Informing Archaeological Site Management Through Faunal Analysis: An Exercise in Applied Zooarchaeology at CA-SCR-10

A Project Report

Presented to

The Faculty of the Department of Anthropology

San Jose State University

In Partial Fulfillment

Of the Requirements for the Degree

Masters of Arts

By Angela Louise Moniz

December 2017

The Undersigned Graduate Committee Approves the Project Report Titled

Informing Archaeological Site Management Through Faunal Analysis: An Exercise in Applied Zooarchaeology at CA-SCR-10

By
Angela Louise Moniz

APPROVED FOR THE DEPARTMENT OF ANTHROPOLOGY
SAN JOSE STATE UNIVERSITY

Dr, Marco Meniketti, Department of Anthropology — 12/5/17 Date

Dr, Ana Pitchon, Department of Anthropology — 12/5/17 Date

Dr, Charlotte Sunseri, Department of Anthropology — 12/5/17 Date

Abstract

This project report describes an effort to negotiate policies regarding archaeological site management through zooarchaeological analysis. This effort is situated within the "Eightfold Path", a theoretical approach to policy evaluation established by Eugene Bardach, in which alternate management strategies are composed and then evaluated for efficiency and effectiveness based on collected evidence, such as scientific data and similar case examples, and selected criteria, such as financial impact and existing policy restrictions. This approach is especially effective when evaluating archaeological site management strategies for deteriorating archaeological sites that may have a limited assemblage to assess.

This project began by sorting and speciating both the marine invertebrate and faunal bone components of the faunal assemblage for CA-SCR-10, an archaeological site located in north Santa Cruz county. The zooarchaeological analysis and interpretation was then followed by a review of the existing policies impacting the site and identifying similar statewide cases of archaeological site management for sites attributed to non-federally recognized tribes. Management alternatives were then established and individually evaluated before final recommendations were developed.

Despite deterioration from being heavily impacted by both natural and anthropogenic effects, CA-SCR-10 still yielded useful data through a zooarchaeological analysis. The faunal component indicates CA-SCR-10 was inhabited for a prolonged period of time and populations inhabiting the site employed a wide variety of subsistence strategies tailored to each of the ecological niches present in and around CA-SCR-10. The persistence of the same suite of floral and faunal populations throughout time, as well as the variability of species found within the region, suggest CA-SCR-10 would be well suited for a variety of land use strategies. However,

the density of the faunal component, the presence of a high proportion of cultural artifacts and features support the conclusion the site should be considered significant. The project report culminates with the recommendation California State Parks files the appropriate paperwork with the California State Historic Preservation Office to designate CA-SCR-10 as culturally significant in an effort to preserve the remaining archaeological assemblage. The close association of CA-SCR-10 to highly significant sites, such as CA-SCR-7 (Sand Hill Bluff), also supports this conclusion and sets precedence for site protection within the region. This information was then drafted into a deliverable report for California State Parks in an effort to both complete the official site report and inform future plans for the management of CA-SCR-10.

Acknowledgements

This project would not have been possible without the support and guidance of several individuals. I would like to thank California State Parks District Supervisor Mark Hylkema for his years of mentorship, input and collaboration. This project could not have taken place without his confidence in my abilities and support throughout the process.

I am grateful to my committee chair, Dr. Marco Meniketti, for his guidance and attention to detail, as well as his commitment to ensuring this project was structurally sound no matter where he was in the world. Dr. Ana Pitchon, who fostered a growing interest in the interaction between policy development and scientific input, has been my sounding board for this project and helped shift the focus of the research. I am also grateful to Dr. Charlotte Sunseri, whose valued feedback and background in zooarchaeology helped me identify and narrow my research goals. I also want to acknowledge and thank the San Jose State Department of Anthropology for their support and encouragement.

I am so thankful for my family and their eternal optimism and support. The culmination of this project included several long, sleepless nights and a vast, "organized" chaos throughout our home. Without their enduring patience, I probably would have given up long ago. Lastly, this project is dedicated to the Amah Mutsun Tribal Band, whose openness and encouragement of research into their history is both unique and collaborative in the best possible way. I hope this project in its own way can contribute to the Tribe's efforts to restore its recognized status and develop a deeper understanding of their connection to the central coast landscape.

The Undersigned Graduate Committee Approves the Project Report Titled

Informing Archaeological Site Management Through Faunal Analysis: An Exercise in Applied Zooarchaeology at CA-SCR-10

By
Angela Louise Moniz

APPROVED FOR THE DEPARTMENT OF ANTHROPOLOGY
SAN JOSE STATE UNIVERSITY

Dr, Marco Meniketti, Department of Anthropology Date

Dr, Ana Pitchon, Department of Anthropology Date

Dr, Charlotte Sunseri, Department of Anthropology Date

TABLE OF CONTENTS

Chapter	Page No.
List of Figures	ix
List of Tables	ix
Chapter 1: Introduction and Project Overview	1
Chapter 2: Contextual Information	10
CA-SCR-10 History	10
Central Coast Historical Ecology	13
Archaeological History	16
Muwekma Ethnohistoric Narrative	19
Contemporary Connections	26
Chapter 3: Zooarchaeology Background	27
Theoretical Frameworks	28
Chapter 4: Methods	34
General Zooarch Methods	34
Methods Employed in this Project	36
Chapter 5: Zooarchaeological Analysis Results	40
Chapter 6: Zooarchaeological Interpretations	54
Chapter 7: Policy Analysis	64
Identifying the Problem	65
Evidence Review	67

Management Alternatives, Outcomes and Trade-offs……………......……..78

Selected Criteria…………………………………………..………………82

Final Recommendations…………………………….....…….………..83

Chapter 8: Conclusion…………………………………………………………84

Bibliography…………………………………………….....…………………89

Appendix A: CA State Parks Files …………………………..…………….....……101

Appendix B: Zooarchaeological Analysis Data……..………………………………131

Appendix C: Project Deliverable…………………………………....…………158

List of Figures

Fig 1. Map of CA-SCR-10……………………………….…………………………6

Fig. 2 Overview of CA-SCR-10………………………………………………………11

Fig. 3 Amah Mutsun historical territory………………………………..……………..21

Fig. 4 Modified *Odocoileus hemionus* fragment…………………………….……..…52

Fig. 5 Graph of estimated annual resource availability at CA-SCR-10…………...……..60

Fig. 6 Map demonstrating the extent of Wilder Ranch State Park……………………….79

List of Tables

Table 1: Chronological cultural scheme for the central coast……………………….……17

Table 2: Marine invertebrates by unit depth…………………………………..……..41

Table 3: Taxonomic NISP and MNI………..……………………………………..46

Table 4: Proportion of modification types…………………………………………………50

Table 5: Proportion of modifications by taxonomic class…….……………………...51

Table 6: NISP by skeletal element…………………………….…………………...53

Table 7: Federal laws CA-SCR-10 management is subject to…………….…………………..69

Table 8: State laws CA-SCR-10 management is subject to………………………………...70

Table 9: City of Santa Cruz ordinances CA-SCR-10 management is subject to………...…71

Chapter 1

Introduction and Project Overview

Introduction

This project seeks to set an example of how the application of zooarchaeological analysis can elicit pertinent data from highly disrupted archaeological sites to aid stakeholders determining the best approach to policy development and archaeological site managing. When forming policy recommendations, especially policy impacting locations with archaeological sites, lawmakers should take as much evidence into consideration as possible. The process of policy evaluation should include gathering information on the region's diachronic cultural sequence, ecological history, and existing policy regulations surrounding management of "significant" archaeological sites. For most archaeological sites, the analysis of human remains often becomes the predominant source of evidence considered when developing policy recommendations. When such analysis is not possible, either by external limitations or restrictions against disturbing Native burials, zooarchaeology, along with an analysis of the cultural artifacts recovered from sites, can highlight the same relationships, ecological background, and significance of a site.

A sub-discipline of archaeology, zooarchaeology is the study of animal remains excavated from archaeological sites from all periods of human history (Grayson 1973:432). Zooarchaeologists analyze recovered animal bone, hair, chitin, scales, DNA and shell to develop inferences about past human behaviors and relationships with specific environments. Conclusions drawn from looking at the faunal and artifact contribution to an archaeological context can reflect similar information obtained from the analysis of human remains, such as subsistence strategies, periods of over-intensification of resources, shifts in dietary choices, possible intermingling and migration of cultures and environmental interactions between a landscape and groups of individuals. By enabling zooarchaeology to assume a larger role in providing evidence for policy decision-making, anthropologists, government officials, and developers can demonstrate to Native American tribes the consideration and respect for their ancestry.

While it is relatively easy in California to come across evidence of pre-colonial occupation, it is much more difficult to interpret how the landscape was utilized, manipulated and changed over time. Zooarchaeological analyses of pre-contact sites in California have the potential to answer key questions about past population changes and have implications for future urban development and preservation projects. Methods drawn from zooarchaeological analysis, as well as archaeology, ecology, and history, can shed light on problematic sites deteriorating with age, exposure and limited access. Specifically, applied zooarchaeology has proven useful in such contexts as wildlife management and environmental impact assessments. "Applied zooarchaeology" is a term that references the broad application of zooarchaeological methodological approaches and insights to problems that affect both present-day and future societies. Understanding pre-contact land management strategies through zooarchaeological analysis, paleoethnobotanical studies, and ethnohistoric documentation have helped establish programs between Native communities and land/wildlife managers. Groups including the California Indian Basketweavers Association, the Native American Traditional Plant Coalition, The Native American Fish and Wildlife Society, and the National Tribal Environmental Council all draw upon historic accounts of Native traditional land and wildlife management strategies to form partnerships with state and national agencies developing environmental policies (Diekman et al. 2007:49).

As California state legislation moves closer to awarding non-federally recognized tribes the same rights as federally-recognized tribes, archaeologists will need to adapt their research and project designs to accommodate new restrictions. With the enactment of California Environmental Quality Act bill AB52, SB18 and existing Native American Heritage Commission statutes 5097.99 and 5097.991, archaeological sites, as well as culturally significant landscapes attributed to non-federally recognized tribes, are currently subject to regulations mirroring the Native American Graves and Repatriation Act and give consultation rights to non-recognized tribes (Senate 2014). Additionally, agencies including California (CA) State Parks and the Bureau of Land Management (BLM) actively recognize small, non-recognized tribes and issue the same permits for the collection of cultural materials as federally-recognized tribes.

In 2016, BLM successfully achieved National Monument recognition for 5800 acres known as 'Cotoni-Coast Dairies'. In May of 2016, BLM and the Amah Mutsun Tribal Band, one of the many non-federally recognized Muwekma Ohlone Tribal groups, signed a Memorandum of Understanding (MOU) granting the Tribe, and only Tribal members, access to Cotoni-Coast Dairies as a cultural preserve. The MOU is significant, as it marks the first time BLM has publically and legally partnered with a non-recognized tribe to manage an ecological zone and grant permission to that tribe to perpetuate traditional cultural practices, as well as exclusively protecting their sacred sites and burials located within the reserve. While partnerships like the one blossoming between the Amah Mutsun Tribal Band and BLM are groundbreaking, they can ultimately restrict the amount of work and information one can extract from a site once Native remains have been discovered. Utilizing zooarchaeological analysis, archaeologists can navigate around these new restrictions and still develop a well-rounded interpretation of sites across a landscape. Just as in wildlife management and environmental assessment, these zooarchaeological reports can be utilized to inform policy decisions.

Project Overview: Goals

This project was conceived while I was working for CA State Parks as a volunteer lab technician. Here I learned about “problematic” sites, or archaeological sites subject to the effects of time, weathering and human encroachment, where potential data, not just for academic purposes but for the Tribe’s benefit, is lost every day. The management of deteriorating archaeological sites seems simple superficially, but as tribes regain more sovereignty, these sites become entangled in a complex discourse on significance, access, and management strategy. This project began with the goal of working towards completing the documentation of CA-SCR-10, but also sets out to establish the usefulness of less-invasive analyses, such as zooarchaeological summaries, and the way this information can still inform policy recommendations without the need to disrupt any human remains found within sites. While this project is just a case example to demonstrate the need and usefulness of incorporating applied zooarchaeology into development and management policy formation, I hope it signifies a shift in the typical paradigm that exists between developers, Native Americans and landscape management strategy.

Lastly, this project aims to establish the importance of “problematic” sites, such as CA-SCR-10, which are subject to several variables that reduce the integrity of the data that can be extracted. Like many coastal sites throughout the world, CA-SCR-10 is not immune to the effects of time, weathering, and disruption by faunal and human populations.

Project Overview: Case Study Site

This project concentrates on CA-SCR-10 as a case example. CA-SCR-10 is a shell mound located roughly six miles north of Santa Cruz on the border of Wilder Ranch State Park CA-SCR-10 is also about half a mile east of the coastal cliffs, and a mile from CA-SCR-7 (Sand Hill Bluff), which is now a National Monument (See Fig.1). As of 2017, the site is located on property managed by CA State Parks, but is currently leased to a local farmer. Along with destruction from plowing, CA-SCR-10 has been victim to intensive collection by the general public for several years. Some of the surface collection for the site at CA State Parks has been turned over by individuals who frequently collected items from the site to the CA State Parks district office, but no current ranger patrol regularly monitors or manages the site to prevent future occurrences of such activity. Extensive, undocumented collection from CA-SCR-10 strips any returned artifacts of their contextual information, and while important to still preserve, the artifacts can no longer speak to the cultural timeline at the site.

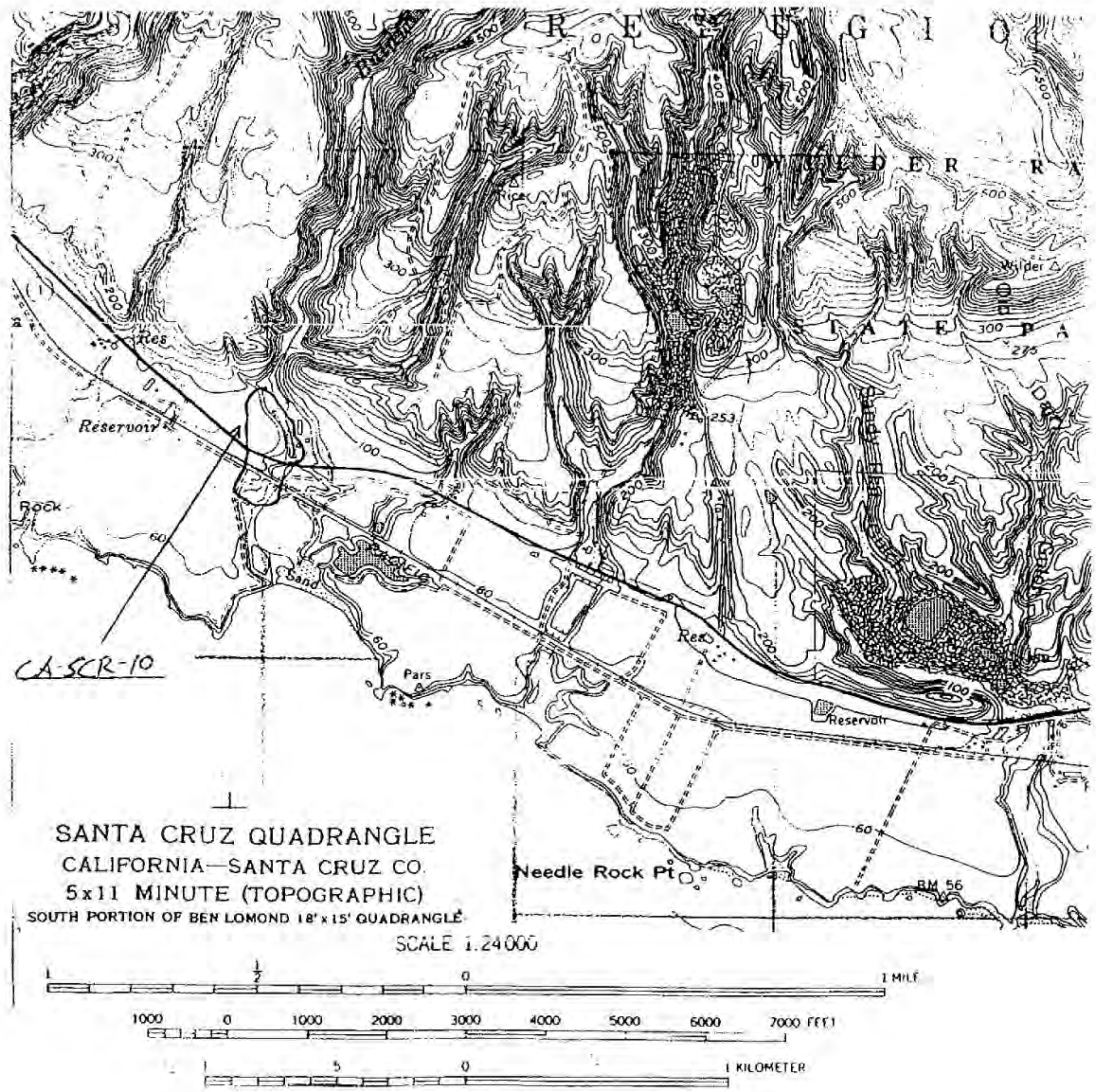


Fig 1. USGS Quadrangle of northern Santa Cruz County demonstrating the location of CA-SCR-10 (Adapted from CASP 2008).

CA-SCR-10 can also be considered a problematic site based on the infrastructure developments that have historically transected and disrupted the site. In 1934, the construction of Highway One, running from Los Angeles to San Francisco, transected the center of the shell mound. CA State Park files on the region indicate no artifacts or documentation of the site until June 25, 2002 (CA State Park files). Additionally, the city of Santa Cruz constructed a pipeline to funnel water from Laguna Creek to supplement water sourced from Loch Lomond and the San Lorenzo River (SC Water Department 2017). The Laguna Creek pipeline spans twelve miles, and runs through CA-SCR-10 parallel to Highway One (SC Water Department 2017). First established in the 1890's, the Laguna Creek pipeline was improved upon in the 1980's, further impacting CA-SCR-10. While development has not yet been approved, the city of Santa Cruz is currently looking to again upgrade the pipeline, which may include relocating the entire pipeline to the western side of Highway One through the half of CA-SCR-10 that has lost its integrity. Without immediate analysis and protection, CA-SCR-10 will continue to degrade until it can no longer yield viable information.

Project Overview: Methodology

Since most of the central coast between Año Nuevo and Monterey is often excluded in discussions regarding settlement mobility and cultural interaction (Arnold et al. 2004; Codding et al. 2012; Hildebrandt and McGuire 2012; Jones and Waugh 1997; Porcasi 2011), it is important to analyze each site in the context of the existing proposed cultural sequence. Without rigorous investigation within the varying ecotones along the coast, a uniform, blanketed interpretation is applied in localities where unique behaviors may have been occurring. While the California coast is typified by a suite of similar floral and faunal populations, they are not identical; species inhabiting steep, rocky sea cliffs are not going to also be located within muddy marshland environments (Reitz and Wing 2010:89). Additionally, pre-contact cultures were highly unlikely to engage in identical methods of resource acquisition and settlement as the availability of the resources in each ecotone would vary (Reitz and Wing 2010:257). A thorough zooarchaeological analysis of CA-SCR-10 will not only reveal dietary habits and expand the discourse on the proposed central coast cultural sequence, but can also expand the historical ecological knowledge of Santa Cruz County, making the data produced in this project applicable in many disciplines. Additionally, when research reconstructing diet and associated settlement patterns is conducted, there seems to be little forethought as to the ways that research can affect developmental policy and elicit changes in contemporary society.

Once the faunal analysis is completed, I then reviewed what policies are currently in place regarding the land CA-SCR-10 is located on, how agencies such as CA State Parks and BLM are currently addressing development and archaeological sites, and what policies the County of Santa Cruz has regarding this land, archaeological sites in general and the potential relocation of a major water pipeline which transects the site. Before making my recommendations for the site's handling, I searched for similar cases in which zooarchaeological analysis has been utilized to shape and develop policies. The data produced in this project will eventually become part of the CA State Parks permanent site report, as well as incorporated into research currently in progress by UC Berkeley students.

Policy evaluation and recommendation in this report is based upon the "Eightfold Path" approach outlined by Eugene Bardach. I selected this model because it provides an opportunity for non-traditional evidence, such as zooarchaeological reports, to be incorporated as evidence. The process began by first defining the problem and then assembling evidence, thus providing an opportunity to incorporate ecological, archaeological and historical information into the evaluation process. (Bardach 2012:xvi). "Evidence" in this context includes research into existing policy, evolving state policies, relationships between stakeholders and what the zooarchaeological analysis tells us about CA-SCR-10's significance, such as emergent cultural patterns and the region's ecological profile. I then followed this step by constructing possible alternatives, where I used the evidence I gathered to develop different recommendations for the management of CA-SCR-10. Some recommendations were developed to benefit specific stakeholders while some focused on the preservation of CA-SCR-10's cultural integrity. Once the alternatives were produced, I then selected the criteria necessary to reduce the recommendation options. This can include legal contexts, precedence/similar cases, and pending legislation. From this point, I then discussed the projected outcomes and trade-offs associated with each recommendation option. The process culminated with the selection of the policy recommendations that best fit the stakeholders and evidence collected. Ultimately, this plan will be shared with the CA State Parks District Supervisor when the zooarchaeological report is submitted.

Chapter 2

Contextual Information

CA-SCR-10 Background

In 2008, CA State Parks partnered with the Cabrillo College Archaeological Technician Program to excavate both CA-SCR-7 (Sand Hill Bluff) and CA-SCR-10. Surface finds included complete manos and pestles, consistent with the Millingstone period in Santa Cruz County (CA State Parks files). Three units were excavated at CA-SCR-10, with unit one oriented to the west, closest to Highway One (See Fig. 2). Unit two was located to the south along the Wilder Ranch border and unit three was situated northeast of unit two. All three units were situated within the field access road and exhibited signs of compaction, heavy plowing and intrusions from roots and rodents (CA State Park files). Both units one and three yielded minimal material before being closed at 70 centimeters (cm)-a depth at which the farmer's plow clearly impacted. Field notes from students list historical plastic and minimal amounts of shell and chert debitage as the artifacts recovered from these two sites (CA State Parks files). "Debitage" in archaeological contexts refers to the leftover lithic material resulting from the production of stone tools and implements (Sullivan and Rozen 1985:755).

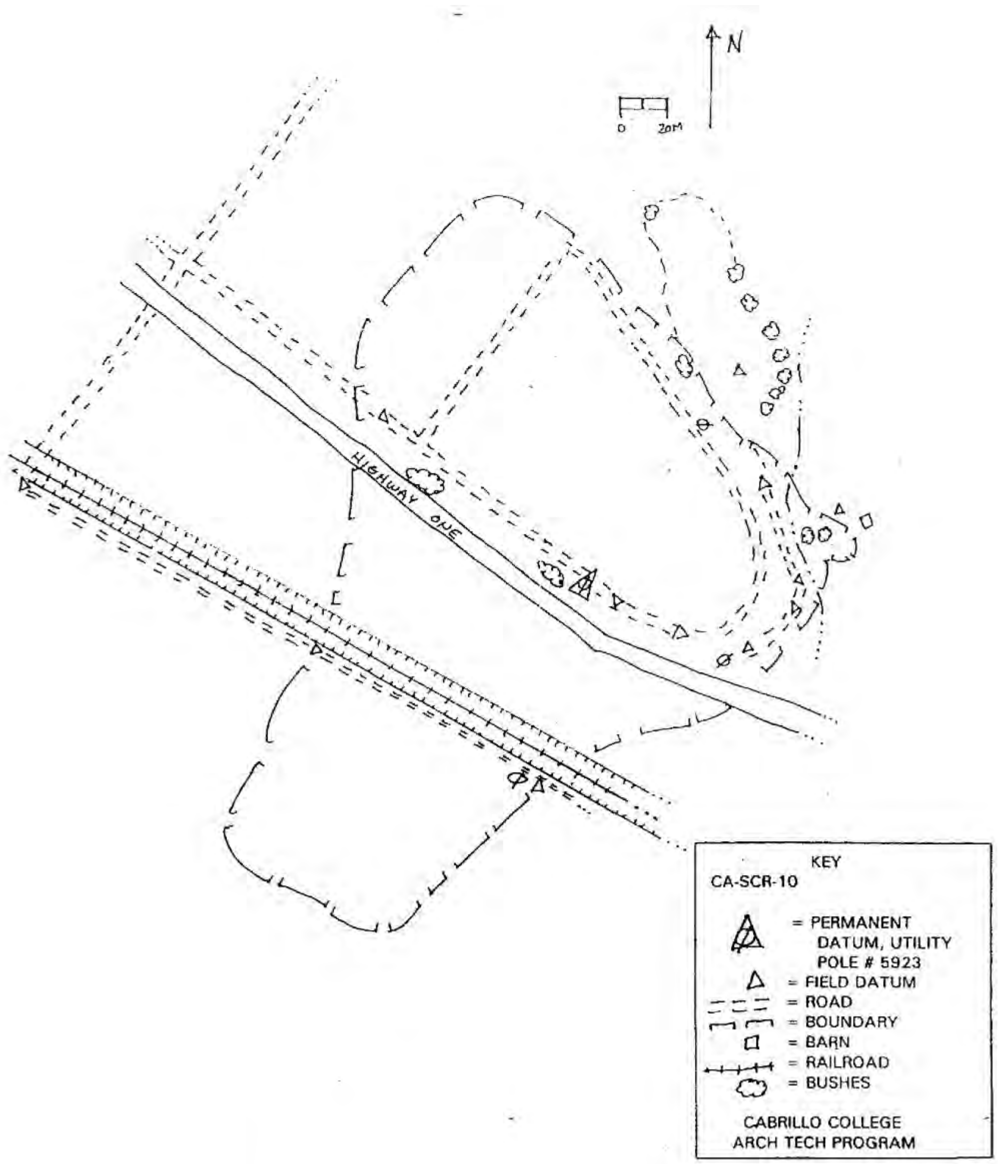


Fig. 2: Overview of CA-SCR-10, drawn by students from Cabrillo College in 2008 (Adapted from CASP 2008).

However, the assemblage recovered from unit two consisted of a dense shellfish component, with small faunal bone fragments, debitage and human remains- evidence this particular site was used as a burial mound by the Amah Mutsun. Unit two was rerouted to the south at 90 cm upon the discovery of human remains (see Appendix A). Three possible hearth features were identified in unit two alone, with the most extensive feature uncovered at 120 cm in a heavy matrix consisting of cracked rock, ash, charcoal and burned faunal bone, suggesting prehistoric subsidence living was occurring on the mound (see Appendix A). Existing radiocarbon dates tested by CA State Parks indicate the temporal range is between 3500 +/- 30 BP and 4020 +/-30 BP (see Appendix A). This could be the result of averaging older and younger shell fragments or due to a very limited temporal range indicating short-term occupation with highly intensive shellfish processing, and are typical for Early Period shell middens on the central coast where bioturbation often results in nearly uniform radiocarbon dates (Breschini and Haversat 2011:9).

CA-SCR-10 provides an interesting test case for the application of zooarchaeology to policy development because it appears simple but is truly complex in its stakeholder composition. The site is owned by CA State Parks, privately leased to a farmer, bordered by a cultural preserve between BLM and the Amah Mutsun Tribal Band, and is transected by one of the County's main resource connections and a major highway. This establishes a complex network of stakeholders that identify the property CA-SCR-10 is situated on through different contexts and usage strategies. The presence of human remains within a dense assemblage of archaeofaunal and intact cultural items hints at the site's significance and thus its potential controversy. Additional cooperative work between academic entities, such as UC Berkeley, and the various stakeholders previously discussed, will need to continue to identify and protect significant sites as this region continues to grow and push into the surrounding open space.

Historical Ecology of the Central Coast

To fully interpret resource intensification strategies employed by pre-contact societies on the California coast, one must understand the historical ecology in the region and how it shaped the resources these pre-contact cultures would have found attractive. Fluctuations between climate and sea level determine whether a region of coastline is rocky with a kelp forest or a much sandier environment, thus impacting availability and selectivity of resources by hunter-gatherer populations (Masters 2010: 38). The Santa Cruz coastal shelf is characterized by relatively young uplift that created the Santa Cruz Mountain Range (Masters 2010:49). This section of coastline was greatly affected by exposure to wave energy, erosion and fluvial deposits due to mountain runoff, refraction of waves into the Monterey Bay and tectonic action. Uniquely, the high amount of seismic activity cut channels into the bedrock of the sea floor, providing natural pathways for marine fauna to migrate through (Masters 2010:50). These "paleochannels" are at their widest roughly four kilometers offshore but would have drawn various marine mammals, such as whale and seal species, close to shore or at least within a range easily accessible by boat.

California is often described as "the most topographically, climatically, and ecologically heterogeneous state in the country" despite the complex paleogeography that has shaped the state (West et al. 2010:11). Since the Last Glacial Maximum, the state has been comprised of a multitude of regional climates, which in turn is further comprised of microclimates that diversify the flora and fauna associated with each region (West et al. 2010:11). Effects from the Pacific Ocean lessen seasonal variability, ultimately promoting a cohesive ecological suite of features associated with the specific regions along the central coast. California's climate is comparable to the Mediterranean, with wet winters, dry summers, relatively stable temperatures and higher disjuncture between seasonal temperatures occurring in regions of greater or lesser elevation than the central coast (West et al. 2010:11). These predictable seasons affect the geochemical composition of sediment, freshwater sources, vegetation, and oceans. This predictability creates measurable differences between the carbon and oxygen ratios in the calcium carbonate of seashells, allowing archaeologists to determine seasonality and settlement patterns through stable isotope analysis (Pew et al. 2013:171).

Seasonal precipitation on the central coast has led to the development of unique vegetation types capable of coping with extended droughts. Floral species along the coast are equipped to extract moisture from the regular blanketing of fog that runs the length of most of the state's coastline, including some introduced species such as *Carpobrotus edulis*, commonly known as Ice Plant, a South African native species introduced at varying periods throughout California's history (CAL-IPC 2015). Proxy vegetation records such as pollen or macrofossils recovered from marsh and lacustrine environments, tree ring or dendrochronology analyses and even pack rat middens have painted an image of coastal California as a mosaic of environments, not identical to each other, with shifting floral composition and distribution (West et al 2010:13).

Most information regarding faunal populations from mid-late Holocene comes from archaeological investigations and zoological reference. Despite the high variability in sea surface temperature, coastline properties and the terrestrial ecology of each region, much of the faunal population along the central coast was, and remains, relatively the same as it is today (Erlandson 2012:23). The "Kelp Highway" hypothesis theorizes the North Pacific shorelines, from Japan to Baja California, facilitated migration of maritime peoples taking advantage of similar environments, and resources along the journey around 16,000 BP, few obstacles would have existed preventing a linear coastal route of migration (Erlandson 2012:23). The multitude of estuaries created along California around this migratory period would have served as extremely productive “sweet spots” to harvest a wide variety of resources in the shallows, protected kelp forests and coastal terraces.

Archaeological assemblages in various regions along the central coast have included tools, such as a pry for shellfish harvesting, constructed from whale ribs and scapulae, but little evidence supports active whale hunting along the central coast (Jones 2002:68). Pelagic and freshwater fish would also have been abundantly available, and included species still harvested today such as anchovies (Engraulidae), sardines and herring (Clupidae), halibut (Pleuronectidae), salmon (Salmonidae), rockfish (Sebastidae), stingrays (Myliobatidae and Dasyatididae), and sharks (Lamnidae). Terrestrial mammals were also an important contributor to pre-contact dietary and cultural needs. Terrestrial faunal populations have historically been subject to compositional change at a higher rate than marine mammals. This is due to a combination of changes “in plant communities, introduction of foreign animal species [through colonization], excessive hunting and deliberate extermination,” ultimately altering native terrestrial taxa (Gifford and Marshall 1984:9). Coastal pre-contact societies primarily targeted large species such as mule deer (*Odocoileus hemionus*), but additionally included pronghorn antelope (*Antilocapra americana*), now only found in northeast California and the Sierra Nevada Mountains, as well as tule elk (*Cervus canadensis nannodes*). Smaller terrestrial species found in archaeological assemblages include coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), grey fox (*Urocyon cinereoagenteus*), black bear (*Ursus americanus*), raccoon (*Procyon lotor),* vole (*Microtus californicus*) and pocket gopher (*Thomomys talpoides*). It should also be noted Pacific Grizzly Bear (*Ursus arctos* *californicus*) was formerly abundant in California, but was hunted to extinction in 1924 (Sides 2014:36).

Archaeological Interpretations

Archaeological phases on the California coast are organized into discrete categories associated with specific cultural features. These categories have been redefined and developed based upon the recognition and organization of shell bead and ornaments recovered from radiocarbon-dated sites (Hylkema 1991; Fredrickson 1974; King 1981). The most widely accepted chronological scheme, the Central California Taxonomic System (CCTS), is based on a cultural model first proposed in the 1930's (Beardsley 1948; Heizer and Fenenga 1939). The cultural sequence was sectioned into three primary periods: Early, Transitional (which later became Middle), and Late. Chronological determinations were based upon mortuary practices and associated artifact typologies, such as shell bead and ornament styles. As research into the central coast region progressed, the chronological model was further refined and divided into more discrete sub-periods (Beardsley 1948; Heizer and Fenenga 1939). As processual archaeological theory developed in the 1960's, archaeologists recognized the CCTS's shortcomings when placing local variation within a set chronological model. Along with the implementation of radiocarbon dating and obsidian hydration, archaeologists established new parameters for incorporating sub-regional variation, including the "Archaic/Emergent" chronology (Beardsley 1948; Bennyhoff and Heizer 1958; Bennyhoff and Hughes 1987; Fredrickson 1974; Milliken and Bennyhoff 1993). The primary chronological divisions include: the Early Holocene (10,000-5500 B.P.), the Early Period (5450-2450 B.P.), the Lower Middle Period (2450-1520 B.P.), the Upper Middle Period (1520-900 B.P.), the Late Period (900-400

B.P.) and the Terminal Late Period (400 B.P.-Contact; Lightfoot 1997; Milliken et al. 2007; Wiberg 1996). Table 1 illustrates the CCTS and the embedded chronological schemes employed by central coast archaeologists. Contemporary archaeological research on the central coast generally incorporates a hybridization of at least two of the schemes outlined.

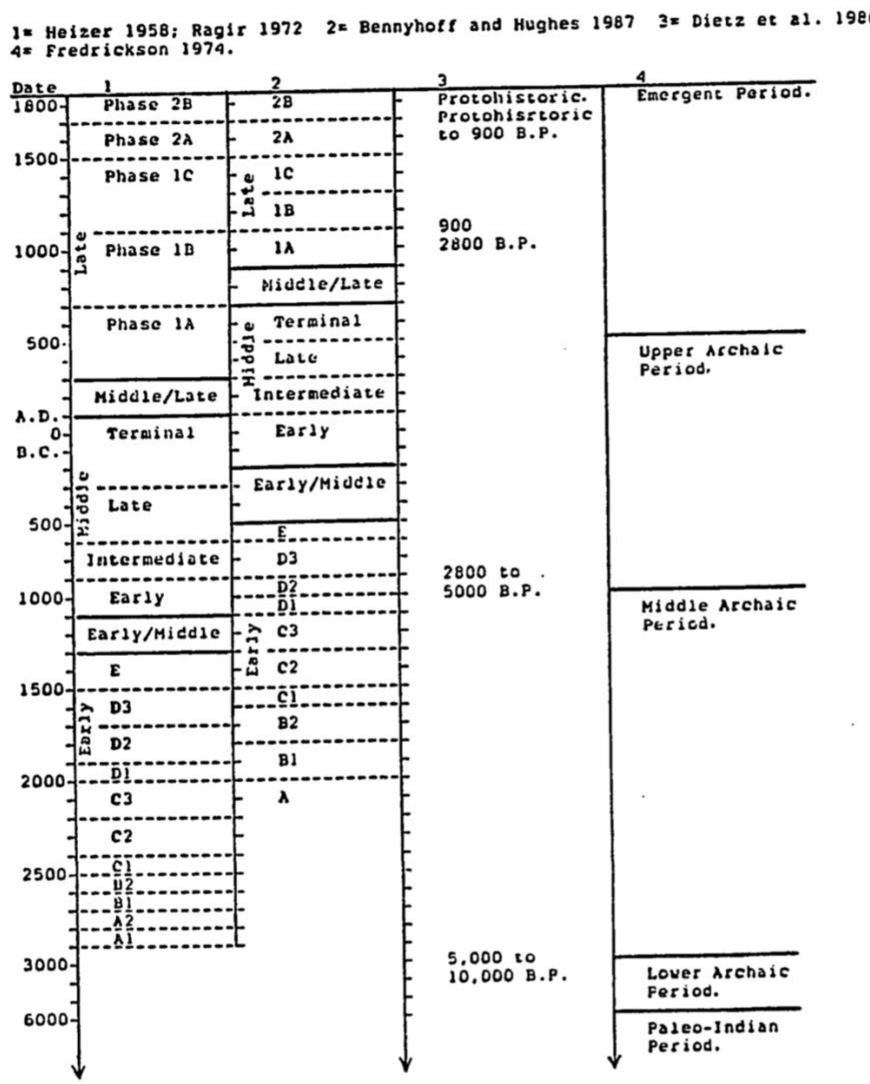


Table 1. Chronological cultural schemes employed on the central coast (Adapted from Hylkema 1991:19).

While the earliest Californians are believed to have reached the southern coast around 20,000 B.P., archaeological site in Scott's Valley places the earliest occupation in the Santa Cruz region between 13,500 B.P. and 11,500 B.P. (Cartier 1993:243). Coastal archaeological assemblages are often characterized by large shell fragment mounds that served multiple purposes. Some mounds were utilized as processing sites for tool, decoration and Olivella shell bead manufacturing. Some mounds contain evidence of habitation, and appear to have played a major role in burial practices as human remains are almost always recovered from mounds in context with burial goods such as milling stone tools or Olivella and abalone jewelry (Erlandson et al 2011:1182).

Middle Period sites tend to be larger than Early Period and Paleoindian sites, indicating a shift in subsistence strategy to stable, localized resources, as well as the establishment of trade routes with neighboring communities (Ryan 1980). Groups settling in the Santa Cruz region during this period appear to have adjusted to a diet more reliant upon marine resources, both from the accessible coastline and the various streams and estuaries along the coastal terrace. Seasonal occupation of sites appears to correspond to the harvest season for targeted resources; groups moved between established sites in order to take advantage of both inland resources, such as acorns during the fall, and coastal resources, including marine invertebrates which generally conclude their peak growth season at the onset of winter (Giribet 2008:116). Mary Ellen Ryan asserts this seasonal camping preference was echoed by later, historic period settlers who targeted the same seasonal resources and geographical features (1980).

The Middle Period was followed by the Late Period, characterized by rapid population expansion stemming from the stability of the regional environment and resources, and terminating with the Spanish colonization of California. Groups were becoming more sedentary as diffusion of storage and processing techniques for acorns, a staple in the diet of Pre-contact Native population diets, reduced the need to seasonally move for resource acquisition (Ryan 1980). The increased presence of Millingstone tools, such as mortars and pestles, in late Middle Period and Late Period archaeological assemblages, coincides with the theory seasonal relocation diminished in favor of a slightly more sedentary settlement pattern (Breschini 1981:4; Hylkema 1991:26). Internal social stratification and socio-political complexity of groups during the Late Period is reflected by the increased presence of cemetery assemblages. The relative importance of an individual can often be inferred by the association of grave goods with certain burials (Monroe 2014:45). Accumulation of goods within a burial implies an individual within the group had achieved wealth and/or notable social status as common grave goods included strings of shell beads and ornaments, often utilized as currency (Monroe 2014: 46; Margolin 1978). Additionally, grave goods signify wealth/status as other individuals within a group would have taken the time to carefully place these artifacts within specific locations in the burial (Monroe 2014:46; Margolin 1978). Later Muwekma burials during the eighteenth century were observed to also be demarcated by poles from which personal goods were hung, such as shell ornaments, lithic implements and grass skirts (Monroe 2014:47).

Muwekma Ethnohistoric Narrative

Distinguishing tribal populations within the central coast is generally based upon the linguistic evolution and geographic distribution of the region. Around 4000 B.P, Utian-speaking groups from the Sacramento Delta region of the San Joaquin Valley began expanding their territory west towards the region now referred to as the “East Bay” (Monroe 2104:34; Breschini

1983; Breschini and Haversat 1997). The emergence of unique, regional dialects, such as the Berkeley Pattern, reflect fusion of older linguistic patterns and Utian from the incoming eastern populations (Monroe 2014:34; Breschini 1983; Breschini and Haversat 1997). Population increases helped fuel the spread of Utian dialects, displacing older Hokan-speaking groups and ultimately reaching the Monterey Bay by approximately 2450 B.P. (Breschini and Haversat 1997:133). Linguistic distinctions would have been difficult to make, and boundaries between different linguistic groups most likely varied due to exchange patterns and marriage arrangements rather than prescribed territorial ranges (Hylkema 1991:51).

What is known of coastal Native populations is primarily derived from the historical narratives composed by early European explorers and mission records. The earliest explorers of the central coast region, including Spanish explorer Gaspar de Portola, who first arrived in the Monterey Bay in 1769, referred to the Native populations they encountered as “Costaños”, or coastal people (Hylkema 1991:51). Although Costanoan (Muwekma) populations spoke eight distinct dialects (Karkin, Ramaytush, Chochenyo (aka Chocheño), Tamyen, Awaswas, Mutsun, Rumsen, and Chalon), missionaries and early ethnographers did not distinguish these linguistic groups but rather referred to each population by the mission they were later assigned to (Hylkema 1991:52). Randall Milliken argues that because documentation of distinct dialects was not noted by missionaries and ethnographers, the geographical distribution and quantity of Muwekma languages may be the result of the missionization process and therefore a historical phenomenon (1995; Monroe 2014:35). Additionally, the reciprocal may have occurred; the process of missionization and assimilation may have resulted in the loss of additional dialects (Monroe 2014:35).

The Amah Mutsun Tribal Band, one of the tribes/tribal bands comprising the Muwekma Ohlone Tribe, was drawn to the central coast due to its unique geographical shape and the special environment it created. Traditional Amah Mutsun territory included regions of Santa Cruz County, Monterey County, and San Benito County. The geography of the San Juan Valley isolated the Amah Mutsun from neighboring tribes, and thus internal variability arose within the tribal band, identified by shared religious, hunting, and craftsmanship practices (AMTB 2017). Primary Amah Mutsun linguistic groups included the Awaswas, Mutsun, and Chalon, as well as overlap with the Esselen and Rumsen Tribes. Figure 3 illustrates territorial boundaries between Amah Mutsun linguistic groups and other neighboring Native populations.

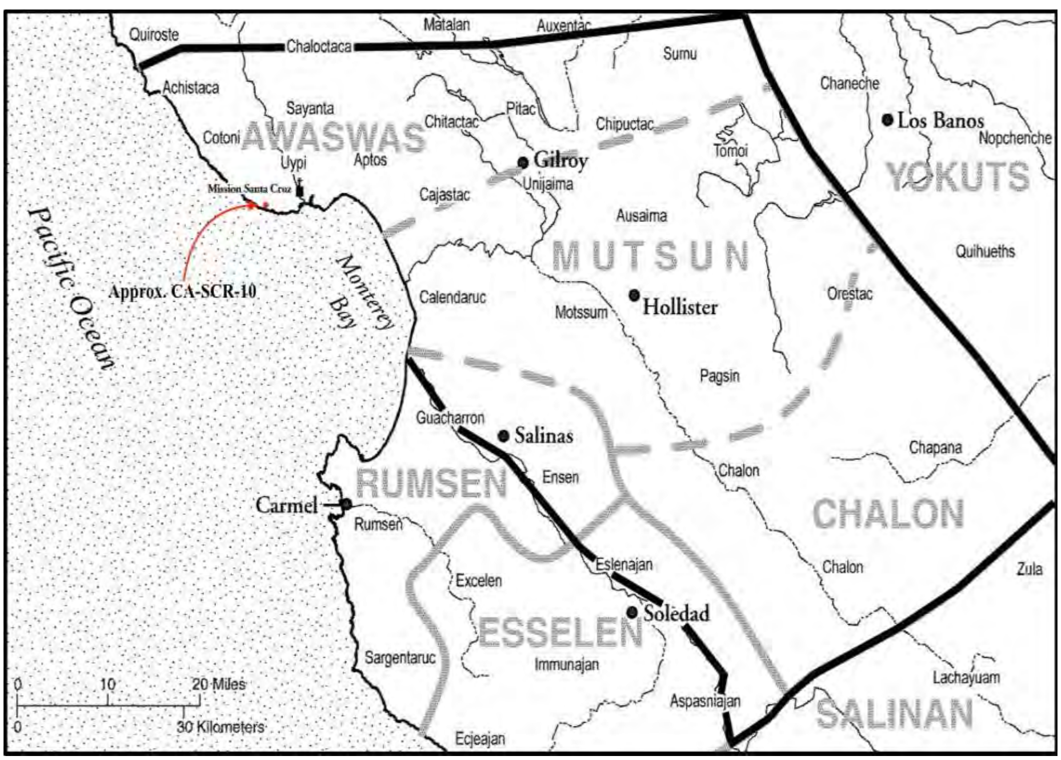


Fig. 3 This map illustrates the linguistic territorial boundaries of the Amah Mutsun Tribal Band and neighboring groups. This project's study site, CA-SCR-10, is demarcated in red (Adapted from AMTB 2017).

Muwekma villages were described by the European explorers in great detail. Villages were comprised of "dome-shaped, reed-covered houses with an assortment of granary structures (Ryan 1980). Work shelters, a centrally-located meeting house and sweathouses were also documented (Ryan 1980). According to Spanish accounts, the estimated Native population was overall around 10,000, with village populations ranging between 50 and 300 people (Hylkema 1991:53; Jones et al. 2007:128). Alfred Kroeber defines the primary socio-political unit on the central coast as "tribelet," with the region of the central coast north of Monterey through San Francisco heavily culturally intertwined-essentially preventing one particular culture from dominating and defining the region (Hylkema 1991:52; Jones et al. 2007:143). Each Tribelet was politically autonomous, and membership within the Tribelet was contingent upon an individual's ability to demonstrate common ancestry. Milliken et al. assert that although Muwekma Tribelets were politically autonomous, regional communities would sometimes band together to form a single political unit, a strategy benefiting localized raiding and defense (2007; Monroe 2014:40). Much like linguistic data, information regarding Muwekma descent systems was not documented in mission records and ethnographic accounts. Post-mission era ethnographic evidence describes the Muwekma as patrilineal and exogamous, with polygamy only practiced by chiefs or high status Tribelet members (Levy 1978:468).

