The Complexities of Neophyte Diet: an Analysis of Faunal Remains from Feature 157 at Mission Santa Clara de Asís

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Authorization to Submit Thesis

The thesis of Lindsay A. Kiel, submitted for the degree of Master of Arts with a major in Anthropology and titled, "The Complexities of Neophyte Diet: an Analysis of Faunal Remains from Feature 157 at Mission Santa Clara de Asís" has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

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Dedication

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Abstract

Between 1769 and 1823, twenty-one missions located from Sonoma down to San Diego were founded in Alta California. With the creation of these missions came the transition of thousands of Native Californians from a life of seasonal rounds to one of sedentary agriculture, all within the span of just a few years' time. While the missions closed in 1837, many remain standing to this day, providing a wealth of information about the people who lived there and about the transition from Native subsistence practices to farming and Christianity.

This thesis focuses on Mission Santa Clara de Asís, located in the southern end of the San Francisco Bay Area. The soil of Mission Santa Clara contains a plethora of information on the lives of the Native people who lived there, and the archaeology that continuously occurs on the site helps to illuminate that. In this thesis, I analyze the faunal remains from Feature 157, a multi-use pit feature that was excavated in the fall of 2013.

By looking at primary source documents written by the Mission Santa Clara padres and by visitors to the mission, I compare the diet of the neophytes as it is recorded in these documents to the skeletal remains present in this assemblage. Researchers have shown that mission Indians ate wild fauna at other missions, and I use the Feature 157 assemblage to show that the same is true at Mission Santa Clara.

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Chapter 1: Introduction

As I was told in one of my graduate level history classes on the American West, California has a history that is unique to the western portion of what is now the United States. While other states became known for the abundant hunting and trapping resources available in the high mountains, rivers, and the sea, California is well known for the network of missions that were established by Spanish Padres. Other areas of the West had some of their own missions, but none had the long-reaching network of relatively closely spaced missions that was indicative of this part of "New Spain" – the term used for both Alta and Baja California. The Spanish required a method to colonize California and establish ownership over the land before the Russians, French, or English could do so, and building missions and presidios proved to be the best method.

Records from California missions provide a wealth of information about the people who lived there and about the transition from native subsistence practices to learning how to farm, and what it means to be a Christian. Many of the missions remain standing to this day, and even those that do not can tell the story of Native peoples through the archaeological remains found buried beneath the surface of the ground. Furthermore, primary sources have survived the ages, providing firsthand accounts of both the padres and visitors to the mission about how many Indians lived in each mission, what life was like for Mission Indians, and how many did not survive the process of missionization.

However, despite these written records, archaeologists continue to excavate mission sites to attempt to discover what can be learned from the archaeology that is not described in the mission records. There is always the possibility that nothing new will come

to light and that what is excavated will simply reinforce the primary source documents, but there is also always the possibility that we will discover something that is new information to researchers. Since many of these mission excavations are done because the site is slated to be destroyed by construction or for some other reason, the removal of the archaeological materials from the earth allows researchers the opportunity to attempt to understand at least a portion of the lives of the Indians living at the mission. This was the case that led to and allowed for the completion of this thesis.

I spent the two years between my undergraduate and graduate degrees working for Albion Environmental, Inc., a cultural resource management firm located in my home town of Santa Cruz California. During these two years I spent the majority of my work week either at Mission Santa Clara de Asís or in the Albion Environmental office sorting materials excavated at Mission Santa Clara. For this particular project, we were excavating in the neophyte – neophyte being the term used by Padres to describe new Indian converts to Christianity – housing complex of the mission to recover materials before they were destroyed by backhoes and excavators in the process of constructing new buildings associated with Santa Clara University.

Ever since I took my first zooarchaeology class during the last quarter of my undergraduate education at the University of California, Davis, I have been fascinated with faunal remains and what they can tell us about the people of the past. I love that by analyzing the bones of animals found in the ground we can discover what past civilizations were eating, and consequentially we can learn about the daily lives of the people and about the overall culture. Faunal analyses done on assemblages from missions are

especially interesting because life in the mission was meant to be a time of assimilation to life as a sedentary Christian. Since the mission records detail what the Indians were eating, we should expect to find the remains of those animals in the archaeological record, and no others. This leaves the potential for either a tedious faunal assemblage that simply reiterates what we already know from the written record, or it can provide an exciting faunal analysis proving that the Mission Indians were eating foods that are not listed by the Padres.

I was lucky enough to be given the opportunity to identify and analyze the faunal remains from one of the features that Albion Environmental excavated at the Mission Santa Clara Site. So many features were discovered and excavated over the course of the project that they were more than happy to allow me to take this on as my Master's thesis, and they chose this particular feature (Feature 157) because the faunal remains that they observed both during excavation and the initial artifact sort piqued their interest in what sort of story it would tell of neophyte subsistence strategies.

Research Questions

Mission records and the excavations conducted at Mission Santa Clara de Asís have the potential to either corroborate one another or to disagree upon the diet of the Mission Indians. As a result, the analysis of the Feature 157 faunal remains poses the following questions for researchers, archaeologists, and anybody interested in California Mission studies.

1. What species from mammalian, avian, fish, or other faunal classes are present in the Feature 157 faunal assemblage?
2. Are the majority of the faunal remains from domestic species? And if they are, how much of a majority do they represent?
3. How much, if any, of the assemblage is made up of wild species that the neophytes would have had to hunt, fish, or trap?
4. Do the three sub-pits from Feature 157 have similar assemblages? If not, are they statistically different from one another?
5. Were the neophytes of Mission Santa Clara exclusively eating what the Mission Padres recorded in the mission records, or does this feature tell a different story of consumption?
6. Can we fully trust the written, first-hand accounts of history to give an accurate picture of the past, or can archaeology help to fill out the missing elements?

Chapter 2: Mission Background

California Missions

Beginning with the establishment of Nuestra Señora de Loreto in 1697, Franciscan padres founded a string of missions from the tip of Baja California north to San Francisco Solano in Sonoma, CA (Jackson 2005: 49). The twenty-one missions located in Alta California – now known simply as "California" – along with their predecessors in Baja California – the Mexican state on the Baja Peninsula –, were ostensibly built to civilize the Indians and to bring them to Christianity, where they were to lead a pious life living and working at the missions. Nevertheless, establishing missions in California was essentially a political strategy. Spain desired the development of Alta California in order to protect their new territories from encroachment by other world powers attempting to enlarge their land holdings in the New World (Chapman 1916: 314). For two centuries Spanish missionaries worked to establish permanent settlements in Baja California, with continuous failure in which missions closed and settlements collapsed (Berger 1941: 20). In their attempts to conquer Mexico, Spain employed both religious institutions and military force. As the necessary force used to subdue Native populations and set up presidios, military intervention was vital; however, the religious element was much more prominent in the lives of Native people (Berger 1941: 17, O'Hagan 2013: 24). Dozens of padres were sent to New Spain by Franciscan, Dominican, and Jesuit orders where they accompanied troops and worked to convert Natives to Christianity, in the process supposedly leading them from a life of savagery to one of civilization (Berger 1941: 17). Once an area was conquered by

the military, a mission was established in order to keep local tribes suppressed, which added to Spain's security of each region conquered. As each mission matured, it not only became self-supporting but also eventually provided the military with resources such as grain and hides (Berger 1941: 17). The conversion of the local Indians to Christianity was accomplished by luring them into a nearby mission village or Rancheria with bribes of food or gifts. Once baptized, Spanish law gave the Indians no legal way to escape, and the padres who remained at each mission became absolute monarchs of the mission and its inhabitants (Berger 1941: 17). Typically, missionaries were genuinely devoted to the salvation of the Indians; therefore if they had to imprison the bodies of the Native people, missionaries justified it for the salvation of Natives' souls (Berger 1941: 17).

After the military's long-term failure to settle both Baja and Alta California, the Jesuit order took over the task. Despite originally declining the opportunity because the "land was too wretched and the natives too few", Padre Francisco Kino became inspired "with an enthusiasm for Jesuit penetration of that baffling region" and along with fellow missionary Juan María Salvatierra offered to undertake the task (Berger 1941: 20). Everything was under the control of the Jesuit order, including the hiring and commanding of soldiers, but while all expenses were covered by the Jesuits, conquests must be made in the name of the crown (Berger 1941: 20). The first permanent European settlement in Baja was founded at Loreto on October 10, 1697 when Padre Salvatierra and six other men crossed the Gulf in just one day (Berger 1941: 20). By the end of the seventeenth century, nearly all of Baja California had been conquered and settled. The next task was Alta California.

In 1767 the Spanish government banished all Jesuits from its dominions due to fear that the Jesuit Order was planning a revolution against the monarchs of Europe, despite the lack of evidence to support this conclusion (Berger 1941: 25, Elder 1913: 1-2). As the Jesuit missionaries were escorted from Baja California, Franciscan missionaries from the College of San Fernando in Mexico City replaced them in their efforts to teach the neophytes. Around the same time, false rumors circulated that New Spain was encountering an increase of incursions from Russians into their northern territories, spurring an urgency to begin plans for the settling of Alta California. A seat of government was established in the Monterey Bay, and a three-pronged approach of "presidio, priests and pueblo" was carried out (O'Hagan 2013: 24). Similar to the strategies employed in Baja California, the plan was for the military to conquer and pacify the Indians, and then for Franciscan padres, led by Junipero Serra, to establish a mission for worship, industry, and education. After a mission was up and running, a civilian population of Spanish people were expected to come and establish a town.

On July 16, 1769, Mission San Diego de Alcala was founded at the southern tip of Alta California. From there, Gaspar de Portolá and a group of his soldiers attempted to travel to Monterey, the location chosen for the first presidio in Alta California, but due to incorrectly recorded latitude, they failed to discover it and returned to San Diego (O'Hagan 2013: 33-34). Finally, on April 16, 1770, a party once again sailed from San Diego in search of Monterey, and just forty days later arrived in their destination, this time having no trouble recognizing it (O'Hagan 2013: 33-34). Between 1770 and 1823 twenty more missions were founded in Alta California, the last being Mission San Francisco de Solano.

Alta California

Before Franciscan missionaries came to Alta California, there were more than 135,000 Indians living in Upper California (Cook 1976: 3). Alta California is known for its extreme diversity of natural landscape, with a variety of ocean environments, mountains, rivers, valleys, plateaus, and deserts (Lightfoot and Parrish 2009). The San Francisco Bay region, also known as the Bay Area, located along the coast of Northern California, has one of the most varied topographies in the state. This is the region that surrounds the San Francisco and San Pablo estuaries and spans from Santa Rosa in the north to parts of the Santa Cruz Mountains in the south. The topography of this area contains estuaries, plains, rolling hills, ridge lands, and forests, which offers a wide variety of resources to tribes living in the area. The region was relatively thinly populated when the Spanish came to the area, but the land in question was divided amongst numerous tribes and their respective family units who worked together during seasonal rounds to harvest wild plant and animal resources (Milliken 1995) (Figure 1). At the time of contact, five tribes with mutually unintelligible languages lived in the Bay Area. These are the Ohlone (also known as Costanoan), Bay Miwok, Plains Miwok, Patwin, and Wappo (Milliken 1995: 13). The lands that these tribes lived on contained rich resources that allowed them to maintain carefully planned settlement patterns designed to exploit seasonally available resources. Summer months were typically spent along rivers or the ocean in brush huts, while the cool and rainy winter months were spent inland in more enclosed tule houses (Lightfoot and Parrish 2009: 211). Traditionally, the people of the San Francisco Bay Area subsisted off of a variety of fish – particularly steelhead trout and silver salmon that came upriver to spawn –,

Figure 1 Map of the location of Indian tribal territories in California before contact with the Spanish. Photo courtesy of kstrom.net. http://www.kstrom.net/isk/maps/ca/calprecontact.gif

shellfish, water-fowl such as ducks and geese, large and small terrestrial game, and plant materials such as seeds, nuts, fruits, bulbs, and acorns (Milliken 1995:16). Although individual hunters procured many species of game alone, communal hunts also targeted large game such as elk, black-tailed deer, and pronghorn, and small game such as rabbit (Lightfoot and Parrish 2009: 212). Collection of plant resources depended upon the

ownership practices of the various groups. Among some groups, families and individuals did not privately own specific resources or the locations where those resources could be collected, which made them communal property. However, in other groups, individuals or families owned fields with known bulb or seed resources, clam beds, fishing locations, or other resources, which were then passed down through the family (Lightfoot and Parrish 2009: 212). A sexual division of labor existed with women harvesting plant foods and men primarily hunting and fishing, although some important resources were acquired from greater distances through an extensive indirect trading network (Milliken 1995: 17).

Indians of the Santa Clara Valley first encountered Europeans in the fall of 1769 when a Spanish exploratory party led by Gaspar de Portolá traveled up the coast from San Diego and docked in what is now Pacifica, just south of the Golden Gate Bridge (Milliken 2002: 45). Once they disembarked from their ship, the exploratory party traveled down the Peninsula, where they encountered Indians from a number of local tribes along the way (Milliken 2002: 45). While camped in what today is Palo Alto, Father Juan Crespí noted the smoke of numerous fires in every direction that he gazed, concluding that there must be a large number of Indian encampments in the immediate area (Milliken 2002: 45). The following day, the Mitenne tribe warmly welcomed all sixty men from the expedition into their village, fed the party, and gave them gifts (Milliken 1995: 32). As the Portolá expedition continued their travels north up the California coast through Oljon, Cotegen, and Chiguan tribal lands, native guides accompanied the party and introduced them to the next people ahead of them (Milliken 1995: 32). With plenty of advance warning, nearly all of the Native groups reacted with warmth and excitement upon the arrival of the visitors

(Milliken 1995: 32, 34). Between 1770 and 1774, three more expeditions came into the area surrounding Santa Clara. The Fages Parties in 1770 and 1772 traveled through the Santa Clara Valley, both encountering a multitude of friendly Natives, and in 1774 when the Rivera Expedition went in search of possible locations for a new mission and military base, the reactions of the Indigenous people were largely the same (Milliken 1995: 36-40). While the majority of Natives reacted with curiosity and helpfulness in the early years, some did show great fear. By 1776 when the Spanish presence in the San Francisco Bay Area markedly increased, some tribes had begun to react with increasing warmth, while others began to openly scorn the foreign invaders (Milliken 2002: 57).

In the San Francisco Bay Area, the Spanish established five missions. Mission San Francisco de Asís was founded in San Francisco on June 29, 1776, just five days before the United States declared independence from Great Britain (O'Hagan 2013: 126). Although work immediately began on a crude structure that would serve as the church, it was not until 1782 that construction of the present church began, a building that was dedicated in 1791 (O'Hagan 2013: 126). Mission Santa Clara was founded on January 12, 1777, less than seven months after Mission San Francisco (O'Hagan 2013: 147). It was the eighth mission to be founded in Alta California, and the first mission to be named after a woman. Just like the missions in San Diego, San Francisco, and San Buenaventura, Mission Santa Clara was originally settled by the Spanish military rather than the Franciscans in order to provide security to the southern end of the San Francisco Bay (O'Hagan 2013: 147-148). Founded on December 14, 1817, Mission San Rafael Arcángel in San Rafael was the twelfth Alta California mission to be established. Situated just north of the Golden Gate from San

Francisco, it was originally built in order to assist the mission in San Francisco, but eventually gained full mission status, being the only *asistencia* (the name for outposts built to assist missions) to do so (O'Hagan 2013: 285). Mission San Rafael Arcángel also served as a barrier to further Russian Expansion along the north coast (O'Hagan 2013: 285). The fourteenth Alta California mission was Mission San Jose in Fremont, founded on June 11, 1797. The founding of Mission San Jose can be seen as the beginning of "phase two" of the Franciscan's project, as the thirteen previous missions had been placed in strategic locations along the El Camino Real (the 600 mile road that connected the missions, presidios, and pueblos of Alta California) and now it was time to "fill in the gaps" (O'Hagan 2013: 219). Having another mission so close to Mission Santa Clara (20 miles) helped to alleviate the burden felt by the earlier mission with regard to housing and feeding all of the neophytes from the surrounding areas. The last mission to be built in Alta California was Mission San Francisco Solano in Sonoma. Although it was founded on July 4, 1823, ground was not broken on Mission San Francisco Solano until late August or early September of that same year (O'Hagan 2013: 293). Along with being the last California mission to be dedicated, it was also the shortest lived, as secularization – the closing of the missions in California, resulting in the emancipation of mission Indians and the remaining lands, livestock, buildings, and other communal properties being divided among the remaining neophytes – of all California missions came in 1834, just over ten years after Mission San Francisco Solano's dedication and only two years after the completion of its construction (Jackson and Castillo 1995: 87, O'Hagan 2013: 296). Mission Santa Clara de Asís, the second mission to be completed in the San Francisco Bay Area, is the focus of this thesis.

