BIGHORN SHEEP RITUAL IN NORTHEAST CALIFORNIA:
AN EXAMINATION OF THE LOYALTON
ROCKSHELTER CACHES

A Thesis
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to the Faculty of
California State University, Chico

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in
Anthropology

by
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BIGHORN SHEEP RITUAL IN NORTHEAST CALIFORNIA:
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by

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Fall 2015

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ABSTRACT

BIGHORN SHEEP RITUAL IN NORTHEAST CALIFORNIA:
AN EXAMINATION OF THE LOYALTON
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Master of Arts in Anthropology
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Until recently, zooarchaeological research has focused almost exclusively on optimal foraging models and aspects of diet reconstruction. While the economic utility of an animal is an important part of interpreting an archaeofaunal assemblage, cultural beliefs also impact the structure of diet and use of animal resources, thereby significantly affecting the types and frequencies of animals present. The faunal remains associated with the Loyalton Rockshelter exhibit ritual features in prehistoric northeast California that highlight the need for analysis beyond utilitarian explanation. Caches of bighorn sheep crania at the site illustrate the importance of the animal to the Native populations who intermittently occupied the rock shelter from the Middle through Late Holocene. The unusual presence of fetal remains demonstrates the imitation of a classical understanding of prehistoric procurement practices and ritual activities. Through an
integration of ethnographic information, native oral tradition, and archaeological
evidence, this thesis presents the unexplored ceremonial significance of bighorn sheep to
prehistoric populations nor northeast California.
CHAPTER I

INTRODUCTION TO RITUAL AND THE HUMAN-ANIMAL RELATIONSHIP

The Caches at Loyalton Rockshelter

Loyalton Rockshelter is an archaeological site situated in Sierra Valley, a basin on the western flanks of the Sierra Nevada in northeastern California. Originally excavated in 1959 by Norman Wilson of Sacramento State College, the site contains a wide range of prehistoric cultural material, including projectile points, grinding stones, and an expansive collection of faunal remains. Loyalton Rockshelter is important because it is one of the few sites to be investigated in Sierra Valley. As such, the cultural materials provide significant archaeological information about northeastern California and the prehistoric inhabitants of Sierra Valley.

Excavations of Loyalton Rockshelter revealed five cache pits containing the cranial and vertebral remains of multiple adult and fetal bighorn sheep. Radiocarbon dates indicate that the bighorn sheep crania were deposited over 500 years ago. In addition to the features containing cranial elements, another cache contained bone pins and a sandstone pipe bowl. Wilson (1963:63-65) suggests that the special disposal or preferential treatment of the cranial elements, in addition to the pins and pipe bowl, is associated with prehistoric hunting ritual or shamanistic activities.
Other bighorn cranial features have been uncovered throughout eastern California and the Great Basin. At the Rose Spring site (CA-INY-372) in Inyo County, California, for instance, a bighorn ram skull was uncovered atop a rock cairn. Yohe and Garfinkel (2012) think the shrine-like feature represents a prehistoric manifestation associated with the Coso Representational Rock Art Complex. In eastern Utah, a bighorn headdress was recovered from a rock crevice near the Green River, and in northwestern Nevada, a bighorn sheep ram skull was uncovered at the center of a prehistoric house floor. These anomalous deposits of bighorn sheep skulls in the West are have been linked to significant prehistoric ritual practices and may be part of a broader theme of bighorn sheep ceremonialism in Numic speaking cultures (Yohe and Garfinkel 2012).

Unlike other bighorn sheep cranial caches that have been found in the American West, Loyalton Rockshelter contains both adult and fetal cranial elements. An examination of the unique distribution of both age and sex in the Loyalton Rockshelter bighorn caches will significantly contribute to our general understanding of prehistoric behavior in the West.

Purpose of Study

The purpose of this study is to examine zooarchaeological evidence for ritual use of animals, particularly bighorn sheep, in the American West. Until recently, the study of ritual in zooarchaeology has generally been a neglected topic of study. This thesis hopes to advance our understanding of the prehistoric ritual use of bighorn sheep in northeastern California and the western Great Basin.
The focus of this study will be on the set of caches uncovered at Loyalton Rockshelter in Sierra Valley, California, containing the cranial remains of multiple adult and fetal bighorn sheep. While these cache features are consistent with the larger trend of bighorn sheep ritual deposits throughout western North America, the presence of fetal cranial remains is unique to the region and may offer an alternative account of prehistoric behavior and ideology in eastern California and the western Great Basin.

Not only is Loyalton Rockshelter significant in regards to the bighorn cranial caches, it is one of the few sites to be investigated in Sierra Valley. As such, the cultural materials provide significant archaeological information about northeastern California and the prehistoric inhabitants of Sierra Valley.

The research presented in this thesis represents a multidisciplinary approach to the identification and interpretation of prehistoric ritual activity in the zooarchaeological context. Archaeological and biological methods will be applied in tandem with ethnographic literature, historic documentation, and current indigenous perspectives to examine the faunal material excavated from Loyalton Rockshelter in an attempt to understand the ritual use of both adult and fetal bighorn sheep at the site. Results from radiocarbon dating of both the caches and the stratigraphic deposits will contribute to our understanding of site occupation. The results from this research are important to addressing questions regarding prehistoric ritual in the American West.

Ritual in Anthropology

Ritual is an incredibly broad and intangible concept and is often one of the most allusive and inaccessible aspects of culture (Russell 2012). In anthropology, ritual is
often studied as a separate category of human culture, generally contrasted against secular or utilitarian actions (Brück 1999; Insoll 2004; O’Day et al. 2004). The category of ritual serves to separate certain human behaviors into approachable divisions that can be studied through Western modes of investigation and analysis. Studying ritual as a separate category proposes a strict separation between ritualized behaviors and everyday life. Belief systems and ideology, however, often inform and direct secular life, just as much as economic and ecological factors (O’Day et al. 2004; Russell 2012), and a multidisciplinary approach to prehistoric belief systems allows us to access the unique worldview of past societies.

Recently, both New World and Old World archaeologists have directed investigations toward deciphering the role of ritual in social systems, acknowledging that people’s behavior is as much directed by economic and ecological constraints as social mechanisms, including religion, status, or ideology in general. Thus, we should consider ritual practices as rational actions within the particular worldview people had in the past.

In archaeology, ceremonial and ritual activities are generally difficult to decipher. Often ‘ritual’ is used to as a catch-all to explain odd or otherwise unknown behavior of prehistoric people (Brück 1999; Hodder 1982; Insoll 2004). The problem with assigning an artifact or feature as a manifestation of ‘ritual’ is that archaeologists run the risk separating ritual actions from practical or rational behaviors associated with ecology and economy. Ritual is not a category recognized in all cultures, and the identification and isolation of ritual is based on contemporary ways of knowing.

Due to the unique relationship that many cultures have with animals, the specialized treatment of faunal remains may inform and broaden our understanding of a
culture’s worldview and general ideology. Ethnographic literature provides some insight into the ceremonial use of animals, and petroglyphs are one of the few artifact categories that are frequently referenced to explain this element of society.

In the zooarchaeological record, ritual practices are often represented by unique variations in depositional processes. Hunters may remove the head of an animal as a trophy or use it to construct a shrine. Certain animals may be sacrificed and included in human burials as an offering to the dead. Animal bones have been found directly linked to the construction of buildings, either creating the structure, used for decoration, or included for its symbolism. These examples are all practices that demonstrate a symbolic or ritual importance of animals beyond their role in human diet. Based on this concept, all human practices are ritualized. However, to examine ritual we must recognize the human practices that may place animals in a more significant role, elevating them above their economic value. Russell (2012:54) identifies four human practices that place greater symbolic emphasis on animals: “special disposal practices, trophies, animal parts in apparel and architecture, and animals and animal parts included in burials.”

Each ritual practice would have a skewing effect on the taxa and elements represented in the faunal assemblage and throughout the archaeological record (Russell 2012:58). Recognizing these types of specialized deposits is essential to understanding animals in ritual and the cultural categories that shaped them. There is no doubt that much information about ritual has “been lost because special deposits and structured deposition have not been recognized, recorded, or separated for analysis” (Russell 2012:79).
Thesis Organization

This thesis will be organized into eight chapters. Chapter I has provided an overview of the research topic and why an assessment of ritual activity is important in the study of prehistoric peoples.

Chapter II: Ritual, Archaeology, and Animals, will provide the theoretical framework on which this study is based. This chapter will examine post-processual approaches to the study of animal remains, illustrating the need to examine the human-animal relationship not from opposing theoretical perspectives but considering both culture expression and economic utility. A discussion of social zooarchaeology will focus on concepts of animals as symbols and in ritual activities. Finally, this chapter will introduce a method for identifying ritual in the zooarchaeological context. This will be employed to systematically and objectively evaluate bighorn sheep deposits found throughout the West and establish a set of expectations for this research.

Chapter III: The Environment and Archaeology of Sierra Valley, will provide the natural and archaeological background of the study area. The first section of this chapter will provide the environmental background of Sierra Valley, as well as the natural history of bighorn sheep in the western Great Basin and Sierra Valley. The second section of this chapter will examine the prehistory and archaeology of Sierra Valley, including a brief review of Numic expansion.