Ethnohistoric records describe Tribelet occupation as seasonal, with a sedentary lifestyle at a central village and smaller periphery occupation occurring in villages abandoned for a portion of the year (Hylkema 1991:53; Jones et al. 2007:129). Tribelets employed a forager/collector subsistence strategy, pursuing resources such as acorns, grass seeds, buckeye nuts, berries, terrestrial game shellfish and anadromous fish were targeted (Hylkema 1991:59; Jones et al. 2007:129). This also coincided with major landscape management efforts such as controlled burning of vegetation in order to promote new growth of the grasses eaten by prey animals (Hylkema 1991:59; Lightfoot et al. 2013:11). Muwekma Tribelets demonstrated a deep understanding of their surrounding environment and often took advantage of the natural landscape to facilitate resource acquisition. For example, acorns were central to the Muwekma diet as they provided an easily accessed and stored source of protein. The processing of acorns commonly occurred near oak groves, but also along natural rock outcroppings where mortars for grinding acorns into a fine powder could be shaped (Ryan 1980). Open coastal prairie meadows were specifically dedicated to trap and snare rabbits (*Lepus* sp.), ridges and canyons were used to establish trails for hunting and regions where specific grasses grew, such as estuaries, were preserved for the production of cultural materials, such as grass skirts and baskets (Ryan 1980). The wide diet breadth of the Muwekma Tribelets is reflected by the multitude of hunting implements employed, although the most intensively exploited resources included shellfish and terrestrial game. These hunting implements included nets constructed from dune grasses, bows and arrows, lances, snares, weirs and other tools (Hylkema 1991:61; Jones et al. 2007:139). While broad-spectrum hunting was clearly employed, the sheer dominance of shellfish in coastal sites indicates an exceptionally high reliance upon marine resources. The volume of available shellfish, perhaps combined with landscape management and intentional cultivation of marine resources, may have reduced the need to pursue large game on a regular basis.

Following the establishment of the Mission San Francisco de Asis in 1776 and Mission Santa Clara de Tamien in1777, Father Fermin Lasuen established Mission Santa Cruz in 1791 (Hylkema 1991:51). Mission San Juan Bautista followed, built two decades later in 1797. In

1796, shortly after the establishment of Mission Santa Cruz, Captain Pere d'Alberni founded a small village along the eastern embankment of the San Lorenzo River (Ryan 1980). Honoring the viceroy of New Spain at the time, Miguel de la Grua Talamanca Branciforte, the growing town was named Villa Branciforte, and later merged with the nearby mission to form the predecessor to Santa Cruz (Ryan 1980). Many archaeological studies have investigated the nature of mission life for Native communities forcibly assigned to missions and their associated pueblos. Such studies include cultural assessments of the erosion of indigenous identities, the persistence and resistance of Native groups, as well as the effects of disease and extreme labor conditions upon Native communities both within and around missions.

By the 1820s, Mexico had gained control of what would become the California territory. A little over a decade later in the mid-1930's, the Mexican government began the process of closing missions and dividing the land formerly associated with each mission (Field et al. 1992: 416). As a method of encouraging settlement by Spanish or Mexican individuals, both the Spanish and Mexican governments granted large tracts of open and former mission-controlled land to non-Native "Californos" (Field et al. 1992:424). These land tracts were described as "ranchos", where land owners raised livestock such as cattle and sheep, and hired "vaqueros", or missionized Natives (Field et al. 1992:424). Californios continued the pattern of controlling behaviors established by missions. Small enclaves of Native groups resisted the Californio's continuation of mission by establishing small refuges between rancho boundaries (Field et al. 1992:424).

The small steps Native populations took to reaffirm their heritage and shared connections to the central coast region were further impacted by the rapid cultural development occurring in American cultural history during the mid-late 1800's. In the 1840's, the United State military invaded the then-Mexican territory and took control, later followed in 1948 by the influx of thousands of non-Native individuals during the ushering in of the Gold Rush and the designation of California as a state in 1850 (Field et al. 1992:424). The United States push for westward expansion during this period ignited a prolonged period of genocide against remaining Native populations in which assimilation, extermination and removal of these populations were the primary objectives (Field et al. 1992:424). United States laws refused to recognize Native heritage and land claims, rejecting the validity of tribal land titles, land ownership rights or the right to file any lawsuits including those petitioning for land rights (Field et al. 1992:425). The early 1900's was characterized by a period of enrollment phases implemented by the Department of the Interior, Bureau of Indian Affairs. Many Muwekma families continued to live on the central coast throughout this period, supported by "Special Indian" censuses and ethnographic materials (Field et al. 1992:416). The Bureau of Indian Affairs recorded the Muwekma as "the Verona Band" on the special censuses and the application/enrollment census for the California Jurisdictional Act of 1928, in which applicants were required to demonstrate their ancestors had been California residents at the point of statehood (Field et al. 1992:417). The Indian Claims Commission Act of 1946 indemnified California Native descendants, including Muwekma members, who had unwittingly signed over land in the 1800's treaties with Spanish, Mexican and United States governments (Field et al. 1992:417; Ramirez 2007:105). Later, the California Indian Claims Settlement of 1964, which paid restitution to qualifying Native tribes, as well as the establishment of the American Indian Historical Society in the San Francisco Bay Area during the Civil Rights Movement of the 1960's, helped the Muwekma "revitalize" and reconnect (Field et al. 1992:415; Ramirez 2007:105).

Contemporary Connections

The echoes of past Muwekma culture can still be observed throughout the Santa Cruz region. MaryEllen Ryan, a local Santa Cruz historian writes:

> "Portions of the Delaveaga area contain sites where chert tools were repaired and re-worked, leaving large amounts of chipping waste in the midden soil. There also exist areas near UCSC that include small multiple use campsites, areas of Seabright where shellfish were processed for food and ornaments, and areas of Westlake associated with Chalumu where chert was worked from raw material into useful tools and projectile points. An area near Pogonip exists where tools were reworked, and where diarists of Portola's expedition described temescals, the sweathouses used for ritual and daily bathing. Areas around Neary Lagoon still contain portions of much larger sites where any number of the marsh associated activities would have taken place" (1980).

While the Muwekma Ohlone Tribe is comprised of multiple tribes/tribal bands, the Amah Mutsun feel individual identification is in their best interest in order to restore their recognized status. The Amah Mutsun were previously recognized by the Bureau of Indian Affairs in 1906 as the "San Juan Tribe", a name associating the Tribe with the San Juan Bautista mission. The contemporary enrolled membership of the Amah Mutsun Tribal Band is comprised of over 600 registered members. While the Amah Mutsun's federally recognized status technically has not been terminated, the Tribe, along with all other Californian tribes, was subjected to congressional acts, which stripped them of their historic territories and land access rights without explicitly stating such actions were occurring (Field et al. 1992:418). The Amah Mutsun are currently in the process of petitioning the Bureau of Indian Affairs to restore their status (Petitioner #120 on the Bureau of Indian Affairs) and have worked independently of the Muwekma Ohlone to establish relationships with agencies such as BLM, California Department of Parks and Recreation, UC Santa Cruz, UC Berkeley and UC Davis in an effort to cooperatively regain tribal lands, conserve native plants and wildlife and collect culturally important materials (AMTB 2017).

Chapter 3

Zooarchaeological Background

Zooarchaeology Background

Zooarchaeology, a subfield within the discipline of archaeology, is the study of animal remains recovered from archaeological sites (Peres 2010:15). Zooarchaeologists examine animal remains from both historic and prehistoric contexts, and seek to develop inferences regarding the development of human behavior and the relationship between humans and their environment. Behavioral studies in zooarchaeology examine seasonality of resource acquisition, seasonality of site use, subsistence strategies, socio-political organization and general resource use (Peres 2010:17). Zooarchaeology is centered around two primary goals: first, to understand diachronically and across a landscape the historical biology and ecology of faunal populations, and secondly, to apply this understanding to interpretations of human behavior (Reitz and Wing 2010:11). This is achieved through several different avenues, including identification of faunal bone, identification of man-made modifications to bone (i.e. evidence of butchery, cooking, hunting technique, domestication) and lastly non-human modifications to bone, which speak more to the ecology of the region in which the bones have been excavated.

Applied Zooarchaeology

"Applied zooarchaeology" refers to the broad application of zooarchaeological methods, concepts and data to modern problems involving human interactions with the environment. Many contemporary problems stem from socio-cultural interpretations of nature; problems such as the continued degradation of rainforest environments and decreasing subsistence resources can be traced back to socio-cultural perspectives on nature, preservation and resource acquisition. In contemporary practice, applied zooarchaeology is most often associated with wildlife management and conservation biology, but as a still-emerging practice, applied zooarchaeology's usefulness and breadth of applicability has not yet been fully explored (Lyman 1996:111). Within the context of wildlife management and conservation strategy, applied zooarchaeology provides insights into protection strategies for threatened wildlife populations, whether or not certain taxa should be reintroduced to a region in an effort to recreate the historic/prehistoric landscape, whether exotic or non-native taxa should be removed from a region to promote regrowth of native taxa populations, and defining the boundaries of ecological zones that should be distinguished from other regions (Lyman 1996:110). To responsibly develop environmental management policies, understanding the diachronic shifts and composition of a particular environment is necessary (Joyce 2012:246). The concepts demonstrated in wildlife management and conservation biology mesh well with the data needed to effectively determine land management strategies and plan archaeological site preservation.

Uniformitarianism and Paleoenvironmental Reconstruction

Zooarchaeologists have long borrowed theoretical frameworks and methods from other disciplines to address research objectives. Central to theoretical frameworks in zooarchaeological research is the concept of "uniformitarianism", a concept readily employed by paleologists. The principle of uniformitarianism asserts the same natural laws and processes in action today throughout the universe have always operated in the same manner and at the same rates, everywhere within the universe (Brewster 1992:202). This principle is the basis of analogies between contemporary faunal/floral species and those that existed in the past; if the principle of uniformitarianism holds true, then it can be presumed identified fauna required the presence of the same specific environmental conditions as their contemporary taxonomical correlates (Brewster 1992:203). Building upon this analogy, paleoenvironment reconstruction incorporates the inferred ecological requirements of identified fauna relative to the magnitude of taxa present in an assemblage (Brewster 1992:203). For example, if species X is represented more abundantly than species Y at a shallow depth and those proportions appear reversed at a deeper depth, zooarchaeologists can infer environmental conditions likely shifted over time to conditions more conducive to species X's survival. (Brewster 1992:203; Bate 1937; Klippel and Parmalee 1982).

Resource Acquisition

Later in archaeological history, the incorporation of radiocarbon dating and an increased interest in dietary studies enabled zooarchaeologists to begin developing nuanced behavioral inferences that built upon Paleoenvironmental reconstructions (Dunnell 1978; Dunnell 1978, 1980). Lewis Binford's 1962 "new archaeology", and emergent processual archaeological theory, were foundational keystones in faunal analysis as they restructured the way archaeologists developed research paradigms and created behavioral correlates. The relationships between observed behavioral aspects were seen as "interdependent parts of a system" rather than descriptive patterns and typologies classifying cultural sequences (Dunnell 1978, 1982; Schiffer 1976; Flannery 1968). This systems approach redirected the focus of archaeological research from the analysis of recovered artifacts to the archaeological site as a whole, linking faunal analysis to technological development within and between cultures, as well as between cultures and their natural surroundings (Brewster 1992:203; Flannery 1968). By employing a systems paradigm and utilizing analogies based upon comparative historical and modern behaviors, zooarchaeologists began addressing questions of how resources were acquired, which taxa were predominately targeted within a region, what acquisition strategies were associated with specific taxa, and what changes in these decisions could be observed diachronically changing in the archaeological record (Brewster 1992:204).

The degree of resource intensification is predicted through the application of the Optimal Foraging Theory (OFT), which predicts the total productivity of labor invested in resource acquisition increases as the cost of energy/time expenditure for an individual also increases (Keene 1983:139; Codding et al 2012:116). Contemporary resource intensification analyses generally stem from a theoretical base in human behavioral ecology, in which Pre-contact Native populations employed either a prey or patch choice subsistence model (Lupo et al. 2013:421). In the prey choice model, potential prey is ranked as high or low yield, referring to caloric contribution to diet, in order to predict what subsistence resources were added/eliminated from foodways. For example, a mule deer (*Odocoileus hemionus*) would be ranked as a higher yield resource in comparison to a cottontail rabbit (*Sylvilagus audubonii)* as the caloric contribution would be higher from a larger source. Thus, shellfish can be labeled as low yield-low energy while deer may be labeled high yield-high energy, as much more effort is required to hunt, butcher, clean and transport the deer. Additionally, the prey choice model anticipates foragers incorporate subsistence resources into their diet in an order ranked from highest energy yield to lowest, and that this pattern shifts opportunistically when higher-ranked resources are encountered (Lupo et al. 2013:421). Lastly, the prey choice model predicts foragers will adjust their subsistence strategy to incorporate an increasing amount of lower-ranked subsistence resources when encounters with prime, higher-ranked resources decreases (Lupo et al. 2013:422).

The patch choice model focuses upon anticipating which environmental patches a forager will frequent and exploit when subsistence resources are heterogeneously distributed across a landscape (Lupo et al. 2013:422). The patch choice model is often employed when analyzing assemblages for indicators of resource depletion. Theoretically, a forager would no longer frequent a patch when subsistence resources have been diminished and an alternate patch would yield a higher energetic return after subtracting the additional energetic costs of traveling to a new patch (Lupo et al. 2013: 422; Charnov 1976; Charnov et al. 1976). Essentially, as productivity declines in one patch, the allocated time spent in that patch would proportionately decrease as the time spent in a more productive patch would increase, thus providing important information regarding both the relative importance of specific resources and an environment's overall rate of productivity (Broughton 1997; Broughton 1999; Butler 2000; Grayson 2001).

In addition to the OFT, the Central Place Foraging Theory, in which distance traveled to a patch to acquire a resource is directly proportional to the width of the diet breadth, is also applied to zooarchaeological research (Schoener 1979:903). The Central Place Foraging Theory hypothesizes the capturing of large, more energetically-profitable prey will likely result in the need to select one or more parts of the prey item to bring back to the central place, as the overall load of the intact prey item is too large (Orian and Pearson 1979). Portions of the kill that are determined to be of lower utility, such as the distal portions of the appendicular skeleton (inferior portions of limbs). Thus, as distance increases, foragers and hunters employ a more selective strategy both in what resource they target and the method of transporting said resource. The closer a targeted resource is to the central patch, the less selective an individual will be regarding the portion transported back to the central patch (Schoener 1979:904; Cannon 2003:3).

Identifying what resources existed, how they were targeted, consumed and potentially managed can, and should, play a major role not only in wildlife management but developmental policy formation. Interdisciplinary approaches to interpreting the historical ecology of California have developed models of entangled resource selectivity, intensification, settlement mobility and sustainability efforts of pre-contact Native American societies. While thorough in their own right, these models often leave important aspects of the discourse on the Californian cultural sequence out (Milliken et al. 2007; Jones et al. 2007). As a whole, they place hunter-gatherers as immediate-return foragers, basing their subsistence strategies upon frequency of resource encounters and caloric return rates (Binford 1978; Lightfoot et al. 2013:4). As Lightfoot et al. state, these models "assume hunter-gatherers made instantaneous decisions about the procurement of resources as they were encountered during foraging activities" (2013:4). Consequently, models stemming from OFT highlight short-term decision making and leave little room for long-term planning on behalf of Native populations. Early cultural models fail to take into consideration efforts by Native populations to establish sustainable harvesting practices and landscape management techniques that ultimately influence the productivity of resources (Lightfoot 2013:286; Vale 2002). Simply assuming all individuals strictly adhered to a Darwinian behavioral mode overlooks cultural adaptions and the variability that arises when cultures interact with an environment and the unpredictability of nature. Additionally, historical applications of OFT may not apply to some coastal habitations as neatly as past studies have implied. Analysis of multiple mid-Holocene sites along the central coast indicates targeted prey varied most with abundance rather than overall caloric return rate.

By understanding what the paleolandscape was like and what flora and fauna flourished, zooarchaeologists can provide an interpretation of how that landscape shifted over time and whether those shifts were in response to anthropogenic pressures or natural events, such as droughts, fires and major geologic events. A zooarchaeological analysis can indicate zones historically rich in resources, zones ideal for habitation and zones prone to hazards within a region. When determining what regions are best to relocate a major infrastructure feature, such as water pipelines, developers should be able to take into consideration the diachronic properties of potential relocation sites and whether the utilization of that space would infringe upon the cultural significance of those sites for native or underrepresented populations.

Chapter 4
Methods

General Zooarchaeological Methods

While some standardization of terminology, methodological approaches, and analytical frameworks exists, the analysis process and interpretation of animal remains varies between researches (Peres 2008:25). Generally, zooarchaeologists record two types of data: primary and secondary (Brewer 1992; Peres 2008; Reitz and Wing 2010). Primary data includes both quantitative and non-quantitative information. The non-quantitative data recorded can include taxonomic identification (the identity or species of the specimen analyzed), represented skeletal elements (femur, ulna, etc.), the portion of each identified skeletal element, human and non-human modifications to the specimen, age estimation based upon epiphyseal fusion or tooth eruption/wear, sex indicators (medullary bone, physical morphology, etc.) and any other characteristics the researcher feels are notable (Reitz and Wing 2010:158).

Zooarchaeological identification of specimens is made primarily by comparison of archaeological specimens to an osteological collection of contemporary species, along with reference manuals and other identified archaeological collections (Peres 2008:23). This method is the core of zooarchaeological research, and stems from the discipline's base in the principle of uniformitarianism, in which past conditions and relative morphological characteristics of fauna should be mirrored by contemporary species. Identification of each specimen begins by sorting first into classes by provenience (Aves, Mammalia, Bivalvia etc.), followed by further identification to the lowest taxonomic level possible (family, genus, species etc.).

Quantitative primary data generally recorded includes weights and specimen counts (Peres 2008:24). Recorded weight for each specimen or by taxon (common for marine invertebrates) is essential because it is a basic, comparable unit of measurement that can also be utilized as the basis of secondary data measurements, such as determining the relative abundance or importance of a taxon within an assemblage. While weight is considered a basic measurement, potential exists for the data to become skewed to favor larger animals within the assemblage when performing secondary data calculations as larger animals often weigh considerable more than those classified as small (Peres 2008:27). Additionally, weight cannot account for taphonomic processes that may have altered the original weight of a specimen, such as degradation due to weather processes or human modifications, such as burning or cooking.

Quantitative primary data also includes determining the number of identifiable specimens (NISP), also known as the species count present in the assemblage (Klein and Cruz-Uribe 1984:25; Peres 2008:26). Each individual bone, scale, tooth etc. is counted as a single unit, whether fragmented or complete (Klein and Cruz-Uribe 1984:25). Sometimes specimens can be counted without identifying a taxon or element in order to demonstrate spatial patterns or when finite identification is not possible due to a lack of identifying features resulting from taphonomic or anthropogenic modifications (Reitz and Wing 2010:167). While NISP is a basic measurement in zooarchaeological research, just like recorded weights it can reflect bias towards more easily identifiable species or specimens that have been better preserved than others (Lyman 1987:98). Primary data is recorded on a specimen tag and later entered into a database capable of performing quantification, such as Apple's Filemaker or Microsoft's Excel.

Secondary data, which builds upon primary data, includes calculations and estimations of biomass, minimum number of individuals (MNI), species diversity and relative abundance (Peres 2008:27). MNI is generally calculated using the most abundant element from each taxon. Diagnostic characteristics are taken into consideration when analyzing pairing sided elements, such as overall size and epiphyseal fusion (Peres 2008:27; Reitz and Wing 2010:205-210). If the selected elements can be paired, the higher NISP of the two is selected as the MNI. Relative abundance within an assemblage can indicate the importance of specific fauna to a group, the group's proximity to an environment that supported specific fauna, diachronic shifts in subsistence strategies or dietary reflections of social stratification (Jackson and Scott 2003; Peres 2001; Peres 2008; VanDerwarker 2006). Both primary and secondary data can be utilized to calculate relative abundance within an assemblage (Peres 2008:27).

Zooarchaeological Methods Employed in This Project

I began my analysis by first rough sorting all screened material from the 2008 excavation of CA-SCR-10. Once all recovered material had been sorted into debitage, marine invertebrates, faunal and human components, I concentrated on marine invertebrate speciation first. Fragments were initially sorted by class (Gastropoda, Bivalvia, Polyplacophora etc.) or into an undetermined classification by provenience. Whenever possible, each class was then sorted into family, genus and species. The highly fragmented nature of the assemblage made this step more difficult, especially as taxonomic data for marine invertebrates is highly variable and is changed often (Ponder and Lindberg 2008; Rehder 1981). Specimens sorted into the undetermined categorization went through two additional rounds of analysis, and were compared to several reference manuals including: *The Phylogeny and Evolution of Mollusca* (Ponder and Lindberg 2008), *The National Audubon Society Field Guide to North American Shells* (Rehder 1981), and

Pearson Field Guide to Pacific Coast Shells (Morris 1966). Additionally, all identifications were ultimately compared to both contemporary and archaeological marine invertebrate collections at the CA State Parks Santa Cruz District Office, as well as my personal collection of modern marine invertebrates. Weights were taken for entire classifications by provenience. The fragmented and dense nature of the marine invertebrate assemblage rendered weights on individual fragments irrelevant and unusable for future comparisons between archaeological site data. Primary data recorded on the specimen tag included provenience data as well as the taxon, observable modifications, NISP (one bag per specimen tag), weight and field/lab notes. The original scope of this project included stable isotope analysis of intact California Mussel (*Mytilus californicus*) specimens to infer seasonality of site use. Specimens located within the assemblage that retained an intact outer growth ring, necessary for isotopic analysis, were pulled and bagged separately. However, the scope of this project eventually shifted, so the data from those specimens was added to the overall California Mussel (*Mytilus californicus*) data per unit depth.

Marine invertebrate identification was then followed by the analysis of the faunal bone component. Faunal bone identifications were made in a similar manner to the marine invertebrate component. Specimens were compared to both my personal osteological collection of modern North American fauna and archaeological specimens identified and stored at the CA State Parks Santa Cruz District Office. Identifications for the archaeological assemblages stored at the CA State Parks Santa Cruz District Office were made by Diane Gifford-Gonzalez and Anneke Janzen. Reference manuals for osteological identifications included: *Mammalian Osteology* (Gilbert 1997), *A Guide to the Measurement of Animal Bones from Archaeological Sites* (VonDenDriesch 1976), *Fish, Amphibian and Reptile Remains from Archaeological Sites* (Olson

1968), *Avian Osteology* (Gilbert et al. 1996), *Manual of Ornithology* (Proctor and Lynch 1993) and the online database *Archaeological Fish Resource* (University of Nottingham 2017).

Each specimen was identified to the most finite taxonomic categorization possible based upon the presence of sufficient distinguishable features. Specimens lacking such discrete features were sorted into broader taxonomic categorization, such as taxonomic class (Aves, Mammalian, etc.). Additionally, when identifiable features were present, specimens were assigned to size categories. Species such as California vole (*Microtus californicus*) were assigned to the "extra small" categorization, species sized between sea otter (*Enhydra lutris*) and cottontail (*Sylvilagus audubonii*) were assigned to the "small" categorization, species sized between sea otter and mule deer (*Odocoileus hemionus*) were assigned to the "medium" categorization, and any species sized larger than mule deer were assigned to the "large" categorization. All faunal specimens from the CA-SCR-10 assemblage were weighed using the same Ohaus 800 series triple beam scale, and all primary data was recorded on individual specimen tags. Primary data recorded for faunal bone specimens included provenience data as well as taxon, NISP, element, portion, side, age, sex, color, any modifications observed, weight and field/lab notes.

The data generated from the faunal analysis was ultimately entered into Excel using shorthand codes in order to generate quantities for the number of specimens (NISP) as well as any modifications made to the specimens. I utilized variable codes established by Diane Gifford-Gonzalez for specimen portions, and loosely based the codes I drafted for specimen elements, modifications, and species, or class if more nuanced identification is not possible, upon Gifford-Gonzalez's work. Since Diane Gifford-Gonzalez has performed the zooarchaeological analysis for several central California coastal sites, including several sites for the central coast CA State Parks office, I specifically chose to utilize Gifford-Gonzalez's approach and coding system. This will help facilitate future comparisons between CA-SCR-10 and other central coast sites since the data entries use a more standardized methodology.

In order to develop inferences regarding significance of species targeted and possible environmental correlations, MNI was calculated utilizing the method outlined by White in 1953. In this methodology, paired bone fragments (such as those from radii, femora etc.) are divided by side and portion. The most abundant number is used as the final estimate of MNI (Buikstra and Ubelaker1994; Lyman 2008). Since the faunal assemblage from CA-SCR-10 is dominated by marine invertebrates and highly fragmented, the 50% rule, which requires an element to be intact by at least 50% in order to be counted towards the MNI total, was not employed (Buikstra and Ubelaker1994; Lyman 2008).

Lastly, portions of human remains were identified within the screened material and set aside for repatriation. When excavated in 2008, unit two of CA-SCR-10 did contain a human burial, uncovered at 70 cm. Field supervisor Dustin McKenzie made the decision to reroute the unit 10 cm along the eastern border (See Appendix A). Since CA-SCR-10 is a shell mound and thus subject to unstable preservation conditions, fragments of the human remains did mix with the remaining material pulled from the unit. All identified human bone fragments were immediately brought to the CA State Parks office and not included in any analysis for this project.

Chapter 5
Zooarchaeological Analysis Results

Marine Invertebrates

Invertebrates overwhelmingly dominated the faunal component of the CA-SCR-10 assemblage, representing 99.7% of the overall recovered material (by weight). A total of 139,374.2 grams of invertebrate fragments were analyzed for this project. As with most archaeological sites along the Santa Cruz coastline, the predominant invertebrate was California Mussel (*Mytilus californianus*), which was densely present in every level (refer to Table 2; Porcasi 2011: 399). Snail (*Tegula/Olivella/Nucella/Crepidula*), clam (*Leukoma/Platyodon/Tresus/Macoma*), chiton (*Polyplacophora*) and barnacle (*Balanus/Semibalanus/Pollicipes*) species were additionally observed in every level analyzed, but in much smaller concentrations than California mussel.

Another notable observation is the proportional increase in invertebrate variation correlating to the decrease in plowing intrusion. At roughly 70 cm., just below the average plow blade depth of 60 cm., the variability of species present sharply increases, possibly reflecting the less frequent use of CA-SCR-10 during the terminal Holocene or exemplifying the reduced and convoluted data left behind after a site has been heavily disturbed (See Table 2). Whether due to natural taphonomic changes, human modification at the time of harvest/hunting or contemporary actions such as plowing, the faunal component of CA-SCR-10 is highly fragmented. While some species such as California mussel and Pacific littleneck clam (*Leukoma staminea)* were found to occasionally be preserved intact, both faunal bone and invertebrate specimens tended to range between one millimeter and two centimeters.

Urchin		X			X	X	X	X	X	X	X	X	X	X	X	X
Intertidal snail	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Subtidal snail	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Intertidal Mussel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Burrowing Mussel						X	X	X	X	X	X	X	X			
Intertidal Limpet	X		X		X	X	X	X	X	X	X	X	X	X	X	X
Kelp Dwelling Limpet						X	X	X		X		X	X		X	X
Crab							X	X	X	X	X		X			
Clam	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chiton	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Floating Barnacle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Intertidal Barnacle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Abalone							X	X	X	X	X					
Level X Inv. Type	0-10	10-20	20-30	30-40	40-50	60-70	70-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180

Table 2. Marine invertebrates by unit depth. Note taxonomic variety begins to increase around 60-70 cm.

Mollusks: Bivalves

The invertebrate component consisted of several genera, but was predominantly composed of bivalve species. The highest concentrated species was California Mussel (*Mytilus californianus)*, which composed 91.9% of the total invertebrate component and 91.7% of the overall faunal component. Ribbed Mussel (*Ischadium demissum*) was also observed in several levels, but occurred much less frequently (note “burrowing mussel” in Table 2). This is notable since ribbed mussel is an invasive species found along the North American Atlantic coast and in South America (GISD 2017). While there is no known date or pathway for the species’ introduction to the Pacific coast, theories have included transportation via ship hulls or migratory shorebirds (GISD 2017). Unlike California mussel, which grows in extensive beds along rocky shorelines, ribbed mussel can be found semi-burrowed into muddy, estuarine-like environments, often in regions where bodies of fresh water meet the ocean. Ribbed mussel grows at a slower rate than California mussel, ultimately reaching an adult size only one third of the native California mussel (GISD 2017). Its introduced status, slow growth rate and thinner, more fragile shell make ribbed mussel a less common species to find in assemblages, especially those that have been highly disturbed.

Additional bivalves observed in the faunal component include a number of clam species, such as Pacific littleneck clams (*Leukoma staminea*), California butter clams (*Saxidomus nuttallii*), Pacific gaper clams (*Tresus nuttallii*), gaper clams (*Tresus capax*), bent nose clams (*Macoma nasuta*), boring soft-shell clams (*Platyodon cancellatus*), undifferentiated clam species (*Macoma sp.)* and Nuttall’s cockles (*Clinocardium nuttallii*). While each species varies by overall shell shape, size, density, and pattern, they are primarily all found in similar intertidal zones composed of gravel/sand/mud substrates between depths of ten centimeters to one meter.

Nuttall's cockle is the only bivalve species which prefers finer grained substrates and eel grass (*Zostera*) beds, commonly found in regions where fresh and salt water mix, such as estuaries, bays, and marshlands (Stauffer 1937:429).

Mollusks: Chitons, Limpets and Snails

Other mollusks identified in the invertebrate analysis included undifferentiated chiton species (Polyplacophora), single-shelled gastropods (limpet species), and snail species inhabiting both intertidal and subtidal zones. Chiton were separated into distinctions: gumboot chiton (*Cryptochiton stelerii*) and Polyplacophora. All chiton species are identified by their unique overlapping shell plates, and inhabit rocky intertidal zones. Gumboot chiton are easily identifiable compared to other Polyplacophora species as their shell plates lack any patterned detail and are the only chiton species reach sizes upwards of thirty centimeters.

Both true and keyhole limpet species were observed in the invertebrate component. Species identified included ribbed limpet *(Collisella digitalis),* rough keyhole limpet *(Diodora aspera),* rough limpet *(Collisella scabra)* and unstable limpet *(Lottia instabillison).* All species, with the exception of unstable limpet, are again mollusks which inhabit rocky intertidal zones and adhere to rocky surfaces in a similar manner to barnacle *(Balanus/Semibalanus species).* Conversely, unstable limpet is a unique limpet species that lives on its primary food source-kelp stipes and holdfasts (Morris 1966:57). Unlike the other limpet species observed, unstable limpet has an elongated shape with slightly upturned edges that allow it to easily glide along kelp and respond to its life in the open ocean.

Several snail species were observed throughout the invertebrate component. This included subtidal-intertidal species such as the purple dwarf olive *(Olivella biplicata),* common slipper *(Crepidula formicata)* and wrinkled amphissa *(Amphissa columbiana).* These species can live in subtidal depths up to thirty meters but are also found in intertidal zones among mussel beds. Purple dwarf olive is a common shell to find in coastal pre-contact Native American sites as the species was targeted for bead making. Shell beads were utilized by a variety of pre-contact coastal populations for ceremonial and exchange purposes. The section of shell selected for the bead and the shape of the bead hole are diachronically diagnostic and can be used to help date archaeological sites to specific periods.

Black turban snail *(Tegula funebralis)* and several periwinkle species *(Nucella canaliculata, Nucella emarginate, Nucella lamillosa, Littorina plena* and *Littorina littoria)* were also observed throughout the entire invertebrate component. These snail species are found strictly in rock, intertidal zones along exposed coastline with the exception of the *Littorina* species, which can also be found in shallow, marshy and estuarine conditions (Morris 1966:64). Abalone (*Haliotis sp.)* was also present at depths between 70 and 130 centimeters. This coincided with the densest portion of the faunal component and the presence of a hearth-like feature (see Appendix A). Abalone are placed within a genus of large marine snails which prefer rocky shorelines and can be found on nearly every coast across the globe (Morris 1966:52). The exterior shell is diagnostic for Abalone, with dull colors and striations reflecting each species' diet and environmental chemical makeup (Morris 1966:52). None of the Abalone specimens examined from CA-SCR-10 still retained any cortex remnants, thus all specimens were only identified to genus. Like purple dwarf olive, Abalone and its unique mother-of-pearl interior is also a culturally important mollusk utilized for subsistence, ceremonial, decorative and exchange purposes by Native populations.

Crustaceans and Echinoderms

The invertebrate component was also composed of several crustacean species that reflect a subsistence strategy targeting the rocky intertidal zone. Barnacle, including *Balanus*, *Semibalanus* and *Pollicipes* species, was observed at every depth and again typifies a suite of species exposed during low tide on the rocks along the shoreline (Morris 1966:43). Like most intertidal invertebrates, barnacle would have to be pried off using some sort of tool, such as one constructed out of faunal bone. Dungeness crab *(Cancer magister)* was also observed in the component between 70 and 150 centimeters, similar to Abalone *(Haliotis sp.).* Dungeness crab is one of the widest-ranging crab species and is distinguished from the similar-looking species by its relative gracility, the serrations found on the dorsal side of its chelipeds and its characteristically white or light-colored cheliped tips.

Lastly, several levels of the invertebrate component contained fragments of urchin species, labeled as *Strongylocentrotus* species due to the extreme similarities between purple urchin (*Strongylocentrotus purpuratus*) and red urchin (*Strongylocentrotus franciscanus*), both found in sub/intertidal zones where they burrow into rock. Urchins *(Strongylocentrotus sp.)* are a favorite food of Sea Otters (*Enhydra lutris*) found along the central California coast. Often otter teeth, both in archaeological and contemporary contexts, are stained a purple-to-maroon color as some individuals choose to subsist strictly upon urchin. Additionally, urchin is an ecological indicator of an oceanic zone's health; urchins feed upon kelp and compete with species such as Abalone. If the urchin population becomes unmanaged due to reduced predation by sea otters, it can lead to the devastation of entire kelp forests (Girard et al. 2012).

Faunal Bone

For this project a total of 1,094 faunal bone specimens, with a combined weight of 299.7 grams, were analyzed and identified to the closest categorization. Avian, fish, terrestrial mammal and marine mammal species were observed within the faunal bone component (refer to Table 3). Undifferentiated mammalian fragments comprised the highest proportion of the assemblage, which was expected as the highly fragmented nature of the faunal bone recovered from CA-SCR-10 makes identification challenging. Very few avian and marine mammals were present throughout the analysis which is notable observation since CA-SCR-10 is within close proximity to locales where such genera would have been accessible (refer to Table 3).

		NISP	MNI	% of assemblage
Class Aves				**0.6%**
Undetermined		3	1	
Callipepla californica	California Quail	3	1	
Meleagris gallopavo	Wild Turkey	1	1	
Class Mammalia				**88.2%**
Undetermined (adult)		746	-	
Undetermined (juvenile)		1	1	
Microtus californicus	California Vole	11	1	
Thomomys bottae	Botta's Pocket Gopher	93	4	
Neotoma fuscipes	Dusky-footed Wood Rat	13	3	
Sylvilagus audubonii	Desert Cottontail	41	3	
Lepus californicus	California Jackrabbit	4	1	
Enhydra lutris	Sea Otter	3	1	
Phoca vitulina	Harbor Seal	1	1	
Odocoileus hemionus (adult)	Mule Deer	50	3	
Odocoileus hemionus (juv.)	Mule Deer	1	1	

Superclass Osteichthyes				11.2%
Undetermined		12	1	
Salmonidae	Ray-finned sp.	19	1	
Pseudopleuronectes	Right-eye Flounder sp.	1	1	
Gadus macrocephalus	Pacific Cod	91	2	

Table 3. The MNI for undetermined mammals was not calculable as the fragments lacked discernable features for determining the side/element. The full data from the zooarchaeological analysis is located in Appendix B.

Aves

As anticipated, very few avian specimens were present in the faunal component. Pre-contact archaeological sites located away from regions of extreme marshland often don't contain a high proportion of subsistence bird bone. Birds were targeted primarily for their feathers for cultural purposes and as one of the sources of bone utilized in manufacturing whistles (Jones et al. 2007: 132). Wild turkey (*Meleagris gallopavo)*, California quail (*Callipepla californica*) and a third, smaller, undetermined avian species were observed within the assemblage. California quail and wild turkey prefer a mixed habitat comprised of grassland, chaparral and open woodland both for cover and variety of subsistence (Spears et al. 2007:71; Blakely et al. 1990:241). Both species also seasonally adjust their diet to incorporate what's available during foraging. This includes leaves, grasses, berries, fruits and insects.

Marine Mammals

Marine mammals did not comprise much of the faunal component; only four specimens from the entire assemblage fall definitively within this category. Three of the marine mammal specimens, including a complete left talus, belong to sea otter *(Enhydra lutris)*, and the fourth, a scapular head/neck fragment, to the *Phocidae* family. Sea otters spend nearly their entire lives in the water, and is most often found floating at the water's surface near kelp forests (Gilkinson et al. 2011:1278). The sea otter subsists upon a purely carnivorous diet composed of mollusks, echinoderms and crustaceans. Some individuals have been known to favor a specific species, such as purple urchin *(Strongylocentrotus purpuratus),* and exclusively hunt that species so long as it's available. Sea otters were targeted by Native populations, much like later Europeans, primarily for their furs (Hylkema 1991:70).

The central California coast is an ideal habitat for both otter and Pinniped species. The dense near-shore kelp forests attract a diverse marine population to feed upon, and the relatively close drop in seafloor elevation creates strong upwelling of cool water and nutrients from decaying matter. This influx of nutrients establishes a self-fulfilling cycle in which increased algae and plankton can flourish, thus leading to increased faunal diversity and ultimately more decaying matter than replenishes nutrient levels. Geographically, the central coast is physically typified by rocky shorelines and outcrops, which are ideal for pinniped species that haul themselves onto the rocks to dry out their coats and rest. Six species of pinnipeds can still be found along the central California coast today: Pacific harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*), northern fur seal (*Callorhinus ursinus*), and the northern elephant seal (*Mirounga angustirostris*), which can only be found at Año Nuevo (Scheffer 1969)

Terrestrial Mammals

While a disproportionate ratio exists between mammalian bone and all other classifications, few terrestrial mammals were finitely identifiable. Dietary species observed throughout the faunal component included mule Deer (*Odocoileus hemionus*), California jackrabbit (*Lepus californicus*), and desert cottontail (*Sylvilagus audubonii*). All three species inhabit a similar mixed environment as the avian species identified: open woodland, chaparral, and grassland. Botta's pocket gopher (*Thomomys bottae*), California vole (*Microtus californicus*) and the dusky-footed woodrat (*Neotoma fuscipes*) also were present throughout the assemblage. Botta's pocket gopher, the California vole, and the dusky-footed woodrat are all intrusive rodent species and generally not considered dietary selections. The dusky-footed woodrat builds dens within chaparral, stacking sticks and plant material in a mound shape. Often these dens have multiple chambers, some full of stored foods and some empty for unknown reasons. Other species, such as the California vole, have been observed occupying these empty rooms within the dens.

Within the highly fragmented recovered assemblage, a large proportion of the faunal component included small, unidentifiable specimens. Most fragments were small bits of trabecular bone lacking any distinguishable features. Only the structure of the trabecular matrix remained, thus I was only able to identify the specimens as Mammalian. Since these fragments are so indistinguishable, there is a slight chance some may actually be from the human burial present within the unit.

Osteichthyes

Pacific cod (*Gadus macrocephalus*), species from the *Salmonidae* family (Pacific salmon and trout sp.), species from the Cottidae family (sculpin), and species from the *Pseudopleuronectes* genus (flounder) were observed throughout the assemblage. Cod feed upon smaller fish and mollusks, and can be found in nearshore oceanic waters (Gilbert and Williams 2002:224). Historically, cod has played a major role in human subsistence and is one of the most contemporarily commercially-fished species (Gilbert and Williams 2002:223). Right-eye flounders inhabit soft-bottomed, nearshore waters, and have been observed entering fresh water estuaries along the Pacific coast (Gilbert and Williams 2002:553). Conversely, sculpins inhabit rocky intertidal zones with high-energy wave action (Gilbert and Williams 2002:305). *Salmonidae* species are some of the most introduced species within North America as they inhabit both temperate fresh and salt water environments (Gilbert and Williams 2002:195). Much like cod, Salmonidae has played a critical role in both prehistoric and modern diets.

Anthropogenic Modifications to Faunal Bone

Nearly half of all bone specimens exhibited some aspect of butchery or food processing. The most common food processing modification observed was evidence of burning/cooking (refer to Table 4). Bone subjected to fire will result in multiple effects, such as sooting, color alteration, increased sheen and density making the bone resemble glass depending upon the intensity of the flames (Specht 2016:9; Reitz and Wing 2010:132). The hotter the fire, the more prevalent the effects become. Butchery marks, such as cuts with thin, sharp blades, and chops, wedge-shaped cuts generally created during dismemberment of the acquired prey, were the second most common modifications to bone. Five impact notches were also observed on faunal bone fragments, indicating concussive, powerful blows made by stone tools were utilized to break into the medullary cavity (refer to Table 4; Reitz and Wing 2010:127).

Butchery Modification	NISP	% of Total Faunal Bone Assemblage
Burned	408	37.3%
Chopped: wedge-shaped cut	2	0.1%
Cut: straight, narrow v-shaped cut	55	5%
Impact notch from bashing	5	0.4%

Table 4. Proportion of faunal bone component characterized by butchery and processing modifications.

Evidence of food processing was observed in all faunal categories, including the invertebrate component. Mammals were the most modified taxon observed, although a high proportion of this classification included undifferentiated mammal, which may include both marine and terrestrial species (refer to Table 5). Mammals were also the only taxonomic classification exhibiting multiple types of butchery marks on the same specimen. For example, Figure 4, a proximal femoral fragment from a mule deer (*Odocoileus hemionus*) is shown exhibiting signs of burning, cutting and chopping. Due to the fragmented nature of these specimens, finer distinctions within this classification were not possible.

Classification	NISP Exhibiting Modifications	% of Classification Modified
Aves	2	28.5%
Undetermined Mammal	392	52.4%
Terrestrial Mammal	46	21.5%
Marine Mammal	2	50%
Osteichthyes	15	12.1%

Table 5. Proportion of modifications by classification.

Fig.4 *Odocoileus hemionus* long bone fragment that has been burned, cut and chopped.

Skeletal Elements

Skeletal elements were also counted and sorted into an axial classification (central skeletal bones; cranial bones, vertebrae, ribs, innominate and sacrum), or an appendicular classification (bones of the limbs; scapulae, long bones, patellae, carpals, tarsals and phalanges) illustrated in Table 6. Twice as many of the specimens analyzed belonged to the appendicular category. The most represented identified elements in the assemblage were vertebrae (NISP=120), closely followed by innominate fragments (NISP=38), femoral fragments (NISP=37), and humeral fragments (NISP=22).

NISP		Appendicular NISP	Axial NISP	Unidentifiable
Class Aves				
Undetermined		3	0	0
Callipepla californica	California Quail	2	0	0
Meleagris gallopavo	Wild Turkey	1	0	0
Class Mammalia				
Undetermined (adult)		385	61	252
Undetermined (juvenile)		3	0	0
Microtus californicus	California Vole	2	9	0
Thomomys bottae	Botta's Pocket Gopher	41	51	0
Neotoma fuscipes	Dusky-footed Wood Rat	10	3	0
Sylvilagus audubonii	Desert Cottontail	34	7	0
Lepus californicus	California Jackrabbit	4	0	0
Enhydra lutris	Sea Otter	3	0	0
Phoca vitulina	Harbor Seal	1	0	0
Odocoileus hemionus (adult)	Mule Deer	37	13	0
Odocoileus hemionus (juv.)	Mule Deer	0	1	0
Superclass Osteichthyes				
Undetermined		0	4	8
Salmonidae	Ray-finned sp.	0	15	4
Pseudopleuronectes	Right-eye Flounder sp.	0	0	1
Gadus macrocephalus	Pacific Cod	0	85	0
	Totals	526	249	265

Table 6. Skeletal elements were counted (NISP) as either axial or appendicular.

Chapter 6
Zooarchaeological Interpretation

Paleoenvironment

The zooarchaeological evidence as a whole supports the interpretation CA-SCR-10 contained a suite of floral and faunal populations that one would expect to find in mixed environment. The species identified generally were observed consistently throughout the analysis, indicating this landscape pattern persisted throughout the region's history. This landscape included stretches of open grassland, likely darted by and bordered to the east by patches of chaparral and scrub brush. Beyond the chaparral to the east, there would have been open woodland, first consisting of California live oak (*Quercus agrifolia*) and deeper into the woodland, coast redwood (*Sequoia sempervirens*). The consistency of the environmental makeup also indicates the climate in the region has remained relatively stable since the site's establishment and occupation.

Applying the principle of uniformitarianism, inferences about the paleoenvironment at CA-SCR-10 can be developed relying upon the bioecological needs and characteristics of the contemporary taxa relatives of species identified within the archaeological assemblage. The high frequency with which Botta's pocket gopher *(Thomomys bottae)* is observed within the faunal assemblage indicates much of the region around CA-SCR-10 has been persistently covered with the gopher's preferred habitat of swaths of open grassland. Other rodents observed with great frequency were the Dusky-footed wood rat *(Neotoma fuscipes)* and California vole *(Microtus californicus).* Much like gophers, voles have historically had a ubiquitous presence in California, and can be found in nearly all ecological niches within the state. However, their presence in association with the wood rat, which establishes elaborate dens frequented by voles in chaparral, further supports the assertion CA-SCR-10 is a site in which several environmental zones intertwine. Whether the gophers, wood rats and voles observed in the faunal assemblage were historically intrusive, or if they were present during the period of site occupation, has not been determined. Similarly, the *Leporidae* species identified, desert cottontail *(Sylvilagus audubonii)* and California jackrabbit *(Lepus californicus),* as well as the mule deer *(Odocoileus hemionus),* inhabit a suite of ecological niches including open grassland, coastal sage scrub, riparian regions and piñon-juniper bushland/forests (Spears et al. 2007:71; Blakely et al. 1990:241). The avian species observed in the faunal assemblage, California quail (*Callipepla californica*) and wild turkey (*Meleagris gallopavo*), are typically associated with a mixed environment, which would provide roosting and protection/safety zones as well as neighboring zones in which food resources could be acquired. The dietary choices of these two species further typify the region, as they both target acorns, leaves, grasses, berries, seeds and insects.

All identified species, both terrestrial and marine, were typical for a site that is located adjacent to both freshwater and oceanic shoreline. The persistence of freshwater species in the faunal assemblage indicates Baldwin Creek existed during the mid to late Holocene and was an important subsistence and freshwater source for pre-contact populations. Fish appear to have played an important role in the subsistence strategy at CA-SCR-10, representing roughly 11% of the faunal component. The variety of Osteichthyes species (*Salmonidae*, *Cottidae*, Pseudopleuronectes, etc.) observed further supports the assertion CA-SCR-10 has historically been comprised of a mosaic environment, including both oceanic and freshwater food sources. Since each Osteichthyes species identified inhabits different environmental niches, hunting strategies and required tools would have to shift accordingly. Poles with lines and shell or stone weights, nets, baskets and weirs could have all been crafted utilizing the natural resources around CA-SCR-10 (Jones 2002:65). The composition of the marine invertebrate component implies the region was possibly comprised of more marshland along Baldwin Creek than exists today, as the substrate at the creek's mouth on Four Mile Beach is comprised of a grainer sand than preferred by ribbed mussel (*Ischadium demissum)* and black periwinkle *(Littorina plena).* Additionally, the presence Pseudopleuronectes, which has been observed in freshwater estuary contexts, further supports this environmental description.

