiliated groups from lowland permanent village locations, to the upper reaches of the Liebre-Sawmill Mountains, and into areas containing live oak and black oak trees. The gathering of resources primarily occurred during fall months when large quantities of oak acorn were collected and stored in above ground storage granaries, strategically placed throughout alternate areas of seasonally producing oak trees. While the current study did not address questions regarding the quantity of acorn needed to sustain specific numbers of population densities, it is thought that local groups would access the stores in various capacities before the onset of winter and perhaps during other occurrences of depletions in environmental productivity.

Architecturally and spatially, the Liebre-Sawmill features hold a striking resemblance to the rock ring acorn granaries found throughout the Sierra Nevada Mountains and within Mono territory (Morgan 2008, 2012). Similar to that of the environment in which the Mono lived, the Liebre-Sawmill Mountains are likewise
characterized by a highly seasonal and spatially patchy environment, in which fluctuating climatic conditions often depressed terrestrial productivity. The use of storage technology by native populations would have offset the negative effects of seasonal variability, while also allowing for the establishment of more permanent settlements in close proximity to seasonally producing plants, and storage facilities. While it is probable that there are alternate explanations as to technological function of some of the circular/cluster rock features found throughout the Liebre-Sawmill vicinity - and perhaps future studies will confirm or deny this probability – the archaeological investigation of Feature B suggests that the development of distinct food storage technology, such as in the case of above ground storage granaries, may speak less to the distinction of a particular group identity, and perhaps more to the ecological climate of the landscape, and the means by which groups learned to cope with constraints imposed by environmental variability.
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APPENDIX A: Phytolith and Starch Analysis Report

PHYTOLITH AND STARCH ANALYSIS OF SAMPLES FROM THE VALENTINE CACHE #3 SITE (05-01-53-377), LOS ANGELES COUNTY, CALIFORNIA

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INTRODUCTION

The Valentine Cache #3 Site (05-01-53-377), located in southwestern Los Angeles County, California, consists of five granitic stone circular features. These features are believed to be associated with caching activities, possibly acorn harvesting. Two soil samples from the center of a Valentine Cache #3 Site rock ring were submitted for phytolith and starch analyses to identify plants associated with the function, type, and method of construction for these features.

METHODS

Phytolith and Starch Extraction from Sediment

First, 15 ml of sediment from each sample was placed in a 500 ml beaker. A solution of hydrochloric acid (HCl) and 70% nitric acid (HNO3) was added and boiled for 1 hour, then rinsed to neutral pH with water. Next, a 10% solution of potassium hydroxide (KOH) was added to each sample and thoroughly mixed. KOH aids in the removal of organic humic substances not removed by nitric acid. After the addition of KOH, the samples were allowed to settle by gravity for two hours, after which, the humates liberated from the sediments were decanted. The samples were then rinsed to neutral pH with water. Following this samples were sieved through 250 μm mesh. Once these steps were complete, a 5% solution of sodium hexametaphosphate was mixed into each sample to suspend clay-sized particles. The samples were allowed to settle by gravity for two hours, after which, the clay-sized particles that were still in suspension were decanted. This step was repeated four more times until the supernatant was clear after two hours of settling time. The samples were then transferred to 50 ml centrifuge tubes and freeze-dried using a vacuum system, which freezes out all moisture at -107 °C and < 10 millitorr. The dried samples were then mixed with sodium polytungstate (SPT, density 2.3 g/ml) and centrifuged to separate the phytolith and starch grain fraction, which will float, from most of the inorganic silica fraction, which will not. Because a lot of silt-sized inorganic material was floated with SPT, each sample was again dried under vacuum and mixed with potassium cadmium iodide (density 2.3 g/ml). The addition of potassium cadmium iodide greatly improved the recovery and concentration of the phytolith fraction, without which, these samples would not have been countable. After several alcohol rinses, the samples were mounted in optical immersion oil for counting with a light microscope at a magnification of 500x. A total count of 200 taxonomically significant phytoliths was attempted, after which, each slide was scanned for rare phytolith types and for starch grains. A percentage phytolith diagram that includes frequency data for any starch grains observed was produced using Tilia 2.0 and TGView 2.0.2.