Chapter IV: The Washoe: Ethnographic Background will examine ethnographies of the Washoe culture, focusing primarily on diet, hunting, shamanism, and ritual activities. This section will also examine the research area, Sierra Valley, in terms of the ethnographic data.
Chapter V: Loyalton Rockshelter: History, Methodology, and Stratigraphy, will introduce Loyalton Rockshelter as an archaeological site, discuss Wilson’s excavation and collection methods, and explore aspects of the assemblage that will be examined for this research. This chapter will summarize the original excavation results along with the ongoing research at California State University, Chico.

Chapter VI: Methods and Results: Report of Faunal Remains from Loyalton Rockshelter, will discuss the methodology utilized to examine the Loyalton Rockshelter faunal assemblage and present the results of the analysis, providing a taxonomic overview of the general assemblage.

The Loyalton Rockshelter bighorn sheep caches will be examined in detail in Chapter VII: The Caches: Taxonomic Overview and Radiocarbon Dates. This chapter will provide details about how the author reconstructed bighorn sheep caches from the curated archaeological collection. The results from faunal analysis of the reconstructed caches will also be provided in this chapter, as well as an outline of the elemental distribution of bighorn sheep within the caches. In addition, the sampling strategy and results from AMS radiocarbon dating will be reported.

The final chapter, Chapter VIII: The Use of Faunal Remains in Ritual will examine the Loyalton Rockshelter caches based on the data provided from the previous chapters. This chapter will also revisit the research questions and provide a discussion and conclusion to the findings. Limitations to the study, as well as avenues for future research will be discussed.
CHAPTER II

RITUAL, ARCHAEOLOGY, AND ANIMALS

Introduction

The anthropological theory behind prehistoric ritual in North America is a recent topic of zooarchaeological interest. While there has been a copious amount of research conducted on the economic role of animals in prehistoric North America, the social and symbolic interpretations of the human-animal relationship has received less attention (Insoll 2004; Reitz and Wing 2008; Russell 2012). The study of faunal remains has been routinely incorporated into archaeological interpretations for the past 50 years (Reiz and Wing 2008). These studies have often centered on the ecological and economic role of animals in prehistory, taking what is known as the processual approach to archaeological interpretation. Through the processual paradigm, or New Archaeology, archaeologists studying food-ways often focus on the functional and economic use of animals, such as herd management strategies, animal exploitation patterns, and the use of secondary products, rather than considering a possible social reasoning which could similarly structure animal exploitation and thus generate the resultant faunal assemblage (Insoll 2004). In the research environment of processual archaeology, the ability to prove and categorize (perceived) non-functional deposits made the study of ritual activity less interesting and rarely pursued.
Theoretical paradigm shifts in the 1980s and 1990s brought attention to the limitations of objective scientific inquiry of processual archaeology. Archaeologists interested in the prehistoric human-animal relationship began to use what is now known as the post-processual perspectives to study the social context of animals in prehistoric cultures. The post-processual approach incorporates concepts of the subjectivity of knowledge, individual agency, and indigenous perspectives, while recognizing the biases of anthropological research (Insoll 2004:77; Trigger 2006:386). This approach acknowledges that ritual and other social factors are potentially key features in structuring diet and animal use. The post-processual paradigm revitalized the study of ritual and demonstrated the importance of studying animals in terms of their symbolic and structural importance to human society.

This thesis takes a post-processual approach to the study of archaeofaunal remains, particularly the examination of the Loyalton Rockshelter bighorn sheep cranial caches. While much of the faunal identification procedures are rooted in processual archaeology, this research focuses on the social element of animals in culture, especially their place in prehistoric ritual activities. Therefore, this thesis does not deny the economic utility of animals but explores the cultural meaning of animals in their symbolic and ritual contexts to address prehistoric human behavior as evidenced in the zooarchaeological record.

This chapter will explore aspects of human culture where animals and animal products act as symbols and function in ritual activities. Because so much research has been completed outside of the study area, this chapter will not be limited in geographic scope but incorporate examples of animal symbolism and ritual throughout the world.
The first section of this chapter will emphasize the theoretical perspectives underpinning this thesis research by examining the concept of ritual and the theoretical perspectives that have influenced the way anthropologists approach the topic. The definition of ritual, as it is used in this thesis research, will be provided in this section.

The Animals as Symbols section will briefly examine the ways in which humans assign meaning to certain animals and bone elements. This section does not necessarily provide an exhaustive discussion of animal symbolism, but addresses concepts pertinent to this thesis research.

Ritual, Animals, and Archaeology will examine how ritual is expressed by the preferential treatment and special disposal of animals, and how these activities can be recognized in the archaeological record. Building on the generalized traits of the special disposal of animals in ritual, evidence for bighorn sheep ritual in the American West will be reviewed in the next section. These examples will provide the context for the symbolic importance and ritual activities associated with bighorn sheep in this research.

The next section, Identifying Ritual through Zooarchaeology, will describe and discuss various zooarchaeological methods used for identifying and interpreting ritual deposits. Characteristics developed by Reitz and Wing (2008) to identify ritual animal use will be introduced and evaluated. The author has adapted this list of ritual characteristics to create a systematic and objective method for evaluating zooarchaeological deposits for the presence of ritual animal use. This method will be used to evaluate the Loyalton Rockshelter bighorn sheep cranial caches.
What is Ritual?

The concept of ritual is complex and multifaceted and has been defined by others to encompass a broad range of human and animal behaviors. Ritual is often perceived as the physical manifestation of ideology and symbolic relationships (Muir and Driver 2004). The purpose of ritual varies between cultures and might be used for religion, magic, social interaction, maintaining traditions, education, upholding hierarchies, or the projection of power.

The abstract nature and complexity of ritual presents obvious difficulties when studying the topic. One of the problems facing the study of ritual in anthropology is that ritual behavior is often contrasted against secular or economic actions (Brück 1999; Insoll 2004; O’Day et al. 2004). Ritual has come to be defined by its opposition to the secular sphere, much like the dichotomy of sacred-profane, culture-nature, mind-body, and subject-object. These dualisms are often separated from each other and studied independently. Brück (1999:317) argues that the separation of ritual from practical and technological activities (or any of the analogous dualisms) in anthropological and archaeological study is a “product of Western post-Enlightenment rationalism in which a scientific logic is prioritized as the only valid way of knowing the world.” Since the Enlightenment, Western scientific thought has prioritized the concept of a set of laws of causation where the mechanical link between cause and effect can be observed and tested. Post-Enlightenment science values objective functionality and practicality. Because no intrinsic means-end relationship can be recognized, post-Enlightenment science often describes ritual as a non-functional, irrational action. This definition creates an opposition between rational, or practical acts, and ritual acts. These scientific values
are prevalent in processual anthropology. As discussed in the introduction to this chapter, processual anthropology significantly favored economic, or ‘rational,’ interpretations over the religious or symbolic explanations of cultural behavior.

While ritual continues to be studied as a separate category, contrasting voices have risen in recent years advocating for a contextual interpretation of ritual (Bradley 2005; Brück 1999; Insoll 2004). Instead of labeling certain practices visible in the archaeological record as irrational ritual behavior with no actual consequences, archaeologists should consider these practices as rational actions within the worldview of the culture (Brück 1999; Insoll 2004). In anthropology, it is essential to consider the unique worldview of past societies and how their beliefs and ideology might have structured the secular and economic tasks of everyday life. Instead of assigning our own categories of thought and labeling perceived ritual objects or features as irrational and non-functional, anthropologists should consider how both functional and social aspects of life coexist, interact, and influence each other. Ritual and symbolism should not be considered simply one aspect of life but rather a lens in which the whole world and human life is perceived (Insoll 2004). “Ritual is thus not set apart from daily life, but is an integral part of it, and people often attach ritual meanings to the practical actions of their daily life” (Äikäs et al. 2009:110).

For this research, ritual will be defined simply as the “physical expression of symbolic relationships and spiritual beliefs through formal behavioral routines” (Muir and Driver 2004:128). The definition of ritual used for this thesis research also assumes that ritual practices are rational activities as seen in the worldview of the culture of study. Because many aspects of prehistoric life in Sierra Valley could be described as
‘ritualized,’ the author will focus primarily on those ritual behaviors that should be most apparent in the zooarchaeological record. These include both large scale communal events and smaller scale private rituals.

Because symbolic meaning and ritual activities vary so broadly cross-culturally, the meaning behind ritual can be difficult, if not impossible, to understand precisely. Walker (1998) argues that cultural deposits resulting from ritual activities, whatever their function or meaning, have the potential to be distinguished from other types of human activity based on the particular depositional patterning or context. While accessing the meaning behind ritual may not be plausible, archaeological and analytical methods have the potential to differentiate animal remains used in ritual activities from archaeofaunal remains resulting from other types of human behavior. These methods will be discussed in the section, *Identifying Ritual through Zooarchaeology*, later in this chapter.