Mission Santa Clara de Asís

Although it was first built in 1777, due to poor placement and subsequent flooding of the first two missions, it has been situated at three different locations since first being built. As a result of its history, Mission Santa Clara de Asís is sometimes referred to as a "movable mission". The mission was first built at the Guadalupe River near its confluence with Mission Creek, approximately ten miles from the San Francisco Bay (Spearman 1963: 12). The three structures – a church and sacristy; a kitchen and other rooms; and a third structure containing offices, habitation rooms, a chicken coop, and privy – were constructed out of wattle and daub with wooden post construction and an earthen roof (Skowronek and Wizorek 1997: 57). There was also a large corral for cattle and a smaller one for sheep and goats, and it is presumed that a cemetery likely existed because the first deaths were recorded in 1777 (Skowronek and Wizorek 1997: 57) (Figure 2). On January 23, 1779, this first manifestation of Mission Santa Clara was destroyed in a flood when the Guadalupe River overflowed its banks and inundated the surrounding area (Spearman 1963: 20). As a result, it was necessary to move the mission to an area where this catastrophe would not be repeated. By the end of the year, Mission Santa Clara was moved to an area of higher elevation about a mile south of the first site (Spearman 1963: 20). A new church was built, as was a house that served as a dwelling for the padres as well as storerooms, a house for the servants, and a house that served as a kitchen and workshop, all of which were constructed in the typical quadrangle formation (Spearman 1963: 20) (Figure 3). This second mission church – made out of similar materials as the first – was only temporary, and the "permanent" third church of Mission Santa Clara de Asís, this time

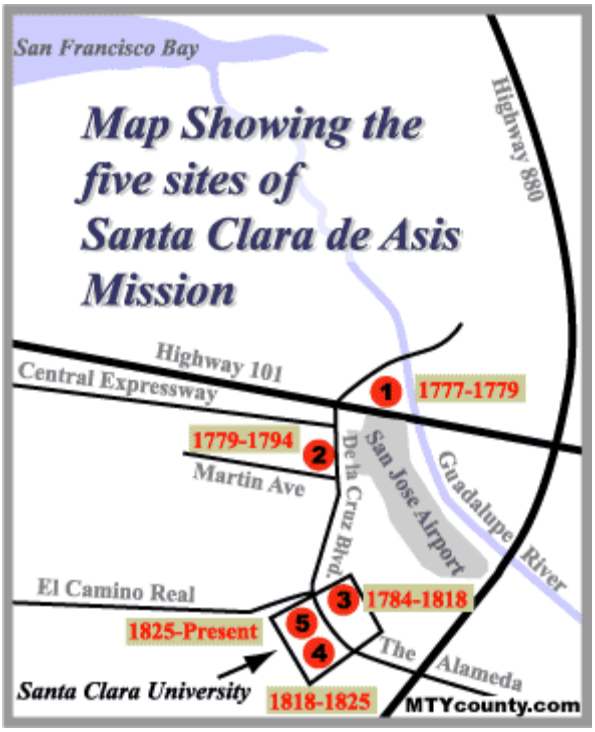

Figure 2 Map showing where the five different locations of Mission Santa Clara. Courtesy of MTYcounty.com.

constructed of adobe to withstand the elements, was dedicated on May 16, 1784 (Skowronek and Wizorek 1997: 61). The third mission site was located at what is now the northeast corner of Santa Clara University. It took the next thirty-five years to complete the quadrangle, which included a number of granaries, a tannery, and houses for the mission guard, the mayordomo (the overseer of work done at the mission), and for the large numbers of neophytes that lived at the mission (Skowronek and Wizorek 1997: 57). Unfortunately, two earthquakes – one in 1812 and another in 1818 – damaged the thirty-four year old mission complex, and fearing its inevitable collapse and the associated tragedy, missionaries chose a new site for the complex, which was near the damaged one (Skowronek and Wizorek 1997: 63). As construction began on the new, and final, quadrangle, a fourth church was quickly erected out of adobe to the east of the main construction site. It served its purpose for five years, until the new quadrangle was

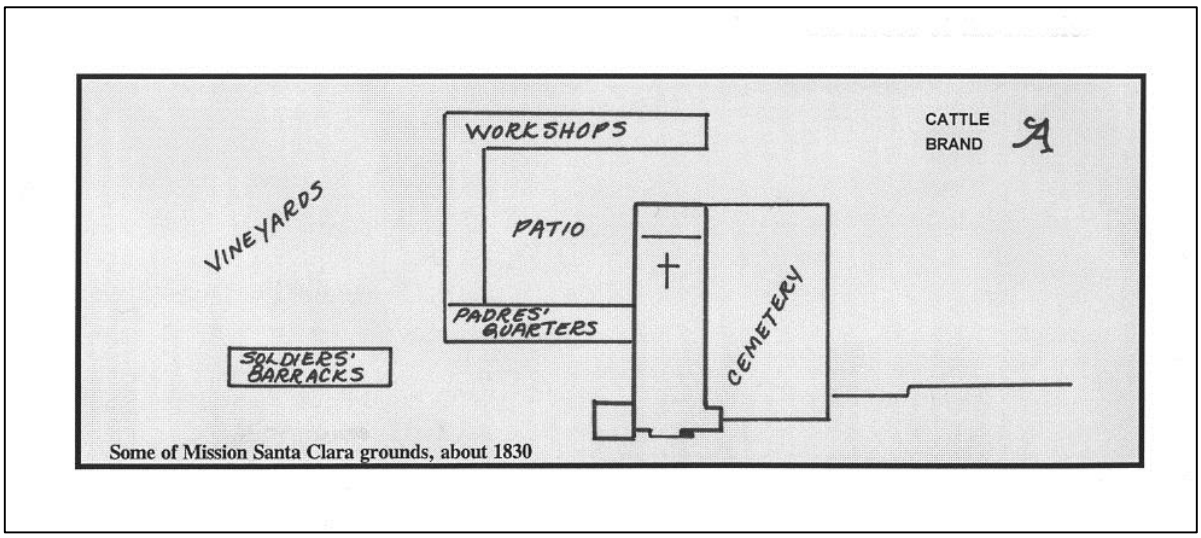

Figure 3 Model of what the Mission Santa Clara quadrangle looked like in 1830. Photo courtesy of factcards.com. http://factcards.califa.org/mis/santaclara.html

dedicated on August 11, 1825 (Skowronek and Wizorek 1997: 70). Santa Clara University currently occupies this final site of Mission Santa Clara de Asís at the South end of the San Francisco Bay region, just forty miles southeast of the current city of San Francisco.

Nearly a year after missionaries first came into the San Francisco Bay region, an unknown disease swept through Indian villages killing mostly one- and two-year-old children (Milliken 1995: 67). This occurred in May and early June of 1777, and as a result many parents allowed the padres at the new mission to baptize their children in an attempt to cure them of this illness. Slowly, over the next few months, Indians from the Santa Clara Valley moved into the mission, became baptized, and were married in Christian ceremonies. These Mission Indians were deemed “neophytes”, meaning someone who is newly converted to a belief. In 1778 and 1779, young people were the main source of recruitment to the mission, but as the months progressed, adults from local villages faced with the possibility that they could be left out of the rank structure that was beginning to

form at the mission (Milliken 1995: 78). To secure their place in this developing society, tribal members began to be baptized, eventually leading to entire villages being absorbed into the mission system. Throughout the course of Mission Santa Clara's existence, thousands of native people called it home, with populations of 1,200 to 1,500 people in its peak years of operation (Panich et al. 2014: 471).

However this process was not without turmoil. As livestock was brought into the area by soldiers, missionaries, and other settlers, the animals grazed on open land. Without anything to restrain the animals, they often wandered onto Native lands where they were killed and butchered by Indian people for their own use. In these cases, soldiers from the nearby pueblo arrested, punished, and sometimes killed the people involved, despite the fact that the animals damaged crops that local Indians relied on (Milliken 1995: 72).

When Native Californians of the Bay Area moved into the mission, the entire structure of their home lives changed. Married neophytes lived with their families at the Rancheria – the small settlement just outside the mission –, but young girls, unmarried women, and widows were housed in special dormitories while boys and unmarried men were housed elsewhere at the mission (Panich et al. 2014: 470). No longer did children spend their formative years with their parents, learning to hunt, gather, and negotiate the political and cultural systems. Instead, as soon as Indian children reached ten years of age, they were separated from their parents and put in the charge of *alcaldes* – well respected elderly Indian men (Galindo 1959: 102). In both the boys' and girls' dormitories, each of the children's names were placed on a board with a correa – a leather strip that was worn

around the neck when not in church – hanging beside each name (Galindo 1959: 102). Each alcalde also possessed a list containing the names of each child, so that between these lists and the correa, they always knew if a child was missing at times of prayer (Galindo 1959: 102). Living separate from their parents, these children were instructed, reprimanded, and fed by the alcaldes and the missionaries. Starting from a young age, all of the children of the mission went to daily mass and said their prayers in the church both morning and night. The padres believed that by beginning religious education early in life and continuing this education throughout adulthood, it was much more likely that the doctrine would be engrained in each person (Galindo 1959: 102). If any of the children skipped mass for whatever reason, the missing child was found, brought back, and punished for his or her actions (Galindo 1959: 102). The padres felt that children could not be allowed to avoid mass for fear of growing up God-less like their ancestors, and if they went unpunished for avoiding worship, they and others would likely continue to rebel.

Adults living and working at the mission were also required to attend mass daily, with punishment of whipping if they did not do so. In an official letter to all of the Alta California missions, Fray José Gazol stated that because the education of the neophytes was the most important activity taking place at each mission, for no reason should anything impede this duty (Gazol 1806). Every mission Indian should be called to prayer every morning, and indeed, Mission Santa Clara neophytes attended mass every morning before work, including Indians who lived outside of the mission walls (Galindo 1959: 102).

The missionaries required each Native adult at Mission Santa Clara to work at a particular trade every day after completion of Mass. These occupations included “weavers, drovers, tanners, shoemakers, blacksmiths, masons, carpenters and butchers” along with a large number of Indians who worked in the fields surrounding Mission Santa Clara (Galindo 1959: 102). By working for the mission and either growing food or creating goods that were used by the mission and sold to nearby towns, mission Indians earned the food and clothing that they were given. They toiled daily for the mission and were also often used by the townspeople of nearby San José for house and fieldwork; this local help came at a monetary price to the townspeople, but the money went to the mission rather than to the neophytes who did the work (Hutchinson 1969: 61-62). At the start of the day, roll was often called in order to ensure that all of the laborers were present, and those who avoided their duties were first scolded and then whipped or imprisoned if the indiscretion continued (Hackel 2005: 281). While the mission and the townspeople apparently benefited from neophyte labor, criticism of the mission institution was harsh.

Francisco de Paula Tamariz y Moure, a Spanish naval officer who visited California during his time in the military, was incensed by the existence of the missions and by the control that padres exercised over the Indians. He accused the padres of inducing the Natives into the missions in order to exploit them for use in manual labor, and he believed that the padres treated the neophytes harshly (Hutchinson 1969: 61-62). Furthermore, Tamariz felt that the mission’s Indian policy impeded the growth of the non-Native settlements in California by restricting their use of non-mission Indians and charging two silver reales per day for use of neophytes (Hutchinson 1969: 62). Eventually, after the

Spanish government chastised mission leaders for over-working the Indians, the official mandate was that Indians should only be forced to work a maximum of seven hours per day in the summer and six hours per day in the winter (SCUMC 08:10:6:1). It is unclear as to whether the padres actually followed this mandate and limited neophyte work hours or if it was ignored. Either way, on his visit to Mission Santa Clara in 1827, Auguste Duhaut-Cilly observed that the neophytes disliked their work at the mission, and stated that "whether they harvested little or much, they would have only their daily pittance, and it meant nothing to them that there might be something left over" (1999: 129). No matter how hard they were forced to work, mission Indians saw no gain to their toils other than their daily food rations, which did not increase with additional labor, and was their only form of payment.

Due to the church funding missionization, the padres put great emphasis on subsidizing the cost accrued in this colonization of Alta California by supplying the excess grain that the neophytes produced to the military garrisons (Jackson and Castillo 1995: 6-7). They hoped that the mission would be self-sustaining and produce enough food and goods to not only assist the military garrisons stationed nearby, but to also sell to nearby towns for extra revenue (Jackson and Castillo 1995: 8). This means that retaining mission Indians as a reliable labor force was very important to the padres of Mission Santa Clara.

Life at Mission Santa Clara likely was not what the Indians were expecting when they left their villages. They were ruled by men who had very little regard for them as human beings, and their lives were structured in ways that were unpleasantly different

from how they had been before. As a result, many mission Indians attempted to defect and rejoin the members of their bands and tribes that had not left their homes for the mission. The padres however, viewed baptism as a vow for life, meaning that they could not allow mission Indians to break the vow and therefore sent soldiers after those who did not return on their own (La Pérouse 1989: 82). When describing his visit to Mission Santa Clara, naturalist George H. von Langsdorff explained that the padres expressed their belief that in the mission, the Indians were much freer from the cares of living in their "natural state" (Langsdorff 1813: 445). He went on to explain that their attachment to the "wandering life" of their past and their preference for hunting and fishing "overbalance[d] all the advantages they enjoy[ed] at the mission," causing them to lose their senses and leave the mission in these pursuits (Langsdorff 1813: 445). From this passage, it can be seen that the Padres, and even many of its visitors, assumed that their culture was the superior culture, and that life at the mission was easier than the life neophytes had lived before joining the mission. This view does not take into account how difficult having an intensely structured routine designed by another culture can be, the demanding nature of farming, or the cultural genocide being practiced against indigenous populations. It assumes that the mission provided advantages to the neophytes, when in reality, this is likely not the case at all. By making these assumptions, both the Padres and Langsdorff discount the culture of the neophytes as being of no consequence. From this passage, it is clear that those in charge of the missions truly believed that it was the neophyte's childish inability to resist the call of nature that lured neophytes away from their work, studies, and the mission itself, not the poor treatment that they received at Mission Santa Clara.

In reality, the structure of the mission and the treatment Indians received within its walls drove many neophytes to desert. As a result of the mistreatment endured, and the yearning for their traditional lifeways, many Natives came to the decision that they had made a mistake in coming to the mission and they attempted to return to their home villages. When this occurred, the padres knew where to find most escaped Indians, since animosity between tribes restricted Natives from taking refuge with any group other than their own (Langsdorff 1813: 445). When brought back to the mission, the offender was often whipped by a padre and "an iron rod of a foot or a foot and a half long, and an inch in diameter, [was] fastened to one of his feet" which had the "double use of preventing him from repeating the attempt, and of frightening others from imitating him" (Langsdorff 1813: 445). Mission Santa Clara's Father Viadar believed, Indians were children driven by their base instincts and were best controlled using fear, punishments, and rewards; further, they went to mass and confession not out of devotion, but out of fear (Viadar ca. 1770s). Even with the urgings of certain church officials to treat the Indians kindly, the majority of padres were unwilling to forgo punishment, as they knew no other way to control neophytes. However, this system of controlling neophytes sometimes backfired in big ways. One such instance occurred at nearby Mission Santa Cruz and included neophytes from both Mission Santa Cruz and Mission Santa Clara. As Lorenzo Asisara, the son of one of the perpetrators, remembers, when Father Quintana acquired a new whip tipped with metal, it was time to end his cruelty (Asisara 1989: 119). A group of men planned the assassination to occur the night before Father Quintana intended to test the new whip. Father Quintana was summoned to the bedside of a man as he feigned illness, and the plan

was to accost him on his return to his quarters. Twice they lost their nerve, but finally, after the third call to the "sick" man's bed, the neophytes seized Father Quintana, strangled him, and severed one of his testicles from his body to ensure his death (Asisara 1989: 119). Subsequently, he was arranged in his bed as if he had gone to sleep after performing his customary Bible readings, and the mission Indians celebrated. When one of the conspirators later went to double-check that Father Quintana had indeed passed away, he found that the padre had roused himself and was attempting to leave the bed. As a result, his other testicle was removed and he finally perished (Asisara 1989: 122). There were no marks on the body and although one person did notice that he was missing his testicles, for the sake of decorum he said nothing about the discovery and it was determined that Father Quintana died of natural causes (Asisara 1989: 123-124). This removal of the testicles without marking up any other part of the body suggests that perhaps Father Quintana may have also been sexually abusing the Indians, as it is a very specific punishment that does not seem to match up with his crimes of overly enthusiastic whipping. For all of the years that passed before their deed was discovered, the involved were wholly unrepentant. As Lorenzo Asisara explains, "The Spanish Padres were very cruel toward the Indians. They abused them very much, they had bad food, bad clothing, and they made them work like slaves. I also was subjected to that cruel life. The Padres did not practice what they preached in the pulpit" (Asisara 1989: 124). This was not the only attack upon a padre that occurred within the Missions, and it is certainly not the only attack in which Mission Santa Clara neophytes participated. When pushed to their breaking point, the Indians did occasionally push back.

Although uprisings were rare and harsh treatment likely did discourage many Indians from attempting to escape, historian Steven W. Hackel explains in his book on Indian labor in the California missions that this treatment "perpetuated a cycle of coercion and violence that contributed to the Indians' already high levels of despair and illness, further reducing their willingness and ability to work" (2005: 281). Escape became even more hopeless as Mission Santa Clara settled into the landscape, nearby towns and pueblos came into existence, and other missions were built. This is a result of the Spanish using this time to eliminate surrounding Indian villages, which cut possible escapees off from food, family, and survival in their homelands (Chartkoff and Chartkoff 1984: 263). In this way, the mission was able to ensure that few Indians abandoned the mission, that they cooperated with the wishes of the Padres, and that they worked to become proper Christians. However, all of this occurred against their will.

In an act of kindness the padres did allow the Native inhabitants to visit their home territories twice a year while they still existed. As Otto von Kotzebue, a German navigator for Russia, chronicled in his journal, it was "the happiest period of their existence" (Kotzebue 1932: 329). He documented their joyous departure in large groups while the sick and infirm who could not make the journey sat alongside the bank, watching those who could make the journey until they were out of sight, often remaining in place for multiple days as they mourned for their lost homes (Kotzebue 1932: 329). This act likely doubled as another method to reduce desertion of mission Indians and therefore served the goals of the Padres.

Although neophytes likely hunted and fished while on sabbatical, all mission records on the subject state that the entirety of the neophyte diet was provided by the mission. In fact, reports on what the neophytes were fed vary only slightly throughout the records. The padres reported in a questionnaire sent to all of the missions regarding the Indians and life at each mission, that the Indians at Mission Santa Clara had three meals a day: a breakfast of atole (cooked flour), a dinner of cooked seeds including lima beans, peas, corn, and wheat, and a supper of the same atole that was fed at breakfast (Fathers Ministers of Mission Santa Clara 1812: 5). The report also states that the neophytes were given forty head of cattle and fifty to sixty *fenegas* of wheat per week to prepare as they wished (Fathers Ministers of Mission Santa Clara 1812: 5). Nasario Galindo recalls a very similar scene from his boyhood at Mission Santa Clara.

> In a large house there were six copper ollas that could hold two or three barrels of water and to this was added a fanega of mixed grain with horse beans. This was the noon-day meal and when the bell was rung, all the Indians came with their little baskets to receive their ration of food. Every evening, three or four fanegas of pinole were made, to which was added a gruel of barley, and again the bell was rung, summoning the Indians for their evening meal. The young girls, known as nuns, were fed separately, each receiving a ration of posol at noon and a meal of pinole in the evening. Every day of the year, this was the customary manner of feeding the Indians at all the missions in California (Galindo 1959: 104).

In Galindo's remembrance, he also states that during the winter months fifty head of cattle were slaughtered every Saturday and given to the neophytes for their own use, with one hundred head slaughtered each week in the spring and summer when the cattle had more weight on them and were of overall higher quality (Galindo 1959: 103). When Duhaut-Cilly visited Mission Santa Clara, he observed the slaughter of one hundred and fifty head of

cattle each week for hides and tallow, indicating that he must have visited in the spring or summer during a peak in cattle production (Duhaut-Cully 1999: 130). He noticed that although the neophytes were eating large portions of the meat that was not dried and made into *tasajo* (jerked beef), much of it went to waste (Duhaut-Cully 1999: 130). On Langsdorff's visit to the mission, he corroborated Galindo's number of cattle slaughtered each week but instead describes the gruel that was served as being "a thick soup made with meat, vegetables, and pulse" that was "portioned out three times in the day, morning, noon, and evening, in the German measure [three English pints] to each person" (Langsdorff 1813: 435). With this hearty gruel, he noted that neophytes were also given bread, meal, maize, peas, beans, and various types of pulse, without any obvious limits (Langsdorff 1813: 435). This description indicates that the Indians were extremely well fed and had no reason to be in want of more food, although this may not have actually been the case. Existing primary source records profess that the nutrition of the neophytes was very well taken care of, however Jackson and Castillo cite a 1797 report written by Diego de Borica, the California governor, in which he attributed poor diet as one of the reasons for the high mortality rates in the missions (Jackson and Castillo 1995: 44). In addition, if neophytes were eating a very limited diet, they may not have received all of the nutrients that their bodies required, resulting in compromised immune systems indicates that neophytes were not exclusively eating what the padres gave them.

In 1833, Mexican legislation was passed mandating that all missions in Alta California be secularized and that Indian converts living at the missions be emancipated. All remaining lands, livestock, buildings, and other communal property were to be divided

among the remaining neophytes (Jackson and Castillo 1995: 87) and in 1837 Mission Santa Clara closed. In 1851, just thirteen years after the closing of the mission, the crumbling adobe buildings of the former Mission Santa Clara de Asís were converted into a school and Santa Clara College was opened in an attempt to "offset growing Protestant influence in 'Catholic' California" (McKevitt 1979: 2). Since then, It has been renamed Santa Clara University and continues to be a Jesuit university in the Silicon Valley.

Historiography

Although less work has been done on Mission Santa Clara specifically, California Mission studies as a whole have not been a neglected research topic in the American West (Chartkoff and Chartkoff 1984, Hackel 2005, Flores 2014, Lightfoot 2005, Silliman 2001, Silliman 2004, Smith-Lintner 2007, Voss 2002, etc). On the contrary, much work has been done on the twenty-one missions that dotted the California coast from the mid eighteenth century to the mid nineteenth century.