PHYTOLITH REVIEW

Phytoliths are silica bodies produced by plants when soluble silica in the ground water is absorbed by the roots and carried up to the plant via the vascular system. Evaporation and metabolism of this water result in precipitation of the silica in and
around the cellular walls. Opal phytoliths, which are distinct and decay-resistant plant remains, are deposited in the soil as the plant or plant parts die and break down. They are, however, subject to mechanical breakage and erosion and deterioration in high pH soils. Phytoliths are usually introduced directly into the soils in which the plants decay. Transportation of phytoliths occurs primarily by animal consumption, gathering of plants by humans, or by erosion or transportation of the soil by wind, water, or ice.

The three major types of grass short-cell phytoliths include festucoid, chloridoid, and panicoid. Smooth elongate phytoliths are of no aid in interpreting either paleoenvironmental conditions or the subsistence record, because they are produced by all grasses. Phytoliths tabulated to represent "total phytoliths" include the grass short-cells, buliform, trichome, elongate, and dicot forms. Frequencies for all other bodies recovered are calculated by dividing the number of each type recovered by the "total phytoliths".

The festucoid class of phytoliths is ascribed primarily to the subfamily Pooideae and occur most abundantly in cool, moist climates. However, Brown (1984) notes that festucoid phytoliths are produced in small quantity by nearly all grasses (mostly rondel-type phytoliths). Therefore, while they are typical phytoliths produced by the subfamily Pooideae, they are not exclusive to this subfamily. Chloridoid phytoliths (short saddles) are found primarily in the subfamily Chloridoideae, a warm-season grass that grows in arid to semi-arid areas and require less available soil moisture. Chloridoid grasses are the most abundant in the American Southwest (Gould and Shaw 1983:120). Bilobates and polylobates (lobates) are produced mainly by panicoid grasses, although a few of the festucoid grasses also produce these forms. Panicoid phytoliths occur in warm-season or tall grasses that frequently thrive in humid conditions. Twiss (1987:181) also notes that some members of the subfamily Chloridoideae produce both bilobate (panicoid) and festucoid phytoliths. "According to Gould (1983:110) more than 97% of the native US grass species (1,026 or 1,053) are divided equally among three subfamilies Pooideae, Chloridoideae, and Panicoideae" (Twiss 1987:181).

Buliform phytoliths are produced by grasses in response to wet conditions and are to be expected in wet habitats of floodplains and other places. Trichomes represent silicified hairs, which may occur on the stems, leaves, and the glumes or bran surrounding grass seeds. Conifers produce opal silica phytoliths in their inner bark and needles. Polyhedral phytoliths are reported to be observed in leaves (Bozarth 1993), and at PaleoResearch Institute we have observed numerous forms in reference samples including globular forms with spines produced by Pinus, along with conifer blocky and elongate forms.

A rapidly growing body of phytolith studies, many of which use three-dimensional typological descriptions, are allowing a much finer resolution of taxa identification, often to the subfamily and genus level. This is especially true with the grass family, where diagnostic forms are now accepted for many additional subfamilies and genera such as: Bambusoideae (bamboo), Erhartoideae (rice), tribe Oryzeae (Oryza, Zizania), Aristidoideae (threeawn, needlegrass), Arundinoideae (reeds), and Zea mays (maize,
corn) (Piperno 2006). Determining local and regional levels of diagnostic morphotypes can also greatly improve taxa identification.

**ETHNOBOTANIC REVIEW**

It is a commonly accepted practice in archaeological studies to reference ethnographically documented plant uses as indicators of possible or even probable plant uses in prehistoric times. The ethnobotanic literature provides evidence for the exploitation of numerous plants in historic times, both by broad categories and by specific example. The presence of numerous sources of evidence for exploitation of a given resource can suggest widespread utilization and strengthens the possibility that the same or similar resources were used in prehistoric times. Ethnographic sources both inside and outside the study area have been consulted to permit a more exhaustive review of potential uses for each plant. Ethnographic sources document that the historic use of some plants was a carryover from the past. A plant with medicinal qualities is likely to have been discovered in prehistoric times, with its use persisting into historic times. There is, however, likely to have been a loss of knowledge concerning the utilization of plant resources as cultures moved from subsistence to agricultural economies and/or were introduced to European foods during the historic period. The ethnobotanic literature serves only as a guide indicating that the potential for use existed in prehistoric times, not as conclusive evidence that the resources were used. Pollen, phytoliths, starch, and macrofloral remains, when compared with the material culture (artifacts and features) recovered by the archaeologists, can become indicators of use. Plants represented by phytoliths and starches are discussed in the following paragraphs to provide an ethnobotanic background for discussing the remains.