**Animals as Symbols**

Animals and animal parts figure prominently in social life independent from their role as food. Animals can act as symbols for cultural groups or social status, or symbolize a connection between humans and the spiritual, cultural, or natural world. Accessing the symbolic meaning of an animal or animal part can be difficult, especially because much of the symbolic content of animals leaves no distinctive archaeological evidence. Generally, animals are used as basic metaphors for the human world; their traits used to indicate status, ethnicity, belief systems, etc.
Humans have long used animals as metaphors. We have used animal metaphors as either positive or negative metaphors to understand and explain ourselves and each other. The production of animal metaphors also varies due to social structure and subsistence strategies. As Russell (2012:13) describes, foragers, farmers, pastoralists, ranchers, and those living in urban societies all construct animal metaphors differently because they all experience animals in different ways. For example, foragers see themselves as equal to animals, and their metaphors are often totemic, with each species representing different human groups (Russell 2012:13).

Depending on the cultural perspective of a particular animal, the consumption of certain animals or animal parts often carries great symbolic importance and could denote to social status or ethnicity. Other animals might be consumed based on their culturally perceived medicinal value. The consumption of fetal or young animals in some cultures can represent heightened social status, or the ingesting of youth and vitality with the consumer taking on those traits of the young animal (Reitz and Wing 2008:280). For example, in China, fetal pangolins, when cooked and served in a soup, are believed to increase men’s sexual stamina (Sopyan 2008). In India, kutti pi is an Anglo-Indian culinary dish consisting of goat fetus and is considered a delicacy. Kutti pi is also considered to have medicinal values, especially for pregnant women. Even though both parent cultures consider the consumption of fetal meat taboo, the dish continues to be a delicacy and only eaten when an unknowingly pregnant goat has been slaughtered. Fetuses have also been described as symbolizing youth and sexual vitality.

Animal symbols and representations are often depicted in art. While the term “art” may not be applied to most societies, it will be used here to refer to any type of
animal representation. Animal representations can be a useful tool for zooarchaeologists to access unique aspects of past human-animal relationships. The appearance of extinct animals, for instance, has been gathered from prehistoric rock art (Zeuner 1953). Additionally, many depictions of animals are thought to represent the illustrator’s intimate knowledge and understanding of the animals (their ecology, behavior, seasonality, mating schedule, etc.) (Matheny et al. 1997). There is no clear relationship between art and subsistence. Just because a certain taxa are found in art does not mean that they were the focus of subsistence strategies. For example, in the upper Paleolithic of Western Europe, bison and horses are some of the most common forms in animal depictions, but red deer and reindeer remains make up most faunal assemblage (Mithen 1988). Additionally, the purpose of art and animal depictions is often disputed. The depictions may symbolize a hunting rite or visual prayer or reflect a hunting event that occurred in the past (Yohe and Garfinkel 2012:210).

These are just a few examples of how animals are used as symbols. Juxtaposing symbolic representations of animals and zooarchaeological evidence leads to a deeper understanding of the symbolic role of animals in past cultures.

Ritual, Archaeology, and Animals

Because of animals’ symbolic value, animals often play a key role in human rituals. In most cultures, ritual “practices give animal remains significance beyond consumption waste” (Russell 2012:54). The following discussion will examine special disposal practices, particularly hunting rituals and trophies, and how these practices may affect the zooarchaeological assemblage.
Hunters often believe they have a relationship of reciprocity with their game or animal spirits. For many hunting cultures, animals are believed to give themselves to the hunter, and out of respect toward the individual animal or the animal spirit, and continued hunting success, the skeletal remains are given special treatment (Hamayon 1990:397-400). In the Washoe culture, after processing the meat and the bones, the skeletal remains of deer are submerged in a streambed so that scavengers cannot disturb the animal spirit (Downs 1966:30). Similarly, the Swampy Cree of northern Quebec, hang skulls, feet, skins, and ears of game animals, partly to show respect for the animal, but also to keep the remains out of reach from scavenging dogs or away from women (Preston 1964). In many cultures, the animal skull is considered a sacred bone and either protected, or exposed of, with special care (Thildervisk 2013).

Hunters will sometimes collect trophies: a symbol of their triumph in hunting. Just as a warrior will bring back weapons of the enemy, hunters value animals’ defenses (antlers, horns, tusks). Hunters will also collect the entire skull or the skin or hide of the animal as a trophy. Animal trophies display a hunter’s skill and success, and often impart a sense of prestige while boosting an individual’s status. Displaying animal trophies is an extension of the respectful treatment of game animals, as described earlier, but exhibiting trophies also conveys the power and importance of the animal to the individual or culture. We often associate hunting trophies with sport hunting, where exotic skulls, large horns, and antlers are displayed on the walls of hunters’ homes. The taxa, age, and sex of animal is generally biased toward adult males of larger species. Hunting trophies are also found among subsistence hunters, but the pursuit of trophies does not always shape or encourage special hunting. In the Pacific, particularly New Guinea, trophy displays are
extremely prevalent. Houses are often adorned with the skulls and mandibles of mammalian prey (Bulmer 1976). These collections of bones are protected from weathering and scavengers. Interestingly, when the house is abandoned, the collection is left as well (Bulmer 1976).

Skulls and other symbolic bones are sometimes grouped together and left as special deposits or caches. These features are often associated with hunting rituals and considered to be hunting shrines (Bement 1999; Frison 2004). Unlike trophies, shrines are not associated with an individual hunter, but are tied to a collective idea, belief, or identify (Russell 2012). Often hunting shrines are tied to societies that relied on hunting for their subsistence, and these shrines may represent a formalized expression of animal respect, as discussed earlier. Shrine-like features are widespread in Mesoamerica, and as Russell (2012:61) explains:

Hunters curate certain bones or other body parts in their houses and periodically deposit them in ritual caches at hunting shrines outside the settlements. These shrines are typically associated with rocky features, apparently tied to a belief that the animal guardian spirits live in mountain caves. However, not all skeletal remains are deposited in these shrines. Only medium to large wild animals are represented, and all shrines exhibit a selection of body parts. Although the particular body parts vary somewhat among shrines, cranial remains feature predominantly at most.

Paleoindians on the North American Plains engaged in collective hunts of bison, pronghorn, and bighorn sheep. Collections of skulls of some of the animals killed have been found to be decorated and associated with ritual-like structures (Bement 1999).

Animal bones, feathers, hides, and other parts are often incorporated into costumes or used as ritual paraphernalia. These parts can be worn every day, either displayed, or concealed. Although these amulets are often associated with burials
(discussed below), they can be found in other contexts. The power ascribed to amulets and ritual paraphernalia is believed to bring good luck and protection (Tanner 1979:140-1). Hunting charms are a common category of amulets. Hunters often carry special plant and animal parts that are believed to protect them from the spiritual and physical dangers associated with hunting (Russell 2012:86). A number of Native North American cultures carried bundles that contained various powerful objects believed to aid in hunting, war, agriculture, healing, or love. As will be discussed in the upcoming ethnographic chapter, shamans, and other religious and spiritual advisors, often work with a specialized toolkit. Shamans’ paraphernalia is somewhat diagnostic in the western Great Basin, and includes pipes and pipe bowls, charm stones, and quartz crystals (Elsasser 1961).

Ritual is ubiquitous and found in almost every culture, and animals often play a key role in ritual activities. The practices listed above outline some of the common types of special disposal practices that often elevate animal remains beyond their significance as consumption waste. To archaeologists, the specialized disposal or preferential treatment of animal bones is often related to ritual behavior. As shown above, skulls appear to play a key role in ritualized disposal. Keeping these practices in mind, the next section will look more closely at the archaeological evidence for the special disposal of bighorn sheep skeletal, especially cranial, remains in the American West.

Bighorn Sheep Ritual in the Western United States

In the American West, archaeological evidence suggests that bighorn sheep played a significant role in prehistoric ritual and ceremonial life. While the complexity and abstract nature of ritual activities varies among cultures, bighorn skulls and horns
appear to be a common symbol in prehistoric Great Basin archaeological deposits (Yohe and Garfinkel 2012).

Spanish explorers were some of the first to document the use of bighorn sheep in the West. In historic times, mule deer provided the most useable meat, however bighorn sheep steadily became a more important meat source. Spanish Captain Juan Mateo Manje recorded in 1697 huge piles of bighorn sheep skulls and horns in the Phoenix Basin, and in a 1774 diary entry, Juan Bautista de Anza noted similar features along the Gila River in the O’odham and Yuman territories in southern Arizona (Jacobs 2010; Yohe and Garfinkel 2012). De Anza noted that the horns were piled in specific locations to “control the wind and prevent the air from leaving that place” (Bolton 1930). Recent ethnographic research (Rea 1998) of Pima and Tohono O’odham beliefs has shown a strong spiritual relationship between bighorn sheep to the wind. Hayden (1985), Woodward (1931), and Haury (1976) have considered these massive accumulations of bighorn skulls and horns part of the “Bighorn Sheep cult” of the Hohokam (Jacobs 2010).