The lack of marine mammals present in the CA-SCR-10 assemblage relative to the accessible coastline can result from a multitude of causes. If butchery of marine mammals occurred at CA-SCR-10 or near the perimeter of the site, a higher proportion of marine mammal bone specimens would have been observed in the excavated units. Butchery of larger species often occurs at or near the kill site as hauling large, heavy resources across distances is impractical and inefficient (Reitz and Wing 2010:204). Therefore, the possibility exists CA-SCR-10 was geographically not ideal for hauling marine mammal carcasses for processing and thus butchery was undertaken closer to the shore. The variety of faunal species indicates pre-contact populations at CA-SCR-10 employed a few different subsistence strategies, and the possibility exists targeting marine mammals was not one of them. Additionally, settlement at CA-SCR-10 coincided with a period in which the marine mammal population could have dipped or relocated. Increased human predation, as well as a suite of ecological factors such as warming ocean temperatures, can influence the rate of marine mammal population depression and encourage established marine mammal populations to relocate to regions similar to their previous environment (Gifford-Gonzales 2011:222).

Resource Acquisition and Selectivity

The prevalence of small game, shellfish and teleost fish suggests the subsistence strategy employed at CA-SCR-10 involved a lower energy expenditure when collecting resources compared to that involved in hunting large game. Terrestrial mammals appear to be the second most targeted faunal resource behind marine invertebrates, with cottontail (*Sylvilagus audubonii*, MNI=3) and mule deer (MNI=3) representing the most individuals within the assemblage. Mammalian and avian adult taxa appear to have been targeted much more frequently than juveniles (NISP=2), which may either reflect a seasonal occupation in which juvenile taxa were not prevalent, or a subsistence strategy that was not based upon targeting age-specific individuals. However, MNI determinations are rooted in the assumption faunal remains are deposit equally across a site, which generally is not taphonomically possible (Peres 2008:27). It is quite likely that one would observe different proportions between age classifications when sampling different regions of CA-SCR-10. The highly fragmented nature of the assemblage also may have masked dietary patterns inferred from the morphological characteristics of specimens. As many of the specimens labeled "undetermined" lacked any distinguishable features, it was not possible to assign an age categorization.

The lack of larger game present in the assemblage can possibly be explained by performing butchery tasks away from the site, possibly where the prey species was killed since it may have been difficult to transport such large resources intact. Since a large proportion of the assemblage does exhibit evidence of butchery modifications, food processing did occur at CA-SCR-10, but may have been limited to more transportable or easily accessible species. Overall, twice as many appendicular fragments were observed, which could be attributed to the high proportion of rodent species identified (refer back to Table 4). However, when the NISP of each skeletal element is compared primary axial elements, such as vertebral and innominate fragments, were observed the most often. Portions of proximal long bones (humeri and femora) were also found with high frequency, suggesting the more substantial sections of prey taxa, generally associated with shoulder and loin regions, were selected and consumed at CA-SCR-10 (Guilday et al. 1962:71). This ratio of elements implies the central patch theory applies to CA-SCR-10, in which Native groups likely acquired and processed subsistence resources at a kill site and brought back sectioned portions of the kill to a central campsite or village. Conversely, if primary butchery was occurring at CA-SCR-10, a more equal representation of axial and appendicular elements would be anticipated, reflecting a less mobile settlement pattern as dietary needs could be addressed in the immediate vicinity of the campsite.

Seasonality

Spring and fall would have been the prime portions of the year to maximize the exploitation of available resources around CA-SCR-10, taking advantage of the natural shifts in prey taxa's own subsistence resources. By applying the OFT, prey taxa adjust their primary patches of resource acquisition as those resources declined, to new ones where other resources were plentiful. Many avian species, including California wild quail *(Callipepla californica)* and turkey *(Meleagris gallopavo),* rely upon a diet of grass shoots, young leaves, berries, and insects which proliferate in grassland regions, such as CA-SCR-10, during the spring and early summer. During the late fall and winter, these species must adjust and relocate to new patches in which other seasonal resources, such as acorns and twigs, would be found in abundance (Charnov 1976; Charnov et al. 1976). This principle also applies to the behavior of terrestrial mammals, including *Leporidae* species and mule deer *(Odocoileus hemionus),* which inhabit grassland ecological zones in the spring/early summer targeting grasses, leaves, flowers, and vegetables, and more forested zones in the fall/winter where acorns, twigs and pine cones would be available. The breeding season for *Leporidae* species extends from February to June, and coincides with the birthing season of mule deer, which frequent grasslands in order to hide young fawns from predators.

Similar to terrestrial resources, marine invertebrates also experience seasonal shifts in growth and optimal harvesting. California mussels (*Mytilus californicus*) spawn during the spring and experience rapid growth during the late summer when temperatures become optimally warm and oceanic currents upwell nutrients from the sea floor (Giribet 2008:137). Contemporary commercial harvesting of mussels is generally in the spring and fall, as mussels reach an optimal size after their summer growth periods, and reach an age between eighteen to twenty-four months (Giribet 2008:136). Salmonidae species such as salmon inhabit both fresh and saltwater contexts, and travel inland up streams and rivers to spawn (Gilbert and Williams 2002:195). In central California, Salmonidae spawns roughly four times per year, with the most abundant run (the fall run) between July and December (Gilbert and Williams 2002:199). The historically abundant spawn run, which would likely have taken place during the habitation at CA-SCR-10, was “late-fall”, between October and April, but shifted in the 1900’s due to environmental and anthropogenic pressure (Gilbert and Williams 2002:201).

Figure 5 is a compilation of these seasonal population shifts of prey resources in response to shifts of the dietary resources of those prey taxa. As the only floral taxa identifiable through the zooarchaeological analysis, “kelp” is included in Figure 5. The morphological attributes of the unstable limpet *(Lottia instabillison)* evolved specifically for life on slippery kelp surfaces subject to constant motion from wave/current action (Morris 1966:57). The presence of unstable limpet in several levels analyzed indicates kelp harvesting, whether fresh from the ocean or collected from beaches where it had washed up, was a component of pre-contact subsistence strategies at CA-SCR-10. Most Pacific kelp species follow a seasonal pattern of rapid growth in the spring after winter upwelling of rich seafloor nutrients, followed by a decline in nutritional concentration in the fall (Tala et al. 2016:34). This means kelp harvesting may have been a seasonal activity or ultimately practiced throughout the year as needed to supplement dietary and cultural needs. While Figure 5 reflects possible shifts in faunal resources, it does not take into account the floral species accessible at or around CA-SCR-10. Therefore, if substantial floral dietary contributions were readily accessible without the need to travel far, the settlement pattern employed at CA-SCR-10 may not ultimately reflect faunal population shifts.

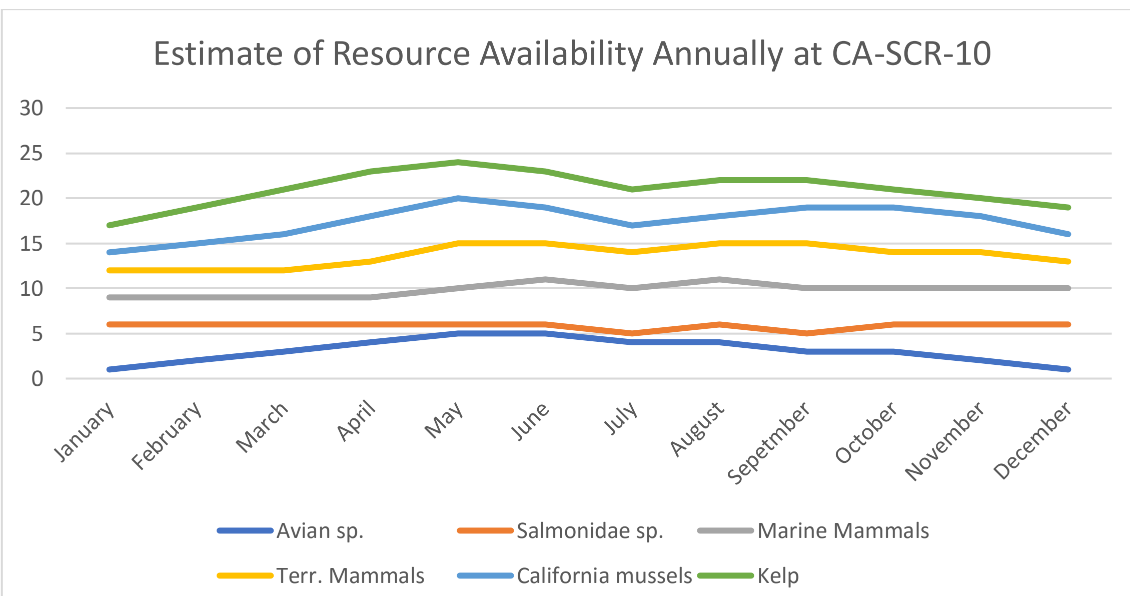


Fig 5. This stacked graph illustrates the estimated seasonal shifts in subsistence resource populations based on the dietary shifts of those resources. Months were assigned the following values: 1=minimally present/absent, 2= somewhat present but not absent, 3= moderately present, 4=highly present, and 6=the most present. The prime months to maximize resource exploitation

at CA-SCR-10 would have been April and May (spring into early summer), and again in September (early fall).

During the invertebrate identification portion of this project I located and bagged *Mytilus californicus* specimens from nearly every depth capable of being utilized in stable isotope analysis. By measuring the ratios of isotope in regular increments along growth bands to the terminal edge of the shell, one would be able to determine the estimated temperature and water salinity at the time of the mollusk's death/harvest. While this research was beyond the scope of this project, it could provide the data necessary to infer the settlement or usage pattern of CA-SCR-10 more accurately than species composition summaries can.

The size and complexity of not only the faunal component but also the presence of hearth features, food processing artifacts, and at least one known burial, demonstrate CA-SCR-10 is a significant cultural resource. The consistent nature of the region also indicates the interpretations drawn from this analysis about past weather, exposure patterns, geographic distribution of landscape features and associated floral and faunal populations can still apply to contemporary plans for the site's management and potential. The potential for further studies specifically focused upon the site as well as the linkages between coastal sites make CA-SCR-10 a candidate for preservation and future interpretation. However, it can also be argued these factors help establish CA-SCR-10 as a good locale for a multitude of developmental tasks; the proximity to freshwater, the consistent climate and level of exposure, as well as the nutrient-rich soil composition resulting from a variety of plant species growing over the site make CA-SCR-10 suitable for farming crops, as it is currently being leased out for. These same characteristics, as well as the site's proximity to existing County resources and infrastructure, also make the land CA-SCR-10 is located upon suitable for residential zoning.

Limitations of Analysis

Any analysis of CA-SCR-10 is subject to several limitations that may have skewed data collected. As noted in the Methodology section, unit 2 had to be rerouted in order to preserve the integrity of a human burial. This was compounded by student error during excavation in which the level at a depth of 70-80 cm, where the human remains were first identified, was over dug and had to be combined into a large level designated 70-90 cm. Shifting the border of the unit and doubling the depth and material to be analyzed, especially at such a critical stratigraphic zone where plowing had ceased to disrupt the context, most likely excluded artifacts and could have resulted in a different ratio of the species in the faunal component. The presence of human remains also establishes the possibility of misidentification of faunal bone. Since a high proportion of bone fragments analyzed were either homogenous trabecular fragments or burned beyond identification, there is a possibility some of the bone included in this analysis is human and not faunal. It is also worth noting that no zooarchaeological analyst is perfect, and speciation errors may have occurred. Due to the highly fragmented nature of the overall faunal component, misidentification and the inclusion of specimens labeled as "unidentified/undifferentiated" is inevitable. This is further compounded by the complexity of invertebrate identification as hundreds of species generally exist or have become extant per genera, thus making the determination of finite species extremely difficult when working with specimens from so long ago.

Additionally, the dataset I worked with was subject to mishandling by third parties. Material recovered from units 1 and 3 of CA-SCR-10 accompanied the field school students to the Cabrillo College Archaeological laboratory for processing, while material recovered from unit 2 was taken to the CA State Parks District Office in Henry Cowell Redwoods State Parks. CA State Parks and the Cabrillo College Anthropology Department utilized different labeling and coding systems for the materials each respective organization retained from the excavation. While the Cabrillo College students utilized a lot system that was never explained in any of the associated documents, CA State Parks chose to renumber and organize the materials brought to their warehouse. Contributing to the confusion, CA State Parks relied upon volunteers from the University of California Santa Cruz's Anthropology Department to organize and sort archaeological material from multiple sites across the central coast. Some of this reorganization performed by volunteers was again not documented, resulting in the misplacement of level bags from 50-60 cm, unit 2, CA-SCR-10. This lack of communication, documentation and accountability can limit the usefulness and reliability of any analysis undertaken at CA-SCR-10. While provenience has most likely remained intact, the fact that level bags have permanently disappeared means any analysis will be incomplete.

Chapter 7
Policy Evaluation

Methodological Background

For this project, I selected Eugene Bardach's eightfold path to policy analysis as my analytical model. I chose to employ this paradigm because it incorporates a circuitous review process in which possible alternatives are thoroughly vetted before final recommendations are made (Bardach 2012:xv). This creates an opportunity for each stakeholder's needs and perspective to be integrated throughout the analysis, thus reducing the potential for bias. Excluding a stakeholder ultimately negates the entire process, and can lead to contestation, legal ramifications and increasing costs to readdress and reassess impacts. This can be especially relevant in cases involving archaeological sites, which are subject to a complex, entangled web of policies and judgments. As an alarming number of archaeological sites have begun to fall into this category, mediation between stakeholders and management of archaeological sites needs to incorporate new policies and methods of resolution. Emile Bardach's model leaves this process open-ended, so that new alternatives can be drafted during reevaluation based on new, incoming information and ultimately leading to quicker decisions regarding final recommendations.

Bardach's model begins by identifying the problem in clearly defined terms. Although not necessary in this model, the identification of stakeholders invested in the issue or project of focus can be useful when narrowing the scope of the problem to be addressed as well as in determining all possible alternatives and strategies. Once the problem has been identified, the model moves on to assembling evidence. Nearly any form of data can be considered evidence so long as it supports the development and defense of alternatives (Bardach 2012:11).

Evidence collection is then followed by "developing alternatives", in which one should be able to quickly develop a list of possible approaches to resolve the problem (Bardach 2012:17). These alternatives are sometimes redundant with only slight differences between them, but should provide a comprehensive set of resolutions ranging from recommending no changes occur to a complete overhaul of the existing paradigm encompassing an issue (Bardach 2012:17). Once the list of alternatives has been drafted, key criteria central to the problem is utilized to map the possible outcomes and trade-offs associated with each alternative resolution. At this stage in the model, the analyst should be able to identify which of the alternatives satisfies the most criteria and addresses the highest proportion of stakeholders (Bardach 2012:69). The selected resolution should then be distributed or publicized in the most appropriate way; when working with archaeological data, drafting a report for stakeholders is a logical method of distributing the chosen resolution and supportive data whereas in a corporate setting a simple company-wide memo may be all that is required to update stakeholders. For this project, I chose to combine developing alternatives, projecting outcomes and determining trade-offs because I found myself naturally expanding upon the alternatives as I constructed them. I then followed this by selecting the criteria central to narrowing the options and identifying which management strategy incorporated the most evidence *and* addressed the most stakeholder objectives.

Identifying the Problem

When considering the process of archaeological site management policy evaluation, the core problem is simple: the current management strategy employed at CA-SCR-10 is not effective for an archaeological site deemed culturally significant under the State Historic Preservation Office's guidelines. The zooarchaeological analysis, as well as the presence of a considerable assemblage of artifacts, and at least one known in situ human burial, demonstrated

CA-SCR-10 is indeed culturally significant. The contemporary conditions at CA-SCR-10 leave the site vulnerable to several factors that actively degrade the site. The lack of a regular CA State Park Ranger patrol on-site increases the potential for continued looting, especially as this is a site known within the Santa Cruz community as a location in which artifacts are readily accessible without the need to excavate much. The perpetuation of agricultural production at CA-SCR-10 most likely won't disturb the site beyond the depth it already has. However, this only is true if the farmer leasing the land maintains the process in place; any alteration to the farming equipment, crops grown or chemicals utilized in the agricultural production can impact the soil integrity, acidity and layering of the CA-SCR-10.

Reevaluating the management strategy of CA-SCR-10 highlights several stakeholders who do not all have the same agendas and goals for CA-SCR-10's management. CA State Parks, who represents both the state and the general public's interests, and the Amah Mutsun Tribe, appear to have similar interests in preserving CA-SCR-10 as a cultural resource. Interested academics, such as the University of California Berkeley Anthropology Department, are seeking to include CA-SCR-10 in a regional survey of archaeological sites across the Santa Cruz landscape. With failing infrastructure transecting CA-SCR-10, the city of Santa Cruz is a vested stakeholder seeking to repair or relocate one of the city's primary water lines. Lastly, one of the most impacted stakeholders is the farmer currently leasing the land (name excluded from report), who would have to adjust their agricultural strategy if any policy changes are implemented. It can be argued that peripherally the Bureau of Land Management should also be considered a stakeholder as they manage all public land not overseen by CA State Parks and have established, in partnership with the Amah Mutsun Tribe, a new cultural preserve located within the Cotoni-Coast Dairies property.

Evidence Review: Policy

CA-SCR-10 is subject to a complex web of regulations that have shifted and evolved to incorporate new stakeholders that were not historically included in the site's management to the degree they now can be. These policies are a nested set ranging from federal laws to city ordinances, all concerned with the preservation of culturally significant sites and the inclusion of the impacted culture in discussions on future development on these sites. For the sake of brevity, the policies informing archaeological site management strategies that have not shifted much since the documentation of CA-SCR-10 are summarized into the three following tables: the first, Table 7, concentrates upon federal laws, the second, Table 8, summarizes policies established by the state, and the third, Table 9, on the County of Santa Cruz's ordinances.

California state laws, carried out by agencies such as CA State Parks, generally establish the terms of cultural significance, and procedural requirements for state agencies and local governments. The California State Historic Preservation Office defines archaeological sites as locations, both in prehistoric and historic contexts, where a "significant" activity, such as habitation or ceremonial events, occurred (CASP 2017). Typical archaeological sites include camp/habitation sites, cemetery contexts, battlefields, ruins/shipwrecks, and natural features such as rock caves utilized for ceremonial or habitation purposes (CASP 2017). The determination of "significance" by the California State Historic Preservation Office is outlined as:

> "(3) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically

> significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Pub. Res. Code, § 5024.1, Title 14 CCR, Section 4852) including the following:
>
> (A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
> (B) Is associated with the lives of persons important in our past;
> (C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
> (D) Has yielded, or may be likely to yield, information important in prehistory or history (CASP 2017)."

Interestingly, the California state policies attribute more rights to non-federally recognized tribes while the more localized city ordinances offer more opportunity for developers to be involved in the management of archaeological sites. These policies do not require any agency to explicitly preserve CA-SCR-10, but do require tribal consultation for all future plans regarding the site. Since CA-SCR-10 is most likely an Amah Mutsun site, most federal laws are not technically applicable as the Tribe has not yet restored its federal recognition status.

The National Historic Preservation Act (NHPA) 16 U.S.C. § 470	Provides measure to protect and preserve significant cultural resources, as defined by federal mandates such as those outlined in NEPA. This can include non-federally owned resources, as per Section 2. This also established the National Register of Historic Places and establishes a protocol for determining whether or not a site meets these definitions.
The National Environmental Policy Act (NEPA) 42 U.S.C. § 4321	Expands the definition of cultural resource to include landscapes, social institutions, lifeways etc., which can all be protected under this umbrella.
The Archaeological Resources Protection Act (ARPA) 16 U.S.C. § 470aa	Establishes regulation of excavation of and the criteria to gain a permit for excavation on federally or tribal-owned land (federally recognized tribal land only).
Executive Order No.13007, 61 (Federal Regulation 26771)	Grants Native Americans access to Native religious/significant sites while restricting access for non-Natives or practices which may degrade the landscape/site.
The Archaeological and Historic Preservation Act 16 U.S.C. § 469	Provides for the preservation of historical & archaeological specimens and data as part of a continuation of salvage archaeology. The Secretary of the Interior is given specific authority to act for preservation when a project is expected to result in the loss of such material.
The Native American Graves Protection and Repatriation Act 25 U.S.C. § 3001	Requires agencies receiving federal funding to return Native American cultural items to cultural groups, and establishes the procedures that go into effect upon discovery or planned excavation projects on Native or Federal land. Additionally details criminal charges to be filed against individuals who are caught in the trade of Native cultural items or remains. This act is the basis for many state statutes that now bestow the same rights to non-federally recognized tribes.
The American Indian Religious Freedom Act 42 U.S.C.	Returns the right to freedom of religion and expression of religion to Native Americans, including the right to access sacred lands/sites, practice traditional rites and possess sacred objects that are often federally illegal (i.e. hawk or eagle feathers).

Table 7. Federal laws CA-SCR-10 management is subject to (NPS 2017).

CA Public Resources Code § 5079.6	Establishes the Heritage Fund to further preserve and recognize sites of cultural and historical importance. This code also recognizes the disjointed relationship between preservation and development, and aims to apply the Heritage Fund to situations that foster stewardship and historical awareness. This code also recognizes the rapid deterioration of archaeological sites due to urban development and natural forces, thus it is encouraged to set aside portions of the Historic Fund to preserve such sites.
CA Public Resources Code § 5097	Defines historic, archaeological and paleontological sites and requires sufficient plans to be submitted to the State Department of Parks and Recreation when a proposed project is slated to take place on state lands. This code also requires an archaeological investigation, including survey, excavation or other operation, must take place before any construction projects on state land take place and outlines the criminal charges for willful destruction of significant sites. Lastly this code establishes the Native American Heritage Commission and further preserves the rights of Native Americans to practice their religions on state lands.
CA Public Resources Code § 5020	Establishes State Historic Committee and review process for registering historic landmarks. The committee makes policy recommendations for the preservation and maintenance of historic sites, including "significant" archaeological sites that demonstrate cultural importance and use.
CA Health and Safety Code § 7050.5	This three-part code cites mutilation of human remains as a misdemeanor, requires excavation or work on a project to cease upon the discovery of human remains and for the proper authorities to be contacted immediately. If the remains are deemed to be prehistoric Native American, the Native American Heritage Commission must be contacted within 24 hours.

CA Health and Safety Code § 8010 & 8011	The state version of NAGPRA; establishes the state's repatriation policy ensuring all human remains and cultural items from California Native Americans are treated with dignity and respect. While not required, this code encourages institutions, such as museums, to return cultural items to tribes voluntarily. This code also states the intent to directly aid non-federally recognized tribes in the repatriation process.
CA Water Code § 234	States the State Water Agency is authorized to excavate and preserve any uncovered archaeological site situated in an area intended for water development projects.
CA Government Code §§ 6253, 6254, & 6254.10	Exempts archaeological records from sites on state land from public record. This includes documents shared between agencies and the Native American Heritage Commission.
Governor's Executive Order W-26-92	Calls for the preservation and maintenance of state historic resources, including archaeological sites, for the public's benefit. This order also ensures the state's preservation guidelines are properly carried out, reviews existing policy and establishes new recommendations for the maintenance of such resources, including those on non-state-owned properties. Lastly, this order establishes the authority of the State Historic Preservation Officer and networks of consultation between this position and state agencies, such as The Resources Agency and the Office of Planning and Research.
Civil Code Section 815.3	Grants all California tribes the ability to acquire and hold conservation easements to protect Native sacred or archaeological sites.

Table 8. State laws and regulations CA-SCR-10 management is subject to (CASP 2017).

Proposition 20 (approved by city in 1972)	State proposition voted in by Santa Cruz citizens; established CA Coastal Commission which evaluates land and marine usage in Santa Cruz County. This determines what open spaces and those the city is vested in can and should be used for, including archaeological sites.
City ordinance 24.12.430	Requires permits for excavations and creates a mitigation plan to allow developers an opportunity to continue projects upon discovery. Also requires a coroner to evaluate any human remains uncovered and provides that the city may perform archaeological reconnaissance of any parcel located within the city (also applies on a County-wide level for unincorporated zones).

Table 9. City of Santa Cruz ordinances CA-SCR-10 management is subject to (CSC 2014).

Since 2002, the most significant policy changes regarding archaeological site management and tribal rights have occurred on a state-wide level and include those mandated by the California Environmental Protection Act (CEQA) and through Governor Jerry Brown's Executive Orders. CEQA's original guidelines included § 21083.10 and 21084.1, which defines archaeological resource and establishes the need for an environmental impact assessment prior to the initiation of a project (CASP 2017). These measures also restrict the scope of excavation and establish mitigation procedures during the course of preserving historically unique or archaeologically significant resources (CASP 2017). In the early 2000's, legislators began to better understand the complexity of California's dynamic history, and the difficulty many tribes within the state face in gaining federal recognition. By reframing state codes and evaluating the language utilized, lawmakers began drafting a series of bills that contained inclusive language recognizing the rights of non-recognized tribes. This began in 2004 when Senate Bill 18 was passed, which requires California cities and counties to contact and consult with the Native

American Heritage Commission prior to amending a general plan or designating a region as open space (CASP 2017). Later, in 2011, Governor Edmund G. Brown, Jr. signed Executive Order B-10-11, which created the Governor's Tribal Advisor position and outlined policy requiring the consultation of state agencies with Californian tribes directly when amending a general plan or designating a zone as open space (CASP 2017).

These regulations set into motion a shift in state policy which expanded upon the definition of tribe and sovereignty as outlined in the state's 1970's Public Resources code ultimately creating the opportunity for Assembly Bill 52 to be drafted. Passed in 2015, Assembly Bill 52 is a small step towards regaining full tribal rights in California for non-federally recognized tribes. Assembly Bill 52 establishes a new class of resource in Public Resources Code § 21074 termed "Tribal Cultural Resources", which can include anything that is of cultural value to a California tribe (CASP 2017). These resources must either be capable of being registered on the CA Historic Register, or be treated as a tribal cultural resource by the lead agency on a development project (CASP 2017).

Assembly Bill 52 also establishes policy requiring consultation with federally and non-federally recognized California tribes in a region prior to the start of any project that encroaches upon the tribal cultural resource. The tribes and agencies entering into consultation may only exit negotiations when all parties agree to future project plans or sign a statement that despite good faith efforts no agreement can be reached (CASP 2017). While a definitive step toward full inclusivity, Assembly Bill 52 is not without its flaws. Consultation with tribes is only required prior to the start of a project; consultation is not required throughout the process. While mitigation steps may be outlined during consultation, there is technically no penalty listed for failing to adhere to those steps. Mandates against *willful* destruction of cultural resources are still in effect, but Assembly Bill 52 fails to fully address the grey areas that arise when entities with diverging goals are working together.

Evidence Review: Zooarchaeological Analysis

The zooarchaeological analysis indicated CA-SCR-10 was comprised of a mixed environment, which included access to rocky seashore and sandy beach zones, open grassland bordered by chaparral, and a nearby freshwater stream with marshy borders. These environmental features have persisted for hundreds of years, indicating the region has been relatively climatically stable. The suite of fauna associated with this mixed environment also persisted; no extant species were identified, and no discernable decline in a specific faunal population could be observed. While the sample size analyzed was limited, the results matched the anticipated summary, and indicated pre-contact populations inhabiting CA-SCR-10 likely employed the central patch model of foraging and processing resources.

Nearly half of all faunal bone specimens analyzed were observed to exhibit marks left by butchery and food processing practices (See Table 6). Elizabeth Reith and Elizabeth Wing assert several aspects of food processing don't leave behind marks, especially when dealing with taxa that doesn't require dismemberment or can be stewed relatively intact (2002:132). Therefore, it can be argued that an even higher proportion of the faunal assemblage could have been subjected to human modification than observed. The sheer size and density of the assemblage, as well as the prevalence of modified fauna, support the assertion CA-SCR-10 was intentionally inhabited for a prolonged period of time, and utilized for a variety of purposes. The zooarchaeological analysis also indicated data between a depth of zero and seventy centimeters is unreliable due to intrusion from agricultural practices, which implies the sections of the site disturbed by the insertion of the city's water line would equally be ineffectual. Thus, future plans to either repair or replace established infrastructure will likely not alter or further impact CA-SCR-10 so long as construction is restricted to those zones of the site.

Although the scope of the relationship between CA-SCR-10 and other sites along the coast has not been fully identified, the zooarchaeological analysis performed as part of this project, along with the presence of several cultural materials and at least one known burial, can clearly demonstrate CA-SCR-10 meets all four of the State Historic Preservation Office's criteria for establishing significance. CA-SCR-10 can be "associated with broad patterns of California's history" as the site was utilized for an extended period time (evidenced by the presence of multiple hearth features and a dense shell midden), and fits within the projected cultural patterns associated with other central coast archaeological sites dating to the Late Period (refer back to Table X). The distinctive artifacts, subsistence strategy reliant upon local resources, and the radio carbon dating of shell sampled from multiple depths supports the placement of CA-SCR-10 within the central coast's Late Period, thus associating CA-SCR-10 with the lives of past Native Californians and meeting the second and third requirements to prove significance. Although the assemblage from CA-SCR-10 was heavily impacted by both natural and anthropogenic taphonomic effects, the site has yielded important data capable of demonstrating where within the CCTS it fits. Additionally, this data can be applied to many potential avenues for future research, including identifying more finite relationships across the central coast region through isotopic analysis and site-to-site comparisons. The contribution to interpretations of cultural development on the central coast, as well as the potential for future research to include CA-SCR-10, meets the fourth requirement of the State Historic Preservation Office's requirements to determine site significance.

Evidence Review: Applicable Case Examples

Little precedence exists for policy explicitly preserving the cultural interests of non-federally recognized tribes. Local agencies are required to consult non-federally recognized tribes and preserve culturally significant sites when possible. Obligation to preserve a site exists only when the tribe involved is federally recognized. Cultural preserves for non-federally recognized tribes are exclusive within the state of California to the Amah Mutsun Tribal Band. No other non-federally recognized tribe in California has established cultural preserves with exclusive tribal access rights through partnerships with government agencies. The Winnemem Wintu from Northern California have recently worked with the United States Forest Service to reroute trails and rehabilitate the culturally significant Panther Meadow on Mount Shasta, but the site is not deemed a cultural preserve in the same manner as the Quirotse Valley Cultural Preserve and Cotoni-Coast Dairies property (USFS 2017). In fact, the terms of the Cotoni-Coast Dairies MOU give the Amah Mutsun exclusive access to specific regions of the new National Monument, while the restored Panther Meadow is open to the general public (USFS 2017). While the research performed in this project indicate CA-SCR-10 is a significant site, identifying the linkages between major sites, such as CA-SCR-7 (Sand Hill Bluff National Monument) and those within Cotoni-Coast Dairies is beyond the scope of this project. The potential for identifying such linkages does exist, and should be considered when evaluating what strategy should be employed for CA-SCR-10's long-term management.

When evaluating policy affecting archaeological sites, the relationship between science and policy analysis needs to be incorporated into the evidence collection step (Clark et al. 1998; Driscoll 2011:791; McLeman et al. 2014:418). Archaeological sites yield scientific data which informs interpretations about past cultures. In order to properly manage sites, understanding the processes that affect the quality of site preservation, the types of scientific data that can be generated through archaeological analyses, and the potential applications of this collected data must all be considered before implementing any management strategy. While archaeological data has not generally been utilized in developmental and landscape management policy analysis (outside of establishing and maintaining significant sites), there exists a precedence for integrating science into the policy evaluation process successfully (Bardach 2012:17). For example, agri-environmental policies have been implemented after scientific studies demonstrated the effects of mass farming upon soil composition (Altieri 1999; McLeman et al. 2014), corresponding decreases in populations reliant upon grasslands commonly utilized for hay or other grass-like crops (Perlut et al. 2011; Green et al. 2005), and growing food security concerns in the wake of climatic shifts (Garnett et al. 2013).

The objectivity and quality-control engrained in a scientific approach provide the public with a sense the data presented is accurate and facilitates the resolution of environmental and social issues (Steel et al. 2004:1). Scientific research is an integral aspect of policy analysis in three primary ways. First, scientists and narratives they can construct provide a comprehensive understanding of the issues central to environmental problems, presenting data identifying what is and isn't working in a scenario (Levien 1979:47; Steel et al. 2004:3). Secondly, scientists can take this data and identify potential alternatives for the resolution of those problems, some of which may or may not have associated political implications (Levien 1979:48; Steel et al. 2004:3). Lastly, science can contribute to the resolution of environmental problems by estimating the economic, social, environmental and political consequences of proposed solutions through time and space, and across population groups (Levien 1979:48; Steel et al. 2004:3). Sarewitz and Pielke (2000:11), elaborate upon this point, stating:

> “Policy makers have called upon scientists to predict the occurrence, magnitude, and impacts of natural and human induced environmental phenomena ranging from hurricanes and earthquakes to global climate change and the behavior of hazardous waste. In the United States, billions of federal dollars are spent each year on such activities. These expenditures are justified in the large part by the belief that scientific predictions are a valuable tool for crafting environmental and related policies.”

As a scientific discipline, Anthropology, and especially archaeological research, equally provides insightful data highlighting past cultural relationships, the historical ecology of a region and the impacts of natural and anthropogenic actions diachronically. Archaeological interpretations rely upon data and interpretations from other scientific and non-scientific disciplines, thus demonstrating its applicability and relevance to policy evaluation in the same manner Sarewitz and Pielke describe the relationship between policy development and scientific information. Thus the data generated through the scientifically-based, zooarchaeological analysis of CA-SCR-10, is equally valid and essential for informing policy evaluation and development.

Management Alternatives, Outcomes and Trade-offs

When constructing possible management alternatives, I considered no criteria other than meeting the imposed governmental policies the site is subject to. I developed eight possible outcomes, beginning with no change occurring at CA-SCR-10. If no action is pursued based upon the data demonstrating CA-SCR-10’s significance and potential for future research, then the persistence of the contemporary management strategy would continue uninterrupted. The persistence of this management strategy would contribute to the site’s further degradation until all useful data that could have been collected is lost. Similarly, CA State Parks may decide that remedying the declining integrity of CA-SCR-10 would be too costly and require too many resources to address, thus the agency could determine the best course of action would be to simply extend the borders of Wilder Ranch State Park to include the tract of land CA-SCR-10 is situated on. CA-SCR-10 is immediately north of the Wilder Ranch State Park border and could easily be incorporated into the park and become part of the patrol along Baldwin Creek, thus not increasing costs by much (refer to Fig. 6). Additionally, either of these strategies could shift to include repair/replacement of the water line since all associated costs would be the responsibility of Santa Cruz County and not the state.

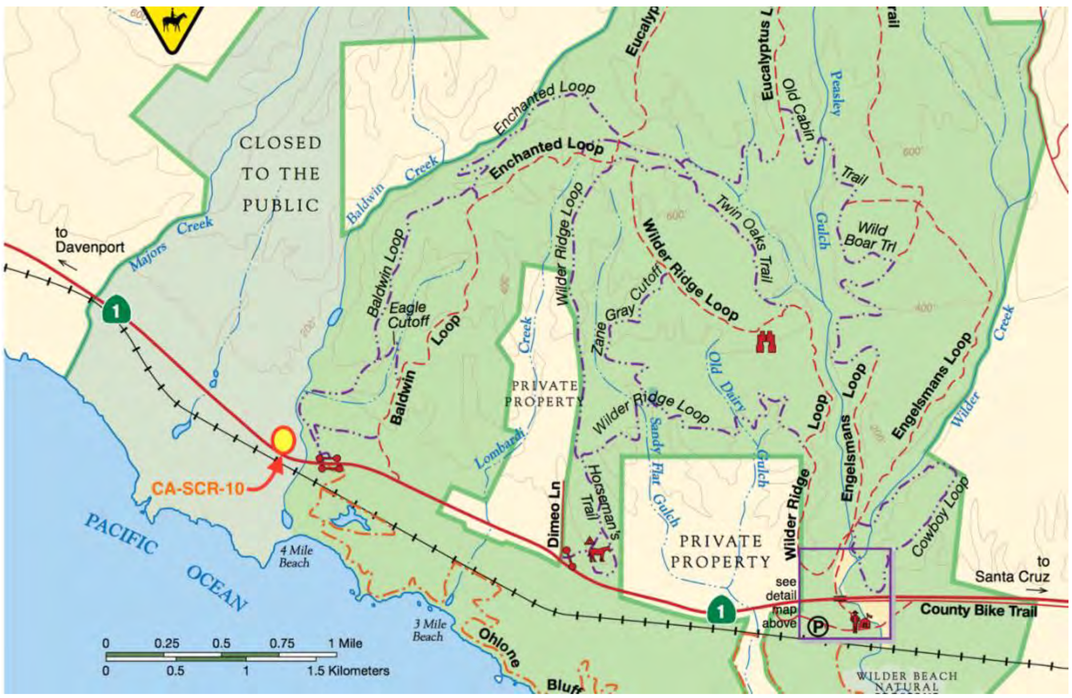


Fig. 6 This map shows the extent of Wilder Ranch State Park in the larger, yellow-green color and CA State Park private land in smaller, grey-green color marked “Closed to The Public.” CA-SCR-10 is highlighted in yellow along Baldwin Creek, which delineates the property types (Adapted from CASP 2008).

CA State Parks could designate CA-SCR-10 as a cultural preserve and grant access strictly to tribal members. Exclusively preserving the site would require immediate termination of the agricultural lease and limit the public’s access to the site. Choosing this management strategy would increase the CA State Parks’ costs, as well as the Amah Mutsun’s costs if an

MOU outlining shared resource responsibilities is drafted. Additionally, the lessee of the property would possibly face economic hardship and increased costs due to the sudden loss of agricultural land and associated income. While this alternative increases the costs for several stakeholders, it does create an opportunity for academics to establish a collaborative relationship with Native descendants and CA State Parks for future research as the remainder of the assemblage would remain intact. Again, this strategy can include or exclude modifications made to the water line with costs attributed to the County.

Since CA State Parks already has a history of leasing the property and the neighboring acres, the agricultural land use could shift to a slightly less destructive practice. This could possibly include transitioning the lease to permit ranging and grazing on the property, a practice currently employed on some of the adjacent properties north of Majors Creek (BLM 2017). While grazing species such as cattle do disrupt the landscape, the damage incurred will be far less destructive than mechanical plowing and regrowth of the natural flora can begin. Additionally, fencing would need to be installed on site to contain grazing livestock. While this may incur extra costs for CA State Parks, the addition of the fencing and daily supervision of livestock by the new lessee would help deter future looting and eliminate the need for a regular Ranger patrol- possibly even negating the costs incurred from the fencing.

The parcel CA-SCR-10 is located on has a dirt access road circling the property, just within the bounds created by the County water line. Any infrastructure modifications the County ultimately decides to undertake would have minimal, if any, impact upon the site if the fencing is installed between the road and water main. This alternative would require the termination of the agricultural lease and force the current lessee to locate land to farm elsewhere or shift to ranching, which would not be a likely solution for them.

A final management strategy alternative would involve parceling the property into two primary sections: a northern portion incorporating roughly one third of the property and the region of the site where unit one was excavated, and a southern portion encompassing roughly two thirds of the property and incorporating the regions where units two and three were excavated. The northern parcel could continue being leased for agricultural purposes as the proportion of the archaeological site on this section has very thin and elicited little data. Conversely, the southern parcel containing the denser component and known burial could remain undisturbed and protected from future intrusion. This alternative can also include or exclude modifications by the County to the water line depending upon where the protected parcel boundary is established. Since there is a dirt road currently separating the agricultural field and water main, any work by the County most likely wouldn't impact the site or its integrity. This alternative would incur increased costs for both CA State Parks and the current property lessee, but results in a compromise in which all stakeholders are given equal access and consideration.

Although the zooarchaeological analysis indicated the region could be well-suited for residential zoning, it is highly unlikely CA State Parks would choose to develop a property historically maintained as open space. The close proximity to the Wilder Ranch State Park Border and a historic barn on the south bank of Baldwin Creek are additional factors that make the consideration of alternatives including residential development ineffectual. In a scenario where CA-SCR-10 becomes developed, none of the stakeholders identified through this project would directly benefit; developing over CA-SCR-10 eliminates a significant cultural resource for the local Native community, cuts a source of income for both the farmer leasing the property and CA State Parks, creates greater strain upon County resources-even forcing the County to relocate the water main rather than simply repair it-and eliminates access to remaining assemblage for academics and researchers.

Selected Criteria

In order to identify the most salient and logical management strategy, select criteria must be considered to eliminate alternatives. Based on the extensive compilation of policies that establish the criteria necessary to determine if an archaeological site is significant, and how to manage such a site, legality is the first criteria I considered in this process. Any management strategy selected must adhere to the guidelines established by the State Historic Preservation Office pending an application to register CA-SCR-10 as significant.

Perhaps the most notable shift in policy affecting CA-SCR-10, as well as California overall, is the shift to incorporate non-federally recognized tribes in developmental decisions and the management of culturally significant locations. Political awareness/equality is the second substantive criteria I selected to weigh alternatives. If regional history is an indication, the establishment of collaborative relationships with Native communities and the repatriation of traditional lands, resources, and artifacts has become the crux of the discourse on open-land management. This particular criterion also remedies the previous lack of collaboration between the Native community and the other stakeholders at CA-SCR-10; there is no mention of a tribal liaison consulted during the excavation of CA-SCR-10, no correspondence, and no "most-likely descendant" identified for future communications in any of the CA State Parks files (CASP 2008). Any management strategy selected must incorporate mediation between stakeholders and provide an opportunity for tribal input.

Lastly, when developing any kind of policy recommendation, the cost efficiency of each alternative is a criterion almost always selected. For agencies such as CA State Parks, and small-scale farmers like the current property lessee, the financial costs associated with each alternative can result in serious detrimental effects and should not be taken lightly. The termination of the agricultural lease can result in many unforeseen consequences as the extent to which the lessee relies upon the income earned from the crops grown at the CA-SCR-10 property is unknown.

Final Recommendations

The significance of CA-SCR-10, its potential to elicit new information regarding land use in pre-contact Santa Cruz County and the trend in statewide policy to develop collaborative preservation strategies with non-federally recognized tribes leads me to determine two of the constructed strategies would be effective for future management of CA-SCR-10. This would include either establishing CA-SCR-10 as a cultural preserve, or transitioning the property to rangeland. Repairing the water line is an inevitable project; between the rapid rate at which the city's population has grown over the last decade and the age of the materials utilized in the line's construction, replacement or relocation will need to happen. Depending upon how the boundaries of the property are defined and appropriately fenced off, any work on the water line should have a minimal impact upon CA-SCR-10.

When evaluating the alternatives utilizing the criteria selected earlier in the analysis process, it's clear the most appropriate resolution is to designate the site as a cultural preserve. CA-SCR-10 is a significant site still yielding pertinent data despite its state of deterioration and disruption. The density of CA-SCR-10's remaining assemblage, the high prevalence of artifacts associated with prolonged habitation, and its proximity to two national monuments specifically registered to highlight pre-contact cultural significance (Sand Hill Bluff and Cotoni-Coast Dairies) support the assertion preservation should be the highest priority. Designating CA-SCR-

10 as a cultural preserve will incur higher costs for both CA-State Parks, as well as the lessee of the property, who will have to invest in agricultural land elsewhere. CA State Parks will need to invest in appropriate fencing and implement a regular patrol to deter future looting. These costs are a small trade off when the scope of potential for the site is considered.

The final step in Bardach's model is sharing/publicizing the chosen resolution (Bardach 2012:70). For this project, that step was the development of the deliverable report (See Appendix C). Since the parcel on which CA-SCR-10 is located is managed by CA State Parks, the project report will be condensed and shared with the CA State Parks District Supervisor. The information conveyed in the report will ultimately become part of CA State Parks official archaeological site report, and remain with the other documentation for CA-SCR-10 at their Henry Cowell Redwoods State Park office in Felton, CA. This information will also be shared with University of California Berkeley students as a portion of a study examining the linkages between archaeological sites across the pre-contact Santa Cruz landscape.

Chapter 8

Conclusion

This project set out to incorporate zooarchaeological data in policy analysis regarding archaeological site management. This process is essential for the timely reassessment of management strategies employed at deteriorating archaeological sites. Applied zooarchaeology has a unique relevance in policy analysis beyond the scope of wildlife management. The data generated during the course of this project highlights the range and applicability of zooarchaeology and posits zooarchaeological research has a legitimate relevancy to policy evaluation. The goals of this project included completion of the faunal analysis documentation for CA State Parks' CA-SCR-10 site report and the demonstration of the usefulness and applicability of zooarchaeology in "non-traditional" avenues. Furthermore, this project sought to establish the importance of problematic sites and the strength of the data that can still be generated through analysis of the remaining assemblage.

Research Questions Reviewed

This project was shaped by a few fundamental research questions exploring the relationship between zooarchaeological research and the extent of its applicability to policy evaluation. These questions included:

What role did CA-SCR-10 play in pre-contact Amah Mutsun society?

The zooarchaeological analysis indicates CA-SCR-10 was a site of cultural significance where the processing of food resources and production of cultural artifacts such as Olivella beads occurred. The fauna observed throughout the zooarchaeological analysis indicates pre-contact populations utilizing the site employed a wide variety of subsistence strategies and cultural practices. A total of 139,374.2 grams of invertebrate fragments representing 99.7% of the overall recovered faunal component was analyzed for this project. Additionally, a total of 1,094 faunal bone specimens, with a combined weight of 299.7 grams, were analyzed and identified to the closest categorization. The faunal analysis indicates some activities, such as resource acquisition, occurred at nearby locations.

Nearly half (42.8%) of all faunal bone specimens exhibited some aspect of butchery or food processing, with burning as the most common food processing modification observed. CA-SCR-10 is located central to important geographical features that would have been sweet spots for resource acquisition. Cultural features present, such as several stone tools, hearth features and at least one known burial, support the argument CA-SCR-10 was frequently utilized by pre-contact populations for an extended period of time. Not all activities that are a part of a society as a whole are reflected, therefore CA-SCR-10 was most likely a site of moderate-high importance and part of a larger, established settlement pattern with nearby sites possibly representing increased significance. This suggests there is a larger connection between archaeological sites, such as CA-SCR-7, and regional geographical features than initially assumed.

How can we effectively apply zooarchaeology in policy decision-making?

The wide-ranging data generated in zooarchaeological analyses can highlight potential land use strategies, determine significance and cultural patterns. By acknowledging the scientific base of zooarchaeological research and incorporating zooarchaeological analyses into the evidence collection portion of policy analysis; identify an appropriate approach to policy evaluation depending upon the problem. Some issues are best resolved through an analytical paradigm that incorporates unbiased scientific data, some are more social/functional within a corporation or institution, and thus may not need the same evidence collection process.

When including zooarchaeological data, the policy evaluation process must look at what the different data points indicate about a site holistically; the relationship between human activity and the natural environment is cyclical and thus should not be evaluated and interpreted separately. An environment and its geographical features influence the associated faunal population, which in turn attracts humans for a variety of activities (hunting, food processing, settlement, spiritual practices, etc.). As humans interact with the natural environment they permanently alter the landscape, which is reflected in the archaeological assemblage left behind. This altered landscape then may or may not attract different faunal populations, which in turn may attract humans for different activities and so on.