**Native Plants**

**Poaceae (Grass family)**

Members of Poaceae (grass family) have been widely used by California groups for food, tools, and construction materials. Grass seeds were an important resource for groups in southern California, and seeds from a variety of grasses were utilized including *Agrostis* (bentgrass), *Alopecurus howellii* (Pacific foxtail), *Avena* (wild oat), *Bromus* (brome grass), *Distichlis spicata* (saltgrass), *Elymus* (ryegrass), *Eragrostis diffusa* (lovegrass), *Festuca* (fescue), *Hordeum* (barley), *Lolium* (ryegrass), *Phalaris* (canary grass), *Phragmites australis* (carrizo grass), *Poa* (bluegrass), *Sporobolus* (dropseed, sacaton), and *Stipa* (needlegrass). Local conditions determined which grasses were abundant and available for utilization. Grass seeds are noted to have been the second most abundant plant food used by the Luiseño (Bean and Shipek 1978:552). Seeds ripen throughout the spring, summer, and fall. Many groups burned dry grass and brush in the late summer and fall to promote a better growth of grass the following year. Grass seeds were often gathered using a seed beater and conical burden basket or a wide-mouthed basket. Seeds could be eaten raw but most often were parched and ground into a flour
that was added to soups and stews, and used to make mush and cakes. Young shoots of "Melica" (melic, oniongrass) were eaten raw or boiled as greens. The bulbous corms at the base of the culms also were eaten. The Kawaiisu pounded "Melica" seeds in a bedrock mortar and cooked them into a mush. Salt was collected from the leaves of "Distichlis spicata" (saltgrass). Grass stems, such as "Muhlenbergia rigens" (deergrass) and "Phragmites" (reed), are noted to have been used for making baskets. "Phragmites" stems also were used to thatch houses and to make arrow shafts, flutes, cordage, and nets. Grass mats were used for doorways, floor coverings, and pillows (Bean 1978:575; Bean and Shipek 1978:552; Ebeling 1986:170-172, 183, 185, 195-198; Hedges and Beresford 1986:25; Kirk 1975; Luomala 1978:600; Mead 1972; Moerman 1998:338).

**Asteraceae (Sunflower Family)**

The Asteraceae (sunflower or aster family) are annual or perennial herbs or shrubs. It is the largest family of plants in California and the largest family of dicots worldwide. Members of the Asteraceae were used in a variety of ways, including as construction materials, tools, crafts, medicines, and as food. Seeds were exploited from several members of this group including "Achyrrachaena mollis" (blow-wives), "Artemisia" (sagebrush), "Aster" (aster), "Balsamorhiza" (balsamroot), "Blenosperma nanum" (common blenosperma), "Chaenactis glabriuscula" (pincushion), "Eriophyllum confertiflorum" (yarrow), "Haplopappus", "Helianthus" (sunflower), "Hemizonia" (tarweed, spikeweed), "Heterotheca grandiflora" (telegraph weed), "Lasthenia" (goldfields), "Layia" (tidy tips), "Madia" (tarweed), "Malacothrix californica", "Senecio" (groundsel), "Solidago" (golden rod), and "Sonchus" (sowthistle). Seeds were most often ground and made into pinole, bread, or mush. Most Asteraceae seeds ripen in the mid- to late summer and fall. "Madia" was an important seed resource for many California groups. The young leaves of "Agoseris retrorsa" (mountain dandelion), "Cirsium" (thistle), "Coreopsis" (tickseed), "Solidago", and "Taraxacum" (dandelion) were cooked and eaten as greens. The Miwok are noted to have eaten young "Wyethia" (mule ears) shoots raw after peeling the outer coating. The roots were fermented on heated stones in the ground for several days and are reported to have a sweet flavor. The leaves and tender tops of "Conyza" (horseweed) have an onion-like flavor and were eaten pulverized, but not cooked, by Miwok groups. Members of this family also were utilized as medicinal resources. "Artemisia" leaves were used to make a ceremonial drink, as well as a medicinal tea taken for treating colds, easing menstrual cramps, and during childbirth. Leaves also were used as a sweatbath inhalant and were especially good for rheumatic aches and pains. The Miwok applied "Eriophyllum" leaves to aching body parts, while "Gnaphalium" (everlasting) leaves were used as a poultice on swellings. A decoction of the leaves was drunk for colds and stomach trouble. "Grindelia" (gumplant) was used as a blood purifier and a cure for colds and colic. The leaves were steeped and applied as a poultice or a wash for sores, poison oak, and minor burns. Indian children chewed the crushed flowers like gum. A decoction of "Haplopappus" leaves was taken to cure stomach trouble and menstrual cramps and was applied to rheumatic parts. Leaves and twigs also were applied to rheumatic parts, as well as to boils and on sores (Ebeling 1986:268-274; Hickman 1993:174; Levy 1978:491; Mead 1972:88, 97, 99-103, 115, 128-129; Westrich 1989:56, 125).
Cyperaceae (Sedge Family)