Excavation at the Rose Spring Site (CA-INY-372), a site west of the Coso Range in Inyo County, California, uncovered a rock cairn topped with the partial remains of a bighorn ram skull with attached horn cores. Based on the dimensions of the horn cores, the bighorn cranium was judged to be a mature adult male, approximately 4 years old. A Humboldt Basal-notched obsidian projectile point was found only 50 cm from the bighorn feature and archaeologists (Yohe and Garfinkel 2012:205) think it was deposited contemporaneously with the use of the bighorn feature. Radiocarbon dates associated with the feature are 1,360±70 and 1,400±50 RCYBP. Yohe and Garfinkel (2012) believe
the shrine-like feature is not associated entirely with subsistence activities but represented a prehistoric manifestation associated with the Coso Representational Rock Art Complex.

In northwest Wyoming, a fragment of a bighorn sheep skull was uncovered from a rock alignment in Mummy Cave (48PA201). This large rockshelter site is situated on the banks of the North Fork of the Shoshone River and contained, what appeared to be, a 1.8 meter-long rock alignment constructed of three stone slabs. Radiocarbon dates from nearby features have dated this site to about 8,800 B.P. Archaeologists (Husted and Edgar 2002) have suggested that this rock and bighorn skull feature may have been a shrine.

In eastern Utah, a bighorn sheep headdress was recovered from a rock crevice on the eastern edge of the San Rafael Swell near the Green River (Yohe and Garfinkel 2012:207). Yohe and Garfinkel (2012:207) describe have described the feature:

The headdress was found in two pieces, with drilled holes in the cranium and a leather headband attached. Six *Olivella* shell beads were scattered around the band but are not attached to it. The sheep horns had been divided in half to minimize their weight and were sewn directly to the skull to ensure permanent attachment. The *Olivella* beads were most likely originally attached to the headdress and the regalia may have been used with the accompanying animal hide hood.

The *Olivella* beads were drilled and split longitudinally, matching the split-punched form type. This type is chronologically diagnostic and dates to ca. A.D. 1050-1150 (Phase M5c in King’s [1990] southern California sequence). Based on this timeframe, the headdress may be associated with early Shoshone or Gosute cultures, since the Fremont expression had been declining. The headdress is currently housed at the Prehistoric Museum at the College of Eastern Utah, in Price, Utah.
In Dry Valley, north of Reno, Nevada, a bighorn sheep ram skull, with attached horns, was uncovered at the center of a Mid-Archaic house floor in a village site (26WA2460) (Morgan et al. 2014; Yohe and Garfinkel 2012). Two complete projectile points were found in association with the cached bighorn skull. Radiocarbon dating throughout the village site returned ages ranging between 3,700 and 2,800 cal. B.P. Young et al. (2009) hypothesize that this feature and associated artifacts were used to demonstrate and project a hunter’s prestige to the rest of the group.

Bighorn atlas vertebrae (C1) have been uncovered during excavations at Nopah Cave (Sutton and Yohe 1987), just east of Death Valley, and Creation Cave (Sutton 2001), a site within Tomo Kahni State Historic Park in the Tehachapi Mountains of eastern California. The atlas from Creation Cave was burned and dated to the late prehistoric era in California (A.D. 600-historic contact). The atlas of bighorn sheep is important in Numic origin stories and may be related to ritual activities in association with origin traditions (Yohe and Garfinkel 2012:208). According to Numic origin stories, “Coyote uses a bighorn atlas vertebrae as a penis sheath in order to copulate with a woman who had a deadly toothed vagina that killed her lovers. Coyote successfully reproduces with the girl and the progeny of their union become the various Numic tribes” (Yohe and Garfinkel 2012:208).

Outside the Great Basin, on the Modoc Plateau in northern California, collections of bighorn sheep skulls were encountered during the first Euro-American explorations of the lava tubes created by the many eruptions of the Medicine Lake Volcano. This area, now known as Lava Beds National Monument and protected by the National Parks Service, contains more than 700 caves and thousands of prehistoric rock
art sites, and was the place of Captain Jack’s famous stronghold during the Modoc War. Bighorn sheep cranial remains were found in two caves, Skull Cave and Ovis Cave. Skull cave contained the bones of pronghorn, mountain goats, the skulls of bighorn sheep, and two human skeletons. Ovis Cave was named for the 36 bighorn skulls found in the cave during Euro-American exploration of the lava tube complex in the 1890s. Information regarding the archaeofaunal contents of these caves is limited and the government agencies managing the land did not have any additional data to contribute to this research. The author’s fiancé, however, while vacationing at Lava Beds National Monument, located the cranium of one adult bighorn sheep at the terminus of Skull Cave.

These archaeological features and isolated skeletal elements that represent special disposal or preferential treatment of bighorn sheep bones provide a context for the symbolic importance of this animal to the indigenous people of the West. Because of its symbolic value, these deposits most likely represent ritual activity associated with the skeletal elements and skulls of the bighorn sheep.

Identifying Ritual through Zooarchaeology

How do archaeologists distinguish between debris deposited as the result of ritual activity and those produced by everyday life? The identification of ritual activities requires that archaeologists distinguish deposits that are the result of ritual activities from deposits associated with more common human behavior (Muir and Driver 2004; Reitz and Wing 2008). Material culture, spatial patterning, and depositional sequences all provide context for distinguishing ritual faunal deposits from the routine use of animals.
Additionally, for many cultures, historical documents or ethnographic records can provide evidence for the ritual use of animals.

Sometimes, however, these contextual features may not be sufficient for identifying ritual. Reitz and Wing (2008:284) compiled a list of criteria to distinguish archaeofaunal deposits that are the result of ritual or ceremonial animal use from those deposits which are the product of common daily subsistence activities. The first section of their list refers to both the physical and ecological characteristics of the identified taxa within an archaeological deposit, as well as cultural perspective of that animal species. The second section of Reitz and Wing’s list relates to the general archaeological deposits and uses specific patterns of the archaeofaunal assemblage to separate ritual animal use from deposits created by more routine activities. Many of the characteristics identifying the ritual use of animals must be compared to secular deposits within the context of the culture. The listed characteristics for the ritual use of animals are not mutually exclusive and a combination of multiple traits can help distinguish ritual animal refuse from common refuse. Characteristics of ritual animal use as defined by Reitz and Wing (2008:285) are:

- The individual taxa deposited as a result of ritual behavior might:
  - exhibit anomalous or atypical behavior
  - be unpredictable
  - be large bodied
  - be available infrequently or for short periods of time
  - be found in only a few locations
  - be present in low numbers
  - be highly mobile
  - be from habitats otherwise seldom utilized
  - be rare or exotic
  - involve risk of personal injury or failure
  - require considerable time to find, pursue, or capture
• require a high degree of skill to acquire
• be costly to acquire in terms of time, energy, or technology
• be satisfying in terms of fat, taste, tenderness, calories, or nutrients
• exhibit behaviors inspiring fear or respect, or embodying admirable attributes
• exhibit unusual features such as bright colors or soft fur
• reinforce social norms, such as the divisions of labor, kinship, political structure, or group identity

 Deposits containing ritually significant animals might:
• exhibit an unusual distribution among animal classes
• contain high quantities of food residue that cannot be explained by preservation
• exhibit an unusual taxonomic ubiquity, richness, diversity, and/or equitability
• contain animals from a higher or lower mean trophic level
• contain an unusual quantity or type of butchering debris
• contain a large percentage of high-quality body parts, often measured as food utility
• be skeletally complete
• exhibit an age and sex distribution weighted in favor of a specific age, class, or sex
• show signs of roasting, ritual sacrifice, or other modifications
• contain human remains

The author has chosen to modify Reitz and Wing’s list of the characteristics of ritual animal use. Characteristics in both sections of Reitz and Wing’s list were reorganized and grouped together based on an animal’s nutritional value, accessibility to an animal, skill to pursue an animal, and a culture’s perception of an animal. Each characteristic in Reitz and Wing’s list was evaluated using these four more basic categories and were then placed into one (or sometimes multiple) category. Grouping the characteristics into distinct categories served to simplify the understanding of each of the characteristics. Incorporating another layer of a hierarchy to the list made the characteristics more accessible and the list more user friendly. Reitz and Wing (2008:285) characteristics of ritual animal use was modified by the author (Figure 1).
I. Characteristics of individual taxa that may be used for ritual behavior might:
   A. Animal’s nutritional value
      - be large bodied;
      - be satisfying in terms of fat, taste, tenderness, calories, or nutrients
   B. Accessibility to the animal
      - be unpredictable;
      - exhibit anomalous or atypical behavior;
      - be available infrequently or for short periods of time;
      - be found in only a few locations;
      - be present in low numbers
      - be highly mobile
      - be from habitats otherwise seldom utilized
      - be rare or exotic
      - require considerable time to find, pursue, or capture;
      - be costly to acquire in terms of time, energy, or technology;
   C. Skill to acquire animal
      - involve risk of personal injury or failure
      - require considerable time to find, pursue, or capture;
      - require a high degree of skill to acquire;
      - be costly to acquire in terms of time, energy, or technology;
   D. Culture’s perception of the animal
      - exhibit behaviors inspiring fear or respect, or embodying admirable attributes;
      - exhibit unusual features such as bright colors or soft fur;
      - reinforce social norms (i.e., divisions of labor, kinship, political structure, or group identity)

II. Patterns of deposits containing ritually-significant animals might:
   A. Animal’s nutritional value
      - contain a large percentage of high-quality body parts, often measured as food utility
   B. Accessibility to the animal
      - exhibit an age and sex distribution weighted in favor of a specific age, class, or sex
      - exhibit an unusual distribution among animal classes
      - contain animals from a higher or lower mean trophic level
   C. Skill to acquire animal
      - be skeletally complete
      - contain animals from a higher or lower mean trophic level
   D. Culture’s perception of the animal
      - contain high quantities of food residue that cannot be explained by preservation
      - show signs of roasting, ritual sacrifice, or other modifications
      - contain an unusual quantity or type of butchering debris
      - contain human remains

Figure 1. Characteristics of ritual animal use adapted from Reitz and Wing (2008).