In *Frontier Settlement in Mexican California,* Hutchinson handles the subject like many others (Berger 1941, Chapman 1916, Cook 1976, Jackson and Castillo 1995, etc). After an introductory chapter detailing Russia's explorations into California and the threat that New Spain felt from Russian interest in their tenuously settled land, he then spends a chapter explaining the background of the Alta and Baja California missions along with the relationships between missionaries, Indians, and non-mission communities (Hutchinson 1969). On a whole, although he puts into perspective the political reasons for missionization and discusses the lives of the Indians at the mission, the scope of the book

far outreached Hutchinson's ability to provide a detailed explanation of the mission system or to discuss individual missions in-depth. Similarly, Kent Lightfoot discussed pre-mission and Mission Period life in the context of the wider discussion on the history of California in *Indians, Missionaries, and Merchants: The Legacy of Colonial Encounters on the California Frontiers*. Conversely, missions were more of a focus for Lightfoot than for Hutchinson, as he discussed their social and political dynamics, the Indian workforce, and the implications of such an institution (Lightfoot 2005). These works, and the many others like them, provide good general descriptions of what brought about the Mission Period in California without having to weed through superfluous detail. However, works that primarily focus on California missions rather than a broad pre-American period California provide more useful information to scholars interested in the details of the time.

A number of works have focused exclusively on the Franciscan Missions of California (Jackson 2005, O'Hagan 2013, Lightfoot et al. 2009, Panich 2013, Panich et al. 2014, Panich 2015, etc). Robert H. Jackson and Edward Castillo's *Indians, Franciscans, and Spanish Colonization: The Impact of the Mission System on California Indians*, focuses exclusively on the Alta California Missions, the economics of missions, social and cultural changes that the Indians underwent, the demographic collapse that occurred, and Indian resistance (Jackson and Castillo 1995). The book takes the discussion of the Alta California missions up through secularization and what was done with mission lands afterwards. Although Jackson and Castillo do not focus on any specific mission, the detailed analysis that is provided gives necessary background for anyone who may wish to then delve into a specific mission. On the other hand, Berger's *The Franciscan Missions of California* focuses

on each Alta California mission after a few brief chapters of background information (Berger 1941). Each chapter is relatively short and provides information on the creation of each mission and some specifics on demographics and economy. There are many works written on the California frontier and specifically on the missions of Alta California, but a vast number are simply overviews.

While many works focus on an overview of California missions, various articles have been written that focus exclusively on the foodways of the mission Indians. Sarah Peelo and Chelsea Blackmore's *What's Optimal About Subsistence*? *Exploring Indigenous Foodscapes in the Spanish Missions of Alta California* uses optimal foraging theory – the premise that resources are ranked according to their rates of caloric return – and the diet breadth model – a model that predicts what type of food a person will choose to pursue– to determine the optimal rates that people involved in the California Mission System may have participated in a mixture of agriculture and traditional food practices (Peelo and Blackmore 2011). They state that it is argued that padres at various missions actually sent neophytes out on seasonal *paseos* (leaves of absence) in order to hunt and gather local resources, and they conclude that from an optimal foraging perspective, people will choose from all of the resources that are available to them from season to season, and they are going to choose the foods that provide the most calories for the least amount of work (Peelo and Blackmore 2011).

In *The Archaeology of El Presidio de San Francisco: Culture Contact, Gender, and Ethnicity in a Spanish-colonial Military Community*, Voss wrote a detailed dissertation on

culture contact and social identity at El Presidio de San Francisco, which was a Spanish-colonial military settlement established shortly before Mission Santa Clara (2002). Voss' research into the lives of the people that lived at the fort village brings together archival records, archaeological evidence from both the presidio's main quadrangle, a midden, and survey data on the patterns of indigenous and colonial landscape practices to reconstruct cultural practices at the Presidio of San Francisco (2002). While her research is on a presidio, which is a military garrison rather than a mission, it is relevant to my research due to its close proximity to Santa Clara and because both Mission Santa Clara and the Presidio of San Francisco encompassed the same indigenous groups; those of the Costanoan/Ohlone, Patwin, Wappo, Bay Miwok, Coast Miwok, and Plains Miwok language groups (Voss 2002: 97). Furthermore, the presidio of San Francisco is often where transgressors from Mission Santa Clara and other surrounding missions were sent for punishment (Asisara 1989, Milliken 1995).

Another dissertation, *Becoming* Californio*: Archaeology of Communities, Animals, and Identity in Colonial California* by Cheryl Ann Smith-Lintner, focuses on how humans and animals were connected in Colonial California (2007). She uses historical archaeology to trace the creation and evolution of the *Californio* identity – the Spanish term for the descendent of a person with Spanish ancestry who was born in what is now California –, and uses an archaeological study of the Presidio San Francisco and of Rancho San Antonio to compare and contrast presidios and early ranchos as different types of colonial institutions (Smith-Lintner 2007). She gives specific attention to faunal remains found at these two locations to study the practice of daily foodways and economic activities related

to animals, and she completes her analysis through the lens of the Peralta family to explore social relationships and identity formation both between colonists and indigenous people, and between ranchers and their laborers (Smith-Lintner 2007). This was done because the two institutions often interacted with one another and with Native people in "dramatic and sometimes divergent ways" (Smith-Lintner 2007: 4). This dissertation, while significantly different from what I attempt to portray in my thesis, gives a contemporary zooarchaeological perspective of colonial institutions that are geographically near to Mission Santa Clara. It allows for a comparison between the consumptive behaviors of the Mission Santa Clara neophytes and the people living at the Presidio of San Francisco and at Rancho San Antonio.

Randall Milliken's *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769-1810* is a detailed telling of Spanish arrival in the San Francisco Bay Area, the social and political landscape of the nearby Indians before the creation of the mission, the events that led to the creation of Mission Santa Clara de Asís, Native decisions to join the institution, and life inside the mission (Milliken 1995). The details provided an example of what life was like pre-mission and the reasons for joining give valuable insight that is not seen elsewhere. Panich et al. questions how Indians differentially handled colonialism by comparing two different types of dwellings inhabited by Native Americans at Mission Santa Clara: adobe barracks and a native-style thatched house (2014). This is a relatively unique study at Mission Santa Clara, although Rebecca Allen and Clinton Blount also briefly reported on house structures that were found at Mission Santa Clara around the same time, along with some faunal remains found in pits

near the residences (Allen and Blount 2009). No other formal scholarship has explored the connection between neophyte diets as recorded by the Mission Santa Clara padres and the faunal remains that have been excavated from the mission site.

My specific focus on Mission Santa Clara separates my scholarship from the majority of California mission studies through specifically looking at neophyte subsistence and its relation to traditional practices adding a new element to a seemingly well-documented period of California history. This is an important subject because diet is deeply engrained in culture and is connected to a wide range of social categories including status, ethnicity, religion, and gender (Bescherer and Beaudry 2015: 221). As Massimo Mantanari, a distinguished culinary historian, explains, food systems both explain and contain the culture of the people involved (Mantnari 2006: 133). In *Tasting Food, Tasting Freedom*, anthropologist Mintz expounds upon this idea by stating that "Consumption… is a form of self-identification and of communication…. The satisfactions seem modest… and yet this act of choosing to consume apparently can provide a temporary, even if mostly spurious, sense of choice, of self, and thereby of freedom" (1996: 13). Although it may seem like a small victory, the ability to choose what food is consumed not only links people to their culture, but it also gives them a small piece of freedom when everything else is dictated to them. In the case of California Indians, the possibility of retaining some autonomy by continuing traditional subsistence strategies likely made life at the mission slightly easier to bear.

Chapter 3: Project Background

Due to its location on the last site of Mission Santa Clara de Asís, there are subsurface artifacts nearly everywhere on the Santa Clara University campus. Much of this is the non-significant mixture of teja (Spanish roof tiles), ladrillo (Spanish floor tiles), ash, charcoal, highly fragmented faunal remains, and American Period artifacts that makes up the disturbed layer of dirt that caps nearly all of the intact features found across campus. These intact features are plentiful in number and as a result often become exposed whenever any sub-surface work is done. As a thriving Silicon Valley university, Santa Clara University has seen numerous improvements made to its campus over the years, from small utility trenches to large new buildings and parking facilities. As a result of this construction and the rich archaeological deposits present, it is not unusual to witness archaeological projects taking place at various locations across campus throughout the year.

Franklin Block 448

In early 2012, Santa Clara University proposed the construction of a new four-level parking garage and three-story Art and Art History building on a city block located in the northwest portion of the Santa Clara University campus. These two new structures were to take up approximately three-quarters of the block (Santa Clara University 2013: 1). The block in question is separated from the main campus by Franklin Street and bordered by Alviso St. to the west, Benton St. to the north, and The Alameda to the east (Figure 4). This area also happens to be directly across the street from the Peña Adobe, which is the only

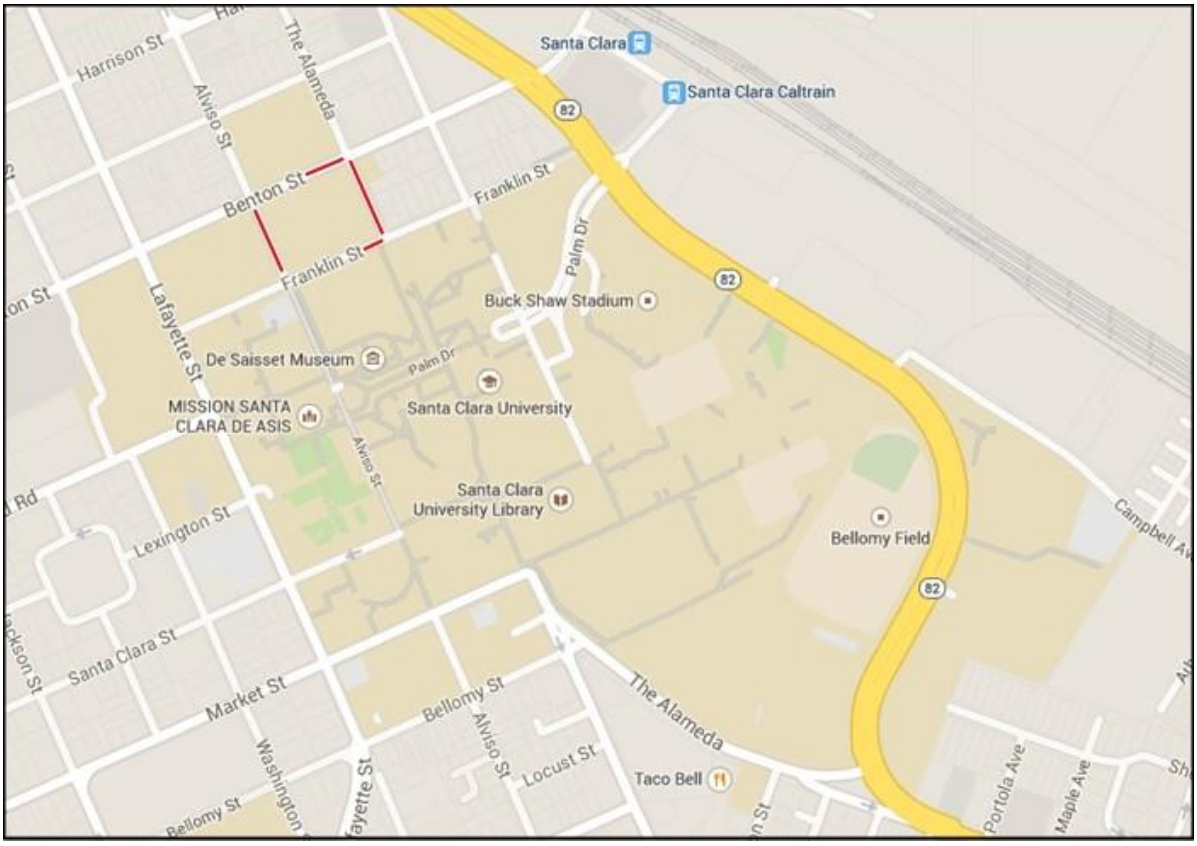

Figure 4 Map of Santa Clara University in relation to project site outlined in red. Image courtesy of Google Maps. Note: everything in beige is part of the University while everything in gray is the city surrounding the campus.

building remaining from the third mission church and quadrangle. This places the project area directly on the site of the third mission church and its associated quadrangle, and therefore significant damage to archaeological resources was expected. Demolition of all existing buildings, with the exception of the retail establishment on the northeast corner of the block, was proposed in April of 2012. Because of its location, the project was likely to affect a number of other cultural resources on the block including Mission Period Native American living and use areas, as well as disturb or destroy a number of cultural resources on the block including "privies, trash filled wells, and other trash deposits or scatters, all of which contribute to an understanding of the residential history of the parcel, and on a larger scale, the history of the City of Santa Clara" (Santa Clara University 2013: 1).

Additionally, this location retains historical significance due to important features associated with the German immigrants that occupied the neighborhood in the post-1848 American Period. Beginning in May 2012, Albion Environmental, a Cultural Resource Management firm based out of nearby Santa Cruz, conducted archaeological excavations on this block, finding deposits from both the Mission Period and the American Period and launching a multi-year project.

The numerous refuse pit deposits of varying types found in the project area demonstrated that the project area is indeed located within the neophyte housing complex of the third mission. Each feature – defined in this context as a collection of one or more contexts that represents a non-portable human activity – was grouped into one of nine category types. The first type listed is a "Mission Industrial Feature, Well", described in the excavation guidelines as "Deep features (approximately 7'), which exhibit a circular shape near the bottom, characteristic of a well. After the well was abandoned, the hole was filled with Mission Period refuse. The likelihood of encountering this type of feature was considered moderate to high (Santa Clara University 2013: 2). Also with a moderate to high likelihood of being encountered were "Mission Industrial Feature, Hearth" features, described as "circular, shallow deposits characterized by burnt bone, charcoal, and burnt earth" (Santa Clara University 2013: 2). The last feature type that had a moderate to high likelihood of being encountered was "Refuse Feature, Primary Use", which were refuse pits that had not been used for anything prior to being a refuse pit and was indeed dug primarily for that reason (Santa Clara University 2013: 2). "Refuse Feature, Storage Pit" had a moderate likelihood of being encountered and are described as being "Discrete hollow-

filled feature with unique characteristics (i.e. descending dirt steps and careful placement of artifacts at the base) that suggest it was likely used as a storage pit that was later appropriated for the disposal of refuse" (Santa Clara University 2013: 2). Similarly, "Architectural Feature, Neophyte Adobe Structures," which had cobble foundations in a square room block alignment and would have likely been located in the neophyte housing dormitory, also had a moderate likelihood of being encountered (Santa Clara University 2013: 2). The likelihood of encountering a "Refuse Feature, Large Communal Pit," (which is exactly what the name implies) was thought to be moderate to low. The same was true for the "Landscape Feature, Shallow Use Area," which were described as "Features that do not exhibit any deep pits, but were rather shallow areas exhibiting patterns of human use" (Santa Clara University 2013: 2). The last feature type described that had a moderate to low likelihood of being encountered was the "Architectural Feature, Pit House" which is circular in shape and has a compact dirt floor (Santa Clara University 2013: 2). Similarly, the "Cache Feature, Concentration of Shell Beads", which is an isolated concentration of shell beads, had a moderate to low probability of being found. Lastly, the "Refuse Feature, Privy" also had a moderate to high likelihood of being encountered and is characterized as a "discrete, hollow-filled, square or rectangular shaped feature with American Period artifacts" (Santa Clara University 2013: 2). During the course of the project, nearly every one of these feature types was encountered, often numerous times.

A crew of varying sizes excavated, wet screened, and sorted materials from more than 135 features over the course of more than two years. In order to build the proposed structures, the surface of the entire project area needed to be excavated to three and a

half feet below the 74' datum that was put in place (Santa Clara University 2013: 8). When removing soil from the project area, a backhoe operator used a flat-edged bucket to carefully peel back thin layers of dirt from the surface while an archaeological monitor watched every scrape of the bucket for the emergence of archaeological features. All features that were discovered in the process needed to be excavated to grade, and any feature that either began at grade or extended below grade would be mitigated depending upon the recommendations and instructions of the soil engineer (Santa Clara University 2013: 8). When excavating features, the materials exposed by the backhoe were then explored by hand to discover if a feature was indeed present or if it was simply a smear of cultural material. If it was deemed to be a feature, the boundaries were then defined using trowels and the Principal Investigator or Field Director assigned it a feature number that was exclusive to that feature. Before excavation began, each feature had a "starting map" drawn and a "starting photo" taken to show the progress each feature went through (Santa Clara University 2013: 9). Every time a level or a feature was completed, a photo was also taken to visually represent what was being noted in the written notes that each excavator and Field Director recorded throughout the process of excavation. These photos included a photo board which always denoted in descending order: Santa Clara University, Franklin Block 448, Art & Art History if the feature was on that side of the site, Feature #, Context #, the date, and whether it was a photo taken at the start of a feature excavation, at the end, or if it was in progress (Santa Clara University 2013: 9) (Figure 5). In order to get an accurate depiction of the stratigraphy in each feature, nearly every feature was bisected and dug by halves, giving a feature profile detailing the layout of the various contexts that

Figure 5 Example of a filled out photo board from Feature 157 Unit B containing most, but not quite all of the required information. Image courtesy of Albion Environmental, Inc.

made up the deposit. If a feature was exceptionally large, it was divided into 1x1 meter or 2x1 meter units, assigned a letter (A, B, C, etc), and then was dug by natural stratigraphic layers in a similar manner to how all other features were dug (Santa Clara University 2013: 9). As new stratigraphic layers were encountered, new context numbers were assigned to these layers and the soils excavated were handled separately from the previous contexts. As features were excavated, crew members wet-screened all excavated materials using 1.6

mm (1/16th inch) mesh screens. A system to quickly and efficiently dry wet screened materials was put into place whereby bedsheets were laid out and secured with large rocks and the wet materials were spread out on the sheets to dry, always with their corresponding feature and context tags. When materials dried, they were de-bulked to remove the Teja, Adobe, and Fire Affected Rock that were then weighed and recorded before being discarded (Santa Clara University 2013: 10). In order to save space when each context was placed into gallon sized Ziploc bags, large rocks and gravel that did not fall through a 12.7mm (1/2 inch) mesh screen were also discarded. In addition to placing at least one associated feature and context label in each bag, every Ziploc bag was also labeled on the outside with all of the pertinent information (project name, feature #, context #, excavator's initials, date, and type of materials [typically TBS for To Be Sorted]). Two bags from each feature and context were then assayed in order to determine the density of artifacts present in each context. This process helped the Principal Investigators from Albion Environmental, Inc. and the SCU Archaeological Research Laboratory determine the size of the sample that would be sorted and further analyzed from each context. The higher the number of artifacts recovered from a context, especially if "rare finds" are present, the larger the percent of the context was analyzed (Santa Clara University 2013: 13).

Feature 157

The feature that became the focus of my thesis is Feature 157, a Mission Refuse Pit Complex that had multiple uses and was located in the neophyte housing complex on the

Art and Art History side of the site (Figure 6). Excavated in August of 2013, it was discovered to have three separate pits with four phases of use, thirty-four contexts, and 202 bags that were collected (Figure 7). When Feature 157 was uncovered by the backhoe, a grid of 2x2 meter units was set up over the fairly large (5x3 meter) unit, and it was then dug in five separate units (A,B,D,E,and F) (Peelo et al. 2013: 1). Each 2x2 meter unit was excavated by natural layers and all materials from each unit were kept separate from those of the other units in this feature. Excavations on Feature 157 made it clear that it is essentially three distinct multi-use pits, or "sub-features", with an American Period intrusion on the south side of the overall feature. Each of the three pits descends down from the surface, with a shelf/step that descends into the deeper pit. These shelves/steps are typical of the well features found and are seen in many of the other pit features across the site.