A few members of the Cyperaceae (sedge) family are noted to have been important resources for Native Americans. *Carex* (sedge) stems are filled with a sugary juice, and the tuberous base of the stem was eaten (Yanovsky 1936:9). Most species are found in wet areas, although some are found in open, dry ground (Hitchcock and Cronquist 1973:578-595). Several species of *Cyperus* (flatsedge, nutgrass) have a tuber-like thickening at the base of the plant or possess tubers at the end of slender rootstalks. These tubers were eaten raw, boiled, dried and ground into a flour, or baked in a fire. The roots also can be roasted until dark brown and ground to make coffee. *Cyperus esculentus* is noted to have been a famous plant food since ancient Egyptian times. *Cyperus* is a grass-like perennial found in moist ground, especially in damp sandy soil and waste places (Harrington 1967:174; Kirk 1975:176; Peterson 1977:230). *Scirpus* syn. *Schoenoplectus* (bulrush) is a perennial plant that was used extensively. Young shoots and older base stems were eaten raw or cooked. Pollen was formed into cakes and baked. The seeds can be used whole, or parched and ground into flour. The rootstalks are rich in starch and sugar. They can be eaten raw, roasted, or dried and ground into a flour. The rootstalks also were crushed and boiled to make a sweet syrup. The long stems were used to weave baskets and mats, and the plant was also used as a ceremonial emetic. Bulrush are found in wet ground and in shallow water around pond, swamp, and lake edges (Duke 1986:141; Harrington 1967:210-213; Kirk 1975:175-176; Moerman 1986:446; Peterson 1977:230).

**Pinus** (Pine)

*Pinus* (pine) trees were utilized for a variety of purposes. The seeds of most pines are edible and rich in protein and fat. Pine seeds were eaten raw, roasted, or pounded into a meal that was used to make cakes, gruel, or in soup. The inner bark can be mashed and formed into cakes, and it was used to make poultices and bandages especially good for burns. Pine needles are rich in vitamins A and C and were brewed into a medicinal tea that was used as a diuretic, an expectorant, a ceremonial emetic, to prevent scurvy, and to treat bad coughs, fevers, and sore throats. The needles also were used to make baskets. Buds were chewed to soothe sore throats. Slivers and infections were drawn out with pine pitch, and an eye wash was made from the hardened sap. The gummy pitch also was used to mend canoes, fasten arrowheads and feathers, and line baskets (Angier 1978:193-197; Moore 1979:126; Robinson 1979:123-124; Sweet 1976:14-16).

**DISCUSSION**

The Valentine Cache #3 Site (05-01-53-377) is located in the Liebre-Sawmill Mountains of the Castaic Mountain Range and consists of five granitic stone circular features. At least 50 other circular rock rings have been located in the Liebre-Sawmill Mountains, and in proximity to black oak and live oak woodlands. Occasionally mature oaks grow within the center of these rings. Each site contains between one and nine rock rings with diameters ranging from 2–4 meters, and heights of 10–30 cm. Local vegetation
in the area includes conifers, live oak (*Quercus virginiana*), black oak (*Quercus kelloggii*), mixed chaparral grasslands, yucca (*Yucca* sp.), Manzanita (*Arctostaphylos* sp.), chia (*Salvia hispanica*), and buckwheat (*Fagopyrum esculentum*). Two soil samples collected at varying elevations from one of the five rings (Feature B, Quadrant 2) present at the Valentine Cache #3 Site (05-01-53-377) were submitted for phytolith and starch analysis (Table 1) to help identify the function of these features, as well as to identify a potential type and method of construction that may be an indicator of cultural identity. Information gained from this project will be used for placement of these features within the larger cultural chronology of the Castaic Mountain Range and potentially will assign or associate this feature class with a particular cultural group.