The two separate sections of the list, the first referring to individual taxa and the second referring to the entire archaeofaunal deposit, were retained in the author’s modified version. These sections are now labeled I and II. In addition, the author labeled
each of the categories alphabetically: (A) an animal’s nutritional value, (B) accessibility to an animal, (C) skill to pursue an animal, and (D) a culture’s perception of an animal.

The categories established by the author for the characteristics of ritual animal use simplify the characteristics and provide order to a once jumbled list. For example, as discussed in previous sections, large-bodied animals are not only nutritionally valuable, they can also hold great cultural importance. In addition, the accessibility to an animal is important and may contribute to an animal’s association with ritual activity. Accessibility to an animal can range from the predictability (e.g., seasonal migrations) or “unpredictability” of an animal’s behavior, to the limiting aspects of population or habitat preference. Sometimes the accessibility to an animal may require a certain skill and knowledge base of the individual or group pursuing the animal. Above all else, a culture must perceive of that individual animal as possessing culturally significant characteristics, which may be a combination of the previous three properties (nutrition, accessibility, or skill).

The next two subsections will provide a detailed description and explanation for the adapted list of ritual animal use. The first subsection will discuss Section I and the characteristics of individual taxa that may be used for ritual behavior. The second subsection will examine Section II and the patterns of deposits containing ritually-significant animals. Both sections will discuss some of the problems the author encountered when using this list, why they pose a problem, and why the list was adapted from its original form.
Section I: Characteristics of Individual Taxa That May Be Used for Ritual Behavior

As described above, the first section of the adapted list separates Reitz and Wing’s ritual characteristics into four basic categories: an animal’s nutritional value, accessibility to the animal, skill to pursue the animal, and a culture’s perception of the animal. The progression from Category A (an animal’s nutritional value) to Category D (culture’s perception of the animal) identifies a scale of how best to measure an animal’s association with ritual activity, and the combination of multiple characteristics within the four categories could distinguish ritual animal refuse from common refuse. For example, a large bodied animal is often not designated as ritually significant, however, if the animal displays other characteristics within the list, it is more likely to be associated with ritual activity (Note: This research does not seek to answer how many characteristics designate the ritual use of animals).

Several of Reitz and Wing’s characteristics appear to be the same (i.e., “exhibit anomalous or atypical behavior” vs. be “unpredictable”), however, the author has interpreted all of these characteristics as defining separate aspects of a culture’s knowledge of an individual taxa. For example, an animal displaying anomalous or atypical behavior is diverging from the culturally recognized or known as ‘normal’ behavior of that animal, while an animal that is unpredictable does not display any standard and habitual type of behavior. Similarly, the category of “be rare or exotic” may be alike “be present in low numbers.” The author has differentiated these categories as representing animals in their native habitat (“be present in low numbers”) versus animals found outside their native habitat ("be rare or exotic").
Several characteristics listed by Reitz and Wing correspond with more than one category as defined by the author. For example, Reitz and Wing suggest an individual taxa deposited from ritual activity might “require considerable time to find, pursue, or capture.” This characteristic bridges categories of accessibility to an animal (B) and the skill required to pursue the animal (C). Reitz and Wing have combined search time with aspects of the prey choice model. Search time is limited to access of an animal, while the pursuit and capture of an animal are contingent on an individual’s skill set and the energetic return or value of an animal. Similarly, Reitz and Wing define an individual taxa deposited from ritual activity might ‘be costly to acquire in terms of time, energy or technology.’ Again, accessibility to an animal (B) and the skill set required to pursue the animal (C) are grouped together to create an imprecise characteristic to define ritual activity. Because these characteristics fit two separate categories, they are represented in each of the categories they represent (B and C) in the author’s adapted list.

Section II: Patterns of Deposits Containing Ritually-Significant Animals

As stated above, the second section of Reitz and Wing’s characteristics of ritual animal use refers to the archaeofaunal deposit as a whole and depositional patterns that may distinguish ritual animal use from more routine activities. In essence, Section II lists the empirical implications of Section I. The characteristics of ritual animal use listed in the Section II correspond mostly with varying distributions of taxa, age, sex, element, or cultural modification within an archaeofaunal assemblage. According to Reitz and Wing, a skewed distribution in favor of one of these categories (taxa, age, sex, element, or cultural modification) may also signal an animal’s role in ritual activities. A skewed
distribution, however, is relative to each culture’s subsistence strategy. It is important to
define what is “normal” in order to determine the “unusual.”

Like Section I, the author has reorganized Reitz and Wing’s characteristics of
ritual animal use. The reorganization of Section II is based on the same basic categories
separating characteristics in Section I. However, because Section II refers to the entire
archaefaulal deposit, the categories designate expected depositional patterns based on the
properties of individual taxa. For example, if an animal is valued for its body size (which
often denotes high nutritional value) (Category A), we would expect an archaefaulal
assemblage to contain a large percentage of high-quality body parts, often measured as
food utility. Similarly, if greater skill is required to pursue an animal associated with
ritual activity (Category B), we could expect an archaeological deposit to contain animals
from a higher or lower mean trophic level. For this example, the mean trophic level is
determined by the culture’s average subsistence strategy. In most hunter-gatherer
societies, carnivores and apex predators (e.g., cougar or wolf) would be considered higher
than the mean trophic level. Using the author’s established categories, Section II provides
a predictive model for the depositional pattern of animal bones based on an animal’s
perceived nutritional value, availability, if an animal is difficult to pursue, and how a
culture perceives the animal.

As in Section I, Section II contains characteristics that share similar
descriptions. For example, Reitz and Wing (2008:285) suggest deposits containing
ritually-significant animals might: “exhibit an unusual taxonomic ubiquity, richness,
diversity, and/or equitability” and “exhibit an unusual distribution among animal
classes.” These characteristics both suggest a ritual deposit can contain an unusual
distribution of taxonomic variation. Because of the overlap in descriptions, the author has chosen to retain only one characteristic designating a patterned assemblage containing a diverse or unique collection of taxa.

Feasting activities would also have a skewing effect on the archaeofaunal assemblage. Feasting can be used or associated with status and power, social consumption of food, ceremonial or ritual activities, or to designate an event. Feasting can be indicated by low taxonomic diversity, large quantity of bone in a single deposition, or high meat yielding species in all faunal classes present. These characteristics do not always hold true. Grimstead and Bayham (2010) expected to find elite feasting activity at the Marana Platform Mound. Their findings, however, showed an overwhelming abundance of small taxa at the site. This still might have been a feast, but not an overt display of power or status. Small taxa are more likely associated with non-elite consumption and possible alliance or intragroup cooperation. It is obvious that feasting is a highly variable and complex social event and can be displayed by a number of ritual characteristics.

In addition, when differentiating ritual and secular deposits, it is important to consider the natural and cultural taphonomic processes that shaped the archaeofaunal assemblage. The excavation methods and sample recovery can also skew taxonomic or elemental representation, possibly silencing ritual activity (Reitz and Wing 2008).

Evaluating the Loyalton Rockshelter Caches

The trait list compiled by Reitz and Wing (2008) and adapted by the author suggests that ritual activities can be identified by individual taxa present or by patterned
zooarchaeological deposits. The identified bighorn sheep ritual features and deposits in the American West (overview provided earlier in this chapter) all exhibit multiple characteristics of ritual animal use, as defined by Reitz and Wing and the author’s adapted list. Table 1 lists the sites and observed features (undocumented sites) that have been identified as containing ritual deposits of bighorn sheep skulls in the American West. Assessing these sites using the author’s adapted characteristics of ritual animal use, we find that these sites and features contain a minimum of 10 ritual characteristics (ethnohistoric accounts along Gila River, Dry Valley) and a maximum of 12 ritual characteristics (Rose Spring Site, Ovis/Skull Caves), with Mummy Cave and Nopah/Creation Caves displaying 11 characteristics of the ritual use of bighorn sheep. The totaled characteristics exclude repeating criteria found in multiple categories.

All bighorn sheep sites examined for this research display the following ritual characteristics: the individual taxa (in this case bighorn sheep) are large bodied; are satisfying in terms of fat, taste, tenderness, calories, or nutrients; are highly mobile; reside in habitats otherwise seldom utilized; require considerable time to find, pursue, and capture; be costly to acquire in terms of time, energy and technology; involve risk of personal injury or failure; require a high degree of skill to acquire; and exhibit behaviors inspiring fear or respect, or embodying admirable attributes. All bighorn sheep sites also contain an unusual quantity or type of butchering debris, represented by the presence of cranial bones and the absence of all other post-cranial skeletal remains.