From the materials observed at the time of excavation along with what was observed in the initial sort, it is believed that this pit complex had multiple uses. These uses, which are thought to be for wells, for use in industrial activities such as food processing or Lyme production, and as refuse disposal pits, likely facilitated the need to have the three pits located in such close proximity (Peelo et al. 2013: 1). Also, because it is likely that they had different uses over time, each sub-feature was assigned a phase number (Phase I, Phase II, and Phase III for each of the pits) as was the disturbed overburden layer that included the American Period intrusion (Phase IV). However, except for Phase IV which covers the three other phases and was clearly the last to be laid down, phase numbers do not necessarily correlate with which pit was originally dug or filled with refuse first.

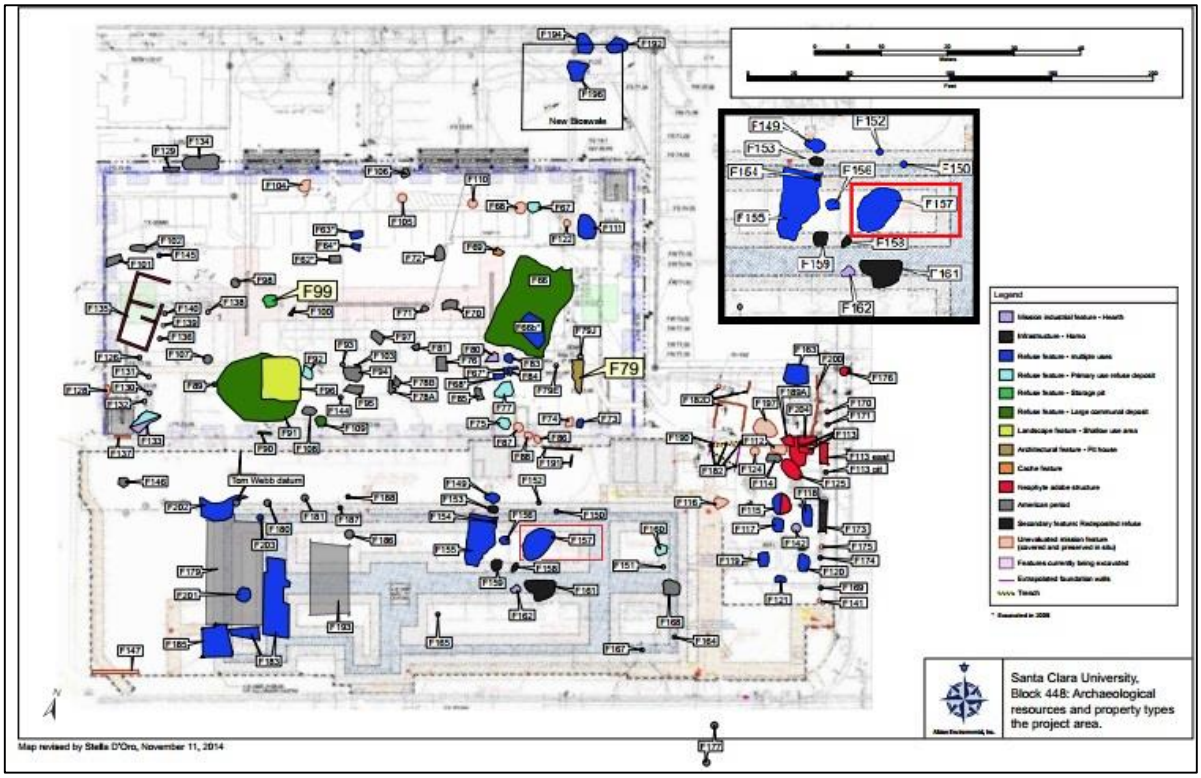

Figure 6 Map of features found and excavated at the Franklin Block 448 site at Santa Clara University. Feature 157 is outlined in red with a larger blowup of Feature 157 and surrounding features in the top right corner. Image courtesy of Santa Clara University and Albion Environmental, Inc.

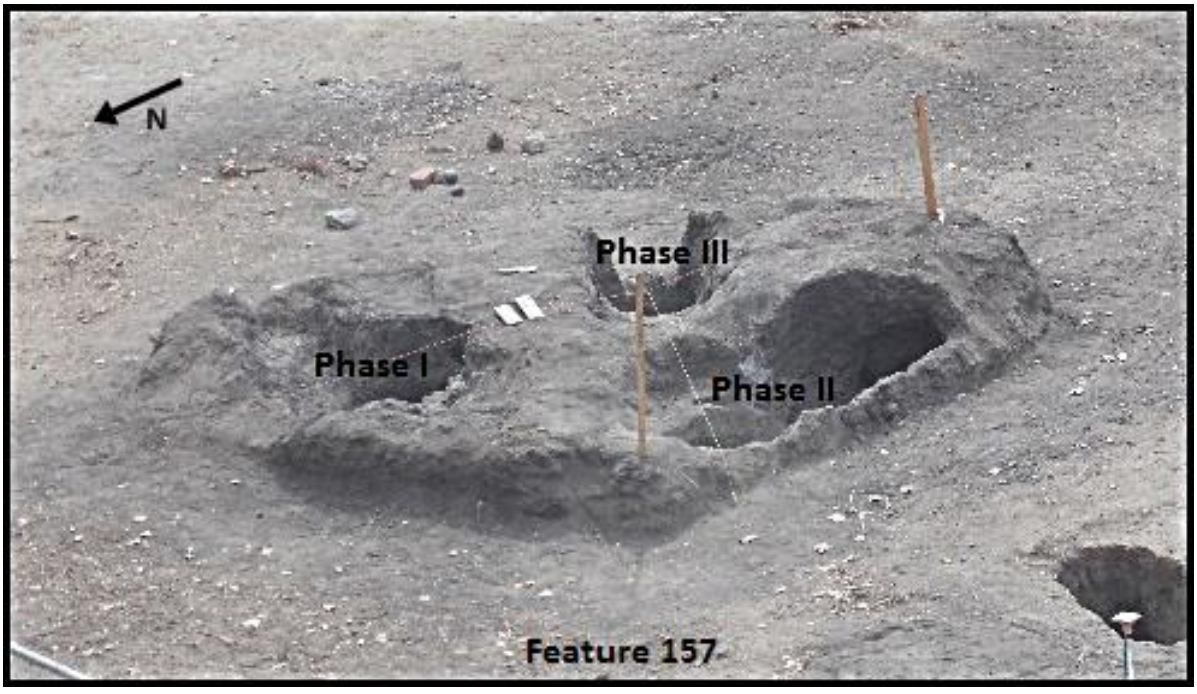

Figure 7 Photo of Feature 157 showing the excavated pits of Phases I, II, and III

Phase I was located at the northern end of the feature within the A and F units. It was characterized by having a shallow, sloping shelf on the east end and a deeper pit on the west end. The shelf was covered by three distinct cultural layers (contexts 5743, 5730, and 5741) while the pit itself contained four fairly thick cultural layers (contexts 5751, 5753, 5756, and 5760), two ash lenses (5749 and 5752), an adobe melt context (5757), and two clay or adobe "bowls" at the bottom (Peelo et al. 2013: 2). These adobe "bowls" are labeled as Phase IIa (5747, 5748, and 5755) and Phase IIb (5759 and 5761) and may have been used to process dietary materials such as acorns and other plant materials (Peelo et al. 2013: 1-2). Along with faunal remains, artifacts recovered include shell and glass beads, lithics, a copper button, a metal chisel, bone artifacts, a bone pendant, and ceramics (Peelo et al. 2013: 2).

Phase II was a pit located in the D and E units in the southwestern end of Feature 157, and is characterized by a shallow shelf on the north end and a deep pit on the southern end. The shelf was covered by an ash layer and a cultural fill layer (contexts 5681 and 5715) with a thin ash lens at the surface of the deep pit (context 5716) (Peelo et al. 2013: 2). The pit itself contained five distinct cultural fill layers (5718, 5738, 5723, 5739, and 5742) (Peelo et al. 2013: 2). This pit is unique in Feature 157 due to the large numbers of shellfish present in context 5723, the middle cultural layer found in the deep pit, which during initial observation contained almost all mussel (Peelo et al. 2013: 2). Thomas Garlinghouse, the Albion Environmental zooarchaeologist, noted that much of the mussel was very large in size and although there was a great deal of variety in degree of fragmentation, there were also some whole mussel shells. Garlinghouse further noted his

surprise at the lack of littleneck clam, which he explained is nearly always present alongside large quantities of mussel shell such as this when found in prehistoric contexts (Peelo et al. 2013: 2). Upon initial scrutiny, he also observed that Phase II contained remains from cattle, rodents, other small mammals, and large birds. Formal artifacts including a bone bead, shell beads, glass beads, obsidian, and ceramics, along with unspecified ecofacts which were considered to be unique and important and were expected to greatly contribute to the project's research questions (Peelo et al. 2013: 2).

Phase III was another pit and was mostly present in unit B in the southeastern portion of Feature 157. Like with Phase I, it had a shallow shelf on the east side of the pit that descended into the deeper pit to the west of the shelf. The deposits on top of the shelf included both a cultural fill layer (5734) and a Lyme deposit (5735), while within the deeper pit there was an adobe melt layer (5682), an ash deposit (5683), and five cultural fill layers (5722, 5724, 5727, 5729, and 5731) (Peelo et al. 2013: 2). Although Phase III was similar to the other two phases in that it contained glass beads, shell beads, ceramics, and faunal remains, it also contained the most formal and varied artifacts that were recovered from Feature 157. These fairly rare items consisted of a large glass bead, a projectile point, modified ceramic artifacts, a metal spur, and copper (Peelo et al. 2013: 2). None of these artifacts had equivalents found in Phase I or Phase II.

Phase IV covers the three pits that make up Phase I, Phase II, and Phase III and contains a mixture of both American Period and Mission Period artifacts. It contains a silty loam overburden layer (context 5495), an adobe concentration (context 5728), an ash lens

(5497), and a concentration of American Period artifacts on the southern end (5496) (Peelo et al. 2013: 2). Although Phase IV contained cultural remains, these remains are not archaeologically significant due to the American Period intrusion and the mixture of Mission Period and American Period artifacts. However, because it was laid down last and therefore capped the other three phases, excavation of Phase IV was required before excavation of Phases I, II, and III could be carried out. Of the 202 bags of material excavated from these four phases, 79 of them were sorted. Therefore, my analysis shows a 39% sample of the faunal remains found in Feature 157.

Previous Work at Santa Clara University

As a thriving University that is often in need of updated buildings or underground electrical lines, scores of archaeological work has been conducted at Santa Clara University prior to the Franklin Block 448 project. In 1907, excavations in the basement of a house on Franklin Street – the street separating the project area from the main campus – uncovered both walls and burial sites associated with the third mission (Santa Clara University 2013: 22). Between 1911 and 1928, trenching for new water pipes and gas mains discovered more evidence of the third mission, and more burials were encountered in the 1960s when another water main was laid down (Santa Clara University 2013: 22). In 1981 when the California Department of Transportation investigated the site of the third mission due to its location inside the area of impaction for the realignment of State Route 82, extensive testing and excavation of the third mission church found intact Mission Period deposits and artifacts including foundation stones, adobe brick, roof tiles, floor tiles, ceramics, glass, and

human bone (Santa Clara University 2013: 22). Since then, many small projects have taken place on the site of the third mission, and many more have taken place throughout the entire campus.

In the 1990's, various projects were carried out across campus including, but not limited to, the Campus Lighting Project in 1995 (Wizorek 1998), the Varsi Hall Potable Waterline Replacement Project (Wizorek and Skowronek 1996), the mitigation of building the East Campus Parking Lot (Wizorek and Skowronek 1997), and the mitigation of building both a new Performing Arts Building (Wizorek and Skowronek 1996.7) and a new Fitness and Recreation Center (Wizorek and Skowronek 1997.3). The 1995 Lighting Project was a campus-wide construction project that lasted from April to October and involved upgrading lighting and also installing emergency boxes throughout campus. During this extensive project, cobblestone foundations from the fourth mission church were exposed, along with a number of both isolated and clustered mission artifacts – mainly ladrillo, teja, and ceramics (Wizorek 1998: 23). Human remains and grave goods were also found during this project when a portion of the cemetery that is associated with the fifth mission church was uncovered along the outer wall of the rose garden (Wizorek 1998: 23). In the same year the Varsi Hall Replace Potable Waterline Project found deposits containing cow bone, ladrillo, glass, various ceramics, and metal fragments (Wizorek and Skowronek 1996: 5,7). Many of the other projects done during this time period found very similar assemblages, but the Lord John's Excavation Project in 1996 goes into much more detail than the other project reports. Level one of the excavation produced mostly teja and ladrillo, but there were also smaller amounts of cow, sheep, unidentified mammal, and other unidentifiable bone along

with glass fragments, nails and other metal, a red abalone shell, and a ceramic marble (Ginn 2005: 24). Level two was dominated by teja, but it also contained cow, sheep, and unidentified mammal along with both wine bottle and window glass fragments, a square cut nail and other iron fragments, abalone shell, ladrillo, and a few pieces of ceramic (Ginn 2005: 27). Level three contained many of the same artifacts, but it also had rodent bones along with cow and unidentified mammal and *Mus*sel shell, and a 1917 Lincoln Head Wheat-back penny (Ginn 2005: 27). Level four not only contained cow and other mammal bone, but also contains some bird along with the typical teja, ladrillo, glass fragments, and ceramic fragments (Ginn 2005: 28). No artifacts were found in level five (Ginn 2005: 30).

In late Fall of 1999, a large deposit dating back to the early nineteenth century was uncovered during the construction excavations prior to the building of a new parking structure. This was the first pit of this type to be found on campus and a variety of faunal remains were excavated from the feature, most of which were from young cattle (Burson 1999: 2). According to Burson, the fact that volumetrically more bone was excavated than soil suggests that this pit represents the remains of a matanza, a mass cattle slaughter that was common in the area during the first third of the nineteenth century (Burson 1999: 2). This deposit also corroborates the mission records stating that a large number of cattle were slaughtered each week for neophyte consumption, all of which convince Burson that it is indeed evidence of a matanza.

Excavations of several Mission Period features conducted throughout the fall of 2005 and the spring of 2006 give the best description of the types of faunal remains that

can be found at Santa Clara University. The entire faunal assemblage that was excavated from these features was composed of 8,210 pieces of bone, the vast majority of which were unidentifiable fragments (Garlinghouse 2009: 1). Nine hundred ninety-three of the bones were able to be identified to both bone specimen and species. The mammal remains that are present predominantly consisted of cow (*Bos taurus*), sheep and goat (*Ovis*/Capra), lagomorphs (rabbits and hares), and rodents (Garlinghouse 2009: 1). There were also 461 pieces of bird bone, 303 of which were identified to more precise categories (Allen et al. 2010: 598). Cow bone dominates the assemblage at thirty-three percent, most of which are heavily fragmented from butchering (Garlinghouse 2009: 2). Only twenty of the bones were identified as sheep and/or goat, twelve of which were positively identified as sheep while the rest could not be distinguished between the two taxa (Garlinghouse 2009: 2). Two canids, one horse, one mule deer, ten lagomorphs, six undifferentiated artiodactyls, and an unstated number of rodent bones were also identified from this site (Garlinghouse 2009: 3). As Garlinghouse explains in his report, the identified species of rodent that were found include ground squirrel, pocket gopher, mouse, deer mouse, and wood rat, but although it is known that some of these species were eaten by nineteenth-century Californians, he does not believe that they factored into the diet of mission Indians and are instead intrusive in the deposit (Garlinghouse 2009: 3).

Identified bird bone accounts for approximately thirty-nine percent of all identified bone from these sites. Identified species of bird include chicken, turkey, quail, heron, and an assortment of duck, with chicken dominating the assemblage (Garlinghouse 2009: 3). There were also numerous perching birds and songbirds present, but it is believed that

these were not used for sustenance (Garlinghouse 2009: 3). Chicken is by far the most dominant species of bird in this assemblage (n=79), followed by duck (n=58), quail (n=56) and then geese/swan (n=32) (Allen et al. 2010: 598). Duck species present are primarily of the dabbling duck variety (*Anas*), which consist of Mallards, Northern shovelers, Cinnamon teals, and unidentified dabbling ducks (Allen et al. 2010: 598). Fish was also present to a small degree, the majority of which were from infraclass Teleostei, which are ray-finned fish. There are also elements from Steelhead, Sacramento Sucker, Rockfish, Bat Ray, and Minnow (Allen et al. 2010: 622-623). The species found during these projects give a good idea of what could be expected from the Feature 157 assemblage.

Chapter 4: Methods

I received the Feature 157 faunal collection when I traveled to Santa Cruz for Winter Break in 2014. The 44 different contexts were being stored in a number of Banker Boxes, which I transferred into a single large cardboard box to be shipped to the University of Idaho through the United States Post Office. When it arrived at Phinney Hall I unpacked the box and organized the bags in ascending order of context number, then I separated the contexts according to each unit. Beginning with Unit A Context 5495, I began to identify all of the elements in the assemblage.

I was fortunate that prior to receiving the Feature 157 faunal assemblage, it had already undergone a preliminary sorting. The preliminary sort consisted of identifying bones by class, burn level of the bone, and size category. The categories consisted of small unburned mammal, medium unburned mammal, large unburned mammal, small burned mammal, medium burned mammal, large burned mammal, unburned bird, burned bird, fish (both burned and unburned fish were placed together), and unidentifiable bone. Since the bone was so conveniently separated for me, I began each context with the largest classification of mammal and worked my way to the smallest, then I identified the bird and any other categories that happened to be a part of that context. Specifically, with each new context I began with large unburned mammal and identified all identifiable specimens before moving on to the large burned mammal. After identifying all that I could with large burned mammal, I moved to medium unburned mammal and medium burned mammal, then to small unburned mammal, and lastly small burned mammal. Once the mammal was completed I moved to unburned bird and then to burned bird bone. Because I found many

identifiable bones in the "unidentifiable" category, I also had to sort through those bones to pick out the mammal and bird that was identifiable. This most often occurred with phalanges, wing bones, and vertebra. All of the bags of fish bone were set aside to be sent to Cristie Boone, a fish bone analyst who has previously analyzed fish bone from the Franklin Block 448 site.

With each bag I used standard zooarchaeological techniques to identify each element. In most cases I knew which element a specimen was by sight, although identifying the species was much more difficult. I have had two different zooarchaeology classes along with a fair amount of experience with bones both in the field and in the lab. While working for Albion Environmental, Inc. I spent many months separating bags of bone into the categories of small, medium, and large unburned mammal; small, medium, and large burned mammal; unburned bird; burned bird; and fish bone. I even spent my last couple of months with the company identifying the large mammal – which was almost always cattle – to element and species. Therefore, it was rare that I did not know what element I was observing from either mammal or bird, but when I did not know what an element was, I employed the use of reference manuals (Brown and Gustagson 1990, Gilbert et al. 1996, Post 2005, and Post 2006) and the University of Idaho's comparative faunal collection to attempt to determine what whole or fraction of an element I was observing. When that did not work and I still could not figure out what the element was, I would either bring it to Mark Warner to identify or I would take photos from various angles and send the photos to Caitlin Hannah and Lindsley Britton at Albion Environmental, who were almost always able to help out.

In identifying species, I began with size. My previous experience with identifying cattle helped greatly with identifying the large mammal remains, as I already knew what cattle looked like, and I knew when elements did not look like cattle. As with my previous identification, most of the large mammals in Feature 157 were the remains of cattle. I also employed books that detail the mammal and avian species that can be found in the Santa Clara area (Berry and Berry 1924, Fix and Bezener 2000, Jameson and Peeters 1988, and Lukas 1964). This kept me from wasting time looking at species that could not possibly be present in my assemblage and gave me an idea of which species I should begin to compare the elements in my assemblage to. The bone lab in Phinney Hall is equipped with the remains of a number of species, but like many comparative collections is nowhere near the level of completion that I needed when identifying the species in my collection. I was fortunate that despite my assemblage originating from the Bay Area of California and the fact that I was using a comparative collection in Idaho, the lab had specimens from many of the species that I was likely to encounter.