Both samples were removed from Quadrant 2 in Feature B. Sample 1B was recovered at a depth of 83–106 cmbd, while Sample 1A represents sediment at 75–83 cmbd. Due to the similarity of the phytolith records in these two samples, the general record will be discussed first. Phytoliths typical of cool season (C3) grasses dominate the record (Figure 1). Nonspecific rondels were the most abundant form recovered. In addition, trapeziform sinuate long and short cells, typically produced in Pooideae grasses, indicates that meadow and pasture grasses were a common part of the local vegetation. Other forms of rondels, such as rondel horned (Figure 2E), rondel keeled, rondel pyramidal forms, may be observed in several different grass genera. *Stipa*-type bilobates and fat bilobates, the latter of which also occur in *Stipa*-type grasses, suggest local growth of needle and thread, rice grass, or other grasses within this group. Evidence for warm season (C4) grasses was minimal and noted as both chloridoid (saddle) and panicoid (bilobate and polylobate) forms. The local Mediterranean climate usually supports a large cool season (C3) grass population, due to the influence relatively mild climatic conditions that include cool winters and summer temperatures modulated by ocean breezes. Nonspecific grass forms such as buliform and elongates were present, but do not contribute to a greater understanding of the specifics of the local grass population. A few dendriform phytoliths (Figure 2C), commonly produced in the glumes surrounding grass seeds, were observed in each of the samples. In quantities greater than three dendriforms within a count of 200 phytoliths these forms are deemed to probably represent economic activity. However, that quantity was not reached in either of these samples, so their presence is interpreted as part of the environmental signal.

A few Cyperaceae-type tuber phytoliths, which were irregular in shape and have tubelike projections extending out from the body (Figure 2D), were observed in each sample. Because phytoliths identical to this have been observed in starchy tubers from *Scirpus* and *Schoenoplectus* (bulrush and tule), which are edible, the possibility that they represent economic activity must be considered. Although *Scirpus* and *Schoenoplectus* tubers are wellknown to be edible, archaeological evidence for their processing is rare. This is due to the highly perishable nature of the tubers and the difficulty in identifying fragments of charred roots and tubers. Another factor that explains the paucity of evidence for use of *Scirpus* and *Schoenoplectus* tubers is the underutilization of microbotanical analyses in investigating subsistence in the archaeological record. The recovery of bulrush/tule tuber phytoliths from this sample might represent food preparation and consumption at the Valentine Cache #3 Site.
Phytoliths representing various, but generally unspecified, dicotyledonous plants were observed. While blocky forms are common in *Artemisia*, they are not restricted to this genus. Dicot knobby forms are common in oak, but again are not restricted to the genus *Quercus*. Parallelepiped forms merely refer to a shape of biogenic silica where the opposing sides are parallel to each other. Parallelepips occur in many different and unrelated plants, so they are not considered taxonomically significant. Tracheary elements are responsible for transporting fluids in many woody plants, and as such their recovery and identification to this general level are not considered to be diagnostic. Epidermal anticlinal tissue may represent deteriorated seed or possibly leaf material, but cannot be identified further.

Globular phytoliths with spines (Figure 2B) produced in the needles of *Pinus ponderosa* trees were present in both samples. Thus far these phytoliths have not been observed in needles of other pine trees. The needles of pine trees are documented to have been used in making tea and for medicinal purposes. The presence of these phytoliths indicates the presence of Ponderosa pine needles and suggests their use as a medicine.