In addition to the shared characteristics, the bighorn sheep cranial remains uncovered from the Rose Spring Site, Mummy Cave, and Nopah/Creation Caves all showed signs of either roasting, ritual sacrifice, or other modifications. The bighorn
Table 1
CHARACTERISTICS OF RITUAL ANIMAL USE EXPRESSED IN WESTERN NORTH AMERICA BIGHORN SHEEP RITUAL SITES

<table>
<thead>
<tr>
<th>Ethnohistoric accounts along the Gila River</th>
<th>Rose Spring Site (CA-INY-372)</th>
<th>Mummy Cave (48PA201)</th>
<th>Dry Valley (26WA2460)</th>
<th>Nopah/Creation Caves</th>
<th>Ovis/Skull Caves</th>
</tr>
</thead>
</table>

I. The individual taxa deposited as a result of ritual behavior might:

A. Animal’s nutritional value
   - be large bodied
   - be satisfying in terms of fat, taste, tenderness, calories, or nutrients

B. Accessibility to the animal
   - be unpredictable
   - exhibit anomalous or atypical behavior
   - be available infrequently or for short periods of time
   - be found in only a few locations
   - be rare or exotic
   - be present in low numbers
   - be highly mobile
   - be from habitats otherwise seldom utilized
   - require considerable time to find, pursue, or capture
   - be costly to acquire in terms of time, energy, or technology

C. Skill to acquire animal
   - involve risk of personal injury or failure
   - require considerable time to find, pursue, or capture
   - require a high degree of skill to acquire
   - be costly to acquire in terms of time, energy, or technology

D. Culture’s perception of the animal
   - exhibit behaviors inspiring fear or respect, or embodying admirable attributes
   - exhibit unusual features such as bright colors or soft fur
   - reinforce social norms, such as the divisions of labor, kinship, political structure, or group identity

II. Patterns of deposits containing ritually-significant animals might:

A. Animal’s nutritional value
   - contain a large percentage of high-quality body parts, often measured as food utility

B. Accessibility to the animal
   - exhibit an age and sex distribution weighted in favor of a specific age class or sex
   - exhibit an unusual distribution among animal classes
   - contain animals from a higher or lower mean trophic level

C. Skill to acquire animal
   - be skeletally complete
   - contain animals from a higher or lower mean trophic level

D. Culture’s perception of the animal
   - contain high quantities of food residue that cannot be explained by preservation
   - show signs of roasting, ritual sacrifice, or other modifications
   - contain an unusual quantity or type of butchering debris
   - contain human remains
sheep remains and the Rose Spring Site have also been associated with aspects of group identity and reinforcing social norms (Yohe and Garfinkel 2012). Because these sites exhibit a large number of characteristics corresponding to ritual animal use, the author has concluded that the identified archaeological sites and isolated features containing bighorn sheep crania are associated with ritual activity as defined by the characteristics of ritual animal use.

**Expectations**

The purpose of this research is to examine zooarchaeological evidence for ritual use of animals, particularly bighorn sheep, in the American West. So far, the author has established a set of characteristics to determine the ritual use of animals and tested its application on the known bighorn sheep crania caches in the American West.

Unlike the identified bighorn ritual deposits, the bighorn sheep caches at Loyalton Rockshelter are features that contain unique archaeofaunal deposits to Sierra Valley and the western Great Basin. The newly defined and organized characteristics of ritual activity, adapted from Reitz and Wing (2008:284), will serve as standards by which to examine and evaluate the Loyalton Rockshelter bighorn sheep cranial caches as ritual deposits.

If the Loyalton Rockshelter bighorn sheep cranial caches are products of ritual activity, the author expects the deposits to exhibit a similar number and type of distinguishing characteristics of ritual animal use as other prehistoric bighorn sheep ritual features found in the American West. If the cache contents do not align with the established characteristics of ritual animal use, the cache contents may not represent prehistoric ritual activity. The results of this evaluation will be presented in Chapter VIII.
Summary

The study of ritual is generally a recent topic of interest in zooarchaeology. Although the use of archaeofaunal remains to study cultural constructs is a new approach to the field, animal bones have the potential to describe the many components of culture beyond elements of subsistence strategy and the production of food. Understanding how animals are used outside the subsistence regime is a critical part of studying past human cultures.

This chapter addressed aspects of animal symbolism and ritual and provided the theoretical framework for evaluating the ritual use of animals. This chapter also introduced a set of standardized characteristics (Reitz and Wing 2008) that can help determine if archaeofaunal deposits are the result of ritual activity. The author restructured Reitz and Wing’s characteristics to create a more approachable table by which to evaluate ritual activity in animal use. These criteria were used to develop expectations that will assess the Loyalton Rockshelter cache contents on the basis of ritual activity.

The next chapter, Chapter III: The Environment and Archaeology of Sierra Valley, will describe both the modern and paleoenvironment of Sierra Valley and the surrounding area. Climactic shifts in the paleoenvironment will be accompanied by a discussion of broad cultural trends in the study area. In addition, the ecology of bighorn sheep will be examined to provide a context for the behavior of the animal. Rock art panels in the Coso Range of southeastern California and in southern Utah suggest that prehistoric people had an intimate understanding bighorn sheep behavior, both of seasonal shifts in location and herd composition. Other cultures pursuing these animals most likely had similar knowledge of the animal and their behaviors. Chapter III will also
provide an overview of the archaeology and prehistory of the western Great Basin, as well as Sierra Valley. This chapter will serve as background for the environmental and archaeological context of Loyalton Rockshelter.
CHAPTER III

ENVIRONMENT AND ARCHAEOLOGY
OF SIERRA VALLEY

Introduction

Chapter II established the theoretical framework and perspectives utilized for this research. It examined the concept of ritual in archaeology and defined characteristics for identifying the ritual use of animals in zooarchaeological deposits. Chapter II also established a method for evaluating the ritual use of animals, which was used to develop expectations this research.

This chapter will first introduce the environmental context of Sierra Valley, focusing on bighorn sheep ecology. This section will demonstrate that the Sierra Valley environment and its surrounding mountains support habitats ideal for both bighorn sheep and prehistoric humans who hunted them. Additionally, this chapter will explore the archaeology and prehistory of Sierra Valley and the broader region of the western Great Basin. Archaeological studies of Sierra Valley will supply the data for this section. The purpose of this section is to outline the archaeological knowledge of prehistoric Sierra Valley. Not only is Loyalton Rockshelter significant in regards to the bighorn cranial caches, it is one of the few sites to be investigated in Sierra Valley. As such, the cultural materials provide significant archaeological information about northeastern California.
and the prehistoric inhabitants of Sierra Valley. This chapter will conclude with a brief examination of the evidence for Numic spread into northeastern California.

Environmental Context of Sierra Valley

Sierra Valley is situated on the western rim of the Great Basin, on the western flanks of northeastern California’s Sierra Nevada Mountain Range. The valley comprises over 120,000 acres and straddles the border of Plumas and Sierra County. The valley floor of Sierra Valley is relatively high, sitting at an elevation of approximately 4,500 feet above sea level. Mountains surround the valley and range in elevation from 6,000 to 8,000 feet above sea level.

The US Geological Survey (USGS) has created a classification system for geographically distinct provinces in the United States (http://www.na.fs.fed.us/sustainability/ecomap/section_descriptions.pdf). Sierra Valley is the northernmost subsection (M261Ei) within the block-faulted part of the Sierra Nevada section (M261E). Differentiated from the southern Sierra Nevada Mountains, the northern range has undergone less uplift and is comprised of smaller ranges with intermountain basins. The northern extent of the Sierra Nevada has abundant and continuous deposits of older prebatholithic metamorphic rocks. Metavolcanic rocks as well as metasediments of quartzite, marble, slate, and schist are some of the older rock formations found in this area. Additionally, younger volcanic rocks, including basalt, are found in the basins of the northern Sierra (Hull 2007). The distribution and availability of these rock types directly affected procurement and production of lithic technology.
During the Pleistocene, the Sierra Valley basin was covered by a shallow lake, modernly known as Lake Beckwourth, which is now filled with alluvial sediment. Depending on the location, soils in Sierra Valley are considered well to poorly drained. The USGS defines Sierra Valley as a temperate, semi-arid to sub-humid environment, with annual precipitation between 10 to 25 inches per year, occurring mostly in snowfall. The mean temperature ranges between 45 to 48 degrees Fahrenheit.

Springs, freshwater marshes, and alkali flats on the valley floor drain west and form the headwaters of the Middle Fork of the Feather River, which flows into the Sacramento River and onto the Pacific Ocean. The altitudinal range in Sierra Valley leads to distinct ecological and geographical zones that contribute to wide variation of resources.

**Vegetal Communities in Sierra Valley**

There are three distinct vegetation zones in Sierra Valley (grasslands, shrublands, and woodlands or forested areas) which are tied roughly to topography, elevation, and hydrology. The valley floor supports populations of cattails, rushes, and other species associated with wetlands, springs, and riparian environments (Wigand 2005). Sagebrush, mule ears, and miscellaneous dryland grasses and forbs, along with the occasional Jeffory pine (*Pinus jeffreyi*), California black oak (*Quercus kelloggii*) and aspen (*Populus tremuloides*), are found at the base of mountains. In higher elevations, pine and sagebrush are the primary vegetation.