Implications and Potential for Future Research

This project represents a reevaluation of an archaeological site that has been neglected for an extended period of time and excluded from analyses concentrating on the central coast region. The zooarchaeological analysis performed as a part of this project indicates CA-SCR-10 was utilized by pre-contact populations for a variety of important activities, including food processing, persistent habitation and mortuary rituals. This data demonstrates zooarchaeology is an efficient application to evaluate site significance and thus has potential to be indispensable during policy evaluation. Furthermore, this project results suggest CA-SCR-10 meets the general requirements established by the California State Historic Preservation Office for establishing significance. Prior to implementing any new management strategies at CA-SCR-10, CA State Parks will need to follow the process outlined in existing historic preservation policy. The data produced by this analysis will be presented to CA State Parks and become a portion of the site's permanent record, as part of the evidence supporting the goal of future preservation and research opportunities at CA-SCR-10.

It is my hope this study demonstrates zooarchaeology has a role to play in policy formation and an application beyond wildlife management. Collaborative, cross-discipline analyses of problematic sites can be performed rapidly and efficiently to remedy failing management strategies before the site has completely vanished. The excavated portion of the CA-SCR-10 assemblage has remained boxed and unprocessed in a storage facility for over a decade as the physical archaeological site continued to be subject to further deteriorating factors. Despite successive years of deterioration, the CA-SCR-10 assemblage was still able to yield viable data capable of shaping and supporting theories of cultural patterns and land use by pre-contact populations. Similar sites that have also been labeled as problematic still have the potential for future cross-discipline research opportunities identifying the extent of relationships across landscapes, gaining insight into subsistence strategies we may not have known about and casual relationships between populations. Continuing in this vein, stable isotope analysis of invertebrates incorporates zooarchaeology, biology, chemistry and meteorology in a minimally invasive approach to identifying seasonality of resource acquisition and thus the pattern of site habitation. Similar techniques can be ultimately applied to other deteriorating sites, preserving in situ burials and addressing changing needs of archaeological sites as policy and site conditions shift over time, leading to a standardization of the construction of management strategies for California archaeological sites.

Bibliography

Altieri, Miguel A.
1999The Ecological Role of Biodiversity in Agrosystems. *Agriculture, Ecosystems & Environment* 74(1-3):19-31.

Amah Mutsun Tribal Band (AMTB)
2017 "History." The Amah Mutsun Tribal Band. http://amahmutsun.org/history. Accessed on February 25, 2017.

Arnold, Jeanne E. with Michael R. Walsh and Sandra E. Hollimon
2004 The Archaeology of California. *Journal of Archaeological Research* 12(1):1-73.

Bardach, Eugene
2012 A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving. Thousand Oaks: CQ Press. Pp. xv, 11, 17, 69, 70.

Beardsley, R.K.
1948 Cultural Sequences in Central California Archaeology. *American Antiquity* 14(1):1-28.

Beierlein, Lars with Gernot Nehrke and Thomas Brey
2005 Confocal Raman microscopy in Sclerochronology: A powerful tool to visualize environmental information in recent and fossil biogenic archives. *Geochemistry, Geophysics, Geosystems* 16:325-335.

Bennyhoff, J.A. and R.E. Hughes
1987 Shell Bead and Ornament Exchange Network Between California and the Western Great Basin. *Anthropological Papers of the American Museum of Natural History* 62(2):83-175.
1994 Variation Within the Meganos Culture. *In* Toward a New Taxonomic Framework for Central California Archaeology: Essays by James A. Bennyhoff and David A. Fredrickson. R. Hughes, ed. *University of California Archaeological Research Facility, Contributions* 52:81-89.

Bennyhoff, J.A. and R.F. Heizer
1958 Cross-dating Great Basin Sites by Californian Shell Beads. *Reports of the University of California Archaeological Survey* 42:129-141.

Binford, L. R.
1962 Archaeology and Anthropology. *American Antiquity* 28:217-25.
1978 Nunamiut Ethnoarchaeology. Academic Press, New York.

1980 Willow Smoke and Dog's Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity* 45:4-20.

Blakey, Kevin with John Crawford, R. Scott Lutz and Kevin Kilbride
1990 Response of Key Foods of California Quail to Habitat Manipulations. *Wildlife Society Bulletin* 18(3):240-245.

Breschini, Gary
1983 Models of Population Movements in Central California Prehistory. PhD Dissertation, Washington State University.

Breschini, Gary and Trudy Haversat
1997 Linguistics and Prehistory: A Case Study from the Monterey Bay Area. Contributions to the Linguistic Prehistory of Central and Baja California, G.S. Breschini and T. Haversat, eds. Coyote Press: Salinas, *Archives of California Prehistory* 44:127-141.
2002 Radiocarbon Dating and Cultural Models on the Monterey Peninsula. *Pacific Coast Archeological Society Quarterly* 38(1)12.
2011 A Revised Culture Sequence for the Monterey Peninsula Area, California. *Pacific Coast Archaeological Quarterly* 44(3):9.

Brewer, Douglas J.
1992 Zooarchaeology Method, Theory, and Goals. *In* Archaeological Method and Theory 4, M. Schiffer, *ed.* University of Arizona Press: Tucson. Pp.195-244.

Broughton, J.M.
1994 Late Holocene Resource Intensification in the Sacramento Valley, California: The Vertebral Evidence. *Journal of Archaeological Science* 21:501-514.
1997 Widening Diet Breadth, Declining Foraging Efficiency, and Prehistoric Harvest Pressure: Ichthyofaunal Evidence from the Emeryville Shellmound, California. *Antiquity* 71:845-862.

1999 Resource Depression and Intensification During the Late Holocene, San Francisco Bay: Evidence from the Emeryville Shellmound Vertebrate Fauna. University of California Berkeley Anthropological Records 32.

Buikstra, J.E and D. H. Ubelaker
1994 Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History, organized by Jonathan Haas. Arkansas Archaeological Survey, Fayetteville.

Butler, V.L.
2000 Resource Depression on the Northwest Coast of North America. *Antiquity* 74:649-661.

California Invasive Plant Council (CAL-IPC)
2015 Invasive Plants of California's Wildland. California Invasive Plants Council. http://www.calipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=25&surveynumber=182.php

California State Parks (CASP)
2008 Collection of files on CA-SCR-10 from Henry Cowell Redwoods District Office.
2017 Preservation Laws, Codes & Regulations. http://ohp.parks.ca.gov/?page_id=1077. Accessed June 17, 2017.

Cannon, Michael D.
2003 A Model of Central Place Forager Prey Choice and an Application to Faunal Remains from the Mimbers Valley, New Mexico. *Journal of Archaeological Science* 22:1-25.

Cartier, R.
1993 The Saunders Site: MNT-391, a littoral site of the Early Period. Scotts Valley Historical Society Monograph 1: Scotts Valley.

Charnov, E.L.
1976 Optimal Foraging: The Marginal Value Theorem. *Theoretical Population Biology* 9:474-498.

Charnov, E.L. with G.H. Orians and K. Hyatt
1976 Ecological Implications of Resource Depression. *American Naturalist* 110:247-259.

City of Santa Cruz (CSC)
2005 Local Coastal Program and Coastal Land Use Policies and Maps. http://www.cityofsantacruz.com/home/showdocument?id=51167. Accessed on June 23, 2017.
2014 Santa Cruz City Ordinances. http://ohp.parks.ca.gov/pages/1072/files/city%20of%20santa%20cruz.pdf. Accessed on June 23, 2017.

Clark, Roger N. and Errol E Weidinger
1998 Integrating Science and Policy in Natural Resource Management: Lessons and Opportunities from North America. *USDA Forest Service Bulletin*, General Technical Report PNW-GTR-441.

Codding, Brian F. with Douglas W. Bird and Terry L. Jones
2012 A Land of Work: Foraging Behavior and Ecology. *In* Contemporary Issues in California Archaeology, Terry L. Jones and Jennifer E. Perry, eds. Pp. 115-131. Walnut Creek: Left Coast Press.

Diekman, Lucy with Lee Pnich and Chuck Striplen
2007 Native American Management and the Legacy of Working Landscapes in California. Society for Range Management. *Rangelands* 29(3):49.

Driscoll, Charles T. with Kathy Fallon Lambert and Kathleen C. Weathers
2011 Integrating Science and Policy: A Case Study of the Hubbard Brook Research Foundation. *BioScience* 61(10):791-801.

Dunnell, Robert C.
1971 Systematics in Prehistory. Free Press: New York.
1978 In Style and Function: A Functional Dichotomy. *American Antiquity* 43:192-202.
1980 Evolutionary Theory in Archaeology. *In* Advances in Archaeological Method and Theory, vol.3, M.B. Schiffer, *ed*. Academic Press: New York. Pp. 35-99.
1982 Science, Social Science and Common Sense: The Agonizing Dilemma of Modern Archaeology. *Journal of Archaeological Research* 38:1-25.

Dyez, Kelsey A. with Paul L. Koch, Heather L. Ford, Stephen A. Schellenberg, Seth D. Newsome, Mark G. Hylkema and Tom P. Guilderson
N.D. Mollusk geochemical records of Holocene climate and the California Current (draft).

Eerkens, Jelmer W. with Brian F. Byrd, Howard J. Spero and AnnaMarie K. Fristschi
2013 Stable isotope reconstructions of shellfish harvesting seasonality in an estuarine environment" implications for Late Holocene San Francisco Bay settlement patterns. *Journal of Archaeological Science* 40:2014-2024.

Erlandson, Jon M.
2012 A Land by the Sea: An Ocean View of California Archaeology. *In* Contemporary Issues in California Archaeology, Terry L. Jones and Jennifer E. Perry, eds. Pp.23-24. Walnut Creek: Left Coast Press.

Erlandson, Jon M. with Torben C. Rick, Todd J. Braje, Molly Casperson, Brenden Culleton, Brian Fulfrost, Tracy Garcia, Daniel A. Guthrie, Nickolas Jew, Douglass J. Kennett, Madonna L. Moss, Leslie Reeder, Craig Skinner, Jack Watts and Lauren Willis
2011 Paleoindian Seafaring, Maritime Technologies, and Coastal Foraging on California's Channel Islands. *Science* 331(1181):1181-1185.

Field, L and A. Leventhal
2003 What it Must Have Been Like! Critical Consideration of Pre-contact Ohlone Cosmology as Interpreted Through Central California Ethnohistory. *Wicazosa Review* 18(2):95-126.

Field, Les with Alan Leventhal, Dolores Sanchez, and Rosemary Cambra
1992 A Contemporary Ohlone Tribal Revitalization Movement: A Perspective from the Muwekma Costanoan/Ohlone Indians of the San Francisco Bay Area. *California History* 71(3):412-431.

Flannery, Kent V.
1967 The Vertebrate Fauna and Hunting Patterns. *In* The Prehistory of the Tehuacan Valley, Vol.1, D.S. Byers, *ed*. University of Texas Press: Austin. Pp.132-178.

1968 Archaeological Systems Theory and Early Mesoamerica. *In* Anthropological Archaeology in the America, M.J. Meggars, *ed*. The Anthropological Society of Washington: Washington D.C. Pp.67-68.

Fredrickson, D.A.
1974 Cultural Diversity in Early Central California: A View from the North Coast Ranges. *Journal of California Anthropology* 1:41-54.

Garnett, T. with M.C. Appleby, A. Balmford, I.J. Bateman, T.G. Benton, P. Bloomer, B. Burlingame, M. Dawkins, L. Dolan, D. Fraser, M. Herrero, I. Hoffman, P. Smith, P.K. Thorton, C. Toulmin, S.J. Vermeulen and H.C.J. Godfray
2013 Sustainable Intensification in Agriculture: Premises and Policies. *Science* 341(6141):33-34.

Gibson, R.O. and G. Frenenga
1978 A Preliminary Analysis of the Shell Beads and Ornaments from CA-SCL-128. *In* Archaeological Investigations at CA-SCL-128, the Holiday Inn Suite, J.C. Winter, *ed*. Coyote Press: Salinas.

Gifford, Diane P. and Francine Marshall
1984 Analysis of the Archaeological Assemblage from CA-SCR-35, Santa Cruz County, California. *Archives of California Prehistory* 2:1-27. Salinas: Coyote Press.

Gifford-Gonzalez, Diane
2011 Holocene Monterey Bay Fur Seals. *In* Human Impacts on Seals, Sea Lions, and Sea Otters: Integrating Archaeology and Ecology in the Northeast Pacific, Todd J. Braje and Torben C. Rick, eds. Pp. 221-242. Oakland: University of California Press.

Gilbert, Carter and James D. Williams
2002 National Audubon Field Guide to Fishes. Alfred A. Knopf, Inc: New York.

Gilbert, B. Miles
1990 Mammalian Osteology. Missouri Archaeological Society: Columbia.

Gilbert, B. Miles with Larry D. Martin and Howard G. Savage
1996 Avian Osteology. Missouri Archaeological Society: Columbia.

Gilikinson, Andrea K. with Shannon E. Finnerty, Frederick Weltz, Timothy M. Dellapenna, Randall W. Davis and Samantha Wisely
2011 Habitat Associations of Sea Otters (*Enhydra lutris*) in a Soft and Mixed Sediment Benthos in Alaska. *Journal of Mammology* 92(6):1278-1286.

Girard, Dominque with Sabrina Clemente, Killian Toledo-Guedes, Alberto Brito and Jose Carlos Hernandez

2012 A Mass Mortality of Subtropical Intertidal Populations of the Sea Urchin *Paracentrtus lividus*: Analysis of Potential Links with Environmental Conditions. *Marine Ecology* 33(3):377-379.

Giribet, Gonzalo
2008 Bivalvia. *In* The Phylogeny and Evolution of Mollusca, Ponder and Lindberg, *eds*. University of California Press: Berkeley. Pp.110-142.

Global Invasive Species Database (GISD)
2017 *Geukensia demissa*. Invasive Species: Mytilidae. http://www.iucngisd.org/gisd/species.php?sc=1153. Accessed September 9, 2017.

Grayson, Donald K.
1973 On the Methodology of Faunal Analysis. *American Antiquity* 38: 432-439.
2001 The Archaeological Record of Human Impacts on Animal Populations. *Journal of World Prehistory* 15:1-68.

Guilday, J.E. with P.W. Parmalee and D.P. Tanner
1962 Aboriginal Butchering Techniques at the Eschelman Site (36La12) Lancaster Co., Pa. *Pennsylvania Archaeology* 32(2):59-83.

Heizer, R.F. and F. Fenenga
1939 Archaeological Horizons in Central California. *American Anthropologist* 41(3):378-399.

Hildebrandt, William R. and Kelly R. McGuire
2012 A Land of Prestige. *In* Contemporary Issues in California Archaeology, Terry L. Jones and Jennifer E. Perry, eds. Pp.133-151. Walnut Creek: Left Coast Press.

Hylkema, Mark G.
1991 Prehistoric Native American adaptions along the central California coast of San Mateo and Santa Cruz counties. MA Project Report and Thesis Archive, San Jose State University Department of Anthropology.

Jackson, Edwin and Susan Scott
2003 Patterns of Elite Faunal Utilization at Moundville, Alabama. *American Antiquity* 68(3):44-54.

Jew, Nicholas P. with Jon M. Erlandson, Jack Watts, and Francis J. White
2013 Shellfish, Seasonality, and Stable Isotope Sampling: δ18O Analysis of Mussel Shells from an 8,800-Year-Old Shell Midden on California's Channel Islands. *Journal of Island and Coastal* Archaeology 8:172.

Jick, Todd D.
1979 Mixing Qualitative and Quantitative Methods: Triangulation in Action. *Administrative Science Quarterly* 24(4):602-611.

Jones, Terry L.
2002 Archaeology & Prehistory. *In* Changes in a California Estuary: A Profile of Elkhorn Slough, Jane Caffrey, Martha Brown, W. Breck Tyler and Mark Silberstein, eds. Moss Landing: Elkhorn Slough Foundation.Pp.53-91.

Jones, Terry and Georgie Waugh
1997 Climatic consequences or population pragmatism? A Middle Holocene prehistory of the central California coast. In Erlandson, J. M., and Glassow, M. A. (eds.), *Archaeology of the California Coast During the Middle Holocene*, Perspectives in California Archaeology, Vol. 4, Institute of Archaeology, University of California, Los Angeles, pp. 111– 128.

Jones, Terry L. with Nathan E. Stevens, Deborah A. Jones, Richard T. Fitzgerald and Mark G. Hylkema
2007 The Central Coast: A Midlattitude Milieu. *In* California Prehistory, Terry L. Jones and Kathryn A. Klar, eds. Lanham: Altamira Press. Pp. 126-146.

Joyce, Megan
2012 Constructing Nature: Art, Conservation and Applied Zooarchaeology. *Journal of Ethnobiology* 32(2):246-264.

Keene, Arthur S.
1983 Biology, Behavior and Borrowing: A Critical Examination of Optimal Foraging Theory in Archaeology. *In* Archaeological Hammers and Theories, James A. Moore and Arthur S Keene, eds. Pp.138-155. Cleveland: Academic Press.

King, C.
1981 Prehistoric and Early Historic California Beads. Ornament 5(1).

Klein, Richard G. and Kathryn Cruz-Uribe
1984 The Analysis of Animal Bones from Archaeological Sites, Karl W. Butzer and Leslie G. Freeman, *eds*. University of Chicago Press; Chicago. Pp.24-37.

Klippel, Ealkter and Paul Parmalee
1982 Diachronic Variation in Insectivores from Cheek Bend Cave and Environmental Change in the Midsouth. *Paleobiology* 8:447-458.

Levian, R.
1979 Global Problems: the role of international science and technology organizations. *In* Science, Technology and Global Problems, J. Gvishiani, *ed*. Oxford: Pergamon Press. Pp. 47-49.

Levy, R.S.
1978 Costanoan. *In* Handbook of North American Indians: California, R. Heizer, *ed*. Smithsonian Institute: Washington D.C. Pp.485-495.

Lightfoot, Kent G.
1997 Cultural Construction of Coastal Landscapes: A Middle Holocene Perspective from San Francisco Bay. In Archaeology of the California Coast During the Middle Holocene, Jon M. Erlandson and Michael A. Glassow, *eds*. Institute of Archaeology, UCLA: Los Angeles. Pp. 129-141

Lightfoot, Kent with Rob Q. Cuthrell, Chuck J. Striplen and Mark G. Hylkema
2013 Rethinking the Study of Landscape Management Practices Among Hunter-Gatherers in North America. *American Antiquity* 78(2):1-17.

Lyman, R. Lee
1987 Zooarchaeology and Taphonomy: A General Consideration. *Journal of Ethnobiology* 7(1):93-117.
1996 Applied zooarchaeology: the relevance of faunal analysis to wildlife management. *World Archaeology* 28(1):110-125.
2008 Quantitative Paleozoology. Cambridge University Press: Cambridge.

Margolin, Malcom
1978 The Ohlone Way: Indian Life in the San Francisco-Monterey Bay Area. Heyday Books: Berkeley.

Masters, Patricia M. with Ivano W. Aielo
2010 Postglacial Evolution of Coastal Environments. *In* California Prehistory: Colonization, Culture and Complexity, Terry L. Jones and Kathryn A. Klar, eds. Pp.35, 36, 38, 40, 47, 49-51. Lanham: Altamira Press.

McLeman, Robert A. with Juliette Dupre, Lea Berrang Ford, James Ford, Konrad Gajewski and Gregory Marchildon
2002 What We Learned from the Dust Bowl: Lessons in Science, Policy, and Adaption. *Population Environment* 35:417-440.

Milliken, Randall
1995 A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area, 1769-1810. Ballena Press: Banning.
2007 Santa Clara Prehistory: Archaeological Investigations at CA-SCL-690, the Tamien Station Site, San Jose, California. Mark G. Hylkema, *ed*. Center for Archaeological Research at Davis, Department of Anthropology, University of California Davis.

Milliken, Randall and J.A. Bennyhoff
1993 Temporal Changes in Beads as Prehistoric California Grave Goods. *In* There Grows a Green Tree: Papers in Honor of David A. Frerickson, G. White, P. Mikkelson, W.R. Hildebrandt and M.E. Basgall, *eds*. Center for Archaeological Research at Davis, University of California: Davis.

Milliken, Randall with Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gillette, Viviana Bellafemine, Eric Strother, Robert Cartier, and David A. Fredrickson
2007 Punctuated Culture Change in the San Francisco Bay Area. *In* California Prehistory, Terrry L. Jones and Kathryn A. Klar, eds. Lanham: Altamira Press. Pp. 99-125.

Milliken, Randall with L. Shoup and B. Ortiz
2009 Ohlone/Costanoan Indians of the San Francisco Peninsula and Their Neighbors, Yesterday and Today. Technical Report National Park Service, Golden Gate Recreation Area, Fort Mason, San Francisco, California. *Archaeological and Historical Consultants:* Oakland.

Monroe, Cara
2014 Correlating Biological Relationships, Social Inequality, and Population Movement Among Prehistoric California Foragers: Ancient Human DNA Analysis from CA-SCL-38 (Yukisma Site). PhD dissertation, University of California Santa Barbara.

Morris, Percy A.
1966 Peterson Field Guide: Pacific Coast Shells. Houghton Mifflin Company: Boston.

National Parks Service (NPS)
2017 Federal Preservation Laws. https://www.nps.gov/subjects/historicpreservation/laws-intro.htm. Accessed June 23, 2017.

Olson, Stanley J.
1968 Fish, Amphibian and Reptile Remains from Archaeological Sites. *Papers of the Peabody Museum of Archaeology and Ethnography* 56(2).

Orians, G.H. and N.E. Pearson
1979 On the Theory of Central Place Foraging, G.H. Oriand and N.E. Pearson, *eds*. Ohio State University Press: Columbus.

Peres, Tanya M.
2001 Coastal Subsistence and Settlement in the Early Ceramic: A Zooarchaeological Study from Central Pacific Panama. PhD Dissertation, Department of Anthropology, University of Florida: Gainesville.
2008 Methodological Issues in Zooarchaeology. *In* Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases, A.M. VanDerwarker and T.M. Peres, eds. Berlin: Springer Science + Business Media. Pp.15-36.

Perlut, Noah G. with Allan M. Strong and Toby J. Alexander
2011 A Model for Integrating Wildlife Science and Agri-Environment Policy in the Conservation of Declining Species. *The Journal of Wildlife Management* 75(7):1657-1663.

Ponder, Winston and David Lindberg
2008. The Phylogeny and Evolution of Mollusca, Winston Ponder and David Lindberg, *eds*. University of California Press: Berkeley.

Porcasi, Judith F.
2011 More on Mollusks: Trans-Holocene Shellfish Exploitation on the California Coast. *Journal of Island & Coastal Archaeology* 6:398-420.

Proctor, Noble S. and Patrick J. Lynch
1993 Manual of Ornithology: Avian Structure & Function. Yale University Press: New Haven.

Ramirez, Renya
2007 Native Hubs: Culture, Community, and Belonging in Silicon Valley and Beyond. Duke University Press: Durham. Pp. 102-125.

Rehder, Harald A.
1994 National Audubon Society Field Guide to North American Seashells. Alfred A. Knopf, Inc.: New York.

Reitz, Elizabeth J. and Elizabeth S. Wing
2010 Zooarchaeology, Second Edition. Cambridge University Press, New York. Pp. 11, 77, 89, 132, 158, 167, 184, 222, 257.

Ryan, Mary Ellen
1980 "Well Looking, Affable People...": The Ohlone of Aulintak/Santa Cruz. Archaeological Resources Protection Amendment, Historic Preservation Plan for the City of Santa Cruz Planning Department.

Santa Cruz Water Department
2017 History of the Santa Cruz City Water Department. Santa Cruz Public Libraries. https://www.santacruzpl.org/history/articles/157/. Accessed June 23, 2017.

Sarewitz, D. and R. Pielke
2000 Prediction in science and policy. *In* Science, Decision Making and the Future of Nature, D. Sarewitz, R. Pielke and R. Byerly, *eds*. Washington D.C.: Island Press. Pp.11-12.

Scheffer, Victor B.
1958 Seals, Sea Lions and walruses: A Review of the Pinnipedia. Stanford University Press: Stanford.

Schiffer, Michael B.
1976 Behavioral Archaeology. Academic Press: New York.

Schoener, T.W.
1979 Generality of the Size-Distance Relation in Models of Optimal Foraging Feeding. *American Naturalist* 114(6):902-914.

Senate Committee on Environmental Quality
2014 Bill Analysis: AB52. California Environmental Quality Act. Senator Jerry Hill, chair. http://www.leginfo.ca.gov/pub/13-14/bill/asm/ab_005100100/ab_52_cfa_20140623_115333_sen_comm.html. Accessed March 17, 2017.

Sides, Josh
2014 The Sunland Grizzly. *Natural History* 122(5):36-46.

Spears, Brian L. with Mark C. Wallace, Warren B. Ballard, Richard S. Phillips, Derrick P. Holdstock, John H. Brunjes, Roger Applegate, Michael S. Miller and Phillip S. Gipson
2007 Habitat Use and Survival of Preflight Wild Turkey Broods. *Journal of Wildlife* Management 71(1):69-81.

Specht, Paula E.
2016 The Effects Wild Fires Have on Skeletal Remains. B.A. Thesis, University of Florida, Gainesville, Florida.

Stauffer, Robert C.
1937 Changes in the Invertebrate Community of a Lagoon After Disappearance of the Eel Grass. *Ecology* 18(3):427-431.

Steel, Brent with Peter List, Denise Latch and Bruce Schindler
2004 The role of scientists in the environmental policy process: a case study from the American west. *Environmental Science & Policy* 7:1-13.

Sullivan III, Alan P. and Kenneth C. Rozen
1985 Debitage Analysis and Archaeological Interpretation. *American Antiquity* 50(4):755-779.

Tala, Fadia with Marcel Velásquez, Andrés Mansilla, Erasmo C. Macaya, and Martin Thiel
2016 Latitudinal and Seasonal Effects on the Short-term Acclimation of Floating Kelp Species from the South-East Pacific. *Journal of Experimental Marine Biology* 483:31-41.

United States Department of Agriculture Forest Service (USFS)
2017 Panther Meadows Restoration Project. Accessed September 7, 2017.

United States Department of the Interior Bureau of Land Management (BLM)
2017 Rangeland Health. Bureau of Land Management: Natural Resources. https://www.blm.gov/programs/natural-resources/rangelands-and-grazing/rangeland-health. Accessed September 8, 2017.

University of Nottingham
2017 Archaeological Fish Resource, electronic database. http://fishbone.nottingham.ac.uk. Accessed August 2017.

Vale, Thomas R.
2002 The Pre-European Landscape of the United States: Pristine or humanized? *In* Fire, Native Peoples, and the Natural Landscape, Thomas R. Vale, *ed*. Island Press: Washington D.C. Pp. 1-39.

VanDerwarker, Amber M.
2006 Farming, Hunting, and Fishing in the Olmec World. University of Texas Press: Austin.

Von DenDreisch, Angela
1976 A Guide to the Measurement of Animal Bones from Archaeological Sites. Peabody Museum of Archaeology and Ethnology Museum Bulletin, Harvard University, Boston.

Watson, Patty Jo with Steven A. Leblanc and Charles Redmon
1972 Explanation in Archaeology. Columbia University Press: New York.

West, James G. with Wallace Woolfenden, James A. Wanket, and R. Scott Andersen
2010 Late Pleistocene and Holocene Environments. *In* California Prehistory: Colonization, Culture and Complexity, Terry L. Jones and Kathryn A. Klar, eds. Pp.11, 13, 20. Lanham: Altamira Press.

White, T. E.
1953 A Method of Calculating the Dietary Percentage of Various Food Animals Utilized by Aboriginal Peoples. *American Antiquity* 18(4):396-398.

Wiberg, R.
1996 Archaeological Excavations and Burial Removal at Sites CA-ALA-483, CA-ALA-483 Extension, and CA-ALA-555, Pleasanton, Alameda County, California, Coyote Press: Salinas.

Appendix A
California State Parks Files

Primary Records

State of California — The Resources Aqencv
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

PRIMARY # P-44-000-005
HRI #
TRINOMIAL CA-SCR-10
NRHP Status Code
Other Listings
Review Code ____ **Reviewer** ____ **Date** ____

Page 1 of 7 ***Resource Name or #:** (Assigned by recorder) CCATP 06_25_02_B-1

P1. Other Identifier: Wilder Ranch State Park

***P2. Location:** X Not for Publication ☐ Unrestricted ***a. County** Santa Cruz

and (P2c, P2e, and P2b or P2d. Attach a Location Map as necessary.) **Mexican Refugio Land Grant System**

***b.** USGS 5'x11' Santa Cruz **Date** 1954/81 **T** _; **R** ; _ **¼ of** _ **¼ of Sec** _; MDM **B.M.**

c. Address: N/A City ____ Zip ____

d. UTM: (Give more than one for large and/or linear resources) Zone 10N; ⁵77943 mE/ ⁴⁰92014 mN GPS reading.

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

Take Hwy 1 North, there is an agricultural road and turn off right side of hwy, approximately 2.3 miles past the Wilder State Park entrance, and 4.5 miles North of Santa Cruz city limits. This site extends both sides of Hwy 1 (there are access roads on the south side of the Hwy as well), through several agricultural roads.

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

The site is extremely large. It extends to the Northern and Southern side of Hwy 1. Baldwin Creek runs along the Eastern edge of the site. This eastern edge includes a historical barn, residential house, and a shed. This eastern edge has been created by the leveling of the field and is eroding and exposing more artifacts. The agricultural fields have been continuously planted and plowed, cut roads have been made for access roads and the railway runs along the south side of Hwy 1. These roads exposed a great deal of shell and lithics which (cont.)

***P3b. Resource Attributes:** (List attributes and codes) AP2. Lithic scatter, AP15 habitation debris

***P4. Resources Present:** ☐ Building ☐ Structure ☐ Object X Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)

P5b. Description of Photo: (view, date, accession #)

***P6. Date Constructed/Age and Source:**
☐ Historic X Prehistoric ☐ Both

***P7. Owner and Address:**
California State Parks
600 Ocean St.
Santa Cruz, CA 95060

***P8. Recorded By:** (Name, affiliation, and address) Cabrillo College (ARCH 2), 6500 Soquel Drive, Aptos, CA 95003
(cont.)

***P9. Date Recorded:** 06/25/2002

***P10. Survey Type:** (Describe)

Reconnaissance

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.")" Arche 2, Summer 2002 Survey and ASCAR review report" by Charr Simpson-Smith and Rob Edwards, 10/31/02"

***Attachments:** ☐ NONE 2 Location Map X Sketch Map X Continuation Sheet ☐ Building, Structure, and Object Record X Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record X Photograph Record ☐ Other (List):

DPR 523A (1/95)

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

PRIMARY# P-44-000005
HRI#
TRINOMIAL CA-SCR-10

 *Resource Name or # (Assigned by recorder) CCATP_06_25_02_B1
*Recorded by Mann, Warren, Elam, Huckabee, Brown Bernard, DeWorkern, Birabent, Dominguez, Smith, Sinick, Casey and Simpson-Smith
*Date 06/25/02 X Continuation ☐ Update

P3a. have resulted in a larger concentration along the road edges. The rest of the side contains Mytilus, Haliotus, Protothaca Balanus, Monterey banded chert flakes; spent cores, bi-faces, hammer stones along with a biface of obsidian and one of andesite. The elevation is 120 Feet.

P8: Mann, Warren, Elam, Huckabee, Brown Bernard, DeWorkern, Birabent, Dominguez, Smith, Sinick, Casey, and Simpson-Smith Cabrillo College 6500 Soquel Drive, Aptos Ca. 95003

Radiocarbon Dating

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Richard T. Fitzgerald — Report Date: 2/1/2016

Department of Parks and Recreation — Material Received: 1/22/2016

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 429487	3540 +/- 30 BP	+0.1 o/oo d18O= +0.0 o/oo	3950 +/- 30 BP

SAMPLE : CASCR10u2 170-180
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (shell): acid etch
2 SIGMA CALIBRATION : Cal BC 1825 to 1595 (Cal BP 3775 to 3545)

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 429488	4020 +/- 30 BP	+1.0 o/oo d18O= +0.3 o/oo	4450 +/- 30 BP

SAMPLE : CASCR10u2 60-70
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (shell): acid etch
2 SIGMA CALIBRATION : Cal BC 2475 to 2255 (Cal BP 4425 to 4205)

Dates are reported as RCYBP (radiocarbon 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.

Page 2 of 4

Cabrillo Field School Documents

Cabrillo College Archaeological Technology Program Field School Contact List

Students

Name	Phone	Email
Fenix Bedoya	[redacted]	
Heather Bradford		
Meredith Chandler		
Fabian Gauthier		
Ian McKinnon		
Pat McNeill		
Tommy Miller-Donnelly		
Cat Nichols		
Claire O'Brien		
Kim Ornellas		
Alyssa Rasmussen		
Melissa Rodrigues		
Kaely Romney		
Jeremy Spradlin		
Andre Sternang		
Anthony Vasquez		
Directors and Crew Leaders		
Rob Edwards		
Dusty McKenzie		
Annamarie Leon Guerrero		
James Sarmento		
Mike Smith		
Carolyn Vankol		

Cabrillo College Archaeological Technology

Crew Leader Summary Form

Crew Leader: Van Kol

Team Number: DC / WS

Date: ~~7-18-08~~ 7-21-08

Team Members: Vasquez, Nichols, Bradford, Bedoya

Assignments: - Continue to wet screen
- Continue to Bx dry cultural material for CC

Problem/s encountered: SCR-10 unit 2 level 70-80 an "intact burial" was found at 74 cm McKenzie contacted Hylkema for instructions on how to handle the remains.

Resolution of problem/s:

Tasks completed:

Tasks to be continued: - Wet Screen (White Buckets) to be processed = 24
- 35 Brown Bags w/cultural material need to be boxed for transport to CC
- 24 Trays drying w/cultural material
- Finish Boxing/Baging Cultural Material from SCR 7 Before we go on to SCR 10

Cabrillo College Archaeological Technology Program

Daily Log Form

Crew Leader: Guerrero, Sarmento

Team: McKinnon, Sternang, Spradlin, Romney

Site: CA-Scr-10

Date: 7/24/08

Unit: 2

Field Activities: Sidewall profile of the West wall for unit 2, completed by Spradlin and Sternang (location of CS 1 & 2 also noted on profile). After sidewall profile was completed, Romney and Spradlin took 25cm x 25cm Column samples in 10cm increments. McKinnon provided data Control (assigning lot numbers for each level & labelling bags & cards). There was an issue with Romney's Column Sample, where the data Control person thought he was bagging the 80-90cm Level/Lot, but according to Romney it was the 90-100cm level, and she was currently working on taking down the 100-110cm level in the sidewall. & so, I told her to continue working on that level and to keep going so everything

Dry Screen Activity: N/A from Romney's level from the 100cm level down is correct, and there are no extra bags (or extra soil) in any of Spradlin's Column Sample - so none of Romney's levels/lots were mixed with his. There is the possibility that Romney dug two levels, but, every level yielded ~~at~~ 3 brown bags and there

Wet Screen Activity: N/A were no extra bags for any of her other levels. The incident with the lot, occurred after a visit from Mark Hylkema which did cause a distraction and could have caused Romney to mis-measure.

Other:

Arche 4 5/2004

LOT #4

[redacted]

UNIT LEVEL RECORD

LOCUS:

SITE: SCR-10 UNIT: (N)(S) 2 /(E)(W) ______ EXCAVATORS: McKenzie, Bedoya

LEVEL: 0-10 UNIT SIZE: N-S 2m /E-W 1

SCREEN SIZE: 1/4" DATE: 7·16·08

TECHNIQUES:

1. **SOILS/STRATIGRAPHY (color, texture, changes):**
Dark Grayish Brown, hard and crumpy soil, very compact

2. **ARTIFACTS (describe and count, draw diagnostics):**
Broken projectile point, Obsidian flake, Lots of Monterey chert

3. **ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):**
shell fragments of abalone, mossell

4. **FEATURES (describe, draw and attach FEATURE RECORD FORM):**
none

5. **DISTURBANCES (insect, rodent, plant, historic, etc.):**

6. **COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):** It is a very hard, compact soil

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS: Unit 2
SITE: SCr-10
UNIT: (N)(S) ~~20cm~~ /(E)(W) ~~10 cm~~
EXCAVATORS: McKenzie, Bedoya
LEVEL: ~~2~~ 10-20
UNIT SIZE: N-S 2mx /E-W 1 m
SCREEN SIZE: 1/4'
DATE: 7/16/08
TECHNIQUES:

1. SOILS/STRATIGRAPHY (color, texture, changes):
Dark Grayish Brown, very compact, crumpy soil, really hard to screen

2. ARTIFACTS (describe and count, draw diagnostics):
Small projectile point (Broken)

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Some abalone shell and mossel

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
none.

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
Agricultural Field.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form): It is a very hard soil, difficult to screen, with some chert fragments and severel rocks.

Cabrillo College
Archaeological Technology Program

Unit Level Record LOT # 6
Soil Sample # 5

LOCUS:
SITE: SCR-10 UNIT: (N)(S) 2 /(E)(W) ______ EXCAVATORS:
LEVEL: 20-30 UNIT SIZE: N-S 2 /E-W 1
SCREEN SIZE: 1/4" DATE: 7.16 08
TECHNIQUES: PICK / SHOVEL / TROWEL

1. SOILS/STRATIGRAPHY (color, texture, changes):
VERY HARD COMPACT SILTY SANDY LOAM.
SOIL CONTAINS SIGNIFICANT [illegible] OF ANGULAR
SHAPE GRAVEL AND [illegible]

2. ARTIFACTS (describe and count, draw diagnostics):
MONT CHERT FLAKES (MULTIPLE STAGES OF REDUCTION [illegible])
NO FORMAL TOOLS WERE FOUND [illegible] → found projectile point base, mont. chert, bagged separately

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
SHELL FISH, MOSTLY MUSSEL WITH SOME
LITTLE NECK CLAM AND BARNACLE

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
NO

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
ALL LEVEL IS PROBABLY DISTURBED BY
AGRICULTURE ASSOCIATED EVENTS (EG PLOWING
ROAD CONSTRUCTION AND MAINTENANCE.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):

Cabrillo College
Archaeological Technology Program

Unit Level Record LOT # 9

LOCUS:
SITE: SCR-10 UNIT: (N)(S) 2 /(E)(W) ______ EXCAVATORS:
LEVEL: 30-40 UNIT SIZE: N-S 2m /E-W 1m VASQUEZ
SCREEN SIZE: 1/4" DATE: ~~7-16-~~ 7.17.08 McKENZIE
TECHNIQUES:

1. SOILS/STRATIGRAPHY (color, texture, changes):
Soil is dark black + extremely compact. Large clumps of very compact soil had to be broken up, + soil was moist.

2. ARTIFACTS (describe and count, draw diagnostics):
Chert flakes (monterey chert). Common throughout level, mostly size of thumb nail. Two pieces found that were heat treated (evident from the creamy-white color).

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Shell fragments somewhat common (mostly very small). Abundance of mussell, some clam + barnacle. One visible flake of abalone.

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
None at this level.

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
Found bits of plastic in unit + in screen. A clump of soil found in screen had a thick line of blue powder/pigment on it.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form): Strong evidence that at this level there has been recent human activity.

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOT # 11

LOCUS:

SITE: SCR-10 UNIT: (N)(S) 2 /(E)(W) ______ EXCAVATORS:

LEVEL: 40-50 UNIT SIZE: N-S 2m /E-W 1m

SCREEN SIZE: 1/4" DATE: 7.18.08

TECHNIQUES: arbitrary 10 cm levels

1. SOILS/STRATIGRAPHY (color, texture, changes):
Dark gray - fine to medium Texture - no changes

2. ARTIFACTS (describe and count, draw diagnostics):

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
mussel is the predominant shell. Very few large fragments

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
none

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
historic plowing evident from pieces of plastic sheet at 45 cm.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOT # 13

LOCUS:

SITE: CA-SCR-10 UNIT: (N)(S) 2 /(E)(W) ______

LEVEL: 50-60 UNIT SIZE: N-S 2m /E-W 1m

SCREEN SIZE: 1/4" DATE: 7.18.08

TECHNIQUES: 10 cm arbitrary levels

EXCAVATORS: McKenzie

1. SOILS/STRATIGRAPHY (color, texture, changes):

dark grey, fine to medium

2. ARTIFACTS (describe and count, draw diagnostics):

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):

mussel, small (<2 cm) fragments

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):

none

5. DISTURBANCES (insect, rodent, plant, historic, etc.):

historic plowing very probable

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):

/

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS:
SITE: CA-SCR-10 UNIT: (N)(S) 2 /(E)(W) ______ EXCAVATORS:
LEVEL: 60-70 UNIT SIZE: N-S 2 /E-W 1 m McKenzie
SCREEN SIZE: 1/4 DATE: 7-18-08
TECHNIQUES: arbitrary 10 cm

1. SOILS/STRATIGRAPHY (color, texture, changes):
Dark Grey, Fine to med grain.

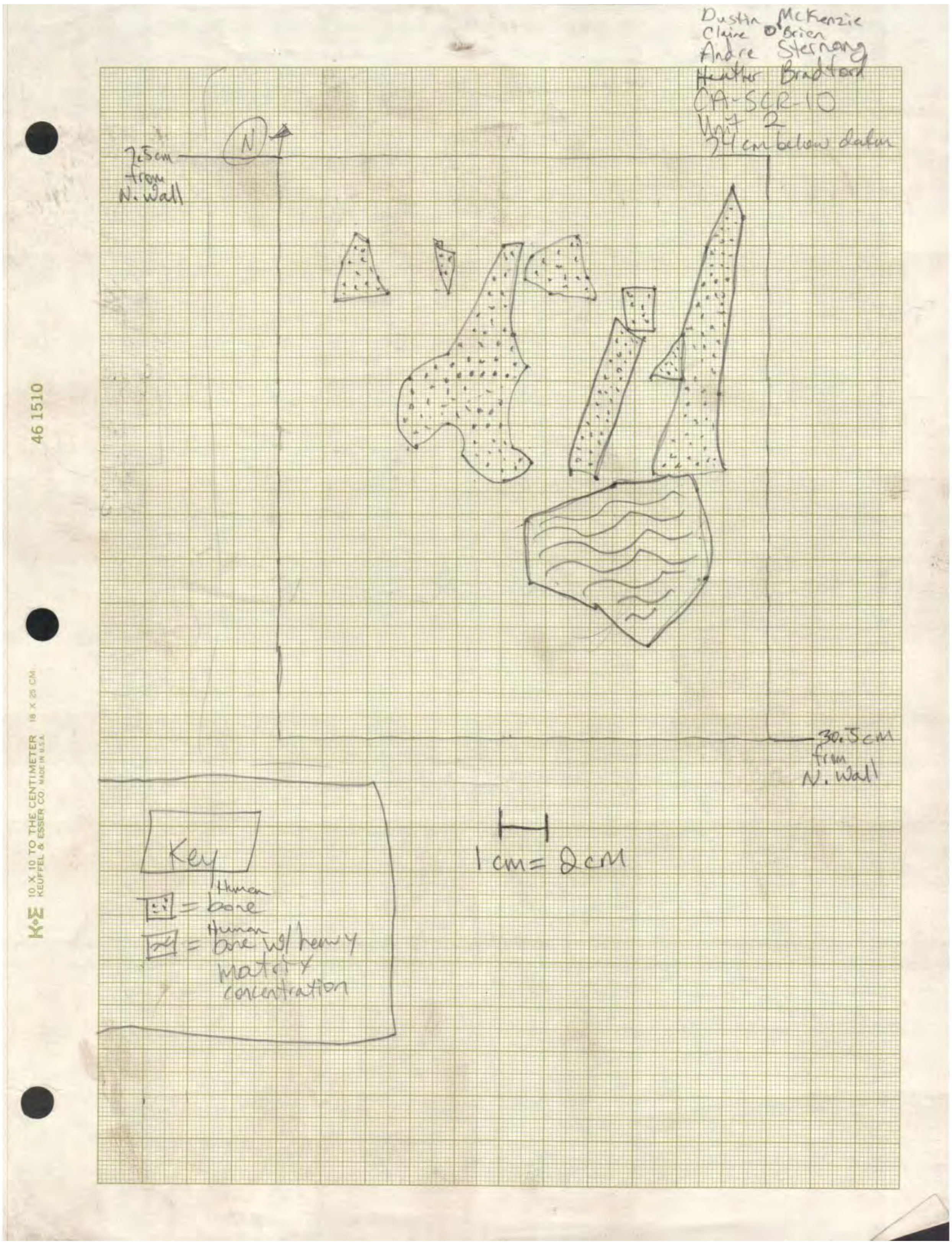
2. ARTIFACTS (describe and count, draw diagnostics):
Chert cobbles and flakes

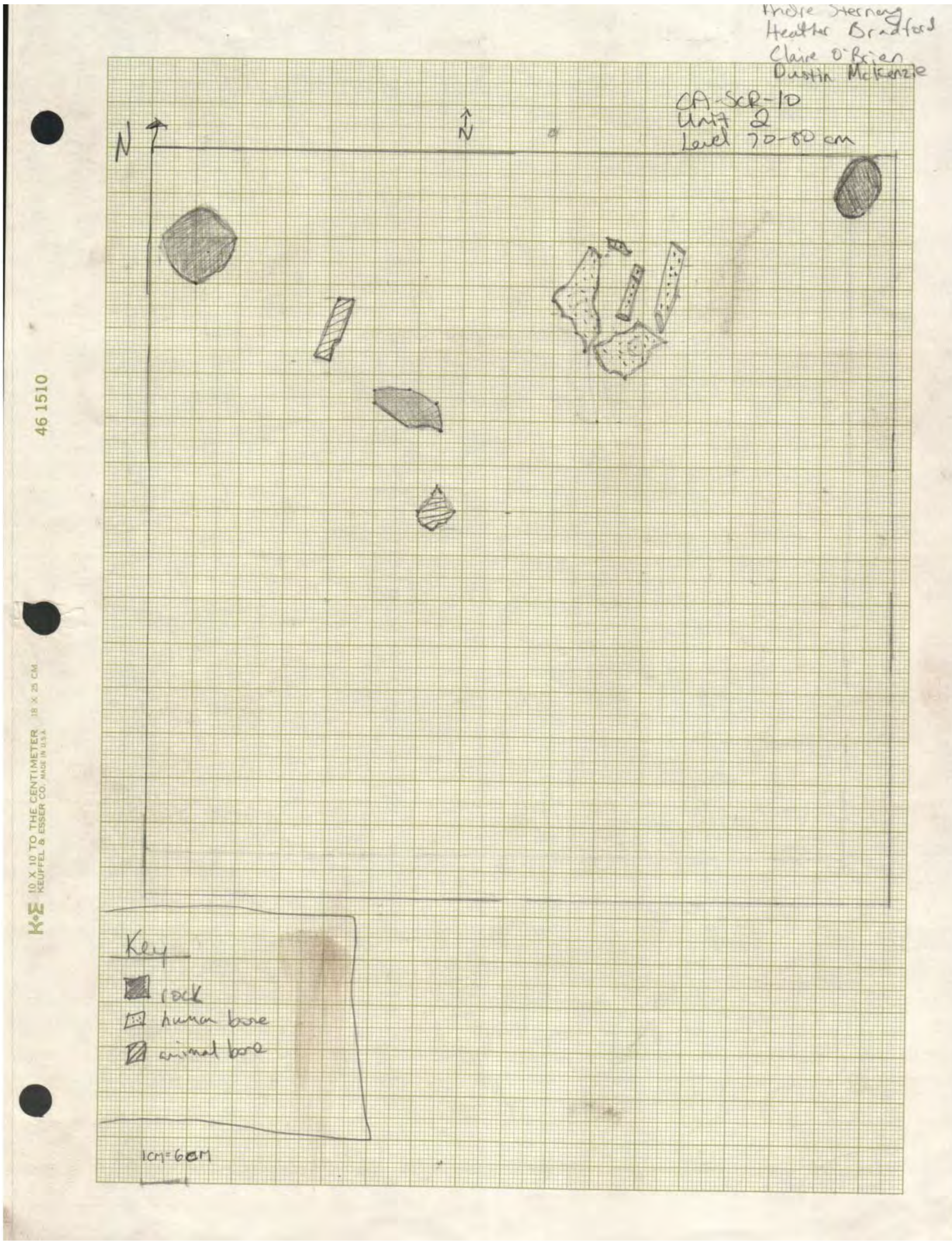
3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Shell: Mussle

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
None

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
~~None~~, Probable Plowing evidence.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):


Dustin McKenzie
Claire O'Brien
Andre Stersnang
Heather Bradford
CA-SCR-10
Unit 2
34 cm below datum
N
7.5cm from N. Wall
30.5cm from N. Wall
Key
= human bone
= human bone w/ heavy matrix concentration
1 cm = 2 cm


Heather Bradford
Claire O'Brien
Dustin McKenzie
CA-SCR-10
Unit 2
Level 70-80 cm
N
N
Key
rock
human bone
animal bone
46 1510
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

~~FAR WESTERN ANTHROPOLOGICAL RESEARCH GROUP, INC.~~

UNIT LEVEL RECORD

LOT 23

LOCUS:

SITE: CA-SCR-10 **UNIT: (N)(S)** 2 **/(E)(W)** ________ **EXCAVATORS:** Mckenzie, Bradford, O'Brien, STERNANG

LEVEL: 90-100 CM **UNIT SIZE: N-S** 1 m **/E-W** 1 m

SCREEN SIZE: 1/4 inch **DATE:** 07-22-08

TECHNIQUES:

1. **SOILS/STRATIGRAPHY (color, texture, changes):**
Soil is hard, grey colored. Tends to soften up underneath the grey layer and becomes darker.