While I conducted my initial identifications in the bone lab in Phinney Hall, I compared each element to comparative skeletons, but when bones were not readily identifiable I simply set them aside to be re-looked at later. In many cases, rather than being able to identify an element to species, I was able to so to just family or genus, such as *Sciurius*/Sciuridae (Squirrel) or *Anas* (Dabbling Duck). Because my assemblage is so large and contains remains from animals that have very similar bone structures, many more elements were identified to these levels of classification than to species.

After making my way through all forty-four contexts from Feature 157, identifying

everything that could be identified using the comparative collection at the University of Idaho, I packed up the remaining unidentified elements and took them to the Washington State University Zooarchaeology Laboratory in College Hall. There, they have a wide variety of species laid out in drawers along the walls with long lab tables taking up the center of the room on which to work. While I was able to identify quite a bit of California Ground Squirrel that I had not previously been able to, I was unable to identify any of the lagomorphs or bird species. Although visiting the bone lab in College Hall did allow me to get through a significant portion of what I could not identify in the Phinney Hall bone lab, I was still left with many specimens that needed to be identified. Luckily, Washington State University also has the Charles R. Conner Museum in the School of Biological Sciences, which has a fantastic collection of skins and skeletons from a wide variety of species. I contacted the curator of the Conner Museum and spent a number of days working with their extensive comparative collection. It was here that I was finally able to identify the Leporidae and bird specimens that I had been unable to identify before.

In the extensive process of identifying the Feature 157 faunal assemblage, each specimen that was identified to element received a tag and was bagged separately from all of the other bones. The only bones that were bagged together were the various classes of unidentified bone, such as unidentified large mammal. Every context had a pre-assigned specimen number but every bone that was bagged separately along with all the bags of unidentified bone were given sub-specimen numbers. I began with the first bone at sub-specimen 1 and continued in order until the database was complete. The tags that were placed in each of the bags held all of the provenience information for where the bone

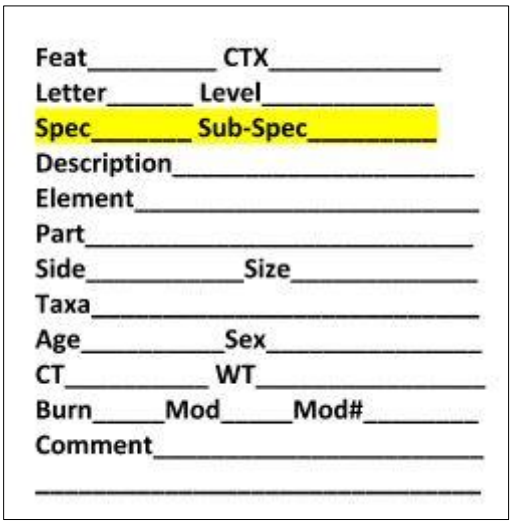

Figure 8 Faunal tag used for every specimen in Feature 157

came from as well as what the bone was. The tags stated that the bone was from Feature 157, the unit and context that it came from, both the specimen number and the sub-specimen number, the class of animal, the species of animal (if possible), the element, the side, what portion of the element is present, the size of the element, the sex, the age, the count, the weight, the level of burning present, and if it had any modifications (Figure 8). Every time I completed a context, I entered it into the Access database that I set up for the feature. Each sub-specimen has its own line in the database and each of the lines contains all of the same information that is located on the specimen tags. All of the elements that I was unable to identify while in the bone lab in Phinney Hall were also entered into the database, but all of the information that I did not have was left blank to be filled in as soon as I had identified the specimen. Fish bone was sent to Cristie Boone who identified them to the best of her ability and then shipped them back to me to be entered into the database myself. Because they were done last, all of the fish bone has sub-specimen numbers at the very end of the Access database.

At the completion of the identification of all of the Feature 157 faunal remains, analysis of the data commenced. I used Microsoft Excel to make a variety of tables (presented as appendices to this thesis) that helped me to interpret the story that the faunal remains tell. The tables laid out the species, how many elements for each species was present in the assemblage, the percentage of the entire identified assemblage those elements made up, the minimum number of individuals (MNI) for each species, and the bone weight of the elements for each species. The minimum number of individuals (MNI) refers to the smallest number of individuals that could be identified with the bones that are present. The element that is used to calculate MNI must come from the same side of the animal's body and the pieces of the boned must overlap each other enough so that the two halves cannot have originally been fused as the same bone. For example, the most abundant element present in the Green Winged Teal (*Anas* carolinensis) category is the coracoid. I found that there were four left coracoids present in the assemblage, three of which were nearly complete and one of which was only a proximal end. The three that are nearly complete cannot be from the same animal because each Green Winged Teal has only one left coracoid and being nearly complete, they all have overlapping parts. Furthermore, the proximal portion of the fourth coracoid cannot be from any of the other three left coracoids present because they all had their own proximal portions. If there had been three nearly complete left Green Winged Teal coracoids, one left proximal portion of a Green Winged Teal coracoid, and a left distal portion of a Green Winged Teal coracoid, I would still have to conclude that the MNI for Green Winged Teal is four because the

proximal and the distal portions present could potentially have been from the same element before being broken by either a person or by natural causes.

Chapter 5: Summary of Results

The initial inspection of the data from Feature 157 shows 23 different mammalian species containing 573 identified mammal bones, 20 different avian species containing 273 identified bird bones, and eight different fish species containing 84 specimens. A species category in this instance refers to either the specific species that a bone was identified to or the highest taxonomic classification that it was identified to if species was not possible. For example, one of my species categories is *Citellus beecheyi*, or California Ground Squirrel, but only a small portion of the squirrel in the assemblage was able to be identified as precisely as those recognized as *Citellus beecheyi*. Therefore, the remainder of the squirrel is in the *sciurus*/sciuridae species category. Similarly, while I did identify a number of *Anas* carolinensis, or Green Winged Teal, in most cases I was only able to identify elements to *Anas* – dabbling ducks – due to the lack of comparative materials of each *Anas* species.

Mammalian Species Found in Feature 157

The data show significantly fewer cattle remains than would be expected from the reports written by the mission padres. According to their reports, we should expect to find nearly all of the faunal remains to be from cattle, with possibly a few sheep intermixed. Although records do not state that sheep were eaten, they are known to have been kept by the mission for use in the creation of wool, so it would not be a surprise to find out that they were also being used as a food source (Annual Report 1823). However, according to

the Feature 157 assemblage, it is not likely that sheep were often consumed, as very little sheep are present.

Out of all of the mammalian, avian, and fish remains in the Feature 157 collection that have been analyzed, a mere 19.67% of the Feature 157 assemblage consists of cattle. Despite the fact that there are 177 elements weighing 8374.3 grams of *Bos taurus* present in the Feature 157 assemblage and that it is possible that these elements came from a large number of individual animals, I can only definitively say that four cows are present in the assemblage, due to the four right metacarpals that have enough overlapping surface area as to be certain that they cannot be from the same element. *Ovis* (sheep and goat) makes up a mere 0.33% of the count, with only two *Ovis aries* (sheep) elements in the entire assemblage and one element that could only be identified to the category of *Ovis*, meaning that it is either sheep or goat but I am unable to determine which. While both *Ovis* and *Ovis aries* have an MNI of one, the two elements associated with *Ovis aries* had a net weight of 21.1 grams while the one *Ovis* phalanx weighed just 1.1 grams. While the lack of sheep in the assemblage corroborates what the mission records indicate of sheep being used for wool rather than for food, the small number of cattle present in the assemblage is a bit surprising when compared to the mission records.

Odocoileus hemionus (mule deer) consists of six elements that make up just 0.67% of the Feature 157 assemblage, while unidentified deer (*Odocoileus*) consists of a mere four elements comprising 0.44%. Both have an MNI of one, and mule deer weighed a total of 112.9 grams while unidentified deer weighed 4.4 grams. Mule deer – also known as

black-tailed deer – are widespread across California. They are found in forests, brushfields, and meadows throughout nearly the entire state except for the San Joaquin Valley and some of the desert areas in southeastern California (Jameson and Peeters 1988: 222). It is a migratory animal that moves to lower elevations in the fall and tend to spend the winter in the Sierra foothills of California (Jameson and Peeters 1988: 222). This wide range brings them solidly into the Santa Clara area and made them a perfect source of prey for Indians living in the San Francisco Bay area.

As I only had one element each of *Ursus* (bear), *Lynx rufus* (bobcat), and *Canis*, these species do not appear to be important resources for the neophytes of Mission Santa Clara. Bear consisted of a single phalanx that weighed a mere 0.6 grams and had no sign of modification on its surface. The one bobcat element that was present consisted of the distal end of a right femur. It was unfused which clearly proves that this particular individual was a juvenile, and since neither the shaft nor the proximal end of the femur – or any other part of the body – was present, I am unable to determine anything else about why this element was present in Feature 157. The *Canis* sacrum that was present weighed 4.7 grams and while it fairly closely resembled that of a coyote, it was also resembled domestic dog specimens that are located in both the Phinney Hall zooarchaeology lab and the Conner *Mus*eum too closely to positively identify it to species. While all of these animals could be found in the San Francisco Bay Area in the past (if not the present), I will not go into their ranges or seasonal availability because their low numbers indicate they were not typical sources of sustenance for the Mission Santa Clara Indians.

Rabbits and hares make up a significant portion of the Feature 157 faunal assemblage. Leporidae species that are native to California include various cottontail (*Sylvilagus*) species and hares (Lepus), and they tend to be prolific across the state (Jameson and Peeters 1988: 333). *Sylvilagus audubonii* (desert cottontail) is a large, long-legged cottontail that is distributed across the majority of the bottom two-thirds of the state, typically at lower elevations (Jameson and Peeters 1988: 339). While there are only four definite elements belonging to *Sylvilagus audubonii* (desert cottontail) with a total weight of 0.4 grams and an MNI of two, the more general category of *Sylvilagus* (cottontail) consists of thirty-four elements. Overall, cottontail has an MNI of four individuals and a net weight of 9.9 grams. Even more generally, the *Lepus/*Leporidae category contains 127 elements with a bone weight of 30.6 grams from a minimum of nine elements. Overall, there are at least fifteen rabbits/hares in the assemblage with a total of 165 elements and 40.9 grams.

Similar to rabbit and hare, there is a large number of squirrel across a few different categories. *Citellus beecheyi* (California ground squirrel) are large ground squirrels that are common in fields and on well-grazed pastures in California (Jameson and Peeters 1988: 236). They prefer to avoid ungrazed grasslands where the groundcover is tall enough to obstruct view, but they can be found across most of the state (except for in the Great Basin) from sea level to approximately 2200 meters in elevation (Jameson and Peeters 1988: 236). The Feature 157 assemblage consists of twenty elements of *Citellus beecheyi* (California ground squirrel) weighing 5.2 grams. It also has an MNI of two individuals. *Sciurus niger* (fox squirrel) are large tree squirrels that are located in the Central Valley and

Coast Ranges, placing it in the vicinity of Mission Santa Clara, as are many other species of sciuridae (Jameson and Peeters 1988: 244-245). In this assemblage, there is one right humerus belonging to *Sciurus niger* (fox squirrel), weighing 0.6 grams. *Sciurus*/Sciuridae (squirrel), the catch-all category for unidentified squirrel, is significantly larger of a category than the other two. *Sciurus*/Sciuridae consists of 116 elements that have an MNI of eight and a weight of 20.8 grams. Also similar to the rabbit and hare category, squirrel are quite small and therefore although there are a total of at least 11 individuals and 137 elements, the combined weight for all of the squirrel from Feature 157 is a mere 26.6 grams.

While Squirrel is easily the most prevalent species of rodent present, there are also a few examples of mice, rats, gophers, and moles. Twenty-one elements of *Mus* (mouse) are present in the overall assemblage, which weighs just 2.1 ounces and has an MNI of four. There were three elements from Murinae (old world mice) consisting of an MNI of one and a weight of 0.3 grams, and one right tibia weighing 0.1 gram was found from the superfamily Muroidea (rats, hamsters, etc). *Neotoma* (pack rat) had three elements with an MNI of one and a weight of 0.8 grams, and there were two elements with an MNI of one and a weight of 0.2 grams from the general category of *Rattus*. There was also one left femur weighing 0.1 grams that belonged to *Geomyidae* (gopher), and two right mandibles collectively weighing 1.1 grams from *Thomomys* (pocket gopher). Lastly, one femur and one tibia weighing 0.2 grams total and with an MNI of one was identified as *Scapanus* (mole). Although forty-three elements could not be identified more specifically than to say that they were from order Rodentia, they collectively weighed 6.4 grams and had an MNI of five, which determined from right mandibles. A wide variety of *Mus*, Murinae, and

Rattus species can be found in the San Francisco Bay Area, just as *Thomomys* and *Geomyidae* can be found virtually statewide except for some higher elevations in the Sierra-Cascade ranges (Jameson and Peeters 1988: 258, 264, 289, 321).

Avian Species Found in Feature 157

The bird portion of the Feature 157 faunal assemblage consists overwhelmingly of ducks and waterfowl, although there are songbirds and some "exotic" species present also. Two hundred forty three avian elements were identified to family, genus, or species, and out of those 243 elements, 210 were from waterfowl. Waterfowl is dominated by *Anas*, which is the genus of dabbling ducks – ducks that mainly feed at the surface of the water rather than diving down to acquire food. The broad category of *Anas* consists of 41.15% of the entire avian assemblage and 11.11% of the entire faunal assemblage from this feature. It has the largest MNI consisting of seven individuals and the 99 elements that are present of *Anas* also weigh the most at 15.8 grams. The family group of Anatidae has the second highest number of elements in the avian assemblage and consists of 72 elements that make up 29.63% of the overall bird present and 8.00% of the overall faunal assemblage. It also has the second highest MNI and bone weight in the bird assemblage with a minimum of five individuals and a weight of 11.5 grams. These two categories are significantly larger than any other category. It should be noted that it is particularly difficult to differentiate dabbling duck species through their skeletal remains. Therefore, in order to cut down on the identification of elements to the wrong species, I erred on the side of caution and often assigned the element to genus *Anas*.

Of the dabbling duck variety, I was able to identify elements from both *Anas carolinensis* (green winged teal) and *Anas platurhynchos* (mallard). *Anas carolinensis* (green winged teal) are common from early August until April in both freshwater and estuarine environments in California (Fix and Bezener 2000: 85). They prefer shallow marshes that contain semifluid mud and scattered low cover such as bulrush tussocks, and they often assemble along lakeshore shallows and protected tidal flats and channels (Fix and Bezener 2000: 85). Similar to green winged teal, *Anas platurhynchos* (mallard) are common to the San Francisco Bay Area from September to April – with smaller numbers in the summer nesting months – and prefer clean freshwater and "brackish" wetland habitats (Fix and Bezener 2000: 80). They are fairly non-discriminate in their choices of habitat and can be found in any wetland environment including "grainfields, row crop stubble, 'sheet water' and sprouting pasturage" (Fix and Bezener 2000: 80). I was only able to positively identify one left mallard carpometacarpus, but I was able to positively identify eighteen green winged teal elements, with a MNI of four and bone weight of 4.2 grams. Although I believe that I could have positively identified more elements as belonging to Green Winged Teal if I had had access to comparative specimens from more *Anas* species, *Anas carolinensis* did comprise 7.41% of the avian assemblage and 2.00% of the entire Feature 157 faunal assemblage. While these may not appear to be high numbers at first glance, many species make up a mere fraction of a percent of the assemblage.

Aix Sponsa (Wood Duck) are year-round inhabitants of the San Francisco Bay Area. While they are much less commonly found in the higher mountains and East of the Cascades in the winter, they typically prefer freshwater ponds, marshes, lakes, and rivers

that are surrounded by dense strands of trees (Fix and Bezener 2000: 76). Twelve elements were positively identified as belonging to *Aix Sponsa*, which had an MNI of two individuals and a weight of 3.6 grams. This too is one of the largest avian categories with 4.94% of the avian assemblage and 1.33% of the overall identified faunal remains. *Aythya collaris* (ring neck duck), while still a member of the family Anatidae, is infrequently represented in the assemblage. Ring Neck Ducks are fairly common from mid-September until early May, but are rarely present during the summer while they are nesting (Fix and Bezener 2000: 88). They can be found in a wide variety of freshwater sources, but prefer "wooded lakes, overgrown lagoons, reed-dotted ponds…, openings within extensive water-lily beds, forested margins of reservoirs and shady river backwaters" and are almost never found in estuaries or other waters that are influenced by the ocean tides (Fix and Bezener 2000: 88). With only five elements present, Ring Neck Duck has an MNI of two and a weight of 1.5 grams, making it only 0.56% of the entire faunal assemblage. However, *Oxyura jamaicensis* (ruddy duck), *Branta canadensis* (canada goose), and *Anserini* (goose) – the last three categories of waterfowl present in the Feature 157 assemblage – each represented by a single element and therefore each have an MNI of one and make up only 0.41% of the avian assemblage and 0.11% of the overall faunal remains. *Oxyura jamaicensis* ruddy duck) is a common year-round resident of the Bay Area and throughout the year can be found in nearly every type of water source, depending upon the season (Fix and Bezener 2000: 102). Although *Branta canadensis* can also be found near Santa Clara year round, they are more often winter residents, appearing on lakeshores, riverbanks, waterfronts, marshes, and croplands (Fix and Bezener 2000: 73).

The most prolific non-waterfowl species of bird in this assemblage is *Turdus migratorius* (American robin). They are common year-round residents of the San Francisco Bay Area and can be found in a wide variety of habitats including riparian woodlands, forests with open meadows, forest edges, roadsides, and pastures (Fix and Bezener 2000: 301). There are sixteen elements belonging to *Turdus migratorius*, with a minimum of two individuals and a total bone weight of 1.7 grams. *Turdus migratorius* comprises 6.58% of the avian assemblage and 1.78% of the total faunal assemblage. The family Sturnidae, which are made up of Starlings, is the second most common songbird in the Feature 157 collection. Various Sturnidae species can be found near Santa Clara, some of which are seasonal visitors that come for the winter months while others live in the area year-round (Fix and Bezener 2000: 307, 349). Sturnidae (starling) consists of five elements weighing 0.5 grams and has an MNI of one. *Callipepla californica* (California quail) are year-round inhabitants of California, choosing to occupy areas from sea level up to 6000 feet in elevation (Fix and Bezener 2000: 127). They prefer areas covered in chaparral, brushland, oak woodlands, streamside woodlands, and along gardens and agricultural fields (Fix and Bezener 2000: 127). California quail in the Feature 157 assemblage consists of three elements that weigh 0.5 grams and have a combined MNI of one, but there is also one left Tarsometatarsus in the general *Callipepla* (quail) category, which weighs 0.1 grams. *Pica* (magpie) is present in just two elements, weighing 0.2 grams and having an MNI of one. Although I was unable to determine if the *Pica* remains belong to *Pica hudsonia* (black-billed magpie) or *Pica nuttalli* (yellow-billed magpie) due to the skeletal similarities between the two birds, it is most likely that the *Pica* remains in this assemblage are from

that of *Pica nuttalli* as their range is much closer to Santa Clara than that of *Pica hudsonia*. yellow-billed magpies are endemic to California and are therefore year-round residents. While they have been extirpated from the peninsula south of San Francisco in the present day, the same has not always been the case and they were indeed residents of the Bay Area in the past (Fix and Bezener 2000: 264-265).