Wilson (1963:11) reported the vegetation around Loyalton Rockshelter, on Elephant Head Peak, at the time of excavation:
Vegetation on Elephant Head consists of shrubs and low plants growing among the rocks and in shallow soil deposits. On the higher ridges leading up to Mount Ina Coolbrith are juniper and western white pine along with a few ponderosa pine at the lower edges of the timber. Fire, logging, and grazing have no doubt altered the general vegetation of the surrounding country, but it is felt that Elephant Head and the country to the northeast have in modern times always had the typical western Great Basin vegetation cover of common sagebrush and other low growing shrubs.

Wilson’s report also includes a list of plants identified near the rockshelter. These include sagebrush (Artemisia sp.), service berry (Amelanchier sp.), green manzanita (Arctostaphylos sp.), bitter brush (Pursia sp.), mule ears (Wyethia sp.), blue camas (Camassia sp.), wild onions (Allium sp.), and squaw potatoes (Carum sp.). The final four plants listed were considered important foods to Native American populations. In addition, Great Basin wildrye (Leymus cinereus) and Indian ricegrass (Achnatherum hymenoides) are also found in Sierra Valley and were significant prehistoric resources (Wigand 2005).

Animal Communities in Sierra Valley

Sierra Valley is now used for grazing domestic cattle. Mule deer (Odocoileus hemionus), and various types of rodents, fish, and waterfowl can still be found in or around the valley. Large predators, such as black bear (Ursus americanus), coyote (Canis latrans), and mountain lion (Felis concolor) are also present in Sierra Valley and the surrounding mountains. Wilson (1963) identified several animals present in Sierra Valley during the excavation. These included mule deer, black bear, marmot, cony [pika], jackrabbit, golden eagle, vulture, and blue grouse. Wilson’s (1963) observations provides a snapshot of animals present surrounding the Loyalton Rockshelter in 1959 which contributes to our understanding of animal populations in the area at that time.
It is postulated (Waechter and Andolina 2007; Wilson 1963) that prior to European contact, Sierra Valley supported large populations of pronghorn (*Antilocapra americana*) due to the ideal environment and topography of the valley floor. Historical accounts verify the presence of pronghorn but little archaeological evidence is present. Bighorn sheep were also present in Sierra Valley prior to historic times. Archaeological evidence from Loyalton Rockshelter (Wilson 1963) and other sites (Payen and Boloyan 1961: Payen and Payan 1996; Schulz and Simons 1973) confirms that a population of bighorn sheep occupied the rocky mountains surrounding the valley prehistorically.

**Bighorn Sheep Ecology**

Bighorn sheep are short-legged, broad-chested ruminants with muscular frames adapted for explosive power and agility. They are superb jumpers and climbers, scaling steep, rocky cliffs to outmaneuver and escape predators. Bighorn sheep range in size from 160 to 250 pounds, with rams as large as 350 pounds and 40 inches tall at the shoulder (Valdez 1988:17). Bighorn sheep have large horns with ever-growing keratinous horn sheaths that can weigh up to 30 pounds, or 13 percent of their body weight. Rams have considerably larger horns that can grow up to 3 feet long, with dramatic curvature. Ewes’ horns are more gracile with less curvature.

Currently, there are three living subspecies of bighorn sheep. These are the Rocky Mountain bighorn sheep (*O. c. canadensis*), the Sierra Nevada bighorn sheep (*O. c. sierra*) formally known as the California bighorn sheep, and the Desert bighorn sheep (*O. c. nelsoni*) (Ramey 1993). The Rocky Mountain bighorn is regarded as the largest of the three subspecies, based on horn measurements and body weight from game
commissions. The Desert bighorn sheep is considered the smallest of the bighorn subspecies, based on cranial dimensions, body weights, and recorded horn size (Geist 1971:46). Both Rocky Mountain and Sierra Nevada bighorn sheep occupied the research area (Cowen 1940:574) and inhabit the cooler mountainous regions of eastern California.

Bighorn sheep (*Ovis canadensis*) live in the mountainous regions of western North America, from southern Canada to northern Mexico (Buechner 1960; Geist 1971). While most populations of bighorn sheep undergo seasonal migrations (summarized below), bighorn sheep tend to occupy open, mountainous habitats. Under constant pressure from predators, primarily animals representing Felidae, Ursidae, and Canidae families, bighorn sheep often select open areas near cliffs or steep, rocky terrain (Geist 1971; Matheny et al. 1997). Open areas are used for grazing, but also enable high visibility for effective predator detection. Smith (1992) showed that 99 percent of areas utilized by bighorn sheep were within 300 meters of rocky escape terrain, demonstrating that escape terrain is a habitat requirement for bighorn sheep.

**Seasonal Movement and Reproduction**

Bighorn sheep experience a yearly migratory cycle based on seasonally available food resources and reproduction activities (Matheny et al. 1997). Group composition and activities vary through the year and change based on movement through habitat areas and resource availability.

- **Fall.** In late September and early October, both rams and ewes move to their wintering areas. For rams, this is their pre-rut home range. Between late October and early November, rams move to their rutting grounds that are typically occupied by ewes,
yearlings, and other rams. This is the only time during the year when rams, ewes, yearlings, and lambs range together (Geist and Petocz 1977).

Fall is also the time when sheep are conceived. During the ‘rut,’ or matting season, rams perform acts to establish a dominance hierarchy to gain access to fertile ewes. Ewe’s have a six month (± 175 day) gestation period (Geist 1971). Once mating has occurred, rams take no part in parental activities. After the rut, rams move away from the ewes, lambs, and yearlings, to their own wintering habitats. The rest of the fall is spent feeding and preparing for winter.

Winter. Rams move from their rutting rounds between December and January. Ewes, lambs, and yearlings remain in the same area. Snow does not generally affect bighorn sheep until it reaches depths of 25 cm. After snow accumulations exceed this depth, bighorn sheep retreat to shallower, snowpack (Smith 1992). Large accumulations of snow make maneuvering costly and access to valuable grazing impossible. Until thaws occur, rams remain in rugged escape terrain. After the thaw, rams move to more level areas to graze, but always remain close to rocky escape routes.

Yearlings and lambs remain with ewes, who are still concerned with their wellbeing and safety. Ewes, yearlings, and lambs generally seek cliff cover during heavy snow accumulations. Although lambs have grown almost ten times their birth weight, they’re short legs tend to make maneuvering in deep snow difficult (Matheny et al. 1997). As the winter comes to a close, ewes also move to more level grazing areas. Gravid ewes become encumbered by their growing fetuses and seek the most rugged, steep terrain to protect themselves from predators (Geist 1971). The steepest terraces become lambing areas for gravid ewes.
Spring. In late March and April, both rams and ewes move to their spring home ranges (Geist 1971). As the snowpack lessens, rams maximize their nutritional intake by grazing in protected meadows abundant with spring-growing forbs.

Gravid ewes are less mobile and remain in their lambing areas through spring. As parturition approaches, ewes move into the most inaccessible terrain, remaining vigilant for predators. Food resources are scarce in the cliffs that gravid ewes inhabit in their final stages of gestation, but the rocky talus provides the safest location for new lambs from predators (Matheny et al. 1997).

Summer. Ewes give birth to their lambs in the summer months, often in the most rugged terrain to protect the newborn from predators. Ewes and their new lambs remain in the birthing sites until lambs are coordinated enough to maneuver down the rocky slopes to foraging areas (Matheny et al. 1997). As summer progresses, and lambs quickly grow, ewes and their new lambs venture to more productive grazing areas.

Rams increase their grazing area, continuing to remain completely separate from groups of ewes, yearlings, and lambs. As summer progresses, bighorn sheep shift their diet from forbs to grasses, increasing feeding activity to prepare for the rut and upcoming winter season.

Population Dynamics

Prior to European contact, it is speculated that large populations of bighorn sheep occupied the western mountains of North America to the “badlands” portions of the Missouri, Little Missouri, Yellowstone, North Platte, Arkansas, Colorado, Green, and Gila rivers (Buechner 1960:13). Seton (1929:535) estimates one and one half to two million individual bighorn sheep occupied the whole of North America prehistorically. In
northeastern California, “large numbers of bighorn sheep were found in the lava beds and mountains” (Buechner 1960:14). While written records are scarce for bighorn sheep distributions and populations in this area, many zoologists (Buechner 1960; Cowen 1940) assume that the Sierra Nevada Mountain Range provided a pristine environment to support healthy populations of bighorn sheep.

By 1900, the bighorn sheep population had been reduced to several thousand. As settlers migrated West, hunting, range deterioration and exotic diseases introduced by domestic sheep and other Old World herd populations decimated bighorn sheep populations (Matheny et al. 1997). In the 1930s, President Theodore Roosevelt’s conservation movement helped reestablish bighorn sheep populations in the West. Since then, conservation groups have continued to raise awareness for certain subspecies, like the Sierra Nevada bighorn sheep, that are listed on the endangered species list. More recently, populations of bighorn sheep have been introduced to geographic areas considered pristine bighorn environment; the success of these experiments have been varied.