2. **ARTIFACTS (describe and count, draw diagnostics):**
Monterey chert flakes. Monterey ~~coal~~ chert cortex
Some fire affected rocks

3. **ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):**
Shells (dogwinkle, Mossel, Barnacle, turbin Snail, Cayton SP?, abalone

4. **FEATURES (describe, draw and attach FEATURE RECORD FORM):**
HUMAN BURIAL found in North part of unit. We have closed this section down and are currently working by a 1×1 m unit in the south section.

5. **DISTURBANCES (insect, rodent, plant, historic, etc.):**
west ~~Unit is~~ of unit, 1 meter, there is an agriculture field. Unit is positioned on a dirt road where tractors drive on.
Plastic pieces are found in the 90-100 level.

6. **COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):**

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS: Unit 2, Lot 24
SITE: CA-SCR-10 UNIT: (N)(S) 2 /(E)(W) 2 EXCAVATORS: Mckenzie
LEVEL: 100-110 UNIT SIZE: N-S 1x1 /E-W
SCREEN SIZE: 1/4" DATE: 7/23/08
TECHNIQUES:

1. SOILS/STRATIGRAPHY (color, texture, changes):
Soil is very dark black. Moist + fluffy.

2. ARTIFACTS (describe and count, draw diagnostics):
[redacted] chert flakes (1 [redacted] flake reduction)
[redacted]

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Lots of large shell pieces; chiton, mussell, clam, olavella, whelk, + abalone. Mostly mussell more than anything else. Bone fragments found [redacted]; not human.

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
None

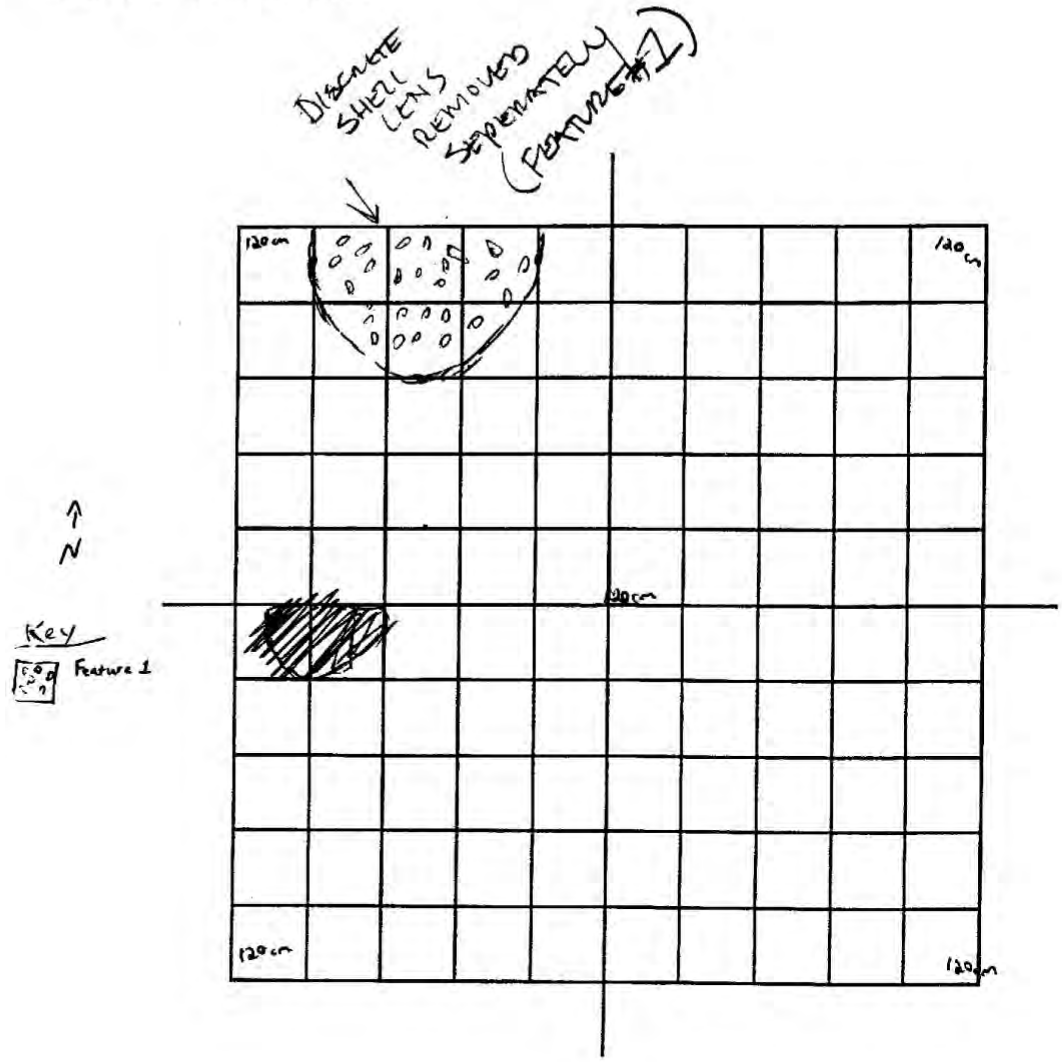
5. DISTURBANCES (insect, rodent, plant, historic, etc.):
Site is on an agriculture field + may have rodent/insect disturbance.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):

UNIT FLOOR SKETCH (note datum and position of any adjacent units).

SITE: CA-SCR-10 **UNIT:** 2 **LEVEL:** 110 - 120 cm

Indicate North, scale and legend.



Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS: Unit 2 Lot ~~[illegible]~~ 25
SITE: CA-SCR-10　UNIT: (N)(S) ___ /(E)(W) ___　EXCAVATORS: McKenzie
LEVEL: 110-120 cm　UNIT SIZE: N-S ___ /E-W 1x1
SCREEN SIZE: 1/4"　DATE: 7/23/08
TECHNIQUES:

1. SOILS/STRATIGRAPHY (color, texture, changes):
Soil is dark black, very fluffy, moist, + midden like. It is soft + easy to dig + sift through. Shell matrix (see Feature 1 + sketch map on backside).

2. ARTIFACTS (describe and count, draw diagnostics):

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Abalone, mussell, clam, winkle, olavella, chiton. Most ecofacts in large pieces, easy to identify. Most common is mussell. Burned bone piece found at 120cm; possibly sea mammal rib. Area has pockets of shell just visible from surface; discrete shell most of which is mussell intermixed with ash + charcoal in NW corner of unit. Sea urchin spines found in this pocket.

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
Feature 1 is a pocket of discrete area of shell mixed in with ash or charcoal. Very little soil in the Feature. Refer to photos 263-264-265 from Camera 3. Very large mussell piece recovered. May represent a hearth cleanout.

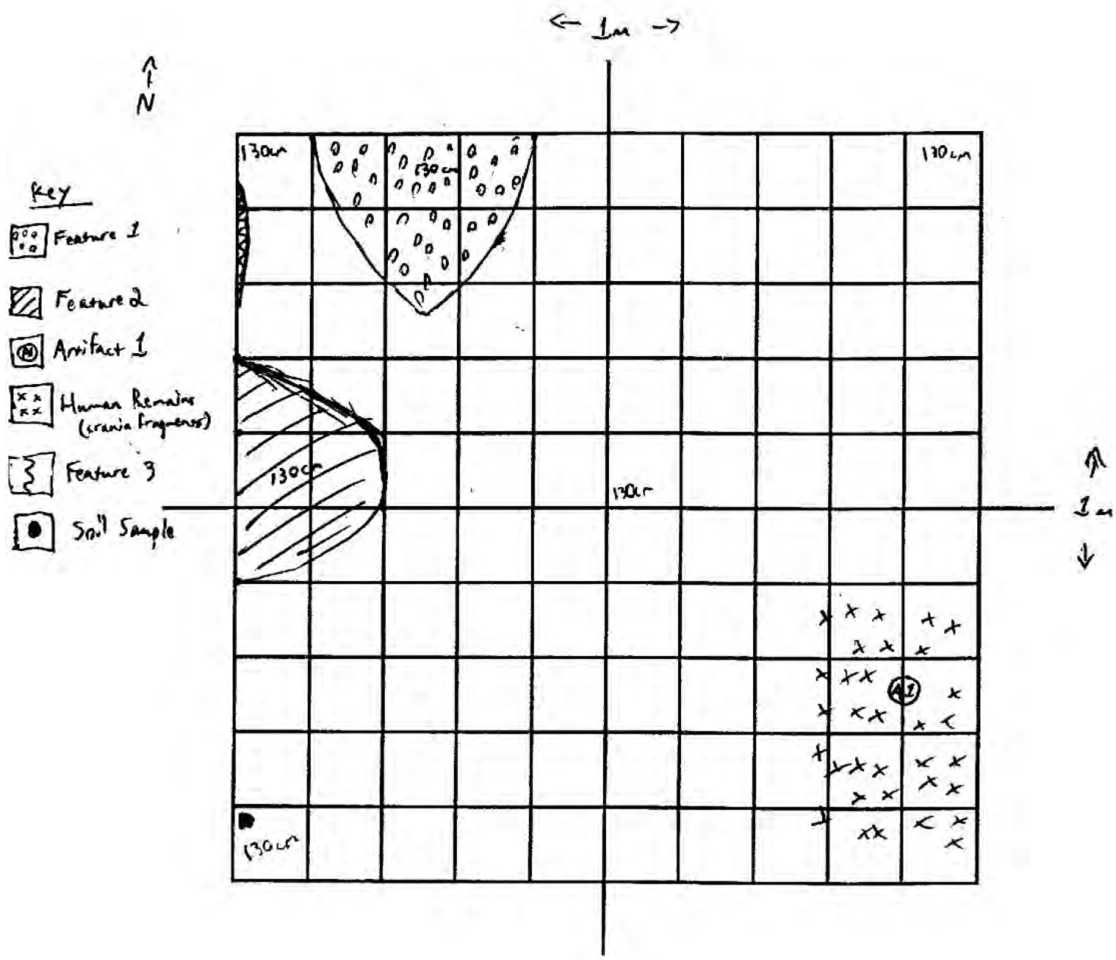
5. DISTURBANCES (insect, rodent, plant, historic, etc.):
On an agriculture field. Probable rodent/insect disturbance. Some roots found in screen.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form): Prior to this level soil has been very compact. 110-120cm unearths midden rich soil deposit. Feature 1 is located 46cm below level of burial + is south of burial. Feature was collected in large plastic bag.

UNIT FLOOR SKETCH (note datum and position of any adjacent units).

SITE: CA-SCR-10 UNIT: 2 LEVEL: 120-130 cm

Indicate North, scale and legend.



Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS: Unit 2, Lot 26

SITE: CA-SCR-7 UNIT: (N)(S) ______ /(E)(W) ______ EXCAVATORS: McKenzie

LEVEL: 120-130cm UNIT SIZE: N-S ______ /E-W ______ 1x1

SCREEN SIZE: 1/4" DATE: 7/23/08

TECHNIQUES:

1. SOILS/STRATIGRAPHY (color, texture, changes):
Very dark black, moist, rich in shell material. Ash found in center of unit.

2. ARTIFACTS (describe and count, draw diagnostics):
Fire cracked rock found in Feature 1. Olavella bead found at 126.5cm depth in SE corner (10cm from west wall 25cm from south wall) called A1 (Artifact 1).

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Shell pieces in large or small pieces. Include mussell, olavella, platform mussell
Bone found in NE corner (sea mammal).

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
Feature 1 continues into this level. It expanded as it went down (see sketch on other side). Sample was collected. Another feature found along West wall, Feature 2 (see sketch). Feature 2 has same material & make-up of Feature 1 (charcoal, ash, large shell, little soil). Found another hearth cleanout on NE wall, called Feature 3, with same make-up of Feature 1 or 2.

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
Roots found in screen; possible bioturbation.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form): Multiple fragments of human cranium found at 126.5-130cm below datum

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS: unit 2, Lot 27

SITE: CA-SCR-10 UNIT: (N)(S) / /(E)(W) EXCAVATORS:

LEVEL: 130-140 cm UNIT SIZE: N-S /E-W 2m x .5m McKenzie

SCREEN SIZE: 1/4" DATE: 7/23/08

TECHNIQUES:

1. SOILS/STRATIGRAPHY (color, texture, changes):
Incredibly dense shell midden. Very little soil matrix between shell. At 139cm this dense collection of shell gives way to soil matrix.

2. ARTIFACTS (describe and count, draw diagnostics):
Fire affected rock. Biface fragment (Monterey chert).

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Whelk. Very large, intact pieces of mussell. Sea mammal talus? found in South section. Slipper shell. Barnacle. Olavella. Overall, mussell is the main shell group.

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
Feature 1, Feature 2, & Feature 3 do not fall below this level. End at 139 cm.

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
~~[illegible]~~ Very small roots (rare).

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form): Looks like the dense pockets of shell/midden end at this level. However, we may have located a new midden type feature in SW corner for next level.

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS:
SITE: CA SCR 10 UNIT: (N)(S) 2 /(E)(W) ______
LEVEL: 140-150cm UNIT SIZE: N-S 1m /E-W .5m
SCREEN SIZE: 1/4 DATE: 7/23/08
TECHNIQUES:

EXCAVATORS:
Mckenzie
Spradlin
Vasquez
Mckinnon
O'BRIEN

1. SOILS/STRATIGRAPHY (color, texture, changes):
soil change → pocket of brown sandy soil depth ~ 146cm, 5cm from west wall, 48 from north (gopher probably)
soil becoming more compact.

2. ARTIFACTS (describe and count, draw diagnostics):
FCR, reduction flakes

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
mussel, barnacle, chiton, fish vertabra, olivella

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
none.

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
some Roots, Rodent activity.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOT 29

LOCUS:
SITE: SCR 10 UNIT: (N)(S) 2 /(E)(W)
LEVEL: 150-160 UNIT SIZE: N-S 1 /E-W .5
SCREEN SIZE: 1/4 DATE: 7/23/08
TECHNIQUES:

EXCAVATORS:
McKenzie
O'Brien
Spradlin
Vasquez,
McKinnon

1. SOILS/STRATIGRAPHY (color, texture, changes):

2. ARTIFACTS (describe and count, draw diagnostics):
Charcoal, FCR.

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
bird bone,
less shell than prior level - mussel, clam, limpet, chiton, winkle

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
larger roots,

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):

Cabrillo College
Archaeological Technology Program

Unit Level Record

LOCUS: LOT 30

SITE: SCR 10 UNIT: (N)(S) 2 /(E)(W) ______

LEVEL: 160-170 UNIT SIZE: N-S 1 /E-W .5

SCREEN SIZE: 1/4 DATE: 7/23/08

TECHNIQUES:

EXCAVATORS:
McKenzie
O'Brien
Saenang
Spradlin
Gauthier
Ornellas

1. SOILS/STRATIGRAPHY (color, texture, changes):

definite increase in the amont of shale cobbles.

2. ARTIFACTS (describe and count, draw diagnostics):

few chert flakes.

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):

mussel, barnacle, winkle, clam

UNIT TERMINATED @ 176cm

Cabrillo College
Archaeological Technology Program

Unit Level Record
LOT 31

LOCUS:
SITE: SCR-10 UNIT: (N)(S) 2 /(E)(W) ________ EXCAVATORS:
LEVEL: 170-180 UNIT SIZE: N-S 1 /E-W .5 McKenzie
SCREEN SIZE: 1/4" DATE: 7/23/08 O'Brien
TECHNIQUES: Ornellas
Gauthier
Spradlin
Sternang

1. SOILS/STRATIGRAPHY (color, texture, changes):
~176cm - shale bedrock extending over unit floor
noted soil change - midden soil dissapates at same level of rocks

2. ARTIFACTS (describe and count, draw diagnostics):
none.

3. ECOFACTS (faunal and floral; attach FIELD SAMPLE RECORD for C-14, flot, soil samples, etc.):
Barnacle, mussel,

4. FEATURES (describe, draw and attach FEATURE RECORD FORM):
none.

5. DISTURBANCES (insect, rodent, plant, historic, etc.):
Roots.

6. COMMENTS/INTERPRETATIONS (NOTE: draw unit level floor and plot in situ artifacts on other side of this form):
see photo.

Examples of Cultural Arftifacts Recovered

Pestles (n=22)

Handstones, including choppers and scrapers (n=49) & worked notched points, lanceolates and small cores (n=107)

Appendix B
Zooarchaeological Analysis Data

Marine Invertebrate Data

CAT #	Unit	Depth (cm)	Type	Taxon	Common Name	Weight (g)		
929	2	0-10	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	265.7		
928A	2	0-10	Shell	*Mytilus californianus*	California Mussel	948.4		
927	2	0-10	Shell	*Tegula funebralis*	Black Turban Snail	1		
930	2	0-10	Shell	*Olivella biplicata*	Purple Dwarf Olive	0.7		
931	2	0-10	Shell	*Cryptochiton stelleri*	Gumboot Chiton	5.6		
932	2	0-10	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	1.7		
933	2	0-10	Shell	*Nucella canaliculata*	Channeled Dogwinkle	2.7		
934	2	0-10	Shell	*Diodora aspera*	Rough Keyhole Limpet	0.1		
935	2	0-10	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	1.1		
928B	2	0-10	Shell	*Mytilus californianus*	California Mussel	279		
936	2	0-10	Shell	Unidentified	Unidentified	0.8		
656	2	0-10	Shell	*Littorina littorea*	Common Periwinkle	0.1		
601	2	0-10	Shell	*Collisella scabra*	Rough Limpet	0.2		
572	2	0-10	Shell	*Leukoma staminea*	Pacific Littleneck Clam	9.6		
624	2	0-10	Shell	*Clinocardium nattallii*	Nuttall's Cockle	0.3		
598	2	0-10	Shell	*Saxidomus nuttallii*	California Butter Clam	0.3		
614	2	0-10	Shell	*Polyplacophora*	Undifferentiated Chiton	3	1520.3	Total level weight
937	2	10-20	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	486.2		
938	2	10-20	Shell	*Cryptochiton stelleri*	Gumboot Chiton	10.1		
939	2	10-20	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	3.8		
940	2	10-20	Shell	*Tegula funebralis*	Black Turban Snail	0.7		
942	2	10-20	Shell	*Strongylocentrotus sp.*	Urchin	0.1		
941	2	10-20	Shell	*Leukoma staminea*	Pacific Littleneck Clam	48.5		
943	2	10-20	Shell	*Olivella biplicata*	Purple Dwarf Olive	3.1		
944	2	10-20	Shell	*Nucella lamillosa*	Frilled Dogwinkle	2.1		
945	2	10-20	Shell	Unidentified	Unidentified	1.1		
946A	2	10-20	Shell	*Mytilus californianus*	California Mussel	1171.7		
946B	2	10-20	Shell	*Mytilus californianus*	California Mussel	1007.8		
593	2	10-20	Shell	*Saxidomus nuttallii*	California Butter Clam	8.8		
634	2	10-20	Shell	*Macoma nasuta*	Bent Nose Clam	0.7		
718	2	10-20	Shell	*Tresus nuttallii*	Pacific Gaper Clam	1.8		
618	2	10-20	Shell	*Polyplacophora*	Undifferentiated Chiton	8.7		
652	2	10-20	Shell	*Littorina littorea*	Common Periwinkle	0.3		
653	2	10-20	Shell	*Nucella canaliculata*	Channeled Dogwinkle	0.2	2755.7	Total level weight

948A	2	20-30	Shell	*Mytilus californianus*	California Mussel	1140.3		
948B	2	20-30	Shell	*Mytilus californianus*	California Mussel	969.7		
947	2	20-30	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	368.5		
949	2	20-30	Shell	*Olivella biplicata*	Purple Dwarf Olive	4.1		
950	2	20-30	Shell	*Cryptochiton stelleri*	Gumboot Chiton	5.75		
951	2	20-30	Shell	*Tegula funebralis*	Black Turban Snail	2		
953	2	20-30	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	2		
52	2	20-30	Shell	Unidentified	Unidentified	0.4		
954	2	20-30	Shell	*Leukoma staminea*	Pacific Littleneck Clam	28.7		
955	2	20-30	Shell	*Littorina littorea*	Common Periwinkle	0.7		
451	2	20-30	Shell	*Nucella canaliculata*	Channeled Dogwinkle	0.7		
454	2	20-30	Shell	*Littorina plena*	Black Periwinkle	0.1		
455	2	20-30	Shell	*Polyplacophora*	Undifferentiated Chiton	5.6		
523	2	20-30	Shell	*Saxidomus nuttallii*	California Butter Clam	9.3		
519	2	20-30	Shell	*Collisella scabra*	Rough Limpet	0.1		
516	2	20-30	Shell	*Tresus nuttallii*	Pacific Gaper Clam	3.1		
567	2	20-30	Shell	*Clinocardium nattallii*	Nuttall's Cockle	0.1		
547	2	20-30	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	0.6	2541.75	Total level weight
1032	2	30-40	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	686.3		
1031	2	30-40	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	8.2		
1030	2	30-40	Shell	*Nucella lamillosa*	Frilled Dogwinkle	0.5		
1029	2	30-40	Shell	*Saxidomus nuttallii*	California Butter Clam	8.2		
1028	2	30-40	Shell	*Cryptochiton stelleri*	Gumboot Chiton	43.2		
1027	2	30-40	Shell	*Olivella biplicata*	Purple Dwarf Olive	6.8		
1026	2	30-40	Shell	*Tegula funebralis*	Black Turban Snail	5.4		
1013	2	30-40	Shell	*Crepidula formicata*	Common Slipper	0.09		
1012	2	30-40	Shell	*Mytilus californianus*	California Mussel	3927.2		
658	2	30-40	Shell	*Littorina littorea*	Common Periwinkle	0.1		
307	2	30-40	Shell	*Nucella canaliculata*	Channeled Dogwinkle	2.8		
551	2	30-40	Shell	*Leukoma staminea*	Pacific Littleneck Clam	52.7		
552	2	30-40	Shell	*Polyplacophora*	Undifferentiated Chiton	11.2	4752.69	Total level weight
965	2	40-50	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	528		
964	2	40-50	Shell	*Olivella biplicata*	Purple Dwarf Olive	11.4		
963	2	40-50	Shell	Unidentified	Unidentified	0.7		
962	2	40-50	Shell	*Crepidula formicata*	Common Slipper	0.3		

961	2	40-50	Shell	*Polyplacophora*	Undifferentiated Chiton	12		
960	2	40-50	Shell	*Leukoma staminea*	Pacific Littleneck Clam	43.5		
959	2	40-50	Shell	*Tegula funebralis*	Black Turban Snail	5.4		
958	2	40-50	Shell	*Collisella digitalis*	Ribbed Limpet	0.1		
957	2	40-50	Shell	*Nucella canaliculata*	Channeled Dogwinkle	2.3		
956	2	40-50	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	4.5		
1043	2	40-50	Shell	*Strongylocentrotus sp.*	Urchin	0.1		
1033A	2	40-50	Shell	*Mytilus californianus*	California Mussel	877.1		
1033B	2	40-50	Shell	*Mytilus californianus*	California Mussel	890.2		
1033C	2	40-50	Shell	*Mytilus californianus*	California Mussel	954.4		
1033D	2	40-50	Shell	*Mytilus californianus*	California Mussel	433.3		
524	2	40-50	Shell	*Nucella lamillosa*	Frilled Dogwinkle	0.4		
494	2	40-50	Shell	*Cryptochiton stelleri*	Gumboot Chiton	32.4		
526	2	40-50	Shell	*Saxidomus nuttallii*	California Butter Clam	13.2		
482	2	40-50	Shell	*Clinocardium nattallii*	Nuttall's Cockle	0.1		
479	2	40-50	Shell	*Macoma nasuta*	Bent Nose Clam	2.5	3823.1	Total level weight
1011A	2	60-70	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	677.7		
1011B	2	60-70	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	198.7		
1010A	2	60-70	Shell	*Mytilus californianus*	California Mussel	3084.1		
1010B	2	60-70	Shell	*Mytilus californianus*	California Mussel	3595.5		
1001	2	60-70	Shell	*Haplotrema minimum*	California Lancetooth (terr.)	0.2		
1000	2	60-70	Shell	*Collisella scabra*	Rough Limpet	2		
999	2	60-70	Shell	*Leukoma staminea*	Pacific Littleneck Clam	86.6		
998	2	60-70	Shell	*Ischadium demissum*	Ribbed Mussel	0.8		
997	2	60-70	Shell	*Crepidula formicata*	Common Slipper	0.6		
996	2	60-70	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	21.2		
995	2	60-70	Shell	*Tegula funebralis*	Black Turban Snail	35.6		
994	2	60-70	Shell	*Polyplacophora*	Undifferentiated Chiton	37		
993	2	60-70	Shell	*Olivella biplicata*	Purple Dwarf Olive	9.9		
992	2	60-70	Shell	*Strongylocentrotus sp.*	Urchin	0.4		
991	2	60-70	Shell	*Nucella canaliculata*	Channeled Dogwinkle	3.1		
484	2	60-70	Shell	*Cryptochiton stelleri*	Gumboot Chiton	99.8		
476	2	60-70	Shell	*Nucella lamillosa*	Frilled Dogwinkle	1.8		
474	2	60-70	Shell	*Littorina plena*	Black Periwinkle	0.3		
467	2	60-70	Shell	*Amphissa columbiana*	Wrinkled Amphissa	0.1		

563	2	60-70	Shell	*Littorina sp.*	Undifferentiated Periwinkle	1.25		
452	2	60-70	Shell	*Littorina littorea*	Common Periwinkle	0.8		
453	2	60-70	Shell	*Tresus nuttallii*	Pacific Gaper Clam	1.1		
306	2	60-70	Shell	*Macoma nasuta*	Bent Nose Clam	1.1		
565	2	60-70	Shell	*Lottia sp.*	Undifferentiated Limpet	0.5		
554	2	60-70	Shell	*Collisella digitalis*	Ribbed Limpet	0.1		
497	2	60-70	Shell	*Lottia instabilison*	Unstable Limpet	1.3		
392	2	60-70	Shell	*Clinocardium nattallii*	Nuttall's Cockle	3.5		
514	2	60-70	Shell	*Saxidomus nuttallii*	California Butter Clam	4.4	7869.45	Total level weight
983A	2	70-90	Shell	*Mytilus californianus*	California Mussel	3489.55		
983B	2	70-90	Shell	*Mytilus californianus*	California Mussel	3704.3		
983C	2	70-90	Shell	*Mytilus californianus*	California Mussel	3547.9		
983D	2	70-90	Shell	*Mytilus californianus*	California Mussel	3435.8		
983E	2	70-90	Shell	*Mytilus californianus*	California Mussel	3631.3		
983F	2	70-90	Shell	*Mytilus californianus*	California Mussel	1985.6		
990	2	70-90	Shell	*Olivella biplicata*	Purple Dwarf Olive	23.2		
989	2	70-90	Shell	*Ischadium demissum*	Ribbed Mussel	1.8		
982	2	70-90	Shell	*Nucella canaliculata*	Channeled Dogwinkle	14.9		
980	2	70-90	Shell	*Littorina plena*	Black Periwinkle	9.7		
979	2	70-90	Shell	*Crepidula formicata*	Common Slipper	5.8		
978	2	70-90	Shell	*Cancer antennarius*	Rock Crab	1.2		
1009	2	70-90	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	84		
1008	2	70-90	Shell	*Leukoma staminea*	Pacific Littleneck Clam	142		
1007	2	70-90	Shell	*Cryptochiton stelleri*	Gumboot Chiton	137		
1006A	2	70-90	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	535.5		
1006B	2	70-90	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	370		
1005	2	70-90	Shell	*Strongylocentrotus sp.*	Urchin	14.5		
1004	2	70-90	Shell	Unidentified	Worm concretion	2.7		
1003	2	70-90	Shell	*Haliotis sp.*	Abalone sp.	83		
1002	2	70-90	Shell	*Tegula funebralis*	Black Turban Snail	200		
488	2	70-90	Shell	*Lottia instabilison*	Unstable Limpet	17.2		
538	2	70-90	Shell	*Diodora aspera*	Rough Keyhole Limpet	10.1		
458	2	70-90	Shell	*Polyplacophora*	Undifferentiated Chiton	123.9		
456	2	70-90	Shell	*Lottia sp.*	Undifferentiated Periwinkle	5.9		
546	2	70-90	Shell	*Nucella lamillosa*	Frilled Dogwinkle	3.3		

544	2	70-90	Shell	*Nucella emarginata*	Emarginate Dogwinkle	0.2		
505	2	70-90	Shell	*Acanthina spirali*	Angular Unicorn Horn	0.1		
555	2	70-90	Shell	*Clinocardium nattallii*	Nuttall's Cockle	0.1		
562	2	70-90	Shell	*Tresus nuttallii*	Pacific Gaper Clam	0.7		
549	2	70-90	Shell	*Saxidomus nuttallii*	California Butter Clam	3		
550	2	70-90	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	5	21589.25	Total level weight
988	2	90-100	Shell	*Cryptochiton stelleri*	Gumboot Chiton	43.5		
987	2	90-100	Shell	Unidentified	Unidentified	0.2		
986	2	90-100	Shell	*Ischadium demissum*	Ribbed Mussel	3		
985	2	90-100	Shell	*Crepidula formicata*	Common Slipper	1.3		
984	2	90-100	Shell	*Littorina plena*	Black Periwinkle	2.3		
1039	2	90-100	Shell	*Leukoma staminea*	Pacific Littleneck Clam	34.5		
975	2	90-100	Shell	Unidentified	Worm concretion	0.3		
974	2	90-100	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	34.3		
973	2	90-100	Shell	*Strongylocentrotus sp.*	Urchin	8.5		
972	2	90-100	Shell	*Lottia instabilison*	Unstable Limpet	3.2		
977	2	90-100	Shell	*Cancer antennarius*	Rock Crab	1.9		
976	2	90-100	Shell	*Haliotis sp.*	Abalone sp.	4.5		
1042	2	90-100	Shell	*Olivella biplicata*	Purple Dwarf Olive	8.5		
1041	2	90-100	Shell	*Tegula funebralis*	Black Turban Snail	90.2		
1038	2	90-100	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	284.1		
981A	2	90-100	Shell	*Mytilus californianus*	California Mussel	1989.3		
981B	2	90-100	Shell	*Mytilus californianus*	California Mussel	2875.9		
981C	2	90-100	Shell	*Mytilus californianus*	California Mussel	3452.7		
478	2	90-100	Shell	*Saxidomus nuttallii*	California Butter Clam	1.7		
480	2	90-100	Shell	*Macoma nasuta*	Bent Nose Clam	0.8		
493	2	90-100	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	1.5		
511	2	90-100	Shell	*Collisella scabra*	Rough Limpet	1.7		
481	2	90-100	Shell	*Collisella digitalis*	Ribbed Limpet	1.8		
558	2	90-100	Shell	*Nucella canaliculata*	Channeled Dogwinkle	5.9		
513	2	90-100	Shell	*Nucella lamillosa*	Frilled Dogwinkle	1		
492	2	90-100	Shell	*Polyplacophora*	Undifferentiated Chiton	38.6	8891.2	Total level weight
1037	2	100-110	Shell	Unidentified	Unidentified	0.7		
1036	2	100-110	Shell	*Cryptochiton stelleri*	Gumboot Chiton	80.6		
1035	2	100-110	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	57.5		

1034	2	100-110	Shell	*Nucella canaliculata*	Channeled Dogwinkle	7.7		
1040	2	100-110	Shell	*Olivella biplicata*	Purple Dwarf Olive	3.4		
1025	2	100-110	Shell	*Haliotis sp.*	Abalone sp.	7.1		
1024	2	100-110	Shell	Unidentified	Worm concretion	0.4		
1023	2	100-110	Shell	*Leukoma staminea*	Pacific Littleneck Clam	45.6		
971	2	100-110	Shell	*Crepidula formicata*	Common Slipper	2		
970	2	100-110	Shell	*Strongylocentrotus sp.*	Urchin	4.3		
969	2	100-110	Shell	*Ischadium demissum*	Ribbed Mussel	4.7		
1022	2	100-110	Shell	*Collisella scabra*	Rough Limpet	6.6		
1021	2	100-110	Shell	*Tegula funebralis*	Black Turban Snail	103		
1020	2	100-110	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	386.7		
1019	2	100-110	Shell	*Cancer antennarius*	Rock Crab	0.4		
1018A	2	100-110	Shell	*Mytilus californianus*	California Mussel	3479.7		
1018B	2	100-110	Shell	*Mytilus californianus*	California Mussel	3039.5		
1018C	2	100-110	Shell	*Mytilus californianus*	California Mussel	3058.8		
1018D	2	100-110	Shell	*Mytilus californianus*	California Mussel	3249.5		
499	2	100-110	Shell	*Littorina plena*	Black Periwinkle	2		
447	2	100-110	Shell	*Nucella lamillosa*	Frilled Dogwinkle	0.3		
506	2	100-110	Shell	*Polyplacophora*	Undifferentiated Chiton	47		
527	2	100-110	Shell	*Collisella digitalis*	Ribbed Limpet	5.4		
472	2	100-110	Shell	*Clinocardium nattallii*	Nuttall's Cockle	0.1		
324	2	100-110	Shell	*Saxidomus nuttallii*	California Butter Clam	3.5		
299	2	100-110	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	2.2		
403	2	100-110	Shell	*Tresus nuttallii*	Pacific Gaper Clam	0.5	13599.2	Total level weight
274	2	110-120	Shell	*Littorina plena*	Black Periwinkle	1.5		
292	2	110-120	Shell	*Nucella lamillosa*	Frilled Dogwinkle	3.4		
430	2	110-120	Shell	*Collisella digitalis*	Ribbed Limpet	6.9		
333	2	110-120	Shell	*Diodora aspera*	Rough Keyhole Limpet	0.6		
432	2	110-120	Shell	*Polyplacophora*	Undifferentiated Chiton	12.4		
539	2	110-120	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	1.7		
309	2	110-120	Shell	*Macoma sp.*	Undifferentiated Clam	1.1		
383	2	110-120	Shell	*Tresus nuttallii*	Pacific Gaper Clam	0.1		
283	2	110-120	Shell	*Tresus capax*	Gaper Clam	2.1		
293	2	110-120	Shell	*Macoma nasuta*	Bent Nose Clam	1.4		
406	2	110-120	Shell	*Lottia instabilison*	Unstable Limpet	0.1		

966	2	110-120	Shell	*Nucella canaliculata*	Channeled Dogwinkle	7.8		
967	2	110-120	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	53		
968	2	110-120	Shell	Unidentified	Unidentified	1.1		
1015	2	110-120	Shell	*Crepidula formicata*	Common Slipper	1.3		
1016	2	110-120	Shell	*Olivella biplicata*	Purple Dwarf Olive	3.2		
1017	2	110-120	Shell	*Haliotis sp.*	Abalone sp.	1.6		
1014	2	110-120	Shell	*Cancer antennarius*	Rock Crab	0.5		
1044	2	110-120	Shell	Unidentified	Worm concretion	0.3		
1045	2	110-120	Shell	*Ischadium demissum*	Ribbed Mussel	7.5		
1046	2	110-120	Shell	*Leukoma staminea*	Pacific Littleneck Clam	36.3		
1047	2	110-120	Shell	*Tegula funebralis*	Black Turban Snail	65		
1048	2	110-120	Shell	*Cryptochiton stelleri*	Gumboot Chiton	71.7		
1049	2	110-120	Shell	*Strongylocentrotus sp.*	Urchin	16		
1050	2	110-120	Shell	*Collisella scabra*	Rough Limpet	5.6		
1051	2	110-120	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	392.4		
1052A	2	110-120	Shell	*Mytilus californianus*	California Mussel	2770.1		
1052B	2	110-120	Shell	*Mytilus californianus*	California Mussel	3241.5		
1052C	2	110-120	Shell	*Mytilus californianus*	California Mussel	3145.7		
1052D	2	110-120	Shell	*Mytilus californianus*	California Mussel	2967.2		
1052E	2	110-120	Shell	*Mytilus californianus*	California Mussel	2867	15686.1	Total level weight
1053A	2	120-130	Shell	*Mytilus californianus*	California Mussel	3786.1		
1053B	2	120-130	Shell	*Mytilus californianus*	California Mussel	2838		
1053C	2	120-130	Shell	*Mytilus californianus*	California Mussel	2738		
1053D	2	120-130	Shell	*Mytilus californianus*	California Mussel	2788		
1053E	2	120-130	Shell	*Mytilus californianus*	California Mussel	2868		
1053F	2	120-130	Shell	*Mytilus californianus*	California Mussel	2738		
1054	2	120-130	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	372.4		
1055	2	120-130	Shell	Unidentified	Unidentified	0.3		
1056	2	120-130	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	84.8		
1057	2	120-130	Shell	*Polyplacophora*	Undifferentiated Chiton	30.6		
1058	2	120-130	Shell	*Leukoma staminea*	Pacific Littleneck Clam			
1059	2	120-130	Shell	*Nucella canaliculata*	Channeled Dogwinkle	5.5		
1060	2	120-130	Shell	*Collisella scabra*	Rough Limpet	3.1		
1061	2	120-130	Shell	*Strongylocentrotus sp.*	Urchin	22.5		
1062	2	120-130	Shell	*Cancer antennarius*	Rock Crab	1.4		

1062	2	120-130	Shell	*Cancer antennarius*	Rock Crab	1.4		
1063	2	120-130	Shell	Unidentified	Worm concretion	0.4		
1064	2	120-130	Shell	*Crepidula formicata*	Common Slipper	0.1		
1065	2	120-130	Shell	*Haliotis sp.*	Abalone sp.	7.9		
1066	2	120-130	Shell	*Ischadium demissum*	Ribbed Mussel	15.6		
1067	2	120-130	Shell	*Haplotrema minimum*	California Lancetooth (terr.)	0.7		
1068	2	120-130	Shell	*Tegula funebralis*	Black Turban Snail	70.3		
1069	2	120-130	Shell	*Olivella biplicata*	Purple Dwarf Olive	2.3		
564	2	120-130	Shell	*Cryptochiton stelleri*	Gumboot Chiton	52		
536	2	120-130	Shell	*Saxidomus nuttallii*	California Butter Clam	0.1		
570	2	120-130	Shell	*Tresus nuttallii*	Pacific Gaper Clam	0.8		
561	2	120-130	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	2		
420	2	120-130	Shell	*Clinocardium nattallii*	Nuttall's Cockle	0.9		
541	2	120-130	Shell	*Collisella digitalis*	Ribbed Limpet	1.4		
515	2	120-130	Shell	*Littorina plena*	Black Periwinkle	2.9		
457	2	120-130	Shell	*Nucella emarginata*	Emarginate Dogwinkle	0.3		
459	2	120-130	Shell	*Nucella lamillosa*	Frilled Dogwinkle	2.2		
491	2	120-130	Shell	*Amphissa columbiana*	Angular Unicorn Horn	0.1	18436.7	Total level weight
334	2	130-140	Shell	*Nucella lamillosa*	Frilled Dogwinkle	1.3		
335	2	130-140	Shell	*Littorina plena*	Black Periwinkle	0.4		
329	2	130-140	Shell	*Nucella emarginata*	Emarginate Dogwinkle	0.4		
232	2	130-140	Shell	*Collisella scabra*	Rough Limpet	6.8		
391	2	130-140	Shell	*Polyplacophora*	Undifferentiated Chiton	97		
317	2	130-140	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	0.8		
308	2	130-140	Shell	*Collisella digitalis*	Ribbed Limpet	0.4		
1070	2	130-140	Shell	*Olivella biplicata*	Purple Dwarf Olive	3.3	Shell bead	
1071A	2	130-140	Shell	*Mytilus californianus*	California Mussel	2710.7		
1071B	2	130-140	Shell	*Mytilus californianus*	California Mussel	2738		
1071C	2	130-140	Shell	*Mytilus californianus*	California Mussel	2588		
1071D	2	130-140	Shell	*Mytilus californianus*	California Mussel	2488		
1071E	2	130-140	Shell	*Mytilus californianus*	California Mussel	2588		
1072	2	130-140	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	229.5		
1073	2	130-140	Shell	*Strongylocentrotus sp.*	Urchin	9.5		
1074	2	130-140	Shell	*Crepidula formicata*	Common Slipper	1.4		
1076	2	130-140	Shell	Unidentified	Worm concretion	0.2		

1077	2	130-140	Shell	*Olivella biplicata*	Purple Dwarf Olive	4.9		
1078	2	130-140	Shell	*Ischadium demissum*	Ribbed Mussel	8.4		
1079	2	130-140	Shell	*Leukoma staminea*	Pacific Littleneck Clam	23		
1080	2	130-140	Shell	*Nucella canaliculata*	Channeled Dogwinkle	2.4		
1081	2	130-140	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	38.2		
1082	2	130-140	Shell	*Lottia instabilison*	Unstable Limpet	1.2		
1083	2	130-140	Shell	*Tegula funebralis*	Black Turban Snail	9.7		
1084	2	130-140	Shell	*Cryptochiton stelleri*	Gumboot Chiton	25.5	13577	Total level weight
1086	2	140-150	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	228.1		
1087	2	140-150	Shell	*Collisella scabra*	Rough Limpet	0.4		
1088	2	140-150	Shell	*Leukoma staminea*	Pacific Littleneck Clam	14.8		
362	2	140-150	Shell	*Tresus capax*	Gaper Clam	0.3		
434	2	140-150	Shell	*Macoma sp.*	Undifferentiated Clam	0.4		
270	2	140-150	Shell	*Lottia instabilison*	Unstable Limpet	0.3		
343	2	140-150	Shell	*Collisella digitalis*	Ribbed Limpet	0.6		
323	2	140-150	Shell	*Littorina plena*	Black Periwinkle	0.5		
342	2	140-150	Shell	*Nucella lamillosa*	Frilled Dogwinkle	0.5		
351	2	140-150	Shell	*Polyplacophora*	Undifferentiated Chiton	4.8		
1089	2	140-150	Shell	*Nucella canaliculata*	Channeled Dogwinkle	1		
1090	2	140-150	Shell	*Cancer antennarius*	Rock Crab	0.2		
1091	2	140-150	Shell	*Strongylocentrotus sp.*	Urchin	6		
1092	2	140-150	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	10.3		
1093	2	140-150	Shell	*Tegula funebralis*	Black Turban Snail	12.3		
1094	2	140-150	Shell	*Crepidula formicata*	Common Slipper	0.8		
1095	2	140-150	Shell	*Olivella biplicata*	Purple Dwarf Olive	2.1		
1096	2	140-150	Shell	*Cryptochiton stelleri*	Gumboot Chiton	45.7		
1097	2	140-150	Shell	*Ischadium demissum*	Ribbed Mussel	0.3		
1098A	2	140-150	Shell	*Mytilus californianus*	California Mussel	3987.1		
1098B	2	140-150	Shell	*Mytilus californianus*	California Mussel	4687.1	9003.6	Total level weight
1099A	2	150-160	Shell	*Mytilus californianus*	California Mussel	3337.1		
1099B	2	150-160	Shell	*Mytilus californianus*	California Mussel	3637.1		
1100	2	150-160	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	280.3		
1101	2	150-160	Shell	*Leukoma staminea*	Pacific Littleneck Clam	20.1		
1102	2	150-160	Shell	*Collisella scabra*	Rough Limpet	1.9		
1103	2	150-160	Shell	*Strongylocentrotus sp.*	Urchin	4.5		