Burned phytoliths and microcharcoal (Figure 2A) noted in this sample indicate use of fire in the rock ring feature. Phytoliths that have been exposed to oxidative fire, particularly an open flame and airflow, can exhibit varying degrees of darkening, from dull opaque to completely black; whereas unburned phytoliths, or those exposed to high heat in a low-oxygen environment, are typically transparent or opalescent (Parr 2006). Therefore, grasses burned in natural fires or burned as fuel in an open-flame thermal feature are more likely to exhibit a darkened appearance. Grasses used as a layer of buffering vegetation in a cooking feature such as an earth oven are much less likely to exhibit darkening. The clouding of the burned phytoliths recovered in this sample appears to be the result of oxidative fire, which may be related to the use of grasses as starter in a thermal feature in this rock ring.

Pennate diatoms, which are ubiquitous and occupy many diverse habitats, also were recovered. Diatoms are unicellular, eukaryotic, pigmented, photosynthetic algae distinguished by the possession of a cell wall that is heavily impregnated with silica. Some species are colonial, living in clusters, chains, or tubes, while others form zig-zag or star-shaped colonies. Many species produce extracellular mucilage pads, stalks, tubes, amorphous masses, strands, threads, or filaments that are composed of polysaccharide. Some diatom species are freefloating planktonic forms living much of their life suspended in the water column, and other species are benthic, either crawling unattached through sediments or spending their lives attached to a solid surface such as sand, pebble, rock, wood, rooted macrophyte, other algae, or floating mat. Most aerophilic species are motile and can glide over surfaces and through sediments for efficient light capture. Diatoms can be found living in a wide variety of natural and man-made terrestrial and aquatic habitats, including seeps, wet walls, damp soil, caves, springs, streams, ponds, lakes, marshes, lagoons, estuaries, bogs, swamps, fens, ditches, canals, and temporary pools. Most are cosmopolitan - found in many parts of the world under similar environmental conditions, and many species have predictable environmental requirements and pollution tolerance. Therefore water quality directly effects diatom
species composition. Diatoms can be readily identified to species by specialists, and a
large and growing body of information exists on the range of ecological tolerance of
many common species. Because diatoms are sensitive indicators of water chemistry,
habitat, and substrate; are often found in large numbers in sedimentary
deposits; can be identified to species; and are cosmopolitan in distribution, they are well-
suited for use in paleoenvironmental reconstruction. Silica shells (spicules) of freshwater
sponges (Spongillidae) also were observed in this sample. Freshwater sponges inhabit a
wide variety of wet habitats, from moist soils to open bodies of water; however, they do
need a hard stratum for growth. They typically thrive in water that is alkaline (above pH
7), and their abundance is negatively correlated with turbidity and sediment load (Barton

The presence of diatoms and sponge spicules in the context of the rock ring is
likely related to the accumulation of rainwater following the period of use of this feature.
The presence of sedge (Cyperaceae) tuber phytoliths suggests either that the sedge tubers
were transported to the site for processing or that sedges grew proximate to the site, or
perhaps both of these explanations are true. Not all sedges are wetland obligates, many
live interspersed with grasses in dry, moderate, or mesic habitats. Local wetlands are
associated with a spring located approximately 0.5 miles north of the site, and with Horse
Camp Canyon and Cow Spring Canyon, which are located 0.25 miles northwest and
northeast of the site, respectively.

No starches were recovered in either sample. Minor variations in quantities of
phytoliths observed between these two samples probably represent fluctuations in local
vegetation, since the samples were collected at different depths.

Taphonomic modification due to environmental processes was noted on some
phytoliths recovered from both samples. Surface pitting, representing dissolution, was
noted on grass long cell phytoliths (Figure 2C and F) as well as some short cell forms.
Additionally, some phytolith surfaces demonstrated striations that result from abrasion by
sand grains, which might be created by wind transport of sediment and phytoliths.

SUMMARY AND CONCLUSIONS

The phytolith record recovered from Samples 1A and 1B collected from a rock
ring feature (Feature B, Quadrant 2) at the Valentine Cache #3 Site in Los Angeles
County, California, provides tantalizing evidence that this feature might have been used
for processing consumables that such as sedge (Cyperaceae) tubers, pine tree (Pinus)
needles, and possibly grass (Poaceae) seeds. The evidence is limited to a few phytoliths
representing sedge tubers (bulrush and tule) that are wetland obligates and ponderosa
pine needles, which are not expected to be part of the local vegetation debris. Because
these plants are not anticipated to be part of the vegetation community in the area of the
rock ring, their phytoliths, even though noted in small quantities, suggest economic
activity. The similarity of these two phytolith records, collected from depths of 75–83
cmbd and 83–106 cmbd (Sample 1A and 1B, respectively), suggests continuity and/or
stability of use of this feature through time. Although not abundant, recovery of microscopic pieces of charcoal suggest use of heat when processing foods and/or medicines in this rock ring. No evidence was present in the microfossil record to associate this feature with a particular cultural group.