Historic evidence for the presence of bighorn sheep in the northern Sierra is rare. Between Observation Peak in Lassen County and Alpine county to the south in eastern California, only one recorded bighorn sheep sighting has been recorded (Wistar 1914:113). This area is often suggested to be pristine bighorn sheep environment (Buechner 1960; Cowen 1940; Hall and Kelson 1959), but evidence is absent in zoological literature. Archaeological research and excavations, however, have provided direct evidence for the prehistoric range of this now rare animal, postulating its prevalence and importance to Native groups inhabiting the area.
Regional Prehistory and Paleoenvironment

Archaeological investigation of Sierra Valley has been limited, which has resulted in a narrow view of the prehistory of the area. Archaeological resources beyond Sierra Valley provide a good record for the time depth of cultural occupation in the general region. Archaeological research along the eastern Sierra Nevada-Cascade front has shown both the cultural adaptations, as well as the environmental changes, that have occurred over the millennia. This section will review the prehistory and paleoenvironment of the eastern Sierra Nevada-Cascade front to provide general context to understand and situate both the cultural and environmental past of Sierra Valley.

Two chronological sequences will be introduced: the Tuscarora Sequence (Delecorte 1997) representing western Great Basin cultural traditions, and the Martis/Kings Beach Sequence (Elston et al. 1994, adapted from Heizer and Elsasser 1953), often applied to the Tahoe region and the eastern slope of the Sierra Nevada. The latter has been used in the past to evaluate the prehistory of Sierra Valley’s cultural deposits. However, the Martis/Kings Beach sequences has recently been criticized for being too broad and lacking regional applicability (King et al. 2004; Waechter and Andolina 2005).

The Tuscarora sequence, generated by projectile points collected from the Tuscarora Pipeline and Alturas Transmission Line projects, is a generalized sequence that represents much of the northwest Great Basin. This sequence has been confirmed by obsidian hydration values and shown to parallel many localized western Great Basin chronologies. While the Tuscarora sequence has regional applicability, it is outside the geographic range of Sierra Valley.
The Lake Tahoe vicinity sequence, originally created by Heizer and Elsasser (1953), has traditionally been used to describe prehistory on the northern Sierra Front. This chronology, developed for the Tahoe-Truckee basin, consists of a two-fold archaeological sequence based on both morphological and material projectile point differences. This chronology has been refined and expanded the archaeological sequence by incorporating data from stratified deposits and radiocarbon dates (Elston et al. 1994). This chronology is now proposed to span over 7,000 years.

Referring to Table 2, it can be seen that the two regional sequences are quite similar, both in time depth and cultural transitions. Because of the similarities between cultural transitions, as well as overall culture traits, these sequences will be used in tandem to discuss the cultural and environmental past of Sierra Valley and the eastern Sierra-Cascade front.

**Early (12,000-7,500 BP) Holocene**

By the beginning of the Holocene, the northwest Great Basin and northeastern California experienced a period of climactic warming. Mountain glaciers retreated, Pleistocene lakes began to shrink, rivers ceased to flow, and springs and marshes began to dry (Mehringer 1986). Pine forests retreated into higher elevations, and junipers moved from their lower Pleistocene ranges into higher mountainous regions, becoming more prominent in higher latitudes (Wigand 2005). Sagebrush-steppe vegetation expanded in the lower elevations during the transition from the Pleistocene to the early Holocene. In Sierra Valley, Wigand (2005) suspects the valley floor was occupied by waterlogged marshes, while fire aided in the expansion of sagebrush-steppe vegetation up the surrounding slopes.
## Table 2
### CLIMACTIC AND CULTURAL PHASES

<table>
<thead>
<tr>
<th>Years BP</th>
<th>Era</th>
<th>Climactic Conditions</th>
<th>Martis/Kings Beach (Elston et al. 1994)</th>
<th>Tuscarora (Delacorte 1997)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Contact</td>
<td>“Little Ice Age”- cooler, wetter weather with little summer precipitation.</td>
<td>Washoe – Late Kings Beach Phase</td>
<td>Terminal Prehistoric</td>
</tr>
<tr>
<td>1000</td>
<td>“Middle” Late Holocene</td>
<td>Medieval Climactic Anomaly- Periods of severe and prolonged drought.</td>
<td>Early Kings Beach Phase</td>
<td>Late Archaic</td>
</tr>
<tr>
<td>1500</td>
<td></td>
<td>Dry interval.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td>End of Mid-Holocene droughts; cooler and moister conditions. Expansion of forests and woodlands, rise of water levels. Beginning of modern forests.</td>
<td>Late Martis Phase</td>
<td>Middle Archaic</td>
</tr>
<tr>
<td>2500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3500</td>
<td>“Early” Late Holocene</td>
<td></td>
<td></td>
<td>Early Holocene</td>
</tr>
<tr>
<td>4000</td>
<td></td>
<td></td>
<td></td>
<td>Early Archaic</td>
</tr>
<tr>
<td>4500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>5500</td>
<td></td>
<td></td>
<td>Spooner Phase</td>
<td></td>
</tr>
<tr>
<td>6000</td>
<td></td>
<td></td>
<td>Post Mazama Phase</td>
<td></td>
</tr>
<tr>
<td>6500</td>
<td>Middle Holocene</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7000</td>
<td></td>
<td></td>
<td></td>
<td>Early Holocene</td>
</tr>
<tr>
<td>7500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8000</td>
<td></td>
<td></td>
<td>Tahoe Reach</td>
<td>Early Holocene</td>
</tr>
<tr>
<td>8500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9000</td>
<td>Early Holocene</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10,000</td>
<td>Early Holocene</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The earliest Paleo-Indian occupation along the eastern Sierra Nevada-Cascade front is reflected in the presence of Clovis-like projectile points (McGuire 2007:169). This lithic technology, often associated with Pre-Archaic adaptive strategies, is highly distinctive and tends to resemble toolkits of the megafauna-hunting Paleo-Indians of the Great Plans, including bifacial knives, stemmed and concave base projectile points, and crescents. In northeastern California, Clovis points have been found at Samwel Cave (Treganza 1964), Mammoth Springs, Eagle Lake, Hat Creek (Dillon 2002:113), and Sconchin Butte (Moratto 1984:87). The Clovis-like points found at these sites have not been directly dated, but are assumed in direct temporal association with other Clovis points found throughout western North America.

While many archaeologists view Early Holocene adaptations generally directed toward large game, diverse Early Holocene artifact assemblages, around Honey Lake in northeastern California suggest some degree of intensification (Milliken and Hildbrandt 1997). These artifacts include both flaked and ground stone and significant concentrations of small game, including rabbits, fish, and shellfish.

Grinding implements are often absent from Early Holocene sites (Elston 1986; Willig and Aikens 1988). Based on obsidian source profiles of projectile points, which demonstrate the highest source variation during this time, Early Holocene peoples were highly mobile, most likely traveling in small groups and focusing on the pursuit of large game while exploiting easily gathered lacustrine-marsh plant foods.

Middle (7,500-5,000 BP) Holocene

Temperatures continued to rise during the Middle Holocene which caused pervasive drought. This period has also been referred to as the Altithermal. Precipitation
decreased and often only fell only in the summer months. Cool-mesic conifer were replaced with warm, xeric species such as ponderosa pine, Jeffory Pine, and cedar. Lakes and marshes continued to recede, and the marshes that occupied the valley floor of Sierra Valley in the Early Holocene, most likely dried up entirely (Wigand 2005).

The warming trend of the Middle Holocene caused a general shift in land-use. Compared to Early Holocene sites that occur along the former lake and marsh boundaries, Middle Holocene sites are almost exclusively located either upslope or adjacent to permanent fresh water sources that would mitigate the effects of the drought (Milliken and Hildebrandt 1997). As once-productive lakes and marshes disappeared during the Altithermal, water sources and riparian habitats became an important resource for people during the Middle Holocene. While population densities remained relatively low during this period, large formal structures have been found near permanent water features, suggesting the growth and formalization of household groups.

The presence of grinding implements and house floors increases dramatically from the Early to Middle Holocene, indicating an increased importance in seed processing and storage, as well as a more complex settlement pattern (Kowta 1988). While large game continued to be a major focus of subsistence, projectile points, represented by the Pinto and Humboldt series, became smaller and less specialized than their Pre-Archaic predecessors (Elston 1986).

The earliest archaeological date from Sierra Valley has been dated to this time period. A rock feature at CA-PLU-1487/H returned a radiocarbon date of 5310 cal. BP.
Late Holocene (5,000 BP-Contact)

While temperatures remained constant, Late Holocene climate brought increased precipitation, sometimes punctuated by periods of extreme rainfall (Wigand 2005). These conditions allowed montane forests to expand again. The valley marshes of Sierra Valley most likely experienced a dramatic recovery from their condition in the Middle Holocene.

The Late Holocene climate, however, was punctuated by a number of droughts. The expansion of sagebrush and saltbrush, approximately 1,000 to 2,000 years ago in the lower elevations of the Great Basin suggest the