1104	2	150-160	Shell	*Nucella canaliculata*	Channeled Dogwinkle	2.9		
1105	2	150-160	Shell	*Crepidula formicata*	Common Slipper	0.05		
1106	2	150-160	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	8.6		
1107	2	150-160	Shell	*Cryptochiton stelleri*	Gumboot Chiton	10.5		
1108	2	150-160	Shell	*Tegula funebralis*	Black Turban Snail	10.6		
1109	2	150-160	Shell	*Amphissa columbiana*	Wrinkled Amphissa	0.1	7313.75	Total level weight
1110	2	160-179	Shell	*Cryptochiton stelleri*	Gumboot Chiton	1.8		
1111	2	160-179	Shell	*Strongylocentrotus sp.*	Urchin	2.5		
1112	2	160-179	Shell	*Crepidula formicata*	Common Slipper	0.3		
1113	2	160-179	Shell	*Tegula funebralis*	Black Turban Snail	4.3		
1114	2	160-179	Shell	*Collisella scabra*	Rough Limpet	0.3		
1115	2	160-179	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	10		
1116	2	160-179	Shell	*Nucella canaliculata*	Channeled Dogwinkle	0.3		
1117	2	160-179	Shell	*Olivella biplicata*	Purple Dwarf Olive	0.9		
1118	2	160-179	Shell	*Leukoma staminea*	Pacific Littleneck Clam	18.6		
1119	2	160-179	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	337.6		
1120	2	160-179	Shell	*Mytilus californianus*	California Mussel	4497.4		
374	2	160-179	Shell	*Nucella lamillosa*	Frilled Dogwinkle	0.4		
281	2	160-179	Shell	*Nucella emarginata*	Emarginate Dogwinkle	0.3		
352	2	160-179	Shell	*Lottia instabilison*	Unstable Limpet	0.2		
276	2	160-179	Shell	*Collisella digitalis*	Ribbed Limpet	0.1		
272	2	160-179	Shell	*Polyplacophora*	Undifferentiated Chiton	2.7		
415	2	160-179	Shell	*Macoma sp.*	Undifferentiated Clam	0.4		
261	2	160-179	Shell	*Tresus nuttallii*	Pacific Gaper Clam	0.2	4878.3	Total level weight
417	2	170-180	Shell	*Cryptochiton stelleri*	Gumboot Chiton	0.3		
446	2	170-180	Shell	*Tresus capax*	Gaper Clam	0.7		
466	2	170-180	Shell	*Platyodon cancellatus*	Boring Soft Shell Clam	0.15		
271	2	170-180	Shell	*Lottia instabilison*	Unstable Limpet	0.1		
385	2	170-180	Shell	*Collisella scabra*	Rough Limpet	0.1		
426	2	170-180	Shell	*Diodora aspera*	Rough Keyhole Limpet	0.3		
1121	2	170-180	Shell	*Collisella digitalis*	Ribbed Limpet	0.1		
1122	2	170-180	Shell	*Polyplacophora*	Undifferentiated Chiton	0.3		
1123	2	170-180	Shell	*Nucella canaliculata*	Channeled Dogwinkle	0.8		
1124	2	170-180	Shell	*Strongylocentrotus sp.*	Urchin	1.5		
1125	2	170-180	Shell	*Tegula funebralis*	Black Turban Snail	2.9		

1126	2	170-180	Shell	*Olivella biplicata*	Purple Dwarf Olive	0.9		
1127	2	170-180	Shell	*Pollicipes polymerus*	Gooseneck Barnacle	4.5		
1128	2	170-180	Shell	*Leukoma staminea*	Pacific Littleneck Clam	5.3		
1129	2	170-180	Shell	*Balanus/ Semibalanus sp.*	Acorn/ Thatched Acorn Barnacle	191		
1130	2	170-180	Shell	*Mytilus californianus*	California Mussel	2937		
1085	2	170-180	Shell	*Buccinidae*	Whelk sp.	1.4	3147.35	Total level weight
					Total shell weight	139374.24		

Faunal Bone Data

Zooarchaeological Codes

Portion Codes
CO- Complete
DFR- Distal fragment
FR- Fragment
PXFR- Proximal fragment
SHFR- Shaft fragment
U-Unidentified

Descriptive & Modification Codes
A- Adult
J- Juvenile
M- Medium
L- Left
P- Present
R- Right
S- Small
X- Axial/No side

Color Codes
B- Black
BL- Blue
DB- Dark Brown
G- Grey
GB- Golden Brown
T-Tan
W- White
Y- Yellow

Element Codes
AN-Angular
AR- Articular
AS- Astragalus/Talus
CA- Calcaneus
CN- Canine
CP- Carpal
CR- Cranial
CT- Cleithrum
CV- Caudal Vertebra
DN- Dentary
EG- Entopterygoid
FM- Femur
HM- Humerus
HY- Hyomandibular
IC- Incisor
IN- Innominate
IO- Interopercular
LB- Long bone indeterminate
MC-Metacarpal
MD- Mandible
MO- Molar
MP- Metapodial
MT- Metatarsal
MX-Maxilla
MY- Metapterygoid
OP- Opercular
PM- Premaxilla
PB- Parasphenoid Basioccipital Complex
PO- Preopercle
PT- Post-temporal
PX- Phalanx
QD- Quadrate
RB- Rib
RD-Radius
SC- Scapula
SL- Supracleithrum
SM- Sacrum
SO- Subopercular
TB- Tibia
TM- Tarsometatarsus
TR- Trapezium
U- Unidentified
UL- Ulna
UR- Urohyal
V-Vertebra
VM- Vomer

CAT #	Unit	Depth (cm.)	NISP	Type	Taxon	Common Name	Element	Portion	Side	Size	Age	Cuts	Chops	Burn Mod	Impact Notch	Weight (g)	Color	Notes		
5	2	0-10	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1		1		0.3	DB	Post-excavation damage		
104	2	0-10	1	Bone	Mammal	Mammal	U	FR	-	-	-			1		0.1	DB			
9	2	0-10	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1		1		0.4	DB			
12	2	0-10	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CV	PXFR	X	M	A					0.3	DB			
1	2	0-10	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	LB	SHFR	-	S	-					0.2	DB			
11	2	0-10	2	Bone	Mammal	Mammal	LB	SHFR	-	M	-					0.4	DB			
4	2	0-10	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-			1		0.9	B			
6	2	0-10	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	PXFR	-	S	-	1		1		0.3	DB			
3	2	0-10	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	RD	PXFR	L	S	A			1		0.2	B			
13	2	0-10	5	Bone	Mammal	Mammal	U	FR	-	-	-					0.7	DB			
15	2	0-10	8	Bone	Mammal	Mammal	LB	SHFR	-	-	-			1		2	W/B/DB		Total level weight =	5.8
36	2	10-20	5	Bone	Mammal	Mammal	U	FR	-	M	-			1		1	B/DB			
39	2	10-20	6	Bone	Mammal	Mammal	LB	SHFR	-	-	-					2.4	T			
40	2	10-20	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-	1				0.3	DB			
109	2	10-20	4	Bone	Mammal	Mammal	U	FR	-	M	-					0.7	T		Total level weight =	4.4
41	2	20-30	2	Bone	Mammal	Mammal	U	FR	-	M	-			2		0.2	B			
42	2	20-30	1	Bone	*Odocoileus hemionus*	Mule Deer	UL	SHFR	-	M	-	1				0.5	DB			
44	2	20-30	2	Bone	Mammal	Mammal	LB	SHFR	-	M	-			2		2.2	W/B/DB			
110	2	20-30	6	Bone	Mammal	Mammal	LB	SHFR	-	M	-					1.6	T/DB		Total level weight =	4.5
54	2	30-40	3	Bone	Mammal	Mammal	U	FR	-	M	-			3		0.3	DB			
56	2	30-40	1	Bone	Mammal	Mammal	U	FR	-	M	-	1		1		0.15	DB			
57	2	30-40	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	HM	PXFR	L	XS	A					0.2	T	Post-excavation damage		
69	2	30-40	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	SHFR	-	M	-					0.2	T			
113	2	30-40	1	Bone	Mammal	Mammal	LB	PXFR	-	M	-					0.6	T			
116	2	30-40	2	Bone	Mammal	Mammal	IN	FR	-	M	-					0.7	DB			
129	2	30-40	1	Bone	Mammal	Mammal	CR	FR	X	M	-					0.8	T			
134	2	30-40	8	Bone	Mammal	Mammal	U	FR	-	M	-					1.8	T/DB			
137	2	30-40	16	Bone	Mammal	Mammal	LB	SHFR	-	M	-					4	T/DB			
139	2	30-40	14	Bone	Mammal	Mammal	LB	SHFR	-	M	-			14		4.9	B/DB		Total level weight =	13.65
80	2	40-50	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	SHFR	R	XS	A					0.2	T			
87	2	40-50	1	Bone	Mammal	Mammal	LB	PXFR	-	M	J					0.2	DB			
91	2	40-50	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.3	GB			
93	2	40-50	12	Bone	Mammal	Mammal	U	FR	-	M	-			12		4.1	W/B/DB			
95	2	40-50	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CV	PXFR	X	M	A			1		0.2	DB			
97	2	40-50	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	HM	DFR	R	S	A					0.2	T			
146	2	40-50	6	Bone	Mammal	Mammal	LB	SHFR	-	M	-			6		1.4	B/DB			
147	2	40-50	1	Bone	*Odocoileus hemionus*	Mule Deer	MO/MD	FR	R	M	A					0.2	W/T			
148	2	40-50	4	Bone	Mammal	Mammal	LB	SHFR	-	-	-					0.9	T/DB			
151	2	40-50	9	Bone	Mammal	Mammal	U	FR	-	M	-					1.5	T/DB		Total level weight =	9.2
102	2	60-70	1	Bone	*Lepus californicus*	California Jackrabbit	FM	DFR	L	S	A			1		0.3	B			

157	2	60-70	1	Bone	Mammal	Mammal	IN	FR	-	M	-	1			0.3	DB		
158	2	60-70	1	Bone	Mammal	Mammal	CR	FR	-	M	-				0.9	DB		
164	2	60-70	1	Bone	*Odocoileus hemionus*	Mule Deer	MP	DFR	-	M	A	1			2.1	DB		
165	2	60-70	1	Bone	*Odocoileus hemionus*	Mule Deer	V	FR	X	M	-	1	1		0.5	B		
167	2	60-70	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TB	PXFR	R	S	A			1	0.2	DB		
177	2	60-70	1	Bone	Mammal	Mammal	V	FR	X	M	-				0.2	DB		
181	2	60-70	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	DFR	L	M	A				0.2	DB		
188	2	60-70	18	Bone	Mammal	Mammal	U	FR	-	M	-		18		4.2	B/DB		
190	2	60-70	25	Bone	Mammal	Mammal	U	FR	-	M	-				5.3	T		
200	2	60-70	24	Bone	Mammal	Mammal	LB	SHFR	-	-	-				9	T/DB		
201	2	60-70	1	Bone	*Gadus macrocephalus*	Pacific Cod	AR	FR	R	S	-				0.2	GB		
206	2	60-70	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	R	XS	-				0.1	T		
222	2	60-70	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	XS	-				0.1	T		
234	2	60-70	3	Bone	Mammal	Mammal	LB	SHFR	-	M	-	3	3		1.3	DB		
235	2	60-70	1	Bone	Mammal	Mammal	V	FR	X	M	-				0.1	DB		
236	2	60-70	13	Bone	Mammal	Mammal	LB	SHFR	-	M	-		13		4.25	B/DB		
237	2	60-70	1	Bone	Mammal	Mammal	LB	SHFR	-	S	-		1	1	0.3	B/DB		
238	2	60-70	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IC	FR	-	XS	-		1		0.05	W		
239	2	60-70	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	SHFR	-	M	-				0.3	DB		
240	2	60-70	1	Bone	Mammal	Mammal	U	FR	-	S	-	1	1		0.2	B/DB		
242	2	60-70	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	DFR	-	M	A				0.3	DB		
247	2	60-70	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS	A				0.2	T		
253	2	60-70	3	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1			0.6	T/DB	Total level weight =	31.2
255	2	70-90	3	Bone	Mammal	Mammal	LB	SHFR	-	-	-	3	3		1.9	B/DB		
257	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	HM	DFR	L	XS	A				0.2	DB		
260	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	PM	FR	R	S	-				0.2	GB		
263	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	IN	FR	-	M	J				0.9	DB		
266	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	SC	FR	-	M	-		1		0.2	DB		
267	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	IN	FR	R	S	A				0.2	DB		
269	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.1	GB		
273	2	70-90	44	Bone	Mammal	Mammal	LB	SHFR	-	-	-		44		7.7	W/B/DB		
278	2	70-90	1	Bone	Mammal	Mammal	CR	FR	-	M	-	1			0.5	T		
280	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	DFR	R	S	A				0.1	DB		
284	2	70-90	1	Bone	Terrestrial Mammal	Terrestrial Mammal	FM	SHFR	-	XS	-				0.1	DB		
287	2	70-90	28	Bone	Mammal	Mammal	LB	SHFR	-	-	-				6.9	DB		
290	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.1	GB		
291	2	70-90	1	Bone	Mammal	Mammal	CA	FR	R	M	A				0.6	DB		
296	2	70-90	1	Bone	Mammal	Mammal	U	FR	-	M	-		1		0.2	B/DB		
298	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.3	GB		
301	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	V	FR	X	S	-				0.1	DB		
302	2	70-90	1	Bone	Mammal	Mammal	V	FR	X	M	-				0.2	DB		

305	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	HM	DFR	L	S	A	1		1		0.3	DB	
311	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-	1				0.2	GB	
312	2	70-90	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-					1.1	DB	Polished edges, possible artifact
313	2	70-90	1	Bone	Terrestrial Mammal	Terrestrial Mammal	RB	SHFR	-	S	-					0.2	DB	
314	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB	
315	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	V	CO	X	XS	A					0.2	DB	
318	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	IN	FR	R	XS	A					0.2	DB	
319	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	CA	CO	L	XS	A					0.2	DB	
320	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	DFR	L	M	A					0.6	DB	
322	2	70-90	1	Bone	*Osteichthyes*	Bony Fish	HY	FR	-	S	-					0.2	GB	
326	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	XS	-					0.1	T	
327	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	PX	DFR	-	M	-	1		1		0.5	B/DB	
328	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	PX	DFR	-	M	-			1		0.3	B	
336	2	70-90	1	Bone	Mammal	Mammal	U	FR	-	S	-			1		0.2	DB	
339	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	S	-					0.1	T	
344	2	70-90	1	Bone	Mammal	Mammal	CR	FR	-	S	-					0.1	T	
345	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	CR	FR	-	S	-					0.05	GB	
346	2	70-90	1	Bone	Mammal	Mammal	CR	FR	-	S	-					0.2	DB	
349	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
354	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	CR	FR	-	S	-					0.2	GB	
356	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	DFR	R	M	A					0.2	DB	
357	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	AR	FR	R	S	-					0.1	GB	
358	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS						0.3	DB	
359	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	PX	DFR	-	M	-			1		0.1	G/W	
360	2	70-90	1	Bone	*Salmonidae*	Ray-finned fish	U	FR	-	S	-					0.1	GB	
361	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TB	PXFR	R	S	A	1		1		0.8	DB	
363	2	70-90	8	Bone	Mammal	Mammal	LB	SHFR	-	-	-	1				2.2	DB	
364	2	70-90	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1				0.1	DB	
366	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	UL	PXFR	L	M	-			1		2.7	B/G	
368	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	RD	PXFR	-	M	-			1		1.4	DB	
371	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.05	GB	
372	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	IN	FR	R	XS	A					0.05	DB	
377	2	70-90	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-					0.1	DB	
380	2	70-90	23	Bone	Mammal	Mammal	U	FR	-	-	-					3.5	DB	
382	2	70-90	1	Bone	*Salmonidae*	Ray-finned fish	V	CO	X	S	-					0.2	GB	
384	2	70-90	17	Bone	Mammal	Mammal	U	FR	-	-	-			17		2.9	B/DB	
386	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	GB	
387	2	70-90	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-					0.2	GB	
388	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	U	FR	-	S	-					0.05	GB	
389	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	U	FR	-	S	-					0.2	GB	
395	2	70-90	1	Bone	*OSteichthyes*	Bony Fish	U	FR	-	S	-					0.05	GB	

397	2	70-90	1	Bone	Mammal	Mammal	V	FR	X	S	-					0.1	DB			
398	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.05	GB			
401	2	70-90	1	Bone	*Osteichthyes*	Bony Fish	VM	FR	X	S	-					0.2	GB	Post-excavation damage		
404	2	70-90	1	Bone	*Odocoileus hemionus*	Mule Deer	RD	PXFR	-	M	A					0.2	DB			
405	2	70-90	1	Bone	Mammal	Mammal	V	FR	X	S	-			1		0.2	B			
408	2	70-90	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	S	-					0.1	DB			
409	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS	A					0.3	DB			
410	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	HM	SHFR	-	XS	-					0.1	DB			
412	2	70-90	1	Bone	Mammal	Mammal	V	FR	X	S	-					0.2	DB			
413	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TB	PXFR	R	S	A					0.1	DB			
420	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	SHFR	-	S	-			1		0.3	B/DB			
422	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	FM	PXFR	-	XS	-					0.1	DB			
427	2	70-90	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	RD	DFR	L	XS	A					0.1	DB			
428	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	TB	CO	R	XS	A					0.2	DB			
435	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TB	PXFR	-	S	-			1		0.2	DB			
571	2	70-90	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-					0.3	GB			
589	2	70-90	1	Bone	Mammal	Mammal	RB	DFR	R	S	A					0.2	DB			
608	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	HM	SHFR	R	S	A			1		0.1	DB			
612	2	70-90	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	RD	CO	R	XS	A					0.1	DB			
648	2	70-90	1	Bone	*Osteichthyes*	Bony Fish	QD	FR	L	S	-					0.2	GB			
655	2	70-90	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	SHFR	-	S	-			1		0.2	B/DB			
744	2	70-90	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-			1		0.1	GB			
804	2	70-90	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB		Total level weight =	44.9
439	2	90-100	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	L	XS	A					0.1	DB			
440	2	90-100	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	HM	DFR	R	XS	A					0.1	T			
441	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB			
442	2	90-100	1	Bone	Mammal	Mammal	MX	FR	X	-	-					0.3	T			
443	2	90-100	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	HM	DFR	R	S	A			1		0.7	B			
444	2	90-100	1	Bone	*Enhydra lutris*	Sea Otter	HM	DFR	L	S	-	1				1	DB			
445	2	90-100	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	SHFR	-	M	-					0.5	DB			
448	2	90-100	1	Bone	Mammal	Mammal	PX	FR	-	M	0					0.1	DB			
449	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
450	2	90-100	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS	-					0.2	DB			
460	2	90-100	1	Bone	Mammal	Mammal	CR	FR	-	M	-					0.1	DB			
461	2	90-100	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS	A					0.2	T			
462	2	90-100	1	Bone	Mammal	Mammal	LB	SHFR	-	-	-		1	1		0.5	DB			
463	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.3	GB			
464	2	90-100	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.2	T			
465	2	90-100	1	Bone	Mammal	Mammal	LB	SHFR	-	-	-	1		1		0.9	DB			
468	2	90-100	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TR	CO	R	S	A					0.2	DB			
469	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB			

470	2	90-100	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	FM	DFR	L	XS	A					0.1	DB
471	2	90-100	1	Bone	Mammal	Mammal	V	FR	X	M	-					0.4	DB
473	2	90-100	1	Bone	*Odocoileus hemionus*	Mule Deer	SM	FR	X	M	A					1.1	DB
475	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB
477	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.05	GB
483	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB
485	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB
486	2	90-100	1	Bone	*Microtus californicus*	California vole	V	CO	X	XS	A					0.1	DB
487	2	90-100	1	Bone	*Odocoileus hemionus*	Mule Deer	SC	FR	-	M	-	1				0.5	DB
489	2	90-100	1	Bone	*Microtus californicus*	California vole	SC	FR	L	XS	A					0.1	T
490	2	90-100	16	Bone	Mammal	Mammal	U	FR	-	-	-			16		2.4	T/DB
495	2	90-100	1	Bone	Mammal	Mammal	LB	SHFR	-	S	-	1				0.6	DB
496	2	90-100	8	Bone	Mammal	Mammal	CR	FR	-	S	-					0.4	T
498	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	VM	FR	X	S	-					0.2	GB
500	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-	1				0.1	GB
501	2	90-100	1	Bone	*Microtus californicus*	California vole	MD	FR	R	XS	A					0.1	T
502	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	VM	CO	X	S	-					0.4	GB
503	2	90-100	1	Bone	*Odocoileus hemionus*	Mule Deer	MO	FR	R	M	A			1		0.6	B
504	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	DN	FR	-	S	-					0.1	GB
507	2	90-100	1	Bone	*Odocoileus hemionus*	Mule Deer	V	FR	X	M	-					0.3	DB
508	2	90-100	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	T
509	2	90-100	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	V	FR	X	S	-					0.2	DB
510	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	VM	FR	X	S	-					0.1	GB
512	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	HM	FR	L	S	-					0.1	GB
517	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			1		0.2	GB
518	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB
520	2	90-100	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	RD	PXFR	-	S	-	1				0.1	DB
521	2	90-100	1	Bone	*Neotoma fuscipes*	Desert Cottontail Rabbit	MD	FR	R	XS	A					0.25	DB
522	2	90-100	6	Bone	Mammal	Mammal	U	FR	-	-	-					1.3	DB
525	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB
526	2	90-100	1	Bone	Mammal	Mammal	RD	PXFR	-	S	J			1		0.2	B
529	2	90-100	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	LB	SHFR	-	S	-					0.2	DB
530	2	90-100	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	HM	DFR	R	XS	A					0.2	DB
532	2	90-100	11	Bone	Mammal	Mammal	LB	SHFR	-	-	-					1.1	DB
533	2	90-100	1	Bone	Terrestrial Mammal	Terrestrial Mammal	RB	SHFR	-	S	-					0.2	T
534	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	UR	FR	-	S	-	1				0.1	GB
535	2	90-100	1	Bone	*Microtus californicus*	California vole	IN	FR	-	XS	-					0.05	T
537	2	90-100	24	Bone	Mammal	Mammal	LB	SHFR	-	-	-			24		8.2	W/B/DB
540	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	PT	FR	R	S	-					0.3	GB
543	2	90-100	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-					0.1	GB
553	2	90-100	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-					0.1	GB

556	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	MY	FR	L	S	-			0.2	GB		
557	2	90-100	1	Bone	*Gadus macrocephalus*	Pacific Cod	DN	FR	-	S	-		1	0.2	GB		
560	2	90-100	1	Bone	*Microtus californicus*	California vole	FM	PXFR	L	XS	A			0.1	T		
566	2	90-100	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-			0.05	GB		
568	2	90-100	1	Bone	*Microtus californicus*	California vole	MO	FR	-	XS	-			0.05	T	Total level weight =	27.65
573	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	-	-		1	0.2	DB		
574	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-			1.8	G/DB		
575	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CP	CO	-	M	-			0.7	DB		
476	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1	1	0.5	DB		
577	2	100-110	1	Bone	Mammal	Mammal	LB	FR	-	M	-		1	0.3	G		
578	2	100-110	1	Bone	*Phoca vitulina*	Harbor seal	SC	FR	-	M	A			1.8	DB		
580	2	100-110	1	Bone	*Odocoileus hemionus*	Mule Deer	MP	PXFR	-	M	-			0.3	DB		
581	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	S	-			0.1	DB		
582	2	100-110	1	Bone	Mammal	Mammal	TB	SHFR	-	S	-			0.7	DB		
583	2	100-110	1	Bone	*Lepus californicus*	California Jackrabbit	TB	PXFR	R	S	A	1		1.9	T		
584	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	U	FR	-	S	-			0.1	GB		
585	2	100-110	1	Bone	*Lepus californicus*	California Jackrabbit	FM	PXFR	L	S	A			0.5	DB		
586	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CR	FR	R	S	-			0.15	DB		
587	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	S	-		1	0.3	DB		
588	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-			1.5	DB		
590	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	XS	-			0.1	DB		
591	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	TB	SHFR	L	XS	A			0.1	T		
594	2	100-110	48	Bone	Mammal	Mammal	U	FR	-	-	-		48	6.8	DB		
595	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.2	GB		
596	2	100-110	1	Bone	Mammal	Mammal	U	FR	-	M	-		1	0.5	B/W		
597	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-			0.3	DB		
599	2	100-110	1	Bone	Mammal	Mammal	CR	FR	-	M	-		1	0.3	DB		
600	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	S	-		1	0.1	B		
602	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-			0.2	DB		
603	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.05	GB		
604	2	100-110	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	SHFR	-	M	-	1		0.2	DB		
605	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.05	GB		
606	2	100-110	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	RD	SHFR	R	S	A	1	1	0.1	B		
607	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	VM	FR	X	S	-			0.1	GB		
608	2	100-110	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	PXFR	-	M	-			0.9	DB		
610	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-		1	0.7	B/DB		
611	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	L	S	-			0.1	T		
613	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	S	-			0.2	T		
615	2	100-110	1	Bone	Mammal	Mammal	U	FR	-	M	-		1	0.1	G/B		
616	2	100-110	1	Bone	Mammal	Mammal	LB	FR	-	M	-		1	0.3	G		
617	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.1	GB		

618	2	100-110	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	SHFR	-	S	-		1	0.1	G		
620	2	100-110	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	CA	CO	L	XS	A			0.1	DB		
621	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1	1	1.2	DB		
622	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	FM	DFR	-	M	-			0.5	DB		
623	2	100-110	1	Bone	Mammal	Mammal	RB	SHFR	-	M	-			0.1	T		
626	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	R	XS	A			0.1	T		
627	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.1	GB		
629	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-	1	1	0.4	DB		
630	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	S	-			0.1	W/DB		
631	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.1	GB		
632	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	XS	-			0.05	T		
633	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	S	-			0.1	DB		
635	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	L	XS	A			0.1	T		
636	2	100-110	1	Bone	Mammal	Mammal	V	FR	X	M				0.1	DB		
637	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	IN	FR	R	M	-			0.3	DB		
638	2	100-110	1	Bone	Mammal	Mammal	U	FR	-	-	-		1	0.4	B/DB		
639	2	100-110	1	Bone	Mammal	Mammal	CR	FR	-	M	-		1	0.1	T/DB		
640	2	100-110	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-			0.2	T/DB		
641	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	FR	R	XS	A			0.1	DB		
642	2	100-110	8	Bone	Mammal	Mammal	LB	SHFR	-	-	-			1.8	DB		
644	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	L	XS	A			0.1	DB		
645	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	SO	FR	R	S	-			0.1	GB		
646	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	PB	FR	-	S	-			0.1	GB		
647	2	100-110	1	Bone	*Odocoileus hemionus*	Mule Deer	V	FR	X	M	-			0.1	DB		
649	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	EG	FR	-	S	-			0.05	GB		
650	2	100-110	1	Bone	*Gadus macrocephalus*	Pacific Cod	U	FR	-	S	-			0.1	GB		
651	2	100-110	1	Bone	Terrestrial Mammal	Terrestrial Mammal	PX	FR	-	-	-			0.1	DB		
654	2	100-110	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-			0.05	DB		
657	2	100-110	1	Bone	*Pseudopleuronectes*	Right-eye flounder	U	FR	-	S	-			0.05	T	Total level weight =	29.15
659	2	110-120	1	Bone	*Aves*	Avian	TM	PXFR	L	XS	-			0.1	T		
660	2	110-120	1	Bone	*Lepus californicus*	California Jackrabbit	PX	CO	-	S	-			0.2	DB		
661	2	110-120	1	Bone	*Aves*	Avian	TM	DFR	L	XS	-			0.1	T		
662	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	R	XS	A			0.1	DB		
663	2	110-120	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	S	-			0.1	DB		
664	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	TB	SHFR	R	XS	A			0.1	T		
665	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	RD	DFR	-	XS	-			0.05	T		
666	2	110-120	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-			0.4	T		
668	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	AR	FR	L	S	-			0.1	GB		
669	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	SHFR	-	M	-	1		0.7	DB		
670	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	RD	PXFR	-	S	-			0.1	DB		
671	2	110-120	1	Bone	Mammal	Mammal	U	FR	-	S	-			0.1	GB		
672	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			0.1	GB		

673	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	L	XS	A				0.1	T	
674	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	CT	FR	L	S	-				0.15	GB	
675	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	FM	DFR	R	M	A				1.7	DB	
676	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	IN	FR	-	M	-	1			1.3	DB	
677	2	110-120	1	Bone	*Lepus californicus*	California Jackrabbit	FM	SHFR	-	S	-		1	1	1	DB	
678	2	110-120	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-				0.1	T	
679	2	110-120	1	Bone	*Salmonidae*	Ray-finned fish	OP	FR	R	S	-				0.6	GB	
680	2	110-120	1	Bone	Mammal	Mammal	V	FR	X	M	-				0.2	T	
681	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	IN	FR	-	M	-	1	1		1	B/DB	
682	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	SHFR	-	M	-				0.3	DB	
683	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	V	FR	X	M	A				1	T	
684	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	IN	FR	-	M	-	1			0.2	DB	
685	2	110-120	1	Bone	Mammal	Mammal	LB	SHFR	-	S	-				0.1	DB	post-excavation damage
686	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS	-				0.3	T	
687	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	L	XS	-				0.1	T	
688	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	IN	FR	-	M	-				1.5	T/DB	
689	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-				0.1	T	
691	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	R	XS	A				0.1	T	
692	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	X	XS	-				0.01	T	
693	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	SHFR	R	S	-				0.1	DB	
694	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	MP	DFR	-	M	-				1.4	DB	
695	2	110-120	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	M	-				0.02	DB	
696	2	110-120	32	Bone	Mammal	Mammal	U	FR	-	-	-		32		5.3	T/B	
697	2	110-120	34	Bone	Mammal	Mammal	LB	SHFR	-	-	-				10.2	W/DB/T	
698	2	110-120	1	Bone	*Microtus californicus*	California vole	IN	FR	-	XS	-				0.01	T	
699	2	110-120	1	Bone	Mammal	Mammal	U	FR	-	-	-				1.2	DB	
700	2	110-120	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-				0.7	T	
702	2	110-120	1	Bone	Mammal	Mammal	U	FR	-	M	-				0.2	T	
703	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.2	GB	
704	2	110-120	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1			0.5	T	
705	2	110-120	1	Bone	Mammal	Mammal	LB	DFR	-	M	-				0.7	DB	
706	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.1	GB	
707	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	DFR	-	M	-		1		0.3	DB	
708	2	110-120	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-				0.1	GB	
709	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	V	FR	-	M	-				0.1	DB	
710	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	DFR	L	XS	A				0.2	T	
711	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	A				0.1	T	
712	2	110-120	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CV	CO	X	S	A	1	1		0.3	DB	
713	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	AR	FR	R	S	-				0.1	GB	
714	2	110-120	1	Bone	Mammal	Mammal	LB	SHFR	-	S	-				0.1	T	
715	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-				0.2	T	
716	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.1	GB	

717	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
719	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	-	XS	-					0.1	T	
720	2	110-120	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-					0.1	GB	
721	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	SHFR	L	XS	A					0.1	T	
722	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	FR	X	XS	-					0.1	T	
723	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	DFR	R	XS	-					0.2	T	
724	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
725	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
726	2	110-120	1	Bone	Mammal	Mammal	IN	FR	-	M	-					0.2	DB	
727	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB	
728	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	LB	DFR	-	S	-					0.2	T	
729	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB	
730	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	PO	FR	L	S	-					0.2	GB	
731	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	PB	CO	X	S	-					0.1	GB	
732	2	110-120	1	Bone	Mammal	Mammal	U	FR	-	S	-			1		0.1	DB	
733	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	SC	FR	L	S	A					0.1	DB	
734	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	FM	DFR	-	M	-					0.1	DB	
735	2	110-120	1	Bone	*Osteichthyes*	Bony Fish	PB	FR	X	S	-			1		0.1	DB	
736	2	110-120	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-					0.1	GB	
737	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	DFR	L	S	A					0.1	T	
738	2	110-120	1	Bone	Mammal	Mammal	U	FR	-	S	-			1		0.2	G	
739	2	110-120	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	PX	CO	-	S	A					0.1	T	Claw/ distal phalanx
740	2	110-120	1	Bone	Mammal	Mammal	U	FR	-	M	-			1		0.3	DB	
741	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
742	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	LB	SHFR	-	XS	-					0.1	T	
743	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-	1		1		0.3	W/B	
745	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-	1		1		0.1	W/T	
747	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	TB	SHFR	R	XS	A					0.2	T	
746	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	S	-					0.1	T	
749	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
750	2	110-120	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-			1		0.1	B/GB	
751	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	L	XS	A					0.1	T	
752	2	110-120	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	DFR	-	S	-					0.1	DB	
753	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	HM	DFR	L	XS	A					0.1	T	
754	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	U	FR	-	S	-					0.1	GB	
755	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
756	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	DFR	L	XS	A					0.2	T	
757	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
758	2	110-120	1	Bone	Mammal	Mammal	LB	DFR	-	-	-					0.2	DB	
759	2	110-120	1	Bone	*Odocoileus hemionus*	Mule Deer	CP	FR	-	M	-			1		0.9	DB	
760	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	
761	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB	

761	2	110-120	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
762	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	A					0.15	Y/T			
763	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	A					0.05	Y/T			
764	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	A					0.1	Y/T			
765	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	A					0.05	Y/T			
766	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	A					0.05	Y/T			
767	2	110-120	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	A					0.1	Y/T		Total level weight =	41.24
768	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	SC	FR	R	XS	A					0.1	T			
769	2	120-130	1	Bone	Mammal	Mammal	FM	PXFR	R	-	-		1	1	1	0.5	DB			
770	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	FM	PXFR	R	XS	A					0.2	T			
771	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	LB	SHFR	-	S	-					0.1	GB			
772	2	120-130	1	Bone	*Meleagris gallopavo*	Wild Turkey	UL	PXFR	R	M	A	1				3.75	DB			
774	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	R	XS	A					0.1	T	Incisor in situ		
775	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	L	XS	A					0.3	T			
776	2	120-130	1	Bone	Mammal	Mammal	CR	FR	-	M	-					0.3	GB			
777	2	120-130	1	Bone	*Odocoileus hemionus*	Mule Deer	MP	SHFR	-	M	-	1				0.3	T			
778	2	120-130	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-			1		0.2	DB			
773	2	120-130	1	Bone	Mammal	Mammal	RB	SHFR	-	M	-	1				0.2	T			
779	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T			
780	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.5	GB			
781	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	SHFR	R	S	A	1		1		0.9	B			
782	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TB	SHFR	R	S	A					0.5	DB			
783	2	120-130	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	M	-					0.1	DB			
784	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.3	GB			
785	2	120-130	1	Bone	Mammal	Mammal	LB	DFR	-	S	-					0.2	DB			
787	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	A					0.2	T/DB			
788	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	FM	DFR	L	S	A			1		0.1	B			
789	2	120-130	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	FR	-	M	-			1		0.3	B/DB			
790	2	120-130	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	S	-					0.2	T			
791	2	120-130	1	Bone	*Odocoileus hemionus*	Mule Deer	FM	DFR	-	M	-					0.1	DB			
792	2	120-130	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	S	-					0.1	DB			
793	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	RD	PXFR	L	XS	A					0.1	T			
794	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T			
795	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MO	FR	-	XS	-					0.1	T			
796	2	120-130	1	Bone	*Odocoileus hemionus*	Mule Deer	RD	SHFR	L	M	-					0.2	DB			
797	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
798	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	PB	FR	X	S	-					0.2	GB			
799	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T			
800	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	TB	DFR	R	S	-			1		0.2	B			
801	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	U	FR	-	S	-					0.1	GB			
802	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
803	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	X	XS	-					0.1	T	Occipital		

803	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	X	XS	-					0.1	T	Occipital		
805	2	120-130	1	Bone	Mammal	Mammal	U	FR	-	M	-			1		0.1	DB			
806	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	-	XS	-					0.1	T	Post-excavation damage		
807	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
808	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MO	FR	-	XS	-					0.1	Y/T			
809	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
810	2	120-130	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	-	-					0.1	DB			
811	2	120-130	1	Bone	Mammal	Mammal	LB	SHFR	-	-	-			1		0.2	DB			
812	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			1		0.1	GB			
813	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MX	FR	X	XS	-					0.1	T			
815	2	120-130	1	Bone	Mammal	Mammal	U	FR	-	-	-			1		0.2	DB			
816	2	120-130	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-			1		0.1	GB			
817	2	120-130	1	Bone	*Odocoileus hemionus*	Mule Deer	IN	DFR	-	M	-			1		0.8	G			
818	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	V	CO	X	S	A					0.3	T			
819	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB			
820	2	120-130	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	V	FR	X	S	-					0.3	T			
821	2	120-130	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-			1		0.1	GB			
822	2	120-130	1	Bone	*Odocoileus hemionus*	Mule Deer	FM	PXFR	L	M	A	1	1	1		0.8	DB			
823	2	120-130	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MX	FR	X	XS	-					0.1	T			
824	2	120-130	1	Bone	*Enhydra lutris*	Sea Otter	RD	DFR	L	S	A	1				2.6	T			
825	2	120-130	1	Bone	Mammal	Mammal	LB	SHFR	-	M	-	1		1		10.5	DB			
826	2	120-130	1	Bone	Mammal	Mammal	U	FR	-	-	-			1		4.1	DB			
827	2	120-130	1	Bone	Mammal	Mammal	U	FR	-	M	-			1		0.8	DB		Total level weight =	32.95
828	2	130-140	11	Bone	Mammal	Mammal	LB	SHFR	-	-	-			11		4.5	W/DB/T			
829	2	130-140	4	Bone	Mammal	Mammal	U	FR	-	M	-					1.5	DB			
830	2	130-140	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
831	2	130-140	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	S	A					0.1	T			
832	2	130-140	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T			
833	2	130-140	1	Bone	*Salmonidae*	Ray-finned fish	V	CO	X	S	-					0.02	GB			
834	2	130-140	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	V	FR	X	S	A					0.2	DB			
835	2	130-140	1	Bone	Mammal	Mammal	RB	PXFR	-	M	-			1		0.1	B/DB			
836	2	130-140	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.1	GB			
837	2	130-140	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	RD	PXFR	R	S	A					0.1	DB			
838	2	130-140	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	S	-	1				0.2	DB			
839	2	130-140	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-					0.2	GB			
840	2	130-140	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	FM	DFR	-	XS	-					0.2	DB			
844	2	130-140	1	Bone	*Aves*	Avian	TB	PXFR	L	XS	A				1	0.6	B/DB			
842	2	130-140	1	Bone	*Gadus macrocephalus*	Pacific Cod	PB	FR	X	S	-					0.1	GB			
843	2	130-140	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-					0.2	GB			
841	2	130-140	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	S	-					0.1	T			
845	2	130-140	1	Bone	*Odocoileus hemionus*	Mule Deer	HM	PXFR	-	M	-					0.4	T			
846	2	130-140	1	Bone	*Enhydra lutris*	Sea Otter	AS	CO	L	S	A					6.2	DB			

846	2	130-140	1	Bone	*Enhydra lutris*	Sea Otter	AS	CO	L	S	A				6.2	DB			
847	2	130-140	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-				0.2	Y/T			
848	2	130-140	1	Bone	*Neotoma fuscipes*	Dusky-Footed Woodrat	SC	PXFR	-	XS	-				0.1	T			
849	2	130-140	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	S	-				0.1	DB			
850	2	130-140	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	S	-		1		0.2	DB			
851	2	130-140	1	Bone	*Odocoileus hemionus*	Mule Deer	FM	SHFR		M	-				0.5	DB		Total level weight =	15.62
852	2	140-150	17	Bone	Mammal	Mammal	LB	SHFR	-	M	-				4.1	B/DB			
853	2	140-150	4	Bone	Mammal	Mammal	U	FR	-	-	-				0.3	DB			
854	2	140-150	1	Bone	*Osteichthyes*	Bony Fish	U	FR	-	S	-				0.1	GB	Post-excavation damage		
855	2	140-150	1	Bone	Terrestrial Mammal	Terrestrial Mammal	IN	FR	-	M	-		1		0.3	DB			
856	2	140-150	1	Bone	*Gadus macrocephalus*	Pacific Cod	RB	FR	R	S	-				0.1	GB			
857	2	140-150	1	Bone	*Gadus macrocephalus*	Pacific Cod	SL	FR	R	S	-				0.1	GB			
858	2	140-150	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	S	-	1			0.1	DB			
859	2	140-150	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-				0.3	DB			
860	2	140-150	1	Bone	*Gadus macrocephalus*	Pacific Cod	IO	FR	L	S	-				0.1	GB			
861	2	140-150	1	Bone	*Odocoileus hemionus*	Mule Deer	LB	SHFR	-	M	-		1		3.7	B/DB			
862	2	140-150	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	LB	SHFR	-	XS	A				0.2	T			
868	2	140-150	1	Bone	Mammal	Mammal	IN	FR	-	M	-				1.8	DB			
863	2	140-150	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CR	FR	-	S	-				0.2	DB			
864	2	140-150	1	Bone	Terrestrial Mammal	Terrestrial Mammal	CV	CO	-	M	-				0.4	T			
866	2	140-150	1	Bone	*Salmonidae*	Ray-finned fish	V	CO	X	S	-				0.05	GB			
867	2	140-150	1	Bone	*Gadus macrocephalus*	Pacific Cod	V	FR	X	S	-				0.4	GB			
869	2	140-150	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-	1			1.1	DB			
870	2	140-150	1	Bone	*Salmonidae*	Ray-finned fish	PO	CO	R	S	-	1			0.3	GB			
871	2	140-150	1	Bone	*Odocoileus hemionus*	Mule Deer	FM	PXFR	-	M	-		1		2.9	B/DB		Total level weight =	16.55
625	2	150-160	1	Bone	*Salmonidae*	Ray-finned fish	AN	CO	L	S	-				0.2	GB			
872	2	150-160	20	Bone	Mammal	Mammal	LB	SHFR	-	M	-		20		6.2	DB			
873	2	150-160	19	Bone	Mammal	Mammal	U	FR	-	-	-		19		2.2	DB			
874	2	150-160	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-				0.1	GB			
875	2	150-160	1	Bone	Mammal	Mammal	U	FR	-	M	-				0.1	DB			
876	2	150-160	1	Bone	Mammal	Mammal	U	SHFR	-	M	-				0.4	DB			
877	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	CO	R	XS	-				0.1	T			
878	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	R	XS	-				0.1	T			
879	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	FR	X	XS	-				0.1	T			
883	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	-				0.1	T			
884	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	-				0.15	T			
885	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	TB	SHFR	-	XS	-				0.1	T			
886	2	150-160	1	Bone	*Microtus californicus*	California vole	V	CO	X	XS	A				0.1	T	Axis		
887	2	150-160	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-				0.5	DB			
888	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	-				0.1	T			
894	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	-	XS	-				0.1	T			
892	2	150-160	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	M	-				0.3	T			

892	2	150-160	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	M	-					0.3	T		
889	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	LB	SHFR	-	XS	-					0.1	T		
899	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	CO	L	XS	A					0.1	T		
890	2	150-160	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	M	-					0.4	DB		
891	2	150-160	1	Bone	*Salmonidae*	Ray-finned fish	V	FR	X	S	-					0.2	GB		
895	2	150-160	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	S	-			1		0.1	B		
896	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T		
897	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	HM	CO	R	XS	J					0.2	T		
898	2	150-160	1	Bone	*Microtus californicus*	California vole	IN	FR	-	XS	-					0.1	T		
900	2	150-160	1	Bone	*Callipepla californica*	California quail	FM	DFR	R	XS	-					0.1	T		
901	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	-					0.1	T		
902	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	-					0.1	T		
903	2	150-160	1	Bone	*Microtus californicus*	California vole	CR	FR	X	XS	-					0.1	T		
904	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	V	CO	X	XS	-					0.2	T		
905	2	150-160	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	CR	FR	X	XS	-					0.1	T		
906	2	150-160	1	Bone	*Callipepla californica*	California quail	TB	CO	L	XS	A					0.2	T	Total level weight =	13.15
907	2	160-170	9	Bone	Mammal	Mammal	U	FR	-	M	-			9		1.3	DB		
908	2	160-170	12	Bone	Mammal	Mammal	LB	SHFR	-	M	-					3.5	DB		
909	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T		
910	2	160-170	1	Bone	*Salmonidae*	Ray-finned fish	PM	FR	L	S	-					0.1	GB		
911	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	T		
912	2	160-170	1	Bone	*Salmonidae*	Ray-finned fish	U	FR	-	S	-					0.1	GB		
913	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	HM	SHFR	-	XS	-					0.1	DB		
914	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.1	Y/T		
915	2	160-170	1	Bone	Terrestrial Mammal	Terrestrial Mammal	LB	SHFR	-	M	-			1		0.1	DB		
916	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	MD	FR	L	XS	-					0.2	T		
917	2	160-170	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	FR	-	S	-					0.02	DB		
918	2	160-170	1	Bone	*Microtus californicus*	California vole	CR	FR	-	XS	-					0.1	T		
919	2	160-170	1	Bone	Terrestrial Mammal	Terrestrial Mammal	V	FR	X	-	-			1		0.2	DB		
920	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.01	Y/T		
921	2	160-170	1	Bone	*Thomomys bottae*	Botta's Pocket Gopher	IN	FR	-	XS	-					0.01	Y/T		
1131	2	160-170	1	Bone	*Odocoileus hemionus*	Mule Deer	SC	FR	-	M	-					0.6	DB	Total level weight =	6.64
922	2	170-180	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	SHFR	-	M	-					0.4	T		
923	2	170-180	1	Bone	*Sylvilagus audubonii*	Desert Cottontail Rabbit	HM	PXFR	R	S	-			1		0.3	DB		
924	2	170-180	1	Bone	Terrestrial Mammal	Terrestrial Mammal	U	SHFR	-	M	-	1				0.2	DB		
926	2	170-180	5	Bone	Mammal	Mammal	LB	SHFR	-	-	-					1.4	DB		
925	2	170-180	2	Bone	Mammal	Mammal	U	FR	-	M	-					0.3	T	Total level weight =	2.6
		Total NISP =	1094									57	3	408	5	299.7			

Appendix C
Project Deliverable

Summary of Zooarchaeological Analysis for CA-SCR-10
Compiled for California State Parks

By Angela Moniz

Table of Contents

List of figures……………………………………………………………………………..iii
List of Tables……………………………………………………………………………..iii
Introduction……………………………………………...……………………………1
Field Excavation………………………………………………………………………3
Ecological Background of the Central Coast…...……………………………………….5
Archaeological Interpretations………………………………………………………..7
Muwekma Ethnohistoric Narrative……………………………………......................11
Contemporary Connections………………………………………………………..17
General Zooarchaeological Methods…………………………………………………18
Zooarchaeological Methods Employed in this Analysis…………………………………..21
Laboratory Analysis: Results..…...………………………………………………………..24
Interpretations ……………………………………………………...……………..39
Recommendations……………………………………………………………………46
Works Cited……………...…………………………………………………………..50
Appendix………………………………………………………………………………..56

List of Figures

Fig. 1 USGS Quadrangle of CA-SCR-10..……………………………………………2
Fig. 2 Overview of CA-SCR-10 unit layout……………………..………………………4
Fig. 3 Map of Amah Mutsun Tribelet territories………………………………………..13
Fig. 4 Anthropogenically modified *Odocoileus hemionus* specimen……………………...37
Fig. 5 Graph illustrating seasonal fluctuations in resource species………………………..45

List of Tables

Table 1: Chronological cultural schemes of the central coast……………….…………..9
Table 2: Marine invertebrates by unit depth……………………………………….………26
Table 3: NISP and MNI by taxon…………………………………………………..…31
Table 4: Proportion of modified faunal bone component………………………………… 35
Table 5: Proportion of modification by taxon classification………………………………36
Table 6: Appendicular versus axial element NISP………………………………………..37

Introduction

CA-SCR-10 is a shell mound located roughly six miles north of Santa Cruz on the border of Wilder Ranch State Park CA-SCR-10 is also about half a mile east of the coastal cliffs, and a mile from CA-SCR-7 (Sand Hill Bluff), which is now a National Monument (See Fig.1). As of 2017, the site is located on property managed by CA State Parks, but is currently leased to a local farmer. Along with destruction from plowing, CA-SCR-10 has been victim to intensive collection by the general public for several years. Some of the surface collection for the site at CA State Parks has been turned over by individuals who frequently collected items from the site to the CA State Parks district office, but no current ranger patrol regularly monitors or manages the site to prevent future occurrences of such activity. Extensive, undocumented collection from CA-SCR-10 strips any returned artifacts of their contextual information, and while important to still preserve, the artifacts can no longer speak to the cultural timeline at the site.