Feature 157 also has a very small number of more "exotic" species than have been previously described. Each of these next five species categories have one element each resulting in an MNI of one for each. They also all make up 0.41% of the avian assemblage and 0.11% of the entire identified faunal assemblage. *Corvus corax* (common raven) is a common year-round resident of California, inhabiting areas from low elevations up to over 14,000 feet (Fix and Bezener 2000: 267). The only places that common ravens are not typically found are habitats that are already occupied by crows (Fix and Bezener 2000: 267). *Corvus corax* is represented by one left coracoid that weighs 0.7 grams. Unidentified *Corvus* consists of one left Phalanx 1; 2nd Digit. Because it is a wing bone, I was unable to identify it to a more precise category than to say that it is either from crow or raven. Feature 157 also has one left scapula that weighs 0.6 grams that belongs to *Cathartes aura* (turkey vulture), one right tibiotarsus weighing 0.1 grams from a *Megascops kinnicotti* (western screech owl), and one right radius weighing 0.1 grams from Strigidae (owl). *Cathartes aura* can be found throughout all of California as aerial cruises bring them to nearly all terrestrial and shoreline habitats at one point or another (Fix and Bezener 2000: 68). Similarly, *Megascops kinnicotti* can be found in the San Francisco Bay Area and can be

found in nearly every habitat including various woodlands, towns, farms, and ranches (Fix and Bezener 2000: 205).

Fish Species Found in Feature 157

Of all the faunal remains present in this assemblage, fish is the most underrepresented. While there are 84 elements that were identified by Cristie Boone, very few could be identified to species. Of the 84 fish bones identified, nine belong to *Pogonichthys macrolepidotus* (Sacramento splittail). This species had an MNI of one and made up 11.39% of the total fish bone, but only 1.00% of the overall faunal assemblage. Sacramento Splittail are hearty minnows that are indigenous to California (University of California 2016). They live in fluctuating environments but are typically found in estuarine environments including the San Francisco Bay, but are also well suited to slow moving rivers, sloughs, and alkaline lakes (University of California 2016). *Gillichthys mirabilis* (longjaw mudsucker) are also indigenous to California and primarily inhabit shallow sloughs and tidal mudflats in the upper ends of bays and estuaries (University of California 2016). While they can live in freshwater, they can only do so for a few days at a time due to the low salinity levels (University of California 2016). In the Feature 157 assemblage, longjaw mudsuckers consist of four elements with an MNI of one individual. It made up 5.06% of the fish assemblage and 0.44% of the overall Feature 157 assemblage. Both *Embiotocidae* (surfperch) and *Catostomus occidentalis* (Sacramento sucker) had just two elements and an MNI of one each. They both also made up 2.53% of the fish and 0.22% of the overall fauna. Multiple genera of *Embiotocidae* (surfperch) are indigenous to the San Francisco Bay Area.

They tend to occupy sloughs, lakes, and slow moving rivers, though many genera are also found in estuarine environments (University of California 2016). *Catostomus occidentalis* (Sacramento sucker) are capable of living within varied conditions in streams, lakes, and mild estuarine environments, but are most often found in clear cool streams and lakes (University of California 2016). *Oncorchynchus* sp. (Pacific salmon + trout) are anadromous fish and therefore can be found in rivers during spawning season. One element of *Oncorchynchus* sp. was present in Feature 157, making up 1.27% of the fish remains and 0.11% of the entire assemblage. The other three categories are much more general than those already listed. Cyprinidae (freshwater fishes) was comprised of 37 elements with a minimum of two individuals. Altogether, Cyprinidae makes up the highest percentage of fish at 46.84% of the fish assemblage and 4.11% of the overall faunal assemblage. The Class Actinopterygii (ray-finned fishes) consists of 26 elements that make up 32.91% of the fish assemblage and 2.89% of the overall assemblage. Lastly, there were three elements belonging to the Order Cypriniformes (ray-finned fish). This category had an MNI of two and made up 3.80% of the fish assemblage.

Phase I

While viewing the data as a single entity gives an overall image of what animals the neophytes were consuming, it is interesting to break up the assemblage by phase. Like I mentioned earlier, Phase I was located at the northern end of the feature within the A and F units and consisted of fifteen separate contexts. This is the phase that contained the two adobe “bowls” that may have been used to process dietary materials such as acorns and

other plant materials. The faunal remains found in Phase I are detailed in the appendix. There is a wide variety of mammalian, avian, and fish species present in Phase I, but most interesting to see is how few cattle remains are present. This phase consists of 47 cattle remains, which makes up just 16.91% of the mammal from Phase I and only 11.14% of the overall Phase I fauna. There is a minimum of three cows present, which appears to be quite a few for one phase when we remember that the overall Feature 157 assemblage had an MNI of four cattle. Quite a few of the elements have cut marks present on the bone, indicating that the animal was butchered. Out of the 47 elements, fifteen had cut marks and one of these same elements also had a chop mark. These fifteen elements are a mixture of two mandibles, a rib, a metacarpal, five phalanges, a radial carpal, a humerus, two scapula, and two thoracic vertebra. Three elements – one premolar, one third phalanx, and one thoracic vertebra – have been burned.

Other domesticates, *Ovis aries* (sheep) and *Ovis* (sheep/goat) are also present, but they are both represented by only one element each. *Ovis aries* is represented by a right Scapula while the *Ovis* element is a second phalanx. The sheep scapula is broken in two places but the sheep or goat phalanx shows no sign of modification. As they are both made up of only one element, they both make up 0.36% of the mammal and 0.24% of the overall fauna in this phase.

Deer is also present in Phase I. Four out of the overall six elements of *Odocoileus hemionus* (mule deer) are present in this phase, as are two out of the overall four elements of unidentified deer. Although there is an MNI of only one for both mule deer and

unidentified deer, it is interesting that such a high percentage of the overall deer is located in Phase I. However, it is less significant to the phase overall as Mule Deer makes up a mere 1.44% of the Phase 1 mammal assemblage and only 0.95% of the entire faunal assemblage of this phase. Similarly small, unidentified deer is only 0.72% of the mammalian assemblage and 0.47% of the entire Phase I assemblage. All four of the mule deer specimens have been broken but none of the unidentified deer have been modified in any way.

Phase I also has two of the "exotic" species that were found in Feature 157. The juvenile *Lynx rufus* (bobcat) distal femur was present in this phase, as was the *Canis* sacrum. Because there is only one element from each of these species, not only is there clearly an MNI of one for each, but they both also make up a very low percentage of this assemblage (0.36% of the Phase I mammal and 0.24% of the overall Phase I fauna). As there is only one bobcat bone present and it has been neither burned nor modified in any other way, I cannot make any determination of why it was present in the assemblage. The *Canis* sacrum was also left unburned, but it does have two small breaks on its surface that I do not believe were done by the inhabitants of the mission. Due to the lack of numbers and the lack of modification done to these two elements, I do not believe that the neophytes of Mission Santa Clara were consuming either animal.

Phase I has the highest percentage of rabbits and hares out of the three phases. Altogether, 146 elements are present. This is 52.52% of the Phase I mammal and 34.6% of the entire Phase I fauna. Only four *Sylvilagus audubonii* (desert cottontail) specimens are present, but for such a small sample size it has an MNI of two. None of the elements have

been cut or burned, but all four are broken. Desert Cottontail makes up only 1.44% of the Phase I mammal and just 0.95% of the entire Phase I assemblage. *Sylvilagus* (cottontail) however has a much larger sample size. With 32 elements present in this assemblage making up an MNI of four, eleven specimens were burned to varying degrees and 31 were broken. Cottontail make up 11.51% of the mammal present in this phase and 7.58% of the overall fauna. Unidentified rabbit and hare (*Lepus/*Leporidae) make up an incredible 39.57% of the Phase I mammal assemblage and 26.07% of the overall faunal remains from this phase. The 110 elements of *Lepus/*Leporidae have an MNI of nine, which is the largest MNI out of this entire assemblage. Thirty-five of the elements were burned, one astragalus had four different cut marks on it, and 81 were broken in at least one place. Although only one element has butchery marks, it is still significant as it shows that rabbit and hare was indeed being butchered.

Squirrel is also prevalent in this phase. The single specimen of *Sciurus niger* (Fox Squirrel) that is present in the Feature 157 assemblage was found in Phase I. This one element is a right humerus and makes up 0.36% of the Phase I mammal and just 0.24% of the overall fauna in this phase. California ground squirrel (*Citellus beecheyi*) is represented by five elements and has an MNI of one. It makes up a very small percent of the assemblage (1.80% of the mammal assemblage of this phase and 1.18% of the overall faunal assemblage), but it is significant because two of the elements – an ulna and a tibia – were darkly burned, and a humerus had one cut mark. This cut mark is exciting because it shows that squirrel is not present in Feature 157 simply as an either intrusive species that dug their way in and ended up dying in large numbers or were being thrown in after being

killed by the neophytes as a pest control mechanism. Instead, this butchered humerus shows that somebody cut apart this animal and therefore squirrels very likely were being eaten by the Mission Indians. The general category of squirrel (Sciurus/Sciuridae) contains 33 specimens, has an MNI of three, and represents 11.87% of the Phase I mammal and 7.82% of the overall Phase I fauna. Nine elements were burned – ranging from lightly burned to burned white – and 23 elements were broken. There were no cut marks in this category.

Mice and rats are also present in this assemblage, but to a lesser extent than rabbits/hares and squirrels. *Mus* consisted of nine elements and an MNI of two, but it represented only 3.24% of the mammal and just 2.13% of the overall fauna in this phase. Both Murinae (Old World mice) and *Neotoma* (pack rat) each had just three elements and an MNI of one for this phase. They also make up 1.08% of this phase's mammal and 0.71% of its overall assemblage. One Murinae element – a mandible – was lightly burned, but none of the *Neotoma* elements had any burn marks. One lightly burned *Rattus* radius was also present. Lastly for mammal, 20 unidentified rodent (Rodentia) with an MNI of five were present, which made up 7.19% of the Phase I mammal and 4.74% of the overall Phase I fauna.

The bird assemblage from Phase I of Feature 157 is the least diverse of the three phase assemblages and is made up almost entirely of waterfowl. Together, *Anas carolinensis* (green winged teal) and the general category of *Anas* make up exactly 50% of the avian remains in this phase. *Anas carolinensis* consists of sixteen elements and has a

minimum of four individuals present. It makes up 11.59% of the total bird in this assemblage, but only 3.79% of the overall fauna in Phase I. Four elements – two coracoids and two carpometacarpi – are burned and fourteen have been broken. *Anas* contains 53 elements, but only has an MNI of three. It makes up 38.41% of this phase's bird and 12.56% of the overall fauna. Fourteen of the *Anas* elements have been burned, ranging from just lightly burned to being burned white, but no cut marks were identified on any of the elements.

Aix Sponsa (wood duck) is represented by five elements in this assemblage. It has an MNI of two, and makes up just 3.62% of the avian assemblage and 1.18% of the overall assemblage. One humerus has been burned and all five of the specimens have been broken. *Aythya collaris* (ring neck duck) is present as just two elements – both right coracoids. One has been lightly burned and both are broken. Ring neck duck composes 1.45% of the Phase I bird assemblage and just 0.47% of the overall Phase I assemblage. Interestingly, the only specimens of both *Oxyura jamaicensis* (ruddy duck) and *Branta canadensis* (canada goose) found in the Feature 157 faunal assemblage are present in this phase. Ruddy duck is comprised of the proximal end of a right scapula and the Canada goose is one left carpometacarpus. These two species make up a tiny part of the assemblage, each comprising just 0.72% of the bird and 0.24% of the fauna from the entire phase. The family Anatidae comprises 40.58% of the bird and 13.27% of the Phase I bird. It is made up of 56 elements that come from a minimum of four individuals. Eight of these elements have been burned, ranging from being lightly burned brown all the way to being

burned to be both gray and white in color. Nearly all of the elements (48) have been broken to some degree.

The only two non-waterfowl species of bird present in the Phase I assemblage are *Callipepla californica* (California quail) and *Corvus*. California quail consists of three elements that have an MNI of one, and all three elements are complete with no modifications. With such a low representation, it makes up just 2.17% of the bird and 0.71% of the overall fauna. The *Corvus* phalanx found in this phase is the only instance of unspecified *Corvus* found in all of Feature 157, although there is one *Corvus corax* coracoid from Phase II.

Fish is an extremely small component of Phase I. None of the six elements that are present could be identified to species, so we only know that two belong to the family Cyprinidae (freshwater fishes) and four belong to the class Actinopterygii (ray-finned fishes). The fish bone in this assemblage only makes up 1.42% of the entire faunal remains from Phase I.

Phase II

While Phase II has some similarities to Phase I in the fauna that is represented, it also has a quite different distribution of that fauna. Phase II was the pit located in the southwestern end of the feature in the D and E units, and contained eight different contexts. This was the phase that contained a large number of shellfish in context 5723, along with beads, obsidian, and ceramic. Unlike in the previous phase, cattle dominate the Phase II mammal, followed closely by squirrel. Sixty-five cattle (*Bos taurus*) bones are

present, which makes up 48.51% of the mammal in this assemblage and 26.32% of the overall Phase II faunal assemblage. Despite the large number of elements present, they made up a minimum of only two cattle. Eight of the bones have been burned – four were burned to a dark brown color while the other four were burned either black or gray – and an enormous number of the bones (25) had either cut marks, chop marks, or both. These elements with signs of butchery came from a wide range of body parts – ten vertebra, six foot and ankle bones, two scapula, one radius, two ulna, four femurs, and one patella – but three contain an exorbitant number of cut marks; far more than any of the other bones in this assemblage. A right astragalus has been cut eleven different times, a left scapula has fourteen cut marks, and a left radius has 28 cut marks and two chop marks. It is also interesting to note that nearly every butchered bone was also broken in at least one place.

Sheep and deer, while present in this phase, make up a very small portion of the assemblage. *Ovis aries* (sheep) consists of just one right humerus, and *Odocoileus hemionus* (mule deer) is represented by just a single right scapula. Each of these elements make up just 0.75% of the Phase II mammal assemblage and 0.40% of the overall fauna. Non-speciated deer (*Odocoileus*) has two elements present in this assemblage – both of which are phalanges – and makes up 1.49% of the mammal and 0.81% of the Phase II fauna. All three categories have an MNI of one.

The one instance of bear found in the entire Feature 157 assemblage is found in this phase. *Ursus* (bear) is represented by a single second phalanx. It is neither cut, broken, nor is it burned, and I was unable to identify it to any one species. While I do not know its

purpose in the assemblage or why it got placed in Feature 157 in the first place, it is an interesting find and once the overall site report is out, I would be interested in finding out if there are other instances of bear found across the Franklin Block 448 site.

Rabbit and hare, while the third most prolific mammal category in Phase II, has very few elements present in comparison to the same category in Phase I. There is only one element – a left radius – belonging to *Sylvilagus* (cottontail), but there are ten specimens of the general *Lepus/*Leporidae category with an MNI of two. Overall, they make up 8.21% of the mammal and 4.45% of the overall fauna in this phase. In the *Lepus/*Leporidae category, one radius was burned black and a tibia has a single cut mark. This is not the first instance of rabbit and hare to show signs of butchery, and it is important to note that the neophytes were indeed butchering these animals, presumably for consumption.

Like I mentioned above, squirrel is quite prolific in Phase II. When combined, *Citellus beecheyi* (California ground squirrel) and *Sciurus*/Sciuridae (squirrel) comprise 34.33% of the Phase II mammal – 3.73% is California ground squirrel while 30.60% is unidentified squirrel – and 18.62% of the overall faunal remains of this feature – 2.02% comes from California ground squirrel while 16.60% is unidentified squirrel. The five elements of California ground squirrel are all pelvic or limb bones that have been broken at least once and one right innominate was burned white. This category has an MNI of two. Unidentified squirrel consists of 41 elements from a minimum of four individuals, five of which were burned – four were burned black while one was burned until it turned gray. While many were broken, none had any butchery marks.

Lastly for the Phase II mammal, there is one element each present from *Mus*, *Scapanus* (mole), and *Thomomys* (pocket gopher), and there are four elements present that could be identified only to the order Rodentia. *Mus* is comprised of a left humerus that is neither burned nor does it contain butchery marks. The right tibia from *Scapanus* that is present in this phase is one of only two *Scapanus* specimens present in all of Feature 157. Similarly, *Thomomys* is represented in this phase by a right mandible, which like *Scapanus*, is one of only two *Thomomys* elements present in all of Feature 157. Each of these two elements make up a mere 0.75% of the mammal and 0.40% of the overall fauna in this phase. The four Rodentia specimens make up 2.99% of the mammal and 1.62% of the faunal remains, and has an MNI of one.

Phase II bird distribution is fairly similar to what was identified in Phase I. Although the sample size is quite a bit smaller in Phase II, waterfowl – and especially dabbling ducks – dominate the assemblage. Surprisingly, there is no *Anas carolinensis* (green winged teal) present, but the one instance of *Anas platurhynchos* (mallard) in the entire Feature 157 assemblage is found in this phase. This element is a single left carpometacarpus that despite its low sample size makes up 1.96% of the Phase II avian assemblage (but just 0.40% of the overall assemblage). *Anas*, the largest avian category in Phase II, is made up of 21 specimens that has an MNI of two and comprises 43.14% of the bird and 8.91% of the mammal for Phase II. Four elements have been burned and one humerus contains a single cut mark, showing that dabbling ducks were being butchered by the neophytes of Mission Santa Clara.

Aix Sponsa (wood duck) is represented in this assemblage by a single right tibiotarsus. Although wood duck is not especially abundant in Phase I, Phase II has significantly fewer specimens. It is difficult to determine why this is the case, but it may simply be because the overall avian assemblage is significantly smaller in this phase. *Aythya collaris* (ring neck duck) comprises 5.88% of the avian assemblage (and just 1.21% of the overall fauna) with just three elements that have an MNI of one. Out of these three elements, one humerus has been burned. *Anserini* (goose) is also present in this phase. Despite a Canada goose specimen being present in Phase I, this tibiotarsus is the only example of unspeciated goose in all of Feature 157. Anatidae, the general category for waterfowl, contains ten elements with an MNI of just one, and makes up 19.61% of the Phase II bird but only 4.05% of its overall faunal assemblage. Two elements – a scapula and a tibiotarsus – were burned, but none of the specimens had butchery marks.

Phase II also has a fair number of non-waterfowl species, and in fact has the most diverse assemblage of these birds out of any of the phases. *Callipepla* (quail) consists of just a single left tarsometatarsus and *Pica* (magpie) is comprised of two elements, a coracoid and a tibiotarsus. Quail makes up just 1.96% of the bird assemblage (0.40% of the overall fauna) while magpie comprises 3.92% of the bird (0.81% overall). Sturnidae (starling) and *Turdus migratorius* (American robin) both contain four specimens in this assemblage. Both groups also each come from a minimum of one individual and make up 7.84% of the avian assemblage and 1.62% of the overall Phase II faunal assemblage. The single examples of both *Corvus corax* (common raven) – a left coracoid – and *Cathartes aura* (turkey vulture) – a left scapula – that were found in Feature 157 came from this

phase. While indigenous to the San Francisco Bay area, these are interesting finds, especially since there is only one example of each. Neither are burned nor do they have cut marks, and so I am not entirely convinced that they were a source of sustenance for the Mission Santa Clara Indians and instead became a part of the assemblage some other way.