TABLE 1
PROVENIENCE DATA FOR SAMPLES FROM THE VALENTINE CACHE #3 SITE (05-01-53-377), LOS ANGELES COUNTY, CALIFORNIA

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Feature</th>
<th>Quad. No.</th>
<th>Depth (cmbd)</th>
<th>Provenience/Description</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>B</td>
<td>2</td>
<td>75–83</td>
<td>Soil sample from the center of a rock ring feature</td>
<td>Phytolith Starch</td>
</tr>
<tr>
<td>1B</td>
<td></td>
<td></td>
<td>83–106</td>
<td></td>
<td>Phytolith Starch</td>
</tr>
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</table>
FIGURE 2: MICROGRAPH COMPILATION OF SELECT PHYTOLITHS RECOVERED FROM THE VALENTINE CACHE #3 SITE (05-01-53-377), LOS ANGELES CO., CALIFORNIA.

A) Charred plant tissue fragment.

B) Globular phytolith with spines produced by pine tree (Pinus) needles.

C) Elongate/dendriform phytoliths; note the pitting on the surface of the lower long cell due to taphonomic (environmental) processes.

D) Tuber phytolith produced by sedges (Cyperaceae).

E) Horned rondel produced by cool season (C3) grasses.

F) Trapeziform long phytolith demonstrating surface striations and pitting due to taphonomic (environmental) processes.
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Yanovsky, E.
### REPORT OF RADIOCARBON DATING ANALYSES

**Dr. Thalia Ryder**  
**Report Date:** 8/5/2013  
**Angeles National Forest**  
**Material Received:** 7/16/2013  

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Measured Radiocarbon Age</th>
<th>13C/12C Ratio</th>
<th>Conventional Radiocarbon Age(*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta-354153</td>
<td>170 +/- 30 BP</td>
<td>23.1 o oo</td>
<td>200 +/- 30 BP</td>
</tr>
</tbody>
</table>

**SAMPLE:** ANF5337Q4L2  
**ANALYSIS:** AMS - Standard delivery  
**MATERIAL/PRETREATMENT:** Charred material - acid/alkali/acid  
**2 SIGMA CALIBRATION:**  
- Cal AD 1570 to 1580 (Cal BP 300 to 200) AND Cal AD 1730 to 1810 (Cal BP 220 to 140)  
- Cal AD 1990 to post 1990 (Cal BP 20 to post 1970)

---

Dates are reported as RCYBP (radiochron years before present, “present” = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard. The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "**". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the “Two Sigma Calibrated Result” for each sample.
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -23.1; lab. mult=1)

Laboratory number: Beta-35-4153

Conventional radiocarbon age: 200 = 30 BP

2 Sigma calibrated results:
Cal AD 1650 to 1680 (Cal BP 390 to 260) and
Cal AD 1730 to 1810 (Cal BP 220 to 140) and
Cal AD 1930 to post 1950 (Cal BP 20 to post 1950)

(95% probability)

Intercept data

Intercepts of radiocarbon age
with calibration curve:
Cal AD 1670 (Cal BP 280) and
Cal AD 1780 (Cal BP 170) and
Cal AD 1800 (Cal BP 150) and
Cal AD 1950 (Cal BP 0) and
Cal AD 1950 (Cal BP 0)

1 Sigma calibrated results: (68% probability)
Cal AD 1660 to 1680 (Cal BP 290 to 270) and
Cal AD 1760 to 1770 (Cal BP 190 to 180) and
Cal AD 1780 to 1800 (Cal BP 170 to 150) and
Cal AD 1940 to post 1950 (Cal BP 10 to post 1950)

References:

Database used
INTCAL09

References to INTCAL09 database

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates


Beta Analytic Radiocarbon Dating Laboratory

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