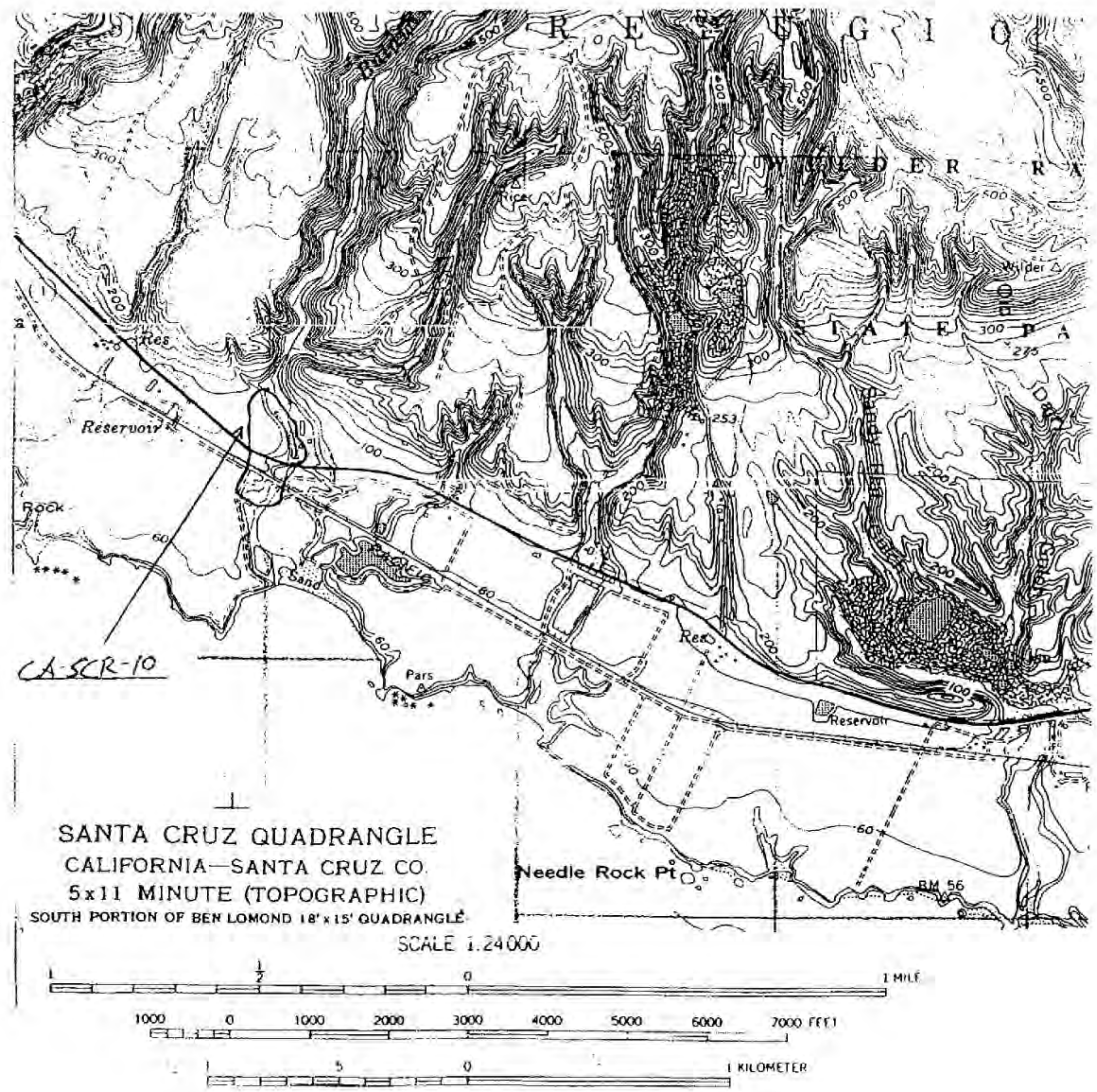


Fig 1. USGS Quadrangle of northern Santa Cruz County demonstrating the location of CA-SCR-10 (CA State Parks files).

A total of 139,374.2 grams of invertebrate fragments representing 99.7% of the overall recovered faunal component was analyzed for this project. Additionally, a total of 1,094 faunal bone specimens, with a combined weight of 299.7 grams, were analyzed and identified to the closest categorization. The faunal analysis indicates some activities, such as resource acquisition and the production of cultural artifacts, including Olivella beads, occurred. Nearly half (42.8%) of all faunal bone specimens exhibited some aspect of butchery or food processing, with burning as the most common food processing modification observed. CA-SCR-10 is located central to important geographical features that would have been sweet spots for resource acquisition. Cultural features present, such as several stone tools, hearth features and at least one known burial, support the argument CA-SCR-10 was frequently utilized by precontact populations for an extended period of time. Not all activities that are a part of a society as a whole are reflected, therefore CA-SCR-10 was most likely a site of moderate-high importance and part of a larger, established settlement pattern with nearby sites possibly representing increased significance. This suggests there is a larger connection between archaeological sites, such as CA-SCR-7, and regional geographical features than initially assumed.

Field Excavation

In 2008, CA State Parks partnered with the Cabrillo College Archaeological Technician Program to excavate both CA-SCR-7 (Sand Hill Bluff) and CA-SCR-10. Surface finds included complete manos and pestles, consistent with the Millingstone period in Santa Cruz County (CA State Parks files). Three units were excavated at CA-SCR-10, with unit one oriented to the west, closest to Highway One (see Fig.2). Unit two was located to the south along the Wilder Ranch border and unit three was situated northeast of unit two. All three units were situated within the field access road and exhibited signs of compaction, heavy plowing and intrusions from roots and rodents. Both units one and three yielded minimal material before being closed at 70 cm-a depth at which the farmer's plow clearly impacted. Field notes from students list historical plastic and minimal amounts of shell and chert debitage as the artifacts recovered from these two units.

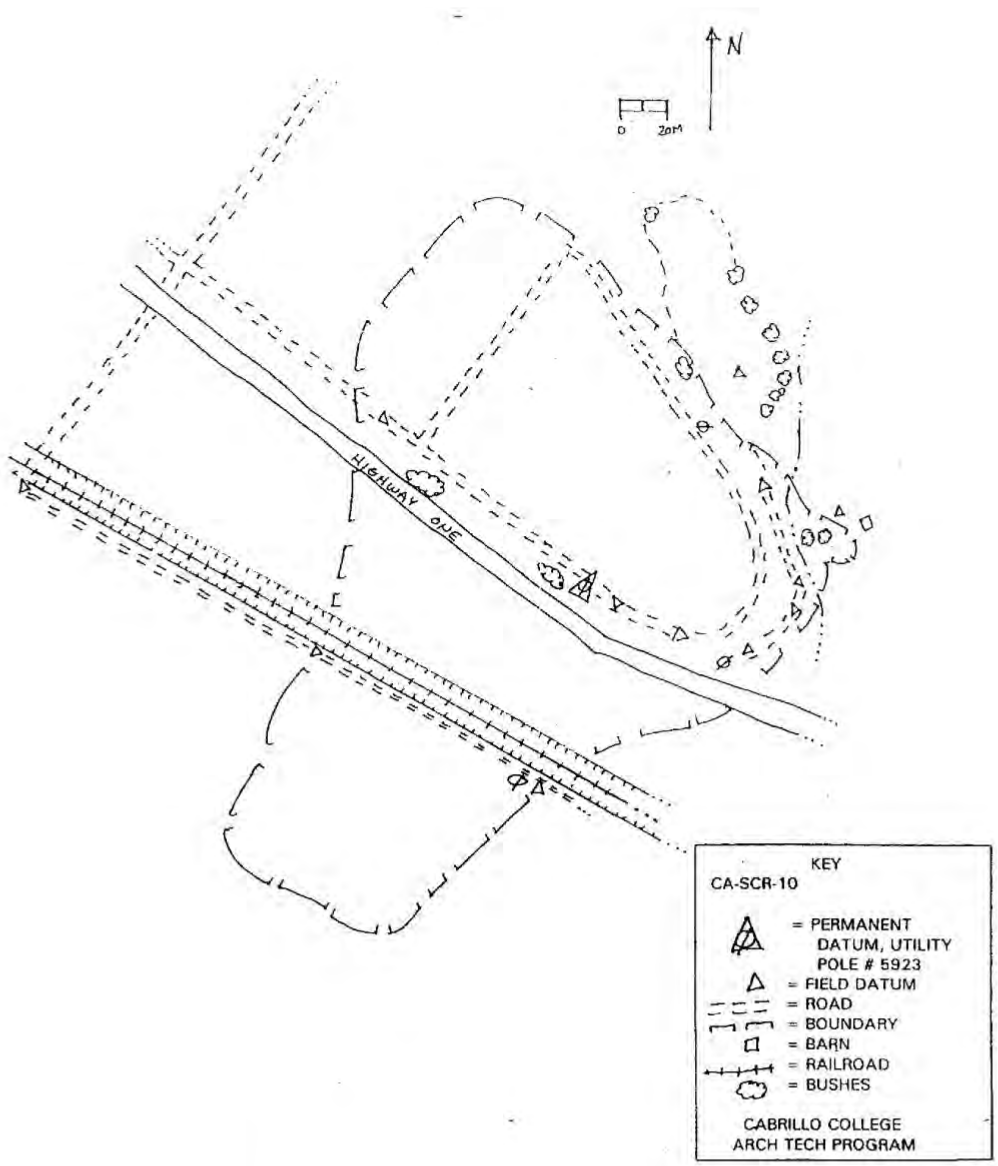


Fig. 2: Overview of CA-SCR-10, drawn by students from Cabrillo College in 2008. (CA State Parks files)

However, the assemblage recovered from unit two consisted of a dense shellfish component, with small faunal bone fragments, debitage and human remains- evidence this particular site was used as a burial mound by the Amah Mutsun. Unit two was rerouted to the south at 90 cm upon the discovery of human remains under the direction of field supervisor Dustin McKenzie. Three possible hearth features were identified in unit two alone, with the most extensive feature uncovered at 120cm in a heavy matrix consisting of cracked rock, ash, charcoal and burned faunal bone, suggesting prehistoric subsidence living was occurring on the mound. Existing radiocarbon dates tested by CA State Parks indicate the temporal range is between 3500 +/- 30 BP and 4020 +/-30 BP (see Appendix). This could be the result of averaging older and younger shell fragments or due to a very limited temporal range indicating short-term occupation with highly intensive shellfish processing, and are typical for Early Period shell middens on the central coast where bioturbation often results in nearly uniform radiocarbon dates (Breschini and Haversat 2011:9).

Ecological Background of the Central Coast

California is often described as “the most topographically, climatically, and ecologically heterogeneous state in the country” despite the complex paleogeography that has shaped the state (West et al. 2010:11). Effects from the Pacific Ocean lessen seasonal variability, ultimately promoting a cohesive ecological suite of features associated with the specific regions along the central coast. California’s climate is comparable to the Mediterranean, with wet winters, dry summers, relatively stable temperatures and higher disjuncture between seasonal temperatures occurring in regions of greater or lesser elevation than the central coast (West et al. 2010:11). These predictable seasons affect the geochemical composition of sediment, freshwater sources, vegetation, and oceans, ultimately creating measurable differences between the carbon and oxygen ratios in the calcium carbonate of seashells.

Seasonal precipitation on the central coast has led to the development of unique vegetation types capable of coping with extended droughts. Floral species along the coast are equipped to extract moisture from the regular blanketing of fog that runs the length of most of the state's coastline, including some introduced species such as *Carpobrotus edulis*, commonly known as Ice Plant, a South African native species introduced at varying periods throughout California's history (CAL-IPC 2015). Proxy vegetation records such as pollen or macrofossils recovered from marsh and lacustrine environments, tree ring or dendrochronology analyses and even pack rat middens have painted an image of coastal California as a mosaic of environments, not identical to each other, with shifting floral composition and distribution (West et al 2010:13).

Archaeological assemblages in various regions along the central coast have included tools, such as a pry for shellfish harvesting, constructed from whale ribs and scapulae, but little evidence supports active whale hunting along the central coast (Jones 2002:68). Coastal archaeological assemblages are characterized by large shell fragment mounds that served multiple purposes. Some mounds were utilized as processing sites for tool, decoration and Olivella shell bead manufacturing while some contain evidence of habitation along the fringes (Gross 2007:195). Additionally, shell mounds appear to have played a major role in burial practices as human remains are almost always recovered from mounds in context with burial goods such as milling stone tools or Olivella and abalone jewelry (Erlandson et al 2011:1182). Pelagic and freshwater fish would also have been abundantly available, and included species still harvested today such as anchovies (*Engraulidae*), sardines and herring (*Clupidae*), halibut (*Pleuronectidae*), salmon (*Salmonidae*), rockfish (*Sebastidae*), stingrays (*Myliobatidae* and *Dasyatididae*), and sharks (*Lamnidae*). Terrestrial mammals were also an important contributor to precontact dietary and cultural needs. Terrestrial faunal populations have historically been subject to compositional change at a higher rate than marine mammals. This is due to a combination of changes “in plant communities, introduction of foreign animal species [through colonization], excessive hunting and deliberate extermination,” ultimately altering native terrestrial taxa (Gifford and Marshall 1984:9). Coastal precontact societies primarily targeted large species such as mule deer (*Odocoileus hemionus*), but additionally included pronghorn antelope (*Antilocapra americana*), now only found in northeast California and the Sierra Nevada Mountains, as well as tule elk (*Cervus canadensis nannodes*). Smaller terrestrial species found in archaeological assemblages include coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), long-tailed weasel (*Mustela frenata*), grey fox (*Urocyon cinereoagenteus*), black bear (*Ursus americanus*), raccoon (*Procyon lotor),* vole (*Microtus californicus*) and pocket gopher (*Thomomys talpoides*). It should also be noted Pacific Grizzly Bear (*Ursus arctos californicus*) was abundant in California at this time but was hunted to extinction by European colonizers.

Archaeological Interpretations

Archaeological phases on the California coast are organized into discrete categories associated with specific cultural features. These categories have been redefined and developed based upon the recognition and organization of shell bead and ornaments recovered from radiocarbon-dated sites (Hylkema 1991; Fredrickson 1974; King 1981). The most widely accepted chronological scheme, the Central California Taxonomic System (CCTS), is based on a cultural model first proposed in the 1930's (Beardsley 1948; Heizer and Fenenga 1939). The cultural sequence was sectioned into three primary periods: Early, Transitional (which later became Middle), and Late. Chronological determinations were based upon mortuary practices and associated artifact typologies, such as shell bead and ornament styles. As research into the central coast region progressed, the chronological model was further refined and divided into more discrete sub-periods (Beardsley 1948; Heizer and Fenenga 1939). As processual archaeological theory developed in the 1960's, archaeologists recognized the CCTS's shortcomings when placing local variation within a set chronological model. Along with the implementation of radiocarbon dating and obsidian hydration, archaeologists established new parameters for incorporating sub-regional variation, including the "Archaic/Emergent" chronology (Beardsley 1948; Bennyhoff and Heizer 1958; Bennyhoff and Hughes 1987; Fredrickson 1974; Milliken and Bennyhoff 1993). The primary chronological divisions include: the Early Holocene (10,000-5500 B.P.), the Early Period (5450-2450 B.P.), the Lower Middle Period (2450-1520 B.P.), the Upper Middle Period (1520-900 B.P.), the Late Period (900-400 B.P.) and the Terminal Late Period (400 B.P.-Contact; Lightfoot 1997; Milliken et al. 2007; Wiberg 1996). Table 1 illustrates the CCTS and the embedded chronological schemes employed by central coast archaeologists. Contemporary archaeological research on the central coast generally incorporates a hybridization of at least two of the schemes outlined.

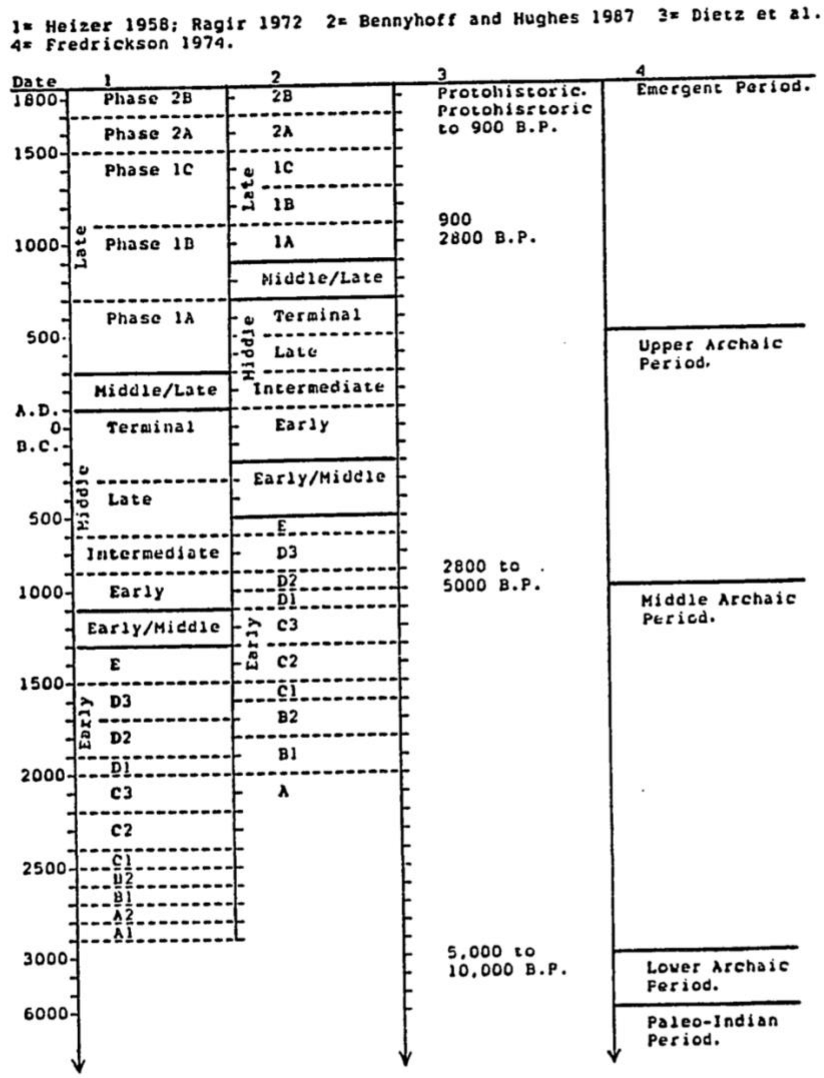


Table 1. Chronological cultural schemes employed on the central coast (Adapted from Hylkema 1991:19).

While the earliest Californians are believed to have reached the southern coast around 20,000 B.P., archaeological site in Scott's Valley places the earliest occupation in the Santa Cruz region between 13,500 B.P. and 11,500 B.P. (Cartier 1993:243). Coastal archaeological assemblages are often characterized by large shell fragment mounds that served multiple purposes. Some mounds were utilized as processing sites for tool, decoration and Olivella shell bead manufacturing. Some mounds contain evidence of habitation, and appear to have played a major role in burial practices as human remains are almost always recovered from mounds in context with burial goods such as milling stone tools or Olivella and abalone jewelry (Erlandson et al 2011:1182).

Middle Period sites tend to be larger than Early Period and Paleoindian sites, indicating a shift in subsistence strategy to stable, localized resources, as well as the establishment of trade routes with neighboring communities (Ryan 1980). Groups settling in the Santa Cruz region during this period appear to have adjusted to a diet more reliant upon marine resources, both from the accessible coastline and the various streams and estuaries along the coastal terrace. Seasonal occupation of sites appears to correspond to the harvest season for targeted resources; groups moved between established sites in order to take advantage of both inland resources, such as acorns during the fall, and coastal resources, including marine invertebrates which generally conclude their peak growth season at the onset of winter (Giribet 2008:116). Mary Ellen Ryan asserts this seasonal camping preference was echoed by later, historic period settlers who targeted the same seasonal resources and geographical features (1980).

The Middle Period was followed by the Late Period, characterized by rapid population expansion stemming from the stability of the regional environment and resources, and terminating with the Spanish colonization of California. Groups were becoming more sedentary as diffusion of storage and processing techniques for acorns, a staple in the diet of Pre-contact Native population diets, reduced the need to seasonally move for resource acquisition (Ryan 1980). The increased presence of Millingstone tools, such as mortars and pestles, in late Middle Period and Late Period archaeological assemblages, coincides with the theory seasonal relocation diminished in favor of a slightly more sedentary settlement pattern (Breschini 1983:4; Hylkema 1991:26). Internal social stratification and socio-political complexity of groups during the Late Period is reflected by the increased presence of cemetery assemblages. The relative importance of an individual can often be inferred by the association of grave goods with certain burials (Monroe 2014:45). Accumulation of goods within a burial implies an individual within the group had achieved wealth and/or notable social status as common grave goods included strings of shell beads and ornaments, often utilized as currency (Monroe 2014: 46; Margolin 1978). Additionally, grave goods signify wealth/status as other individuals within a group would have taken the time to carefully place these artifacts within specific locations in the burial (Monroe 2014:46; Margolin 1978). Later Muwekma burials during the eighteenth century were observed to also be demarcated by poles from which personal goods were hung, such as shell ornaments, lithic implements and grass skirts (Monroe 2014:47).

Muwekma Ethnohistoric Narrative

Distinguishing tribal populations within the central coast is generally based upon the linguistic evolution and geographic distribution of the region. Around 4000 B.P, Utian-speaking groups from the Sacramento Delta region of the San Joaquin Valley began expanding their territory west towards the region now referred to as the "East Bay" (Monroe 2104:34; Breschini 1983; Breschini and Haversat 1997). The emergence of unique, regional dialects, such as the Berkeley Pattern, reflect fusion of older linguistic patterns and Utian from the incoming eastern populations (Monroe 2014:34; Breschini 1983; Breschini and Haversat 1997). Population increases helped fuel the spread of Utian dialects, displacing older Hokan-speaking groups and ultimately reaching the Monterey Bay by approximately 2450 B.P. (Breschini and Haversat

1997:133). Linguistic distinctions would have been difficult to make, and boundaries between different linguistic groups most likely varied due to exchange patterns and marriage arrangements rather than prescribed territorial ranges (Hylkema 1991:51).

What is known of coastal Native populations is primarily derived from the historical narratives composed by early European explorers and mission records. The earliest explorers of the central coast region, including Spanish explorer Gaspar de Portola, who first arrived in the Monterey Bay in 1769, referred to the Native populations they encountered as "Costaños", or coastal people (Hylkema 1991:51). Although Costanoan (Muwekma) populations spoke eight distinct dialects (Karkin, Ramaytush, Chochenyo (aka Chocheño), Tamyen, Awaswas, Mutsun, Rumsen, and Chalon), missionaries and early ethnographers did not distinguish these linguistic groups but rather referred to each population by the mission they were later assigned to (Hylkema 1991:52). Randall Milliken argues that because documentation of distinct dialects was not noted by missionaries and ethnographers, the geographical distribution and quantity of Muwekma languages may be the result of the missionization process and therefore a historical phenomenon (1995; Monroe 2014:35). Additionally, the reciprocal may have occurred; the process of missionization and assimilation may have resulted in the loss of additional dialects (Monroe 2014:35).

The Amah Mutsun Tribal Band, one of the tribes/tribal bands comprising the Muwekma Ohlone Tribe, was drawn to the central coast due to its unique geographical shape and the special environment it created. Traditional Amah Mutsun territory included regions of Santa Cruz County, Monterey County, and San Benito County. The geography of the San Juan Valley isolated the Amah Mutsun from neighboring tribes, and thus internal variability arose within the tribal band, identified by shared religious, hunting, and craftsmanship practices (AMTB 2017).

Primary Amah Mutsun linguistic groups included the Awaswas, Mutsun, and Chalon, as well as overlap with the Esselen and Rumsen Tribes. Figure 3 illustrates territorial boundaries between Amah Mutsun linguistic groups and other neighboring Native populations.

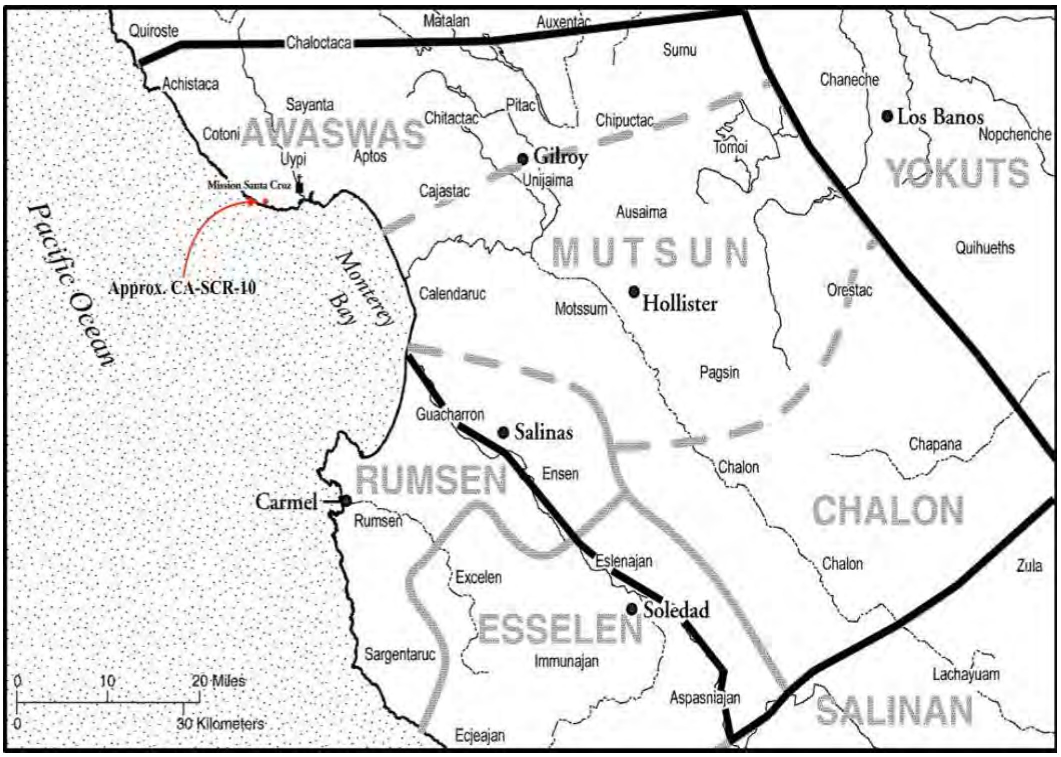


Fig. 3 This map illustrates the linguistic territorial boundaries of the Amah Mutsun Tribal Band and neighboring groups. This project's study site, CA-SCR-10, is demarcated in red (Adapted from AMTB 2017).

Muwekma villages were described by the European explorers in great detail. Villages were comprised of "dome-shaped, reed-covered houses with an assortment of granary structures (Ryan 1980). Work shelters, a centrally-located meeting house and sweathouses were also documented (Ryan 1980). According to Spanish accounts, the estimated Native population was overall around 10,000, with village populations ranging between 50 and 300 people (Hylkema 1991:53; Jones et al. 2007:128). Alfred Kroeber defines the primary socio-political unit on the central coast as "tribelet," with the region of the central coast north of Monterey through San Francisco heavily culturally intertwined-essentially preventing one particular culture from dominating and defining the region (Hylkema 1991:52; Jones et al. 2007:143). Each Tribelet was politically autonomous, and membership within the Tribelet was contingent upon an individual's ability to demonstrate common ancestry. Milliken et al. assert that although Muwekma Tribelets were politically autonomous, regional communities would sometimes band together to form a single political unit, a strategy benefiting localized raiding and defense (2007; Monroe 2014:40). Much like linguistic data, information regarding Muwekma descent systems was not documented in mission records and ethnographic accounts. Post-mission era ethnographic evidence describes the Muwekma as patrilineal and exogamous, with polygamy only practiced by chiefs or high status Tribelet members (Levy 1978:468).

Ethnohistoric records describe Tribelet occupation as seasonal, with a sedentary lifestyle at a central village and smaller periphery occupation occurring in villages abandoned for a portion of the year (Hylkema 1991:53; Jones et al. 2007:129). Tribelets employed a forager/collector subsistence strategy, pursuing resources such as acorns, grass seeds, buckeye nuts, berries, terrestrial game shellfish and anadromous fish were targeted (Hylkema 1991:59; Jones et al. 2007:129). This also coincided with major landscape management efforts such as controlled burning of vegetation in order to promote new growth of the grasses eaten by prey animals (Hylkema 1991:59; Lightfoot et al. 2013:11). Muwekma Tribelets demonstrated a deep understanding of their surrounding environment and often took advantage of the natural landscape to facilitate resource acquisition. For example, acorns were central to the Muwekma diet as they provided an easily accessed and stored source of protein. The processing of acorns commonly occurred near oak groves, but also along natural rock outcroppings where mortars for grinding acorns into a fine powder could be shaped (Ryan 1980). Open coastal prairie meadows were specifically dedicated to trap and snare rabbits (*Lepus* sp.), ridges and canyons were used to establish trails for hunting and regions where specific grasses grew, such as estuaries, were preserved for the production of cultural materials, such as grass skirts and baskets (Ryan 1980). The wide diet breadth of the Muwekma Tribelets is reflected by the multitude of hunting implements employed, although the most intensively exploited resources included shellfish and terrestrial game. These hunting implements included nets constructed from dune grasses, bows and arrows, lances, snares, weirs and other tools (Hylkema 1991:61; Jones et al. 2007:139). While broad-spectrum hunting was clearly employed, the sheer dominance of shellfish in coastal sites indicates an exceptionally high reliance upon marine resources. The volume of available shellfish, perhaps combined with landscape management and intentional cultivation of marine resources, may have reduced the need to pursue large game on a regular basis.

Following the establishment of the Mission San Francisco de Asis in 1776 and Mission Santa Clara de Tamien in1777, Father Fermin Lasuen established Mission Santa Cruz in 1791 (Hylkema 1991:51). Mission San Juan Bautista followed, built two decades later in 1797. In 1796, shortly after the establishment of Mission Santa Cruz, Captain Pere d'Alberni founded a small village along the eastern embankment of the San Lorenzo River (Ryan 1980). Honoring the viceroy of New Spain at the time, Miguel de la Grua Talamanca Branciforte, the growing town was named Villa Branciforte, and later merged with the nearby mission to form the predecessor to Santa Cruz (Ryan 1980). Many archaeological studies have investigated the nature of mission life for Native communities forcibly assigned to missions and their associated pueblos. Such studies include cultural assessments of the erosion of indigenous identities, the persistence and resistance of Native groups, as well as the effects of disease and extreme labor conditions upon Native communities both within and around missions.

By the 1820s, Mexico had gained control of what would become the California territory. A little over a decade later in the mid-1930's, the Mexican government began the process of closing missions and dividing the land formerly associated with each mission (Field et al. 1992: 416). As a method of encouraging settlement by Spanish or Mexican individuals, both the Spanish and Mexican governments granted large tracts of open and former mission-controlled land to non-Native "Californos" (Field et al. 1992:424). These land tracts were described as "ranchos", where land owners raised livestock such as cattle and sheep, and hired "vaqueros", or missionized Natives (Field et al. 1992:424). Californios continued the pattern of controlling behaviors established by missions. Small enclaves of Native groups resisted the Californio's continuation of mission by establishing small refuges between rancho boundaries (Field et al. 1992:424).

The small steps Native populations took to reaffirm their heritage and shared connections to the central coast region were further impacted by the rapid cultural development occurring in American cultural history during the mid-late 1800's. In the 1840's, the United State military invaded the then-Mexican territory and took control, later followed in 1948 by the influx of thousands of non-Native individuals during the ushering in of the Gold Rush and the designation of California as a state in 1850 (Field et al. 1992:424). The United States push for westward expansion during this period ignited a prolonged period of genocide against remaining Native populations in which assimilation, extermination and removal of these populations were the primary objectives (Field et al. 1992:424). United States laws refused to recognize Native heritage and land claims, rejecting the validity of tribal land titles, land ownership rights or the right to file any lawsuits including those petitioning for land rights (Field et al. 1992:425). The early 1900's was characterized by a period of enrollment phases implemented by the Department of the Interior, Bureau of Indian Affairs. Many Muwekma families continued to live on the central coast throughout this period, supported by "Special Indian" censuses and ethnographic materials (Field et al. 1992:416). The Bureau of Indian Affairs recorded the Muwekma as "the Verona Band" on the special censuses and the application/enrollment census for the California Jurisdictional Act of 1928, in which applicants were required to demonstrate their ancestors had been California residents at the point of statehood (Field et al. 1992:417). The Indian Claims Commission Act of 1946 indemnified California Native descendants, including Muwekma members, who had unwittingly signed over land in the 1800's treaties with Spanish, Mexican and United States governments (Field et al. 1992:417; Ramirez 2007:105). Later, the California Indian Claims Settlement of 1964, which paid restitution to qualifying Native tribes, as well as the establishment of the American Indian Historical Society in the San Francisco Bay Area during the Civil Rights Movement of the 1960's, helped the Muwekma "revitalize" and reconnect (Field et al. 1992:415; Ramirez 2007:105).

Contemporary Connections

The echoes of past Muwekma culture can still be observed throughout the Santa Cruz region. MaryEllen Ryan, a local Santa Cruz historian writes:

> "Portions of the Delaveaga area contain sites where chert tools were repaired and re-worked, leaving large amounts of chipping waste in the midden soil. There also exist areas near UCSC that include small multiple use campsites, areas of Seabright where shellfish were processed for food and ornaments, and areas of Westlake associated with Chalumu where chert was worked from raw material into useful tools and projectile points. An area near Pogonip exists where tools were reworked, and where diarists of Portola's expedition described temescals, the sweathouses used for ritual and daily bathing. Areas around Neary Lagoon still contain portions of much larger sites where any number of the marsh associated activities would have taken place" (1980).

While the Muwekma Ohlone Tribe is comprised of multiple tribes/tribal bands, the Amah Mutsun feel individual identification is in their best interest in order to restore their recognized status. The Amah Mutsun were previously recognized by the Bureau of Indian Affairs in 1906 as the “San Juan Tribe”, a name associating the Tribe with the San Juan Bautista mission. The contemporary enrolled membership of the Amah Mutsun Tribal Band is comprised of over 600 registered members. While the Amah Mutsun’s federally recognized status technically has not been terminated, the Tribe, along with all other Californian tribes, was subjected to congressional acts, which stripped them of their historic territories and land access rights without explicitly stating such actions were occurring (Field et al. 1992:418). The Amah Mutsun are currently in the process of petitioning the Bureau of Indian Affairs to restore their status (Petitioner #120 on the Bureau of Indian Affairs) and have worked independently of the Muwekma Ohlone to establish relationships with agencies such as BLM, California Department of Parks and Recreation, UC Santa Cruz, UC Berkeley and UC Davis in an effort to cooperatively regain tribal lands, conserve native plants and wildlife and collect culturally important materials (AMTB 2017).

General Zooarchaeological Methods

While some standardization of terminology, methodological approaches, and analytical frameworks exists, the analysis process and interpretation of animal remains varies between researches (Peres 2008:25). Generally, zooarchaeologists record two types of data: primary and secondary (Brewer 1992; Peres 2008; Reitz and Wing 2010). Primary data includes both quantitative and non-quantitative information. The non-quantitative data recorded can include taxonomic identification (the identity or species of the specimen analyzed), represented skeletal elements (femur, ulna, etc.), the portion of each identified skeletal element, human and non-human modifications to the specimen, age estimation based upon epiphyseal fusion or tooth eruption/wear, sex indicators (medullary bone, physical morphology, etc.) and any other characteristics the researcher feels are notable (Reitz and Wing 2010:158).

Zooarchaeological identification of specimens is made primarily by comparison of archaeological specimens to an osteological collection of contemporary species, along with reference manuals and other identified archaeological collections (Peres 2008:23). This method is the core of zooarchaeological research, and stems from the discipline's base in the principle of uniformitarianism, in which past conditions and relative morphological characteristics of fauna should be mirrored by contemporary species. Identification of each specimen begins by sorting first into classes by provenience (Aves, Mammalia, Bivalvia etc.), followed by further identification to the lowest taxonomic level possible (family, genus, species etc.).

Quantitative primary data generally recorded includes weights and specimen counts (Peres 2008:24). Recorded weight for each specimen or by taxon (common for marine invertebrates) is essential because it is a basic, comparable unit of measurement that can also be utilized as the basis of secondary data measurements, such as determining the relative abundance or importance of a taxon within an assemblage. While weight is considered a basic measurement, potential exists for the data to become skewed to favor larger animals within the assemblage when performing secondary data calculations as larger animals often weigh considerable more than those classified as small (Peres 2008:27). Additionally, weight cannot account for taphonomic processes that may have altered the original weight of a specimen, such as degradation due to weather processes or human modifications, such as burning or cooking.

Quantitative primary data also includes determining the number of identifiable specimens (NISP), also known as the species count present in the assemblage (Klein and Cruz-Uribe 1984:25; Peres 2008:26). Each individual bone, scale, tooth etc. is counted as a single unit, whether fragmented or complete (Klein and Cruz-Uribe 1984:25). Sometimes specimens can be counted without identifying a taxon or element in order to demonstrate spatial patterns or when finite identification is not possible due to a lack of identifying features resulting from taphonomic or anthropogenic modifications (Reitz and Wing 2010:167). While NISP is a basic measurement in zooarchaeological research, just like recorded weights it can reflect bias towards more easily identifiable species or specimens that have been better preserved than others (Lyman 1987:98). Primary data is recorded on a specimen tag and later entered into a database capable of performing quantification, such as Apple's Filemaker or Microsoft's Excel.

Secondary data, which builds upon primary data, includes calculations and estimations of biomass, minimum number of individuals (MNI), species diversity and relative abundance (Peres 2008:27). MNI is generally calculated using the most abundant element from each taxon. Diagnostic characteristics are taken into consideration when analyzing pairing sided elements, such as overall size and epiphyseal fusion (Peres 2008:27; Reitz and Wing 2010:205-210). If the selected elements can be paired, the higher NISP of the two is selected as the MNI. Relative abundance within an assemblage can indicate the importance of specific fauna to a group, the group's proximity to an environment that supported specific fauna, diachronic shifts in subsistence strategies or dietary reflections of social stratification (Jackson and Scott 2003; Peres 2001; Peres 2008; VanDerwarker 2006). Both primary and secondary data can be utilized to calculate relative abundance within an assemblage (Peres 2008:27).

Zooarchaeological Methods Employed in This Project

I began my analysis by first rough sorting all screened material from the 2008 excavation of CA-SCR-10. Once all recovered material had been sorted into debitage, marine invertebrates, faunal and human components, I concentrated on marine invertebrate speciation first. Fragments were initially sorted by class (Gastropoda, Bivalvia, Polyplacophora etc.) or into an undetermined classification by provenience. Whenever possible, each class was then sorted into family, genus and species. The highly fragmented nature of the assemblage made this step more difficult, especially as taxonomic data for marine invertebrates is highly variable and is changed often (Ponder and Lindberg 2008; Rehder 1981). Specimens sorted into the undetermined categorization went through two additional rounds of analysis, and were compared to several reference manuals including: *The Phylogeny and Evolution of Mollusca* (Ponder and Lindberg 2008), *The National Audubon Society Field Guide to North American Shells* (Rehder 1981), and *Pearson Field Guide to Pacific Coast Shells* (Morris 1966). Additionally, all identifications were ultimately compared to both contemporary and archaeological marine invertebrate collections at the CA State Parks Santa Cruz District Office, as well as my personal collection of modern marine invertebrates. Weights were taken for entire classifications by provenience. The fragmented and dense nature of the marine invertebrate assemblage rendered weights on individual fragments irrelevant and unusable for future comparisons between archaeological site data. Primary data recorded on the specimen tag included provenience data as well as the taxon, observable modifications, NISP (one bag per specimen tag), weight and field/lab notes. The original scope of this project included stable isotope analysis of intact California Mussel (*Mytilus californicus*) specimens to infer seasonality of site use. Specimens located within the assemblage that retained an intact outer growth ring, necessary for isotopic analysis, were pulled and bagged separately. However, the scope of this project eventually shifted, so the data from those specimens was added to the overall California Mussel (*Mytilus californicus*) data per unit depth.

Marine invertebrate identification was then followed by the analysis of the faunal bone component. Faunal bone identifications were made in a similar manner to the marine invertebrate component. Specimens were compared to both my personal osteological collection of modern North American fauna and archaeological specimens identified and stored at the CA State Parks Santa Cruz District Office. Identifications for the archaeological assemblages stored at the CA State Parks Santa Cruz District Office were made by Diane Gifford-Gonzalez and Anneke Janzen. Reference manuals for osteological identifications included: *Mammalian Osteology* (Gilbert 1997), *A Guide to the Measurement of Animal Bones from Archaeological Sites* (VonDenDriesch 1976), *Fish, Amphibian and Reptile Remains from Archaeological Sites* (Olson 1968), *Avian Osteology* (Gilbert et al. 1996), *Manual of Ornithology* (Proctor and Lynch 1993) and the online database *Archaeological Fish Resource* (University of Nottingham 2017).

Each specimen was identified to the most finite taxonomic categorization possible based upon the presence of sufficient distinguishable features. Specimens lacking such discrete features were sorted into broader taxonomic categorization, such as taxonomic class (Aves, Mammalian, etc.). Additionally, when identifiable features were present, specimens were assigned to size categories. Species such as California vole (*Microtus californicus*) were assigned to the "extra small" categorization, species sized between sea otter (*Enhydra lutris*) and cottontail (*Sylvilagus audubonii*) were assigned to the "small" categorization, species sized between sea otter and mule deer (*Odocoileus hemionus*) were assigned to the "medium" categorization, and any species sized larger than mule deer were assigned to the "large" categorization. All faunal specimens from the CA-SCR-10 assemblage were weighed using the same Ohaus 800 series triple beam scale, and all primary data was recorded on individual specimen tags. Primary data recorded for faunal bone specimens included provenience data as well as taxon, NISP, element, portion, side, age, sex, color, any modifications observed, weight and field/lab notes.

The data generated from the faunal analysis was ultimately entered into Excel using shorthand codes in order to generate quantities for the number of specimens (NISP) as well as any modifications made to the specimens. I utilized variable codes established by Diane Gifford-Gonzalez for specimen portions, and loosely based the codes I drafted for specimen elements, modifications, and species, or class if more nuanced identification is not possible, upon Gifford-Gonzalez's work. Since Diane Gifford-Gonzalez has performed the zooarchaeological analysis for several central California coastal sites, including several sites for the central coast CA State Parks office, I specifically chose to utilize Gifford-Gonzalez's approach and coding system. This will help facilitate future comparisons between CA-SCR-10 and other central coast sites since the data entries use a more standardized methodology.

In order to develop inferences regarding significance of species targeted and possible environmental correlations, MNI was calculated utilizing the method outlined by White in 1953. In this methodology, paired bone fragments (such as those from radii, femora etc.) are divided by side and portion. The most abundant number is used as the final estimate of MNI (Buikstra and Ubelaker1994; Lyman 2008). Since the faunal assemblage from CA-SCR-10 is dominated by marine invertebrates and highly fragmented, the 50% rule, which requires an element to be intact by at least 50% in order to be counted towards the MNI total, was not employed (Buikstra and Ubelaker1994; Lyman 2008).

Lastly, portions of human remains were identified within the screened material and set aside for repatriation. When excavated in 2008, unit two of CA-SCR-10 did contain a human burial, uncovered at 70 cm. Field supervisor Dustin McKenzie made the decision to reroute the unit 10 cm along the eastern border. Since CA-SCR-10 is a shell mound and thus subject to unstable preservation conditions, fragments of the human remains did mix with the remaining material pulled from the unit. All identified human bone fragments were immediately brought to the CA State Parks office and not included in any analysis for this project.

Zooarchaeological Analysis Results: Marine Invertebrates

Invertebrates overwhelmingly dominated the faunal component of the CA-SCR-10 assemblage, representing 99.7% of the overall recovered material (by weight). A total of 139,374.2 grams of invertebrate fragments were analyzed for this project. As with most archaeological sites along the Santa Cruz coastline, the predominant invertebrate was California Mussel (*Mytilus californianus*), which was densely present in every level (refer to Table 2; Porcasi 2011: 399). Snail (*Tegula/Olivella/Nucella/Crepidula*), clam (*Leukoma/Platyodon/Tresus/Macoma*), chiton (*Polyplacophora*) and barnacle (*Balanus/Semibalanus/Pollicipes*) species were additionally observed in every level analyzed, but in much smaller concentrations than California mussel.

Another notable observation is the proportional increase in invertebrate variation correlating to the decrease in plowing intrusion. At roughly 70 cm., just below the average plow blade depth of 60 cm., the variability of species present sharply increases, possibly reflecting the less frequent use of CA-SCR-10 during the terminal Holocene or exemplifying the reduced and convoluted data left behind after a site has been heavily disturbed (See Table 2). Whether due to natural taphonomic changes, human modification at the time of harvest/hunting or contemporary actions such as plowing, the faunal component of CA-SCR-10 is highly fragmented. While some species such as California mussel and Pacific littleneck clam (*Leukoma staminea)* were found to occasionally be preserved intact, both faunal bone and invertebrate specimens tended to range between one millimeter and two centimeters.

Level X / Inv. Type	0-10	10-20	20-30	30-40	40-50	60-70	70-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180
Urchin		X			X	X	X	X	X	X	X	X	X	X	X	X
Intertidal snail	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Subtidal snail	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Intertidal Mussel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Burrowing Mussel						X	X	X	X	X	X	X	X			
Intertidal Limpet	X		X		X	X	X	X	X	X	X	X	X	X	X	X
Kelp Dwelling Limpet						X	X	X		X		X	X		X	X
Crab							X	X	X	X	X		X			
Clam	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chiton	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Floating Barnacle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Intertidal Barnacle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Abalone							X	X	X	X	X					

Table 2. Marine invertebrates by unit depth. Note taxonomic variety begins to increase around 60-70 cm.

Mollusks: Bivalves

The invertebrate component consisted of several genera, but was predominantly composed of bivalve species. The highest concentrated species was California Mussel (*Mytilus californianus)*, which composed 91.9% of the total invertebrate component and 91.7% of the overall faunal component. Ribbed Mussel (*Ischadium demissum*) was also observed in several levels, but occurred much less frequently (note “burrowing mussel” in Table 2). This is notable since ribbed mussel is an invasive species found along the North American Atlantic coast and in South America (GISD 2017). While there is no known date or pathway for the species’ introduction to the Pacific coast, theories have included transportation via ship hulls or migratory shorebirds (GISD 2017). Unlike California mussel, which grows in extensive beds along rocky shorelines, ribbed mussel can be found semi-burrowed into muddy, estuarine-like environments, often in regions where bodies of fresh water meet the ocean. Ribbed mussel grows at a slower rate than California mussel, ultimately reaching an adult size only one third of the native California mussel (GISD 2017). Its introduced status, slow growth rate and thinner, more fragile shell make ribbed mussel a less common species to find in assemblages, especially those that have been highly disturbed.