The fish in Phase II is much more varied than in any other phase. While there are the general categories of ray-finned and freshwater fishes, this phase also contained the only examples of multiple fish species found in the Feature 157 assemblage. All nine elements of *Pogonichthys macrolepidotus* (Sacramento splittail) are found in this phase, which consist of Lower Pharyngeal, Hyomandibular, Maxilla, Cleithrum, and Basioccipital elements. Despite the number of elements present, there is a small MNI of one. Sacramento splittail makes up 14.52% of the entire fish assemblage and 3.64% of the overall faunal assemblage. Similarly, all four elements of *Gillichthys mirabilis* (longjaw mudsucker) present in Feature 157 came from this phase. This makes up 6.45% of the fish assemblage of Phase II and only 1.62% of the overall assemblage. *Oncorchynchus* sp. (Pacific salmon + trout) contains only one element, which is once again the only element of that species in the entire Feature 157 assemblage. Overall for Phase II, the majority of the fish bones come from Cyprinidae (freshwater fishes). This category consists of 28 elements with an MNI of 2 that comprises 45.16% of the fish assemblage and 11.34% of the overall assemblage. Actinopterygii (ray-finned fishes) is represented by 18 elements but has an MNI of one. This makes up 29.03% of the fish assemblage but only 7.29% of the entire Phase II fauna. Lastly, there are only three elements belonging to the Cypriniformes (ray-finned fish) and this makes up 3.23% of the fish (and 0.81% of the entire assemblage).

Clearly, the vast majority of the fish in Phase II is unidentifiable, but it is interesting to see how many species are found in this phase only, and were found in neither of the others.

Phase III

Phase III, if you recall, was mostly present in unit B, which was in the southeastern portion of Feature 157. This is the pit that is thought to possibly have been used for lyme production, but had since been filled in with nine different contexts. In the distribution of mammal, Phase III is quite similar to Phase II. Cow remains make up the majority of the assemblage with 40.37% of the mammal and 28.14% of the overall faunal remains. Despite the fairly large sample size of 65 cattle remains in this phase, they come from a minimum of just three individuals. 41 of these elements exhibit burns that range from dark brown to blue, and six elements – three vertebra, a radius, an astragalus, and a metacarpal – have cut marks indicating butchering. Four of these six burned elements were also broken, but since 32 of the cattle bones in this phase were broken in at least one place, it is not a surprise that a high percent of the burned bone was also broken. Except for one incidence of *Odocoileus hemionus* (mule deer) that makes up just 0.62% of the mammal and 0.43% of the overall fauna, cow is the only large mammal found in Phase III.

Like in Phase II, rabbit and hare are not particularly prevalent in this phase. There is only one *Sylvilagus* (cottontail) humerus present in the assemblage, but it has been burned black which shows human interference. *Lepus/*Leporidae, the category of unspeciated rabbit and hare, contains seven elements that make up 4.35% of the mammal and 3.03% of the overall fauna in this phase. Two elements, both of which are radii, exhibit burn marks –

one was burned dark brown while the other was burned black – but none of these elements contain evidence of butchery.

Squirrel once again makes up the second highest percentage of the assemblage. Together, California ground squirrel and unspeciated squirrel make up 32.92% of the Phase III mammal. *Citellus beecheyi* (California ground squirrel) contains ten specimens that comprise 6.21% of the mammal and 4.33% of the overall fauna in this phase, and five of the elements were burned. *Sciurus*/Sciuridae (squirrel) contains 42 elements, making up 26.09% of the mammal and 18.18% of the overall faunal assemblage from Phase III. There is a wide variety of burning in the squirrel assemblage with 25 elements exhibiting burns ranging from lightly brown all the way to being burned blue.

Phase III also has a large number of other rodents present. Eleven elements of *Mus* is present – with an MNI of three –, as are one element each from Muroidea (rats, hamsters, etc), *Geomyidae* (gopher), *Scapanus* (mole), *Thomomys* (pocket gopher), and *Rattus*. *Mus* makes up 6.83% of the mammal assemblage and 4.76% of the overall faunal assemblage, while the others make up just 0.62% and 0.43% respectively. Only one element of *Mus* was burned (and very lightly at that), but the one gopher femur and the one *Rattus* humerus present were burned dark brown. The general category of rodentia makes up 11.80% of the mammal assemblage (8.23% of the overall Phase III fauna) with its nineteen elements, fourteen of which have been burned to varying degrees.

Like in the other two phases, waterfowl clearly dominates the Phase III bird assemblage. When all of the species and species categories are combined, it can be seen

that waterfowl make up 72.22% of the overall bird, with just 27.78% being composed of other bird species. Also in similarity to the other two phases, dabbling ducks are especially prevalent in this phase. *Anas carolinensis* (green winged teal), while only containing two elements – a scapula and a phalanx – makes up 3.70% of the bird in this assemblage (but just 0.87% of the overall Phase III fauna). On the other hand, the general category of *Anas* contains 25 elements that came from a minimum of four ducks composes 46.30% of the Phase III bird and 10.82% of its faunal assemblage. Six of the *Anas* elements have been burned and while nearly all of the elements have been broken, none show signs of butchery.

Of the non-dabbling duck waterfowl species found in this phase, *Aix Sponsa* (wood duck) is represented by six elements that have an MNI of one. Anatidae, the category for waterfowl that cannot be identified to species, is also composed of six elements that have an MNI of one. Wood duck and Anatidae each make up 11.11% of the Phase III bird assemblage and 2.60% of this phase's overall faunal remains. While none of the wood duck has been burned, one cuneiform from the Anatidae category was burned white.

Phase III bird also contain a number of non-waterfowl species. *Turdus migratorius* (American robin) is the most plentiful species of this type with twelve elements that originate from a minimum of one individual. This species also makes up a significant 22.22% of the Phase III bird (5.19% of the overall fauna). Sturnidae (starling), *Megascops kinnicotti* (western screech owl), and Strigidae (owl) each contain only one element – starling is represented by a femur, western screech owl by a tibiotarsus, and Strigidae by a

radius – that make up 1.85% of the bird and 0.43% of the overall fauna from this phase. It is also interesting to note that these are the only two elements of owl that were found in the entire Feature 157 faunal assemblage.

Like in the other two phases, the fish assemblage is dominated by elements that cannot be identified to species. However, Phase III does contain two elements each of *Embiotocidae* (surfperch) and *Catostomus occidentalis* (Sacramento sucker). These elements are the only examples of these two species found in the entire Feature 157 assemblage. Although both have small sample sizes, they each compose 12.50% of the Phase III fish assemblage (but only 0.87% of the Phase III fauna). Cyprinidae (freshwater fishes) has the largest sample size for this assemblage with seven elements, making up 43.75% of the fish but just 3.03% of the overall Phase III fauna. Finally, Actinopterygii (ray-finned fishes) contains four elements that make up 25.00% of the fish assemblage (1.73% of the fauna) and Cypriniformes (ray-finned fish) only contains one specimen making up just 6.25% of the fish and 0.43% of the overall fauna. All of the fish categories in this phase have an MNI of one.

Similarities and Differences in Phases

It is interesting to note the similarities and differences between the faunal remains in each of the three phases. These comparisons can be seen below in Figure 9 and Figure 10 below. Each graph contains every species present in the Feature 157 assemblage, whether or not it is present in each phase. Figure 9 shows the total number of elements from each species of fauna that is present in each phase's assemblage, while Figure 10

shows the percent that each bone species makes up of each phase. These two graphs essentially show the exact same thing, but the adjusted figures allow us to better compare the three phases without the influence of sample size.

While I would be interested in determining if these three phases are statistically different from one another, temporal data for this feature and its three phases is not currently available to me, so I can only date the materials to sometime during the operation of Mission Santa Clara (1777-1837). Without suspecting that the three pits have varying fill dates, I have no reason to conduct these tests as there is little that I can learn from doing them. Rather, I can simply state that Figure 9 and Figure 10 appear to show that there are differences across the three phases and that some species appear to be more present in some of the phases than they are in others.

Bone Weights

It is also interesting to note the bone weights for each species as many zooarchaeologists use this as a measure of a species importance to the diet of the people studied. The weight of all of the identifiable bone from Feature 157 totals 8649 grams, with 8374.3 grams coming from cattle bone and 112.9 grams coming from mule deer. The rest of the species present in this assemblage contribute such a minimal amount to the overall bone weight that it is not worthwhile to create a figure showing the results. When this is done, cow shows a tall column reaching past 8000 grams and the very short column for mule deer is the only other species in which a column showing weight can be seen. It is clear from this figure that cattle is by far the heaviest of all of the species categories

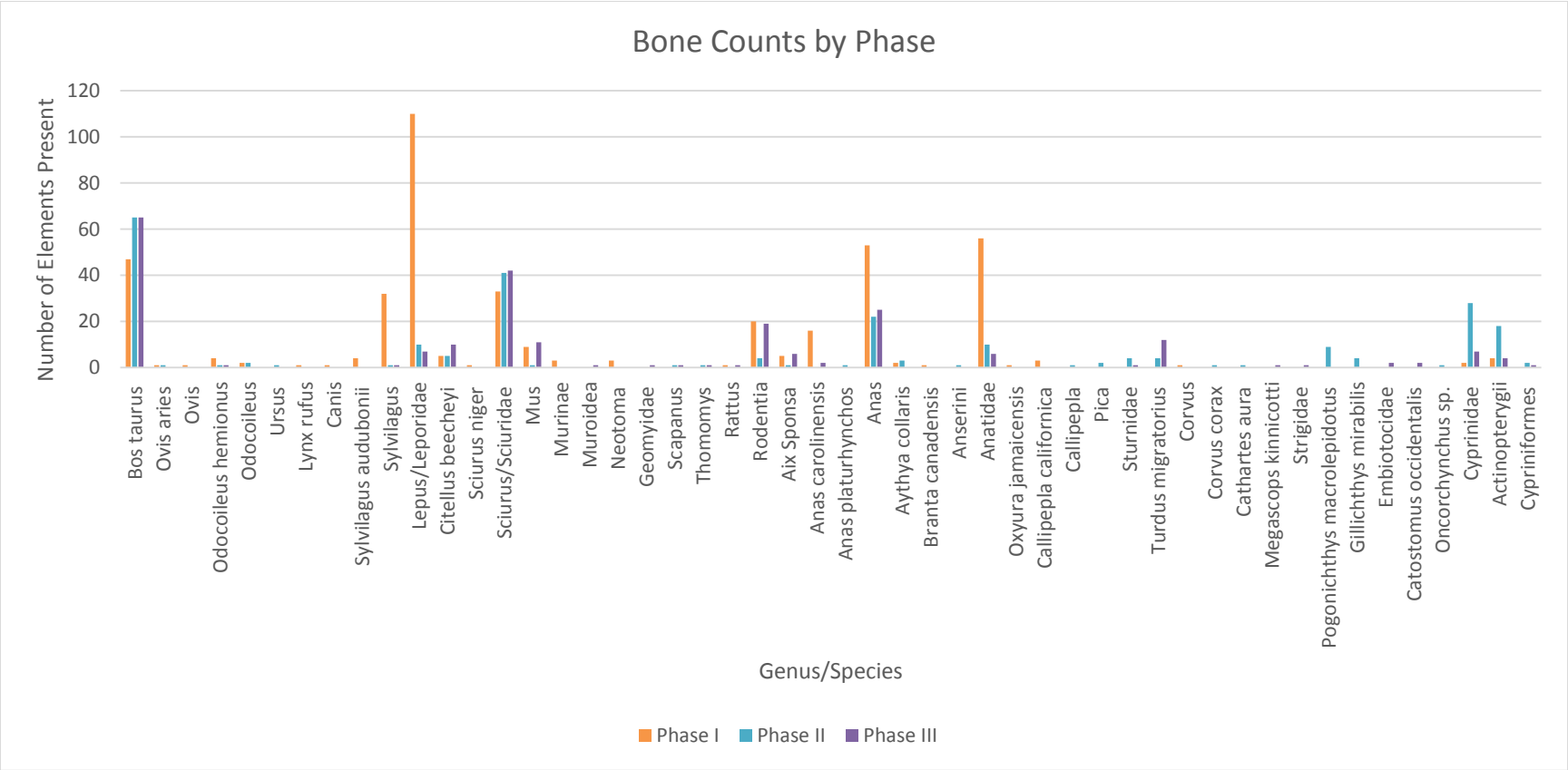

Figure 9 Exact numbers of elements present in each phase for each species present in the Feature 157 assemblage

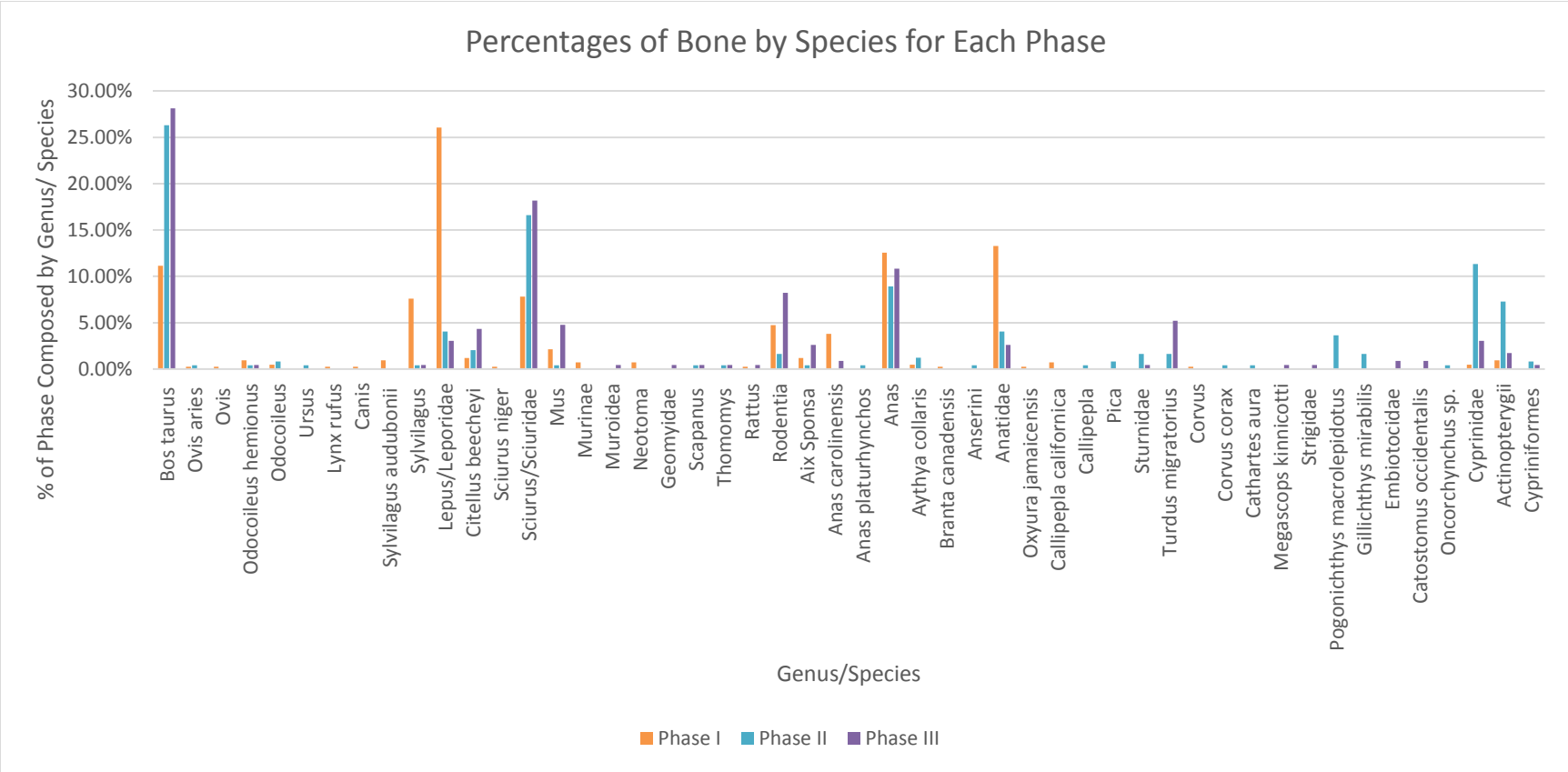

Figure 10 Percentage that each element comprises of each phase for each species present in the Feature 157 assemblage

present in Feature 157. This is not a surprise as cattle are very large and therefore their bones must be comparatively large in order to support the musculature of the body, whereas lagomorphs, rodents, and bird have very small, very light bones to fit with their small stature. Furthermore, as cattle contains the largest number of specimens for any one species, it also makes sense that it would weigh the most.

Chapter 6: Conclusion

What I have done so far is present a detailed descriptive summary of the remains that have been analyzed for this thesis. What is key however, is to explore what can be inferred from those remains. This chapter will consider what the wild fauna found in Feature 157 tells us about the diet of the neophytes at Mission Santa Clara de Asís, and how it compares to the primary records written during the Mission Period. Primary source documents (Geiger and Meighan 1976, La Pérouse 1989, etc) and contemporary researchers have shown that mission Indians were supplementing their mission diet with wild game resources at other missions, but here I am interested in comparing what is stated in the Mission Santa Clara records to what was found archaeologically.

As I described in the previous chapter, while cattle do compose the largest portion of the Feature 157 assemblage and also dominates the total bone weight, there are a significant number of small mammal and bird bones present in this assemblage. These bones are far more present than I would expect them to be due to the mission records describing the diet of the neophytes. The more than 17,000 bones that have been analyzed for this thesis – 900 of which were identified to genus or species – provide the foundation for an expanded understanding of Indian foodways at Mission Santa Clara de Asís and show that primary sources do not always provide the entire picture of the past.

Written accounts of the Mission Period in California consistently recorded the fact that Indians living at Mission Santa Clara were being wholly provided for by the padres (Duhaut-Cully 1999, Fathers Ministers of Mission Santa Clara 1812, Galindo 1959, Langsdorff 1813). The records state that the neophytes ate beans, peas, corn, wheat, and other grains grown at the mission, and for protein, they are reported to have eaten cattle that were raised at the mission. I do not claim that the neophytes did not consume these domesticated foods, but the archaeological evidence as manifested in the faunal remains found in Feature 157 paint a somewhat more complex picture of neophyte subsistence.

Beef was clearly an important source of food for the neophytes of Mission Santa Clara as cattle dominated the Feature 157 faunal assemblage. This is evidenced not only by the fact that cattle contained the largest number of elements present, but it also clearly dominates the bone weight for the assemblage. In light of what the mission records indicate, this proliferation of cattle is to be expected. However, a closer examination of the cattle bone reveals some issues in the assertion that beef played such an important role in the neophyte diet.

When the cattle remains are examined closely, it is clear that many of the elements present in this assemblage come from the low quality cuts of meat, particularly from the limbs of the animal (Appendix A.5). 73.86% of the cattle remains consist of limb elements (carpal and tarsal bones, phalanges, Femurs, Tibias, Humeri, Radii, Ulnas, and Patellas), while 15.34% of the cattle assemblage consists of cranial, neck, shoulder, and tail elements. Only 10.80% of the cattle remains are from the torso and pelvic girdle of the cattle, where it is generally recognized that the prime cuts of meat are found. The weight of the cattle

bone present and the resulting assumption that this animal provided much more to neophyte subsistence than any other species is offset by the fact that many of the elements of cow are from the ankle and foot portions of the animal. What we are seeing in this assemblage is a pattern where neophytes were generally receiving portions of the animal that were low quality, would likely have only have been suitable to be boiled into soup or stew, and may not have actually been very nutritionally beneficial.

When the number of elements are taken into consideration, the number of cattle elements present are actually not much higher than those of small mammal and bird, indicating that other food procurement strategies were implemented by the neophytes and that they were indeed procuring wild game. The assertion by the padres that the neophytes of Mission Santa Clara ate exclusively from what was produced at the mission is extremely suspect since just 19.67% of the identifiable elements from the Feature 157 faunal assemblage was composed of cattle remains.

I attribute the high number of cattle to the fact that as large as the elements are, not only is it much easier to identify the small nuances that differentiate them from other species, but there are very few faunal species that are large enough to have bones this size. With the options being so limited, it is much easier to identify the elements to species, whereas carpals, tarsals, and vertebra from squirrels, rabbits/hares, and other rodents are much more difficult to positively identify to species because of the small size and the sheer number of rodent species that these bones could potentially be from.

In the same vein of being large and heavy, cattle bones are much more likely to survive time and taphonomic processes designed by nature to break apart bone. While

small mammal and bird bone can easily be carried off by scavengers looking for a meal, it is much less likely that the same thing would happen to something as large as a cow bone. Furthermore, bones from smaller, more fragile species are more likely to undergo both natural taphonomic processes such as breakage and decomposition, but they are also more likely to get broken or crushed during the excavation and screening processes. In light of the multitude of taphonomic processes that work to break down faunal remains, I can only surmise that the bird and small mammal remains that were actually discarded by the Indians of Mission Santa Clara originally composed a much larger percent of the assemblage.

Overall, the story that the analysis presents is a much more complex story about food acquisition by the Indians – one that is in line with what has been identified by other archaeologists (Allen 1998, Blackmore and Peelo 2011, Garlinghouse 2009, Langenwalter and McKee 1985, etc) but is at odds with the historical literature of the time. The profuse numbers of small mammal and bird present in the assemblage make it clear that the neophytes were utilizing traditional foods (as described on pages 8, 9, and 10), and the cut and burn marks on the specimens further solidify these findings.

I am sure that the results of this analysis will not be an earth shattering revelation to the majority of people conducting California Mission studies. It is clear during excavation that we do not exclusively find cattle remains at the site and archaeologists are well versed in the idea that primary sources do not always tell the whole story. As a padre, you likely do not want to admit that the neophytes at your mission are not wholly being provided for, or the padres may not have known that the neophytes were hunting and fishing for a

portion of their sustenance. Large mammal that is not cow is very limited in the assemblage, so the Indians may have been opportunistically hunting or trapping small mammal (such as the rabbit/hare and squirrel found in the assemblage) and birds. Whatever was the case, the burn marks and the few butchery marks that were found on these remains show that they are not exclusively intrusive to the site and were instead placed there by the people. However, despite the fact that this analysis will likely serve to back up what people already know or suspect about neophyte diet at Mission Santa Clara, it is personally satisfying to have obtained these results. What the padres recorded as the neophyte diet is in no doubt correct, but as I discovered from Feature 157, it is clearly not all that the neophytes were eating.

Chapter 7: Epilogue

The identification of the Feature 157 faunal remains occurred over the course of approximately nine months during which time I spent as many hours as I could in the bone lab. As anybody who has done faunal analysis could have told me if I had asked, it is a process that takes significantly longer than I expected it to, meaning that I spent at least three more months to identify the fauna than I had expected to. I took on a daunting project that challenged me in many ways and often left me wondering if I had made the right choice. I questioned my skill in faunal analysis more times per context than I could have possibly kept track of and I sometimes wondered if I even liked bones anymore. I progressed in skill and confidence throughout the process and I know that I am a much better archaeologist for having completed this analysis. However, there are certainly a few things that I would have done differently if I had known better and that I will improve upon in future faunal analyses.

What to Improve Upon

My main complaint with how I conducted the faunal identifications is that in certain areas I do not think that I was specific enough in what I recorded in the database. Although I noted if an element was burned and to what extent (burn color), I should have noted where on the element it was burned. Was the entire element burned or was just the end burned? Where was it burned black versus where was it just lightly burned brown? Are the places where the bone was burned blue on the other end of the bone from where it is burned white or are the two colors intermixed? These are some of the questions that I

asked myself as I went back through the database upon completion of the identifications. In the same vein, going back through the database made me realize that I should have been more specific in terms of bone breaks. Using standard zooarchaeological techniques, I should have noted if the break was a spiral fracture or if a little piece had just broken off at some point, leaving the element basically whole except for that small spot. I should have attempted to discern if it was a green break or if the element had broken sometime more recently. It is much too late to go back and correct these oversights, but in the future I certainly plan to pay attention to these details. Furthermore, for elements that were clearly recently broken and that I was able to fit back together, I always bagged these pieces together, but I often marked how many pieces of bone were in each specimen bag in the column for "count" rather than putting down that I had one element and then noting in another column that it was made up of multiple broken pieces. While this did not affect my bone count when it came to the analysis stage, it could prove to be confusing to people who look at my Access data table. I don't think that any of these things hindered my project, but I believe that it could only have been enhanced had I done them differently.

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Appendix A

Supplementary Data Tables

Table A.1. Feature 157 Fauna.

Genus / Species	Number of Elements Present	Percentage of Total	MNI	Weight (g)
Mammal				
Bos taurus (Cow)	177	19.67%	4 R Metacarpal	8374.3
Ovis aries (Sheep)	2	0.22%	1 R Humerus	21.1
Ovis (Sheep/Goat)	1	0.11%	1 R Phalanx	1.1
Odocoileus hemionus (Mule Deer)	6	0.67%	1 R Innominate	112.9
Odocoileus (Deer)	4	0.44%	1 R Phalanx	4.4
Ursus (Bear)	1	0.11%	1 Phalanx	0.6
Lynx rufus (Bobcat)	1	0.11%	1 R Femur	2
Canis	1	0.11%	1 Sacrum	4.7
Sylvilagus audubonii (Desert Cottontail)	4	0.44%	2 R Radius	0.4
Sylvilagus (Cottontail)	34	3.78%	4 L Innominate	9.9
Lepus/Leporidae	127	14.11%	9 L Astragalus	30.6
Citellus beecheyi (California Ground Squirrel)	20	2.22%	2 R Innominate	5.2
Sciurus niger (Fox Squirrel)	1	0.11%	1 R Humerus	0.6
Sciurus/Sciuridae (Squirrel)	116	12.89%	8 R Radius	20.8
Mus (Mouse)	21	2.33%	4 R Femur	2.1
Murinae (Old World Mice)	3	0.33%	1 Mandible	0.3
Muroidea (Rats, Hamsters, etc)	1	0.11%	1 R Tibia	0.1
Neotoma (Pack Rat)	3	0.33%	1 R Innominate	0.8
Geomyidae (Gopher)	1	0.11%	1 L Femur	0.1
Scapanus (Mole)	2	0.22%	1 Femur, Tibia	0.2
Thomomys (Pocket Gopher)	2	0.22%	2 R Mandible	1.1
Rattus	2	0.22%	1 R Humerus	0.2
Rodentia	43	4.78%	5 R Mandible	6.4
Aves				
Aix Sponsa (Wood Duck)	12	1.33%	2 L Scapula	3.6
Anas carolinensis (Green Winged Teal)	18	2.00%	4 L Coracoid	4.2
Anas platurhynchos (Mallard)	1	0.11%	1 L Carpometacarpus	0.9
Anas	100	11.11%	7 L Coracoid	15.8
Aythya collaris (Ring Neck Duck)	5	0.56%	2 R Coracoid	1.5
Branta canadensis (Canada Goose)	1	0.11%	1 L Carpometacarpus	3
Anserini (Goose)	1	0.11%	1 R Tibiotarsus	0.7
Anatidae	72	8.00%	5 L Tarsometatarsus	11.5
Oxyura jamaicensis (Ruddy Duck)	1	0.11%	1 R Scapula	0.1
Callipepla californica (California Quail)	3	0.33%	1 L Humerus	0.5

Table A.1. Feature 157 Fauna (Cont.).

Genus / Species	Number of Elements Present	Percentage of Total	MNI	Weight (g)
Aves				
Callipepla (Quail)	1	0.11%	1 L Tarsometatarsus	0.1
Pica (Magpie)	2	0.22%	1 L Tibiotarsus	0.2
Sturnidae (Starling)	5	0.56%	1 R Femur	0.5
Turdus migratorius (American Robin)	16	1.78%	2 L Carpometacarpus	1.7
Corvus	1	0.11%	1 L Phalanx 1; 2nd Digit	0.1
Corvus corax (Common Raven)	1	0.11%	1 L Coracoid	0.7
Cathartes aura (Turkey Vulture)	1	0.11%	1 L Scapula	0.6
Megascops kinnicotti (Western Screech Owl)	1	0.11%	1 R Tibiotarsus	0.1
Strigidae (Owl)	1	0.11%	1 R Radius	0.1
Fish				
Pogonichthys macrolepidotus (Sacramento Splittail)	9	1.00%	1	0.9
Gillichthys mirabilis (Longjaw Mudsucker)	4	0.44%	1	0.4
Embiotocidae (Surfperch)	2	0.22%	1	0.2
Catostomus occidentalis (Sacramento Sucker)	2	0.22%	1	0.2
Oncorchynchus sp. (Pacific Salmon + Trout)	1	0.11%	1	0.1
Cyprinidae (freshwater fishes)	37	4.11%	2 Ultimate Vertebra	3.7
Actinopterygii (ray-finned fishes)	26	2.89%	1	2.6
Cypriniformes (ray-finned fish)	3	0.33%	2 L Tripus	0.3

Table A.2. Phase I Fauna

Genus / Species	Number of Elements Present	Percentage of Phase I Mammal	Percentage of Phase I Total	Percentage of Feature 157 Total	MNI
Mammal					
Bos taurus (Cow)	47	16.91%	11.14%	5.22%	3 L Scapula
Ovis aries (Sheep)	1	0.36%	0.24%	0.11%	1 R Scapula
Ovis (Sheep/Goat)	1	0.36%	0.24%	0.11%	1 2nd phalanx
Odocoileus hemionus (Mule Deer)	4	1.44%	0.95%	0.44%	1 L Innominate
Odocoileus (Deer)	2	0.72%	0.47%	0.22%	1 2 + 3 phalanx
Lynx rufus (Bobcat)	1	0.36%	0.24%	0.11%	1 R Femur
Canis	1	0.36%	0.24%	0.11%	1 Sacrum
Sylvilagus audubonii (Desert Cottontail)	4	1.44%	0.95%	0.44%	2 R Radius
Sylvilagus (Cottontail)	32	11.51%	7.58%	3.56%	4 L Innominate
Lepus/Leporidae	110	39.57%	26.07%	12.22%	9 L Astragalus
Citellus beecheyi (California Ground Squirrel)	5	1.80%	1.18%	0.56%	1 R Femur
Sciurus niger (Fox Squirrel)	1	0.36%	0.24%	0.11%	1 R Humerus
Sciurus/Sciuridae (Squirrel)	33	11.87%	7.82%	3.67%	3 L Calcaneus
Mus	9	3.24%	2.13%	1.00%	2 R Femur
Murinae (Old World Mice)	3	1.08%	0.71%	0.33%	1 L Ulna
Neotoma (Pack Rat)	3	1.08%	0.71%	0.33%	1 R Innominate
Rattus	1	0.36%	0.24%	0.11%	1 R Radius
Rodentia	20	7.19%	4.74%	2.22%	5 R Mandible
Aves					
Aix Sponsa (Wood Duck)	5	3.62%	1.18%	0.56%	2 L Scapula
Anas carolinensis (Green Winged Teal)	16	11.59%	3.79%	1.78%	4 L Coracoid
Anas	53	38.41%	12.56%	5.89%	3 L Humerus
Aythya collaris (Ring Neck Duck)	2	1.45%	0.47%	0.22%	2 R Coracoid
Branta canadensis (Canada Goose)	1	0.72%	0.24%	0.11%	1 L Carpometacarpus
Oxyura jamaicensis (Ruddy Duck)	1	0.72%	0.24%	0.11%	1 R Scapula
Anatidae	56	40.58%	13.27%	6.22%	4 L Radius
Callipepla californica (California Quail)	3	2.17%	0.71%	0.33%	1 L Carpometacarpus
Corvus	1	0.72%	0.24%	0.11%	1 L Phalanx 1; 2nd Digit
Fish					
Cyprinidae (freshwater fishes)	2	33.33%	0.47%	0.22%	1
Actinopterygii (ray-finned fishes)	4	66.67%	0.95%	0.44%	1

Table A.3. Phase II Fauna

Genus / Species	Number of Elements Present	Percentage of Phase II Mammal	Percentage of Phase II Total	Percentage of Feature 157 Total	MNI
Mammal					
Bos taurus (Cow)	65	48.51%	26.32%	7.22%	2 R Ulna
Ovis aries (Sheep)	1	0.75%	0.40%	0.11%	1 R Humerus
Odocoileus hemionus (Mule Deer)	1	0.75%	0.40%	0.11%	1 R Scapula
Odocoileus (Deer)	2	1.49%	0.81%	0.22%	1 R 2nd Phalanx
Ursus (Bear)	1	0.75%	0.40%	0.11%	1 Phalanx
Sylvilagus (Cottontail)	1	0.75%	0.40%	0.11%	1 L Radius
Lepus/Leporidae	10	7.46%	4.05%	1.11%	2 R Innominate
Citellus beecheyi (California Ground Squirrel)	5	3.73%	2.02%	0.56%	1
Sciurus/Sciuridae (Squirrel)	41	30.60%	16.60%	4.56%	4 R Calcaneus
Mus	1	0.75%	0.40%	0.11%	1 L Humerus
Scapanus (Mole)	1	0.75%	0.40%	0.11%	1 R Tibia
Thomomys (Pocket Gopher)	1	0.75%	0.40%	0.11%	1 R Mandible
Rodentia	4	2.99%	1.62%	0.44%	1 L Tibia
Aves					
Aix Sponsa (Wood Duck)	1	1.96%	0.40%	0.11%	1 R Tibiotarsus
Anas platurhynchos (Mallard)	1	1.96%	0.40%	0.11%	1 L Carpometacarpus
Anas	22	43.14%	8.91%	2.44%	2 R Humerus
Aythya collaris (Ring Neck Duck)	3	5.88%	1.21%	0.33%	2 R Ulna
Anserini (Goose)	1	1.96%	0.40%	0.11%	1 R Tibiotarsus
Anatidae	10	19.61%	4.05%	1.11%	1 L Coracoid
Callipepla (Quail)	1	1.96%	0.40%	0.11%	1 L Tarsometatarsus
Pica (Magpie)	2	3.92%	0.81%	0.22%	1 L Tibiotarsus
Sturnidae (Starling)	4	7.84%	1.62%	0.44%	1 R Tibiotarsus
Turdus migratorius (American Robin)	4	7.84%	1.62%	0.44%	1 R Carpometacarpus
Corvus corax (Common Raven)	1	1.96%	0.40%	0.11%	1 L Coracoid
Cathartes aura (Turkey Vulture)	1	1.96%	0.40%	0.11%	1 L Scapula

Table A.3. Phase II Fauna (Cont.).

Genus / Species	Number of Elements Present	Percentage of Phase II Mammal	Percentage of Phase II Total	Percentage of Feature 157 Total	MNI
Fish					
Pogonichthys macrolepidotus (Sacramento Splittail)	9	14.52%	3.64%	1.00%	1
Gillichthys mirabilis (Longjaw Mudsucker)	4	6.45%	1.62%	0.44%	1
Oncorchynchus sp. (Pacific Salmon + Trout)	1	1.61%	0.40%	0.11%	1
Cyprinidae (freshwater fishes)	28	45.16%	11.34%	3.11%	2 Ultimate Vertebra
Actinopterygii (ray-finned fishes)	18	29.03%	7.29%	2.00%	1
Cypriniformes (ray-finned fish)	2	3.23%	0.81%	0.22%	2 L Tripus

Table A.4. Phase III Fauna

Genus / Species	Number of Elements Present	Percentage of Phase III Mammal	Percentage of Phase II Total	Percentage of Feature 157 Total	MNI
Mammal					
Bos taurus (Cow)	65	40.37%	28.14%	7.22%	3 R Metacarpal
Odocoileus hemionus (Mule Deer)	1	0.62%	0.43%	0.11%	1 R Ulna
Sylvilagus (Cottontail)	1	0.62%	0.43%	0.11%	1 R Humerus
Lepus/Leporidae	7	4.35%	3.03%	0.78%	2 R Radius
Citellus beecheyi (California Ground Squirrel)	10	6.21%	4.33%	1.11%	2 L Calcaneus
Sciurus/Sciuridae (Squirrel)	42	26.09%	18.18%	4.67%	4 L Tibia
Mus	11	6.83%	4.76%	1.22%	3 L Femur
Muroidea (Rats, Hamsters, etc)	1	0.62%	0.43%	0.11%	1 R Tibia
Geomyidae (Gopher)	1	0.62%	0.43%	0.11%	1 L Femur
Scapanus (Mole)	1	0.62%	0.43%	0.11%	1 L Femur
Thomomys (Pocket Gopher)	1	0.62%	0.43%	0.11%	1 R Mandible
Rattus	1	0.62%	0.43%	0.11%	1 R Humerus
Rodentia	19	11.80%	8.23%	2.11%	3 R Innominate
Aves	161				
Aix Sponsa (Wood Duck)	6	11.11%	2.60%	0.67%	1 R Carpometacarpus
Anas carolinensis (Green Winged Teal)	2	3.70%	0.87%	0.22%	1 L Scapula
Anas	25	46.30%	10.82%	2.78%	4 L Coracoid
Anatidae	6	11.11%	2.60%	0.67%	1 L Tarsometatarsus
Sturnidae (Starling)	1	1.85%	0.43%	0.11%	1 R Femur
Turdus migratorius (American Robin)	12	22.22%	5.19%	1.33%	1 R Coracoid
Megascops kinnicotti (Western Screech Owl)	1	1.85%	0.43%	0.11%	1 R Tibiotarsus
Strigidae (Owl)	1	1.85%	0.43%	0.11%	1 R Radius
Fish	54				
Embiotocidae (Surfperch)	2	12.50%	0.87%	0.22%	1
Catostomus occidentalis (Sacramento Sucker)	2	12.50%	0.87%	0.22%	1
Cyprinidae (freshwater fishes)	7	43.75%	3.03%	0.78%	1
Actinopterygii (ray-finned fishes)	4	25.00%	1.73%	0.44%	1
Cypriniformes (ray-finned fish)	1	6.25%	0.43%	0.11%	1

Table A.5. Feature 157 Cattle Body Part Representation

Element	Number of Elements Present	Percentage of Total
2nd + 3rd Carpal	1	0.57%
Accessory Carpal	4	2.27%
Astragalus	5	2.84%
Calcaneus	2	1.14%
Caudal Vertebra	2	1.14%
Cervical Vertebra	5	2.84%
Cranium	2	1.14%
Femur	8	4.55%
First Phalanx	19	10.80%
Fourth Carpal	5	2.84%
Fused 2nd and 3rd Tarsal	1	0.57%
Humerus	1	0.57%
Incisor	2	1.14%
Intermediate Carpal	3	1.70%
Lateral Malleolus	2	1.14%
Lumbar Vertebra	1	0.57%
Mandible	4	2.27%
Metacarpal	5	2.84%
Metapodial	2	1.14%
Metatarsal	2	1.14%
Molar	2	1.14%
Naviculo-Cuboid	3	1.70%
Patella	7	3.98%
Premolar	1	0.57%
Proximal Sesamoid	3	1.70%
Radial Carpal	3	1.70%
Radius	6	3.41%
Rib	6	3.41%
Sacrum	1	0.57%
Scapula	7	3.98%
Second + Third Carpal	1	0.57%
Second + Third Tarsal	1	0.57%
Second Phalanx	20	11.36%
Second Premolar	1	0.57%
Sesamoid	1	0.57%
Sternum	1	0.57%
Third Phalanx	13	7.39%
Thoracic Vertebra	11	6.25%
Tibia	2	1.14%
Ulna	6	3.41%
Ulnar Carpal	4	2.27%