Additional bivalves observed in the faunal component include a number of clam species, such as Pacific littleneck clams (*Leukoma staminea*), California butter clams (*Saxidomus nuttallii*), Pacific gaper clams (*Tresus nuttallii*), gaper clams (*Tresus capax*), bent nose clams (*Macoma nasuta*), boring soft-shell clams (*Platyodon cancellatus*), undifferentiated clam species

(*Macoma sp.)* and Nuttall's cockles (*Clinocardium nuttallii*). While each species varies by overall shell shape, size, density, and pattern, they are primarily all found in similar intertidal zones composed of gravel/sand/mud substrates between depths of ten centimeters to one meter. Nuttall's cockle is the only bivalve species which prefers finer grained substrates and eel grass (*Zostera*) beds, commonly found in regions where fresh and salt water mix, such as estuaries, bays, and marshlands (Stauffer 1937:429).

Mollusks: Chitons, Limpets and Snails

Other mollusks identified in the invertebrate analysis included undifferentiated chiton species (Polyplacophora), single-shelled gastropods (limpet species), and snail species inhabiting both intertidal and subtidal zones. Chiton were separated into distinctions: gumboot chiton (*Cryptochiton stelerii*) and Polyplacophora. All chiton species are identified by their unique overlapping shell plates, and inhabit rocky intertidal zones. Gumboot chiton are easily identifiable compared to other Polyplacophora species as their shell plates lack any patterned detail and are the only chiton species reach sizes upwards of thirty centimeters.

Both true and keyhole limpet species were observed in the invertebrate component. Species identified included ribbed limpet *(Collisella digitalis),* rough keyhole limpet *(Diodora aspera),* rough limpet *(Collisella scabra)* and unstable limpet *(Lottia instabillison).* All species, with the exception of unstable limpet, are again mollusks which inhabit rocky intertidal zones and adhere to rocky surfaces in a similar manner to barnacle *(Balanus/Semibalanus species).* Conversely, unstable limpet is a unique limpet species that lives on its primary food source-kelp stipes and holdfasts (Morris 1966:57). Unlike the other limpet species observed, unstable limpet has an elongated shape with slightly upturned edges that allow it to easily glide along kelp and respond to its life in the open ocean.

Several snail species were observed throughout the invertebrate component. This included subtidal-intertidal species such as the purple dwarf olive *(Olivella biplicata),* common slipper *(Crepidula formicata)* and wrinkled amphissa *(Amphissa columbiana).* These species can live in subtidal depths up to thirty meters but are also found in intertidal zones among mussel beds. Purple dwarf olive is a common shell to find in coastal pre-contact Native American sites as the species was targeted for bead making. Shell beads were utilized by a variety of pre-contact coastal populations for ceremonial and exchange purposes. The section of shell selected for the bead and the shape of the bead hole are diachronically diagnostic and can be used to help date archaeological sites to specific periods.

Black turban snail *(Tegula funebralis)* and several periwinkle species *(Nucella canaliculata, Nucella emarginate, Nucella lamillosa, Littorina plena* and *Littorina littoria)* were also observed throughout the entire invertebrate component. These snail species are found strictly in rock, intertidal zones along exposed coastline with the exception of the *Littorina* species, which can also be found in shallow, marshy and estuarine conditions (Morris 1966:64). Abalone (*Haliotis sp.)* was also present at depths between 70 and 130 centimeters. This coincided with the densest portion of the faunal component and the presence of a hearth-like feature (see Appendix A). Abalone are placed within a genus of large marine snails which prefer rocky shorelines and can be found on nearly every coast across the globe (Morris 1966:52). The exterior shell is diagnostic for Abalone, with dull colors and striations reflecting each species' diet and environmental chemical makeup (Morris 1966:52). None of the Abalone specimens examined from CA-SCR-10 still retained any cortex remnants, thus all specimens were only identified to genus. Like purple dwarf olive, Abalone and its unique mother-of-pearl interior is also a culturally important mollusk utilized for subsistence, ceremonial, decorative and exchange purposes by Native populations.

Crustaceans and Echinoderms

The invertebrate component was also composed of several crustacean species that reflect a subsistence strategy targeting the rocky intertidal zone. Barnacle, including *Balanus*, *Semibalanus* and *Pollicipes* species, was observed at every depth and again typifies a suite of species exposed during low tide on the rocks along the shoreline (Morris 1966:43). Like most intertidal invertebrates, barnacle would have to be pried off using some sort of tool, such as one constructed out of faunal bone. Dungeness crab *(Cancer magister)* was also observed in the component between 70 and 150 centimeters, similar to Abalone *(Haliotis sp.)*. Dungeness crab is one of the widest-ranging crab species and is distinguished from the similar-looking species by its relative gracility, the serrations found on the dorsal side of its chelipeds and its characteristically white or light-colored cheliped tips.

Lastly, several levels of the invertebrate component contained fragments of urchin species, labeled as *Strongylocentrotus* species due to the extreme similarities between purple urchin (*Strongylocentrotus purpuratus*) and red urchin (*Strongylocentrotus franciscanus*), both found in sub/intertidal zones where they burrow into rock. Urchins *(Strongylocentrotus sp.)* are a favorite food of Sea Otters (*Enhydra lutris*) found along the central California coast. Often otter teeth, both in archaeological and contemporary contexts, are stained a purple-to-maroon color as some individuals choose to subsist strictly upon urchin. Additionally, urchin is an ecological indicator of an oceanic zone's health; urchins feed upon kelp and compete with species such as

Abalone. If the urchin population becomes unmanaged due to reduced predation by sea otters, it can lead to the devastation of entire kelp forests (Girard et al. 2012).

Zooarchaeological Analysis Results: Faunal Bone

For this project a total of 1,094 faunal bone specimens, with a combined weight of 299.7 grams, were analyzed and identified to the closest categorization. Avian, fish, terrestrial mammal and marine mammal species were observed within the faunal bone component (refer to Table 3). Undifferentiated mammalian fragments comprised the highest proportion of the assemblage, which was expected as the highly fragmented nature of the faunal bone recovered from CA-SCR-10 makes identification challenging. Very few avian and marine mammals were present throughout the analysis which is notable observation since CA-SCR-10 is within close proximity to locales where such genera would have been accessible (refer to Table 3).

		NISP	MNI	% of assemblage
Class Aves				**0.6%**
Undetermined		3	1	
Callipepla californica	California Quail	3	1	
Meleagris gallopavo	Wild Turkey	1	1	
Class Mammalia				**88.2%**
Undetermined (adult)		746	-	
Undetermined (juvenile)		1	1	
Microtus californicus	California Vole	11	1	
Thomomys bottae	Botta's Pocket Gopher	93	4	
Neotoma fuscipes	Dusky-footed Wood Rat	13	3	
Sylvilagus audubonii	Desert Cottontail	41	3	
Lepus californicus	California Jackrabbit	4	1	

Enhydra lutris	Sea Otter	3	1	
Phoca vitulina	Harbor Seal	1	1	
Odocoileus hemionus (adult)	Mule Deer	50	3	
Odocoileus hemionus (juv.)	Mule Deer	1	1	
Superclass Osteichthyes				**11.2%**
Undetermined		12	1	
Salmonidae	Ray-finned sp.	19	1	
Pseudopleuronectes	Right-eye Flounder sp.	1	1	
Gadus macrocephalus	Pacific Cod	91	2	

Table 3. The MNI for undetermined mammals was not calculable as the fragments lacked discernable features for determining the side/element.

Aves

As anticipated, very few avian specimens were present in the faunal component. Pre-contact archaeological sites located away from regions of extreme marshland often don't contain a high proportion of subsistence bird bone. Birds were targeted primarily for their feathers for cultural purposes and as one of the sources of bone utilized in manufacturing whistles (Jones et al. 2007: 132). Wild turkey (*Meleagris gallopavo)*, California quail (*Callipepla californica*) and a third, smaller, undetermined avian species were observed within the assemblage. California quail and wild turkey prefer a mixed habitat comprised of grassland, chaparral and open woodland both for cover and variety of subsistence (Spears et al. 2007:71; Blakely et al. 1990:241). Both species also seasonally adjust their diet to incorporate what's available during foraging. This includes leaves, grasses, berries, fruits and insects.

Marine Mammals

Marine mammals did not comprise much of the faunal component; only four specimens from the entire assemblage fall definitively within this category. Three of the marine mammal specimens, including a complete left talus, belong to sea otter *(Enhydra lutris)*, and the fourth, a scapular head/neck fragment, to the *Phocidae* family. Sea otters spend nearly their entire lives in the water, and is most often found floating at the water's surface near kelp forests (Gilkinson et al. 2011:1278). The sea otter subsists upon a purely carnivorous diet composed of mollusks, echinoderms and crustaceans. Some individuals have been known to favor a specific species, such as purple urchin *(Strongylocentrotus purpuratus),* and exclusively hunt that species so long as it's available. Sea otters were targeted by Native populations, much like later Europeans, primarily for their furs (Hylkema 1991:70).

The central California coast is an ideal habitat for both otter and Pinniped species. The dense near-shore kelp forests attract a diverse marine population to feed upon, and the relatively close drop in seafloor elevation creates strong upwelling of cool water and nutrients from decaying matter. This influx of nutrients establishes a self-fulfilling cycle in which increased algae and plankton can flourish, thus leading to increased faunal diversity and ultimately more decaying matter than replenishes nutrient levels. Geographically, the central coast is physically typified by rocky shorelines and outcrops, which are ideal for pinniped species that haul themselves onto the rocks to dry out their coats and rest. Six species of pinnipeds can still be found along the central California coast today: Pacific harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), Steller sea lion (*Eumetopias jubatus*), northern fur seal (*Callorhinus ursinus*), and the northern elephant seal (*Mirounga angustirostris*), which can only be found at Año Nuevo (Scheffer 1969)

Terrestrial Mammals

While a disproportionate ratio exists between mammalian bone and all other classifications, few terrestrial mammals were finitely identifiable. Dietary species observed throughout the faunal component included mule Deer (*Odocoileus hemionus*), California jackrabbit (*Lepus californicus*), and desert cottontail (*Sylvilagus audubonii*). All three species inhabit a similar mixed environment as the avian species identified: open woodland, chaparral, and grassland. Botta's pocket gopher (*Thomomys bottae*), California vole (*Microtus californicus*) and the dusky-footed woodrat (*Neotoma fuscipes*) also were present throughout the assemblage. Botta's pocket gopher, the California vole, and the dusky-footed woodrat are all intrusive rodent species and generally not considered dietary selections. The dusky-footed woodrat builds dens within chaparral, stacking sticks and plant material in a mound shape. Often these dens have multiple chambers, some full of stored foods and some empty for unknown reasons. Other species, such as the California vole, have been observed occupying these empty rooms within the dens.

Within the highly fragmented recovered assemblage, a large proportion of the faunal component included small, unidentifiable specimens. Most fragments were small bits of trabecular bone lacking any distinguishable features. Only the structure of the trabecular matrix remained, thus I was only able to identify the specimens as Mammalian. Since these fragments are so indistinguishable, there is a slight chance some may actually be from the human burial present within the unit.

Osteichthyes

Pacific cod (*Gadus macrocephalus*), species from the *Salmonidae* family (Pacific salmon and trout sp.), species from the Cottidae family (sculpin), and species from the *Pseudopleuronectes* genus (flounder) were observed throughout the assemblage. Cod feed upon smaller fish and mollusks, and can be found in nearshore oceanic waters (Gilbert and Williams 2002:224). Historically, cod has played a major role in human subsistence and is one of the most contemporarily commercially-fished species (Gilbert and Williams 2002:223). Right-eye flounders inhabit soft-bottomed, nearshore waters, and have been observed entering fresh water estuaries along the Pacific coast (Gilbert and Williams 2002:553). Conversely, sculpins inhabit rocky intertidal zones with high-energy wave action (Gilbert and Williams 2002:305). *Salmonidae* species are some of the most introduced species within North America as they inhabit both temperate fresh and salt water environments (Gilbert and Williams 2002:195). Much like cod, *Salmonidae* has played a critical role in both prehistoric and modern diets.

Anthropogenic Modifications to Faunal Bone

Nearly half of all bone specimens exhibited some aspect of butchery or food processing. The most common food processing modification observed was evidence of burning/cooking (refer to Table 4). Bone subjected to fire will result in multiple effects, such as sooting, color alteration, increased sheen and density making the bone resemble glass depending upon the intensity of the flames (Specht 2016:9; Reitz and Wing 2010:132). The hotter the fire, the more prevalent the effects become. Butchery marks, such as cuts with thin, sharp blades, and chops, wedge-shaped cuts generally created during dismemberment of the acquired prey, were the second most common modifications to bone. Five impact notches were also observed on faunal bone fragments, indicating concussive, powerful blows made by stone tools were utilized to break into the medullary cavity (refer to Table 4; Reitz and Wing 2010:127).

Butchery Modification	NISP	% of Total Faunal Bone Assemblage
Burned	408	37.3%
Chopped: wedge-shaped cut	2	0.1%
Cut: straight, narrow v-shaped cut	55	5%

Impact notch from bashing	5	0.4%

Table 4. Proportion of faunal bone component characterized by butchery and processing modifications.

Evidence of food processing was observed in all faunal categories, including the invertebrate component. Mammals were the most modified taxon observed, although a high proportion of this classification included undifferentiated mammal, which may include both marine and terrestrial species (refer to Table 5). Mammals were also the only taxonomic classification exhibiting multiple types of butchery marks on the same specimen. For example, Figure 4, a proximal femoral fragment from a mule deer (*Odocoileus hemionus*) is shown exhibiting signs of burning, cutting and chopping. Due to the fragmented nature of these specimens, finer distinctions within this classification were not possible.

Classification	NISP Exhibiting Modifications	% of Classification Modified
Aves	2	28.5%
Undetermined Mammal	392	52.4%
Terrestrial Mammal	46	21.5%
Marine Mammal	2	50%
Osteichthyes	15	12.1%

Table 5. Proportion of modifications by classification.

Fig.4 *Odocoileus hemionus* long bone fragment that has been burned, cut and chopped.

Skeletal Elements

Skeletal elements were also counted and sorted into an axial classification (central skeletal bones; cranial bones, vertebrae, ribs, innominate and sacrum), or an appendicular classification (bones of the limbs; scapulae, long bones, patellae, carpals, tarsals and phalanges) illustrated in Table 6. Twice as many of the specimens analyzed belonged to the appendicular category. The most represented identified elements in the assemblage were vertebrae (NISP=120), closely followed by innominate fragments (NISP=38), femoral fragments (NISP=37), and humeral fragments (NISP=22).

		Appendicular NISP	Axial NISP	Unidentifiable NISP
Class Aves				
Undetermined		3	0	0
Callipepla californica	California Quail	2	0	0

Meleagris gallopavo	Wild Turkey	1	0	0
Class Mammalia				
Undetermined (adult)		385	61	252
Undetermined (juvenile)		3	0	0
Microtus californicus	California Vole	2	9	0
Thomomys bottae	Botta's Pocket Gopher	41	51	0
Neotoma fuscipes	Dusky-footed Wood Rat	10	3	0
Sylvilagus audubonii	Desert Cottontail	34	7	0
Lepus californicus	California Jackrabbit	4	0	0
Enhydra lutris	Sea Otter	3	0	0
Phoca vitulina	Harbor Seal	1	0	0
Odocoileus hemionus (adult)	Mule Deer	37	13	0
Odocoileus hemionus (juv.)	Mule Deer	0	1	0
Superclass Osteichthyes				
Undetermined		0	4	8
Salmonidae	Ray-finned sp.	0	15	4
Pseudopleuronectes	Right-eye Flounder sp.	0	0	1
Gadus macrocephalus	Pacific Cod	0	85	0
	Totals	526	249	265

Table 6. Skeletal elements were counted (NISP) as either axial or appendicular.

Zooarchaeological Interpretation: Paleoenvironment

The zooarchaeological evidence as a whole supports the interpretation CA-SCR-10 contained a suite of floral and faunal populations that one would expect to find in mixed environment. The species identified generally were observed consistently throughout the analysis, indicating this landscape pattern persisted throughout the region's history. This landscape included stretches of open grassland, likely darted by and bordered to the east by patches of chaparral and scrub brush. Beyond the chaparral to the east, there would have been open woodland, first consisting of California live oak (*Quercus agrifolia*) and deeper into the woodland, coast redwood (*Sequoia sempervirens*). The consistency of the environmental makeup also indicates the climate in the region has remained relatively stable since the site's establishment and occupation.

Inferences about the paleoenvironment at CA-SCR-10 can be developed relying upon the bioecological needs and characteristics of the contemporary taxa relatives of species identified within the archaeological assemblage. The high frequency with which Botta's pocket gopher *(Thomomys bottae)* is observed within the faunal assemblage indicates much of the region around CA-SCR-10 has been persistently covered with the gopher's preferred habitat of swaths of open grassland. Other rodents observed with great frequency were the Dusky-footed wood rat *(Neotoma fuscipes)* and California vole *(Microtus californicus).* Much like gophers, voles have historically had a ubiquitous presence in California, and can be found in nearly all ecological niches within the state. However, their presence in association with the wood rat, which establishes elaborate dens frequented by voles in chaparral, further supports the assertion CA-SCR-10 is a site in which several environmental zones intertwine. Whether the gophers, wood rats and voles observed in the faunal assemblage were historically intrusive, or if they were present during the period of site occupation, has not been determined. Similarly, the *Leporidae* species identified, desert cottontail *(Sylvilagus audubonii)* and California jackrabbit *(Lepus californicus),* as well as the mule deer *(Odocoileus hemionus),* inhabit a suite of ecological niches including open grassland, coastal sage scrub, riparian regions and piñon-juniper bushland/forests (Spears et al. 2007:71; Blakely et al. 1990:241). The avian species observed in the faunal assemblage, California quail (*Callipepla californica*) and wild turkey (*Meleagris gallopavo*), are typically associated with a mixed environment, which would provide roosting and protection/safety zones as well as neighboring zones in which food resources could be acquired. The dietary choices of these two species further typify the region, as they both target acorns, leaves, grasses, berries, seeds and insects.

All identified species, both terrestrial and marine, were typical for a site that is located adjacent to both freshwater and oceanic shoreline. The persistence of freshwater species in the faunal assemblage indicates Baldwin Creek existed during the mid to late Holocene and was an important subsistence and freshwater source for pre-contact populations. Fish appear to have played an important role in the subsistence strategy at CA-SCR-10, representing roughly 11% of the faunal component. The variety of Osteichthyes species (*Salmonidae*, *Cottidae*, Pseudopleuronectes, etc.) observed further supports the assertion CA-SCR-10 has historically been comprised of a mosaic environment, including both oceanic and freshwater food sources. Since each Osteichthyes species identified inhabits different environmental niches, hunting strategies and required tools would have to shift accordingly. Poles with lines and shell or stone weights, nets, baskets and weirs could have all been crafted utilizing the natural resources around CA-SCR-10 (Jones 2002:65). The composition of the marine invertebrate component implies the region was possibly comprised of more marshland along Baldwin Creek than exists today, as the substrate at the creek's mouth on Four Mile Beach is comprised of a grainer sand than preferred by ribbed mussel (*Ischadium demissum)* and black periwinkle *(Littorina plena).* Additionally, the presence Pseudopleuronectes, which has been observed in freshwater estuary contexts, further supports this environmental description.

The lack of marine mammals present in the CA-SCR-10 assemblage relative to the accessible coastline can result from a multitude of causes. If butchery of marine mammals occurred at CA-SCR-10 or near the perimeter of the site, a higher proportion of marine mammal bone specimens would have been observed in the excavated units. Butchery of larger species often occurs at or near the kill site as hauling large, heavy resources across distances is impractical and inefficient (Reitz and Wing 2010:204). Therefore, the possibility exists CA-SCR-10 was geographically not ideal for hauling marine mammal carcasses for processing and thus butchery was undertaken closer to the shore. The variety of faunal species indicates pre-contact populations at CA-SCR-10 employed a few different subsistence strategies, and the possibility exists targeting marine mammals was not one of them. Additionally, settlement at CA-SCR-10 coincided with a period in which the marine mammal population could have dipped or relocated. Increased human predation, as well as a suite of ecological factors such as warming ocean temperatures, can influence the rate of marine mammal population depression and encourage established marine mammal populations to relocate to regions similar to their previous environment (Gifford-Gonzales 2011:222).

Zooarchaeological Interpretation: Resource Acquisition and Selectivity

The prevalence of small game, shellfish and teleost fish suggests the subsistence strategy employed at CA-SCR-10 involved a lower energy expenditure when collecting resources compared to that involved in hunting large game. Terrestrial mammals appear to be the second most targeted faunal resource behind marine invertebrates, with cottontail (*Sylvilagus audubonii*, MNI=3) and mule deer (MNI=3) representing the most individuals within the assemblage. Mammalian and avian adult taxa appear to have been targeted much more frequently than juveniles (NISP=2), which may either reflect a seasonal occupation in which juvenile taxa were not prevalent, or a subsistence strategy that was not based upon targeting age-specific individuals. However, MNI determinations are rooted in the assumption faunal remains are deposited equally across a site, which generally is not taphonomically possible (Peres 2008:27). It is quite likely that one would observe different proportions between age classifications when sampling different regions of CA-SCR-10. The highly fragmented nature of the assemblage also may have masked dietary patterns inferred from the morphological characteristics of specimens. As many of the specimens labeled "undetermined" lacked any distinguishable features, it was not possible to assign an age categorization.

The lack of larger game present in the assemblage can possibly be explained by performing butchery tasks away from the site, possibly where the prey species was killed since it may have been difficult to transport such large resources intact. Since a large proportion of the assemblage does exhibit evidence of butchery modifications, food processing did occur at CA-SCR-10, but may have been limited to more transportable or easily accessible species. Overall, twice as many appendicular fragments were observed, which could be attributed to the high proportion of rodent species identified (refer back to Table 4). However, when the NISP of each skeletal element is compared primary axial elements, such as vertebral and innominate fragments, were observed the most often. Portions of proximal long bones (humeri and femora) were also found with high frequency, suggesting the more substantial sections of prey taxa, generally associated with shoulder and loin regions, were selected and consumed at CA-SCR-10 (Guilday et al. 1962:71). This ratio of elements implies Native groups likely acquired and processed subsistence resources at a kill site and brought back sectioned portions of the kill to a central campsite or village. Conversely, if primary butchery was occurring at CA-SCR-10, a more equal representation of axial and appendicular elements would be anticipated, reflecting a less mobile settlement pattern as dietary needs could be addressed in the immediate vicinity of the campsite.

Zooarchaeological Interpretation: Seasonality

Spring and fall would have been the prime portions of the year to maximize the exploitation of available resources around CA-SCR-10, taking advantage of the natural shifts in prey taxa's own subsistence resources. By applying the OFT, prey taxa adjust their primary patches of resource acquisition as those resources declined, to new ones where other resources were plentiful. Many avian species, including California wild quail *(Callipepla californica)* and turkey *(Meleagris gallopavo),* rely upon a diet of grass shoots, young leaves, berries, and insects which proliferate in grassland regions, such as CA-SCR-10, during the spring and early summer. During the late fall and winter, these species must adjust and relocate to new patches in which other seasonal resources, such as acorns and twigs, would be found in abundance (Charnov 1976; Charnov et al. 1976). This principle also applies to the behavior of terrestrial mammals, including *Leporidae* species and mule deer *(Odocoileus hemionus),* which inhabit grassland ecological zones in the spring/early summer targeting grasses, leaves, flowers, and vegetables, and more forested zones in the fall/winter where acorns, twigs and pine cones would be available. The breeding season for *Leporidae* species extends from February to June, and coincides with the birthing season of mule deer, which frequent grasslands in order to hide young fawns from predators.

Similar to terrestrial resources, marine invertebrates also experience seasonal shifts in growth and optimal harvesting. California mussels (*Mytilus californicus*) spawn during the spring and experience rapid growth during the late summer when temperatures become optimally warm and oceanic currents upwell nutrients from the sea floor (Giribet 2008:137). Contemporary commercial harvesting of mussels is generally in the spring and fall, as mussels reach an optimal size after their summer growth periods, and reach an age between eighteen to twenty-four months (Giribet 2008:136). *Salmonidae* species such as salmon inhabit both fresh and saltwater contexts, and travel inland up streams and rivers to spawn (Gilbert and Williams 2002:195). In central California, *Salmonidae* spawns roughly four times per year, with the most abundant run (the fall run) between July and December (Gilbert and Williams 2002:199). The historically abundant spawn run, which would likely have taken place during the habitation at CA-SCR-10, was “late-fall”, between October and April, but shifted in the 1900’s due to environmental and anthropogenic pressures (Gilbert and Williams 2002:201).

Figure 5 is a compilation of these seasonal population shifts of prey resources in response to shifts of the dietary resources of those prey taxa. As the only floral taxa identifiable through the zooarchaeological analysis, “kelp” is included in Figure 5. The morphological attributes of the unstable limpet *(Lottia instabillison)* evolved specifically for life on slippery kelp surfaces subject to constant motion from wave/current action (Morris 1966:57). The presence of unstable limpet in several levels analyzed indicates kelp harvesting, whether fresh from the ocean or collected from beaches where it had washed up, was a component of pre-contact subsistence strategies at CA-SCR-10. Most Pacific kelp species follow a seasonal pattern of rapid growth in the spring after winter upwelling of rich seafloor nutrients, followed by a decline in nutritional concentration in the fall (Tala et al. 2016:34). This means kelp harvesting may have been a seasonal activity or ultimately practiced throughout the year as needed to supplement dietary and cultural needs. While Figure 5 reflects possible shifts in faunal resources, it does not take into account the floral species accessible at or around CA-SCR-10. Therefore, if substantial floral dietary contributions were readily accessible without the need to travel far, the settlement pattern employed at CA-SCR-10 may not ultimately reflect faunal population shifts.

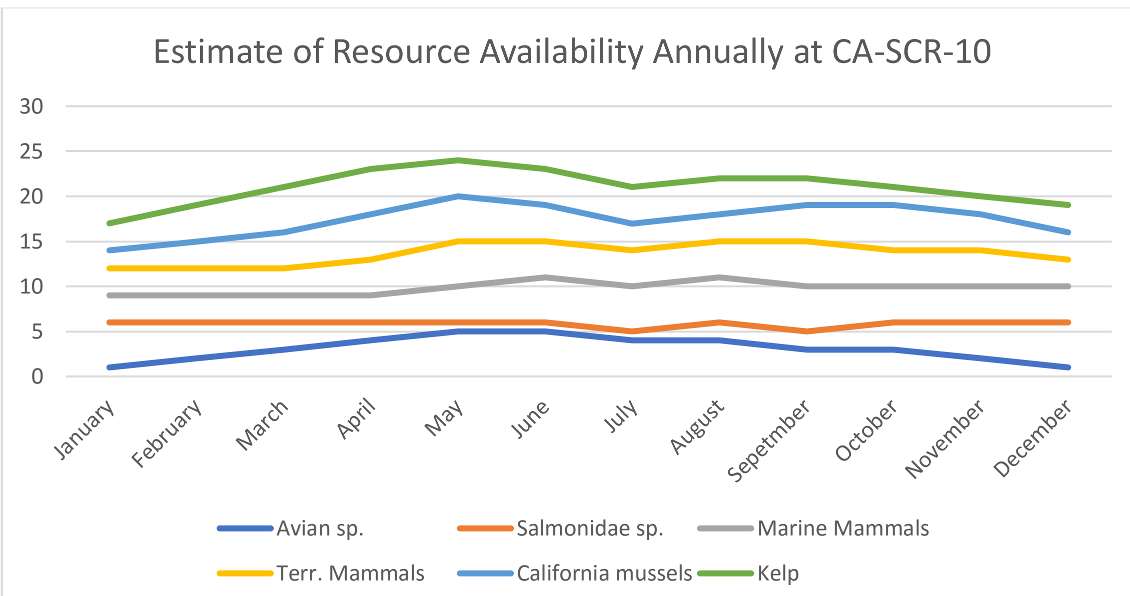


Fig 5. This stacked graph illustrates the estimated seasonal shifts in subsistence resource populations based on the dietary shifts of those resources. Months were assigned the following values: 1=minimally present/absent, 2= somewhat present but not absent, 3= moderately present, 4=highly present, and 6=the most present. The prime months to maximize resource exploitation at CA-SCR-10 would have been April and May (spring into early summer), and again in September (early fall).

Recommendations for Site Management table 6 skeletal portion

The zooarchaeological analysis indicated CA-SCR-10 was comprised of a mixed environment, which included access to rocky seashore and sandy beach zones, open grassland bordered by chaparral, and a nearby freshwater stream with marshy borders. These environmental features have persisted for hundreds of years, indicating the region has been relatively climatically stable. The suite of fauna associated with this mixed environment also persisted; no extant species were identified, and no discernable decline in a specific faunal population could be observed. While the sample size analyzed was limited, the results matched the anticipated summary, and indicated pre-contact populations inhabiting CA-SCR-10 likely employed the central patch model of foraging and processing resources.

Nearly half of all faunal bone specimens analyzed were observed to exhibit marks left by butchery and food processing practices (See Table 6). Elizabeth Reith and Elizabeth Wing assert several aspects of food processing don't leave behind marks, especially when dealing with taxa that doesn't require dismemberment or can be stewed relatively intact (2002:132). Therefore, it can be argued that an even higher proportion of the faunal assemblage could have been subjected to human modification than observed. The sheer size and density of the assemblage, as well as the prevalence of modified fauna, support the assertion CA-SCR-10 was intentionally inhabited for a prolonged period of time, and utilized for a variety of purposes. The zooarchaeological analysis also indicated data between a depth of zero and seventy centimeters is unreliable due to intrusion from agricultural practices, which implies the sections of the site disturbed by the insertion of the city's water line would equally be unproductive. Thus, future plans to either repair or replace established infrastructure will likely not alter or further impact CA-SCR-10 so long as construction is restricted to those zones of the site.

Although the scope of the relationship between CA-SCR-10 and other sites along the coast has not been fully identified, the zooarchaeological analysis performed as part of this project, along with the presence of several cultural materials and at least one known burial, can clearly demonstrate CA-SCR-10 meets all four of the State Historic Preservation Office's criteria for establishing significance. The California State Historic Preservation Office defines archaeological sites as locations, both in prehistoric and historic contexts, where a "significant" activity, such as habitation or ceremonial events, occurred (CASP 2017). Typical archaeological sites include camp/habitation sites, cemetery contexts, battlefields, ruins/shipwrecks, and natural features such as rock caves utilized for ceremonial or habitation purposes (CASP 2017). The determination of "significance" by the California State Historic Preservation Office is outlined as:

> **"**(3) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Pub. Res. Code, § 5024.1, Title 14 CCR, Section 4852) including the following:
>
> > (A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
> > (B) Is associated with the lives of persons important in our past;
> > (C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
> > (D) Has yielded, or may be likely to yield, information important in prehistory or history (CASP 2017)."

CA-SCR-10 can be "associated with broad patterns of California's history" as the site was utilized for an extended period time (evidenced by the presence of multiple hearth features and a dense shell midden), and fits within the projected cultural patterns associated with other central coast archaeological sites dating to the Late Period (refer back to Table X). The distinctive artifacts, subsistence strategy reliant upon local resources, and the radio carbon dating of shell sampled from multiple depths supports the placement of CA-SCR-10 within the central coast's Late Period, thus associating CA-SCR-10 with the lives of past Native Californians and meeting the second and third requirements to prove significance. Although the assemblage from CA-SCR-10 was heavily impacted by both natural and anthropogenic taphonomic effects, the site has yielded important data capable of demonstrating where within the CCTS it fits. Additionally, this data can be applied to many potential avenues for future research, including identifying more finite relationships across the central coast region through isotopic analysis and site-to-site comparisons. The contribution to interpretations of cultural development on the central coast, as well as the potential for future research to include CA-SCR-10, meets the fourth requirement of the State Historic Preservation Office's requirements to determine site significance.

The size and complexity of not only the faunal component, but also the presence of hearth features, food processing artifacts, and at least one known burial, demonstrate CA-SCR-10 is a significant cultural resource. Its significance in the past helps make it significant today. The consistent nature of the region also indicates the interpretations drawn from this analysis about past weather, exposure patterns, geographic distribution of landscape features and associated floral and faunal populations can still apply to contemporary plans for the site's management. The potential for further studies specifically focused upon the site, as well as the linkages between coastal sites, make CA-SCR-10 a candidate for preservation and future interpretation.

It's clear the most appropriate management resolution is to designate the site as a cultural preserve. CA-SCR-10 is a significant site, still yielding pertinent data despite its state of deterioration and disruption. The density of CA-SCR-10's remaining assemblage, the high prevalence of artifacts associated with prolonged habitation, and its proximity to two national monuments specifically registered to highlight precontact cultural significance (Sand Hill Bluff and Cotoni-Coast Dairies) support the assertion preservation should be the highest priority. Designating CA-SCR-10 as a cultural preserve may ultimately incur higher costs for both CA-State Parks, as well as the lessee of the property, who will have to invest in agricultural land elsewhere. However, these costs are a small trade off when the scope of potential for the site is considered.

Works Cited

Amah Mutsun Tribal Band (AMTB)
2017 "History." The Amah Mutsun Tribal Band. http://amahmutsun.org/history. Accessed on February 25, 2017.

Beardsley, R.K.
1948 Cultural Sequences in Central California Archaeology. *American Antiquity* 14(1):1-28.

Bennyhoff, J.A. and R.F. Heizer
1958 Cross-dating Great Basin Sites by Californian Shell Beads. *Reports of the University of California Archaeological Survey* 42:129-141.

Bennyhoff, J.A. and R.E. Hughes
1987 Shell Bead and Ornament Exchange Network Between California and the Western Great Basin. *Anthropological Papers of the American Museum of Natural History* 62(2):83-175.

Blakey, Kevin with John Crawford, R. Scott Lutz and Kevin Kilbride
1990 Response of Key Foods of California Quail to Habitat Manipulations. *Wildlife Society Bulletin* 18(3):240-245.

Breschini, Gary
1983 Models of Population Movements in Central California Prehistory. PhD Dissertation, Washington State University: Pullman.

Breschini, Gary and Trudy Haversat
2002 Radiocarbon Dating and Cultural Models on the Monterey Peninsula. *Pacific Coast Archeological Society Quarterly* 38(1)12.
2011 A Revised Culture Sequence for the Monterey Peninsula Area, California. *Pacific Coast Archaeological Quarterly* 44(3):9

Brewer, Douglas J.
1992 Zooarchaeology Method, Theory, and Goals. *In* Archaeological Method and Theory 4, M. Schiffer, *ed.* University of Arizona Press: Tucson. Pp.195-244.

Buikstra, J.E and D. H. Ubelaker
1994 Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History, organized by Jonathan Haas. Arkansas Archaeological Survey: Fayetteville.

California Invasive Plant Council (CAL-IPC)
2015 Invasive Plants of California's Wildland. California Invasive Plants Council. http://www.calipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=25&surveynumber=182.php

California State Parks (CASP)
2008 Collection of files on CA-SCR-10 from Henry Cowell Redwoods District Office.
2017 Preservation Laws, Codes & Regulations. http://ohp.parks.ca.gov/?page_id=1077. Accessed June 17, 2017.

Cartier, R.
1993 The Saunders Site: MNT-391, a littoral site of the Early Period. Scotts Valley Historical Society Monograph 1: Scotts Valley.

Charnov, E.L.
1976 Optimal Foraging: The Marginal Value Theorem. *Theoretical Population Biology* 9:474-498.

Charnov, E.L. with G.H. Orians and K. Hyatt
1976 Ecological Implications of Resource Depression. *American Naturalist* 110:247-259.

Erlandson, Jon M. with Torben C. Rick, Todd J. Braje, Molly Casperson, Brenden Culleton, Brian Fulfrost, Tracy Garcia, Daniel A. Guthrie, Nickolas Jew, Douglass J. Kennett, Madonna L. Moss, Leslie Reeder, Craig Skinner, Jack Watts and Lauren Willis
2011 Paleoindian Seafaring, Maritime Technologies, and Coastal Foraging on California's Channel Islands. *Science* 331(1181):1181-1185.

Field, Les with Alan Leventhal, Dolores Sanchez, and Rosemary Cambra
1992 A Contemporary Ohlone Tribal Revitalization Movement: A Perspective from the Muwekma Costanoan/Ohlone Indians of the San Francisco Bay Area. *California History* 71(3):412-431.

Fredrickson, D.A.
1974 Cultural Diversity in Early Central California: A View from the North Coast Ranges. *Journal of California Anthropology* 1:41-54.

Gifford, Diane P. and Francine Marshall
1984 Analysis of the Archaeological Assemblage from CA-SCR-35, Santa Cruz County, California. *Archives of California Prehistory* 2:1-27. Coyote Press: Salinas.

Gifford-Gonzalez, Diane
2011 Holocene Monterey Bay Fur Seals. *In* Human Impacts on Seals, Sea Lions, and Sea Otters: Integrating Archaeology and Ecology in the Northeast Pacific, Todd J. Braje and Torben C. Rick, *eds*. University of California Press: Oakland. Pp.221-242.

Gilbert, Carter and James D. Williams
2002 National Audubon Field Guide to Fishes. Alfred A. Knopf, Inc: New York.

Gilbert, B. Miles
1990 Mammalian Osteology. Missouri Archaeological Society: Columbia.

Gilbert, B. Miles with Larry D. Martin and Howard G. Savage
1996 Avian Osteology. Missouri Archaeological Society: Columbia.

Gilikinson, Andrea K. with Shannon E. Finnerty, Frederick Weltz, Timothy M. Dellapenna, Randall W. Davis and Samantha Wisely
2011 Habitat Associations of Sea Otters (*Enhydra lutris*) in a Soft and Mixed Sediment Benthos in Alaska. *Journal of Mammology* 92(6):1278-1286.

Giribet, Gonzalo
2008 Bivalvia. *In* The Phylogeny and Evolution of Mollusca, Ponder and Lindberg, *eds*. University of California Press: Berkeley. Pp.110-142.

Global Invasive Species Database (GISD)
2017 *Geukensia demissa*. Invasive Species: Mytilidae. http://www.iucngisd.org/gisd/species.php?sc=1153. Accessed September 9, 2017.

Guilday, J.E. with P.W. Parmalee and D.P. Tanner
1962 Aboriginal Butchering Techniques at the Eschelman Site (36La12) Lancaster Co., Pa. *Pennsylvania Archaeology* 32(2):59-83.

Heizer, R.F. and F. Fenenga
1939 Archaeological Horizons in Central California. *American Anthropologist* 41(3):378-399.

Hylkema, Mark G.
1991 Prehistoric native American adaptions along the central California coast of San Mateo and Santa Cruz counties. MA Project Report and Thesis Archive. San Jose State University: San Jose.

Jackson, Edwin and Susan Scott
2003 Patterns of Elite Faunal Utilization at Moundville, Alabama. *American Antiquity* 68(3):44-54.

Jones, Terry L.
2002 Archaeology & Prehistory. *In* Changes in a California Estuary: A Profile of Elkhorn Slough, Jane Caffrey, Martha Brown, W. Breck Tyler and Mark Silberstein, *eds*. Elkhorn Slough Foundation Moss Landing. Pp.53-91.

Jones, Terry L. with Nathan E. Stevens, Deborah A. Jones, Richard T. Fitzgerald and Mark G. Hylkema
2007 The Central Coast: A Midlattitude Milieu. *In* California Prehistory, Terry L. Jones and Kathryn A. Klar, eds. Altamira Press: Lanham. Pp. 126-146.

King, C.
1981 Prehistoric and Early Historic California Beads. Ornament 5(1).

Klein, Richard G. and Kathryn Cruz-Uribe
1984 The Analysis of Animal Bones from Archaeological Sites, Karl W. Butzer and Leslie G. Freeman, *eds*. University of Chicago Press: Chicago. Pp.24-37.

Levy, R.S.
1978 Costanoan. *In* Handbook of North American Indians: California, R. Heizer, *ed*. Smithsonian Institute: Washington D.C. Pp.485-495.

Lightfoot, Kent G.
1997 Cultural Construction of Coastal Landscapes: A Middle Holocene Perspective from San Francisco Bay. In Archaeology of the California Coast During the Middle Holocene, Jon M. Erlandson and Michael A. Glassow, *eds*. Institute of Archaeology, UCLA: Los Angeles. Pp. 129-141

Lightfoot, Kent with Rob Q. Cuthrell, Chuck J. Striplen and Mark G. Hylkema
2013 Rethinking the Study of Landscape Management Practices Among Hunter-Gatherers in North America. *American Antiquity* 78(2):1-17.

Lyman, R. Lee
1987 Zooarchaeology and Taphonomy: A General Consideration. *Journal of Ethnobiology* 7(1):93-117.
1996 Applied zooarchaeology: the relevance of faunal analysis to wildlife management. *World Archaeology* 28(1):110-125.
2008 Quantitative Paleozoology. Cambridge University Press: Cambridge.

Marine Mammal Center (MMC)
2017 The Pinnipeds: Seals, Sea Lions, and Walruses. Pinnipeds. http://www.marinemammalcenter.org/education/marine-mammal-information/pinnipeds/. Accessed September 9, 2017.

Milliken, Randall and J.A. Bennyhoff
1993 Temporal Changes in Beads as Prehistoric California Grave Goods. *In* There Grows a Green Tree: Papers in Honor of David A. Frerickson, G. White, P. Mikkelson, W.R. Hildebrandt and M.E. Basgall, *eds*. Center for Archaeological Research at Davis, University of California: Davis.

Milliken, Randall with Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottsfield, Donna Gillette, Viviana Bellafemine, Eric Strother, Robert Cartier, and David A. Fredrickson
2007 Punctuated Culture Change in the San Francisco Bay Area. *In* California Prehistory, Terrry L. Jones and Kathryn A. Klar, eds. Altamira Press: Lanham. Pp. 99-125.

Monroe, Cara
2014 Correlating Biological Relationships, Social Inequality, and Population Movement Among Prehistoric California Foragers: Ancient Human DNA Analysis from CA-SCL-38 (Yukisma Site). PhD dissertation, University of California: Santa Barbara.

Morris, Percy A.
1966 Peterson Field Guide: Pacific Coast Shells. Houghton Mifflin Company: Boston.

National Ocean and Atmospheric Association (NOAA)
2012 Eelgrass-Habitat of the Month. Habitat Conservation. http://www.habitat.noaa.gov/abouthabitat/eelgrass.html. Accessed September 9, 2017.

Olson, Stanley J.
1968 Fish, Amphibian and Reptile Remains from Archaeological Sites. *Papers of the Peabody Museum of Archaeology and Ethnography* 56(2).

Peres, Tanya M.
2001 Coastal Subsistence and Settlement in the Early Ceramic: A Zooarchaeological Study from Central Pacific Panama. PhD Dissertation, Department of Anthropology, University of Florida: Gainesville.
2008 Methodological Issues in Zooarchaeology. *In* Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases, A.M. VanDerwarker and T.M. Peres, *eds.* Springer Science + Business Media: Berlin. Pp.15-36.

Ponder, Winston and David Lindberg
2008. The Phylogeny and Evolution of Mollusca, Winston Ponder and David Lindberg, *eds*. University of California Press: Berkeley.

Porcasi, Judith F.
2011 More on Mollusks: Trans-Holocene Shellfish Exploitation on the California Coast. *Journal of Island & Coastal Archaeology* 6:398-420.

Ramirez, Renya
2007 Native Hubs: Culture, Community, and Belonging in Silicon Valley and Beyond. Duke University Press: Durham. Pp. 102-125.

Reitz, Elizabeth J. and Elizabeth S. Wing
2010 Zooarchaeology, Second Edition. Cambridge University Press: New York. Pp. 11, 77, 89, 132, 158, 167, 184, 257.

Ryan, Mary Ellen
1980 "Well Looking, Affable People...": The Ohlone of Aulintak/Santa Cruz. Archaeological Resources Protection Amendment, Historic Preservation Plan for the City of Santa Cruz Planning Department: Santa Cruz.

Scheffer, Victor B.
1958 Seals, Sea Lions and walruses: A Review of the Pinnipedia. Stanford University Press: Stanford.

Spears, Brian L. with Mark C. Wallace, Warren B. Ballard, Richard S. Phillips, Derrick P. Holdstock, John H. Brunjes, Roger Applegate, Michael S. Miller and Phillip S. Gipson
2007 Habitat Use and Survival of Preflight Wild Turkey Broods. *Journal of Wildlife* Management 71(1):69-81.

Specht, Paula E.
2016 The Effects Wild Fires Have on Skeletal Remains. B.A. Thesis, University of Florida, Gainesville: Florida.

Tala, Fadia with Marcel Velásquez, Andrés Mansilla, Erasmo C. Macaya, and Martin Thiel
2016 Latitudinal and Seasonal Effects on the Short-term Acclimation of Floating Kelp Species from the South-East Pacific. *Journal of Experimental Marine Biology* 483:31-41.

University of Nottingham
2017 Archaeological Fish Resource, electronic database. http://fishbone.nottingham.ac.uk. Accessed August 2017.

VanDerwarker, Amber M.
2006 Farming, Hunting, and Fishing in the Olmec World. University of Texas Press: Austin.

Von DenDreisch, Angela
1976 A Guide to the Measurement of Animal Bones from Archaeological Sites. Peabody Museum of Archaeology and Ethnology Museum Bulletin. Harvard University: Boston.

West, James G. with Wallace Woolfenden, James A. Wanket, and R. Scott Andersen
2010 Late Pleistocene and Holocene Environments. *In* California Prehistory: Colonization, Culture and Complexity, Terry L. Jones and Kathryn A. Klar, eds. Altamira Press: Lanham. Pp.11, 13, 20.

Wiberg, R.
1996 Archaeological Excavations and Burial Removal at Sites CA-ALA-483, CA-ALA-483 Extension, and CA-ALA-555, Pleasanton, Alameda County, California, Coyote Press: Salinas.

Appendix
Radiocarbon Dates

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Richard T. Fitzgerald — Report Date: 2/1/2016

Department of Parks and Recreation — Material Received: 1/22/2016

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 429487	3540 +/- 30 BP	+0.1 o/oo d18O= +0.0 o/oo	3950 +/- 30 BP

SAMPLE : CASCR10u2 170-180
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (shell): acid etch
2 SIGMA CALIBRATION : Cal BC 1825 to 1595 (Cal BP 3775 to 3545)

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 429488	4020 +/- 30 BP	+1.0 o/oo d18O= +0.3 o/oo	4450 +/- 30 BP

SAMPLE : CASCR10u2 60-70
ANALYSIS : AMS-Standard delivery
MATERIAL/PRETREATMENT : (shell): acid etch
2 SIGMA CALIBRATION : Cal BC 2475 to 2255 (Cal BP 4425 to 4205)

Dates are reported as RCYBP (radiocarbon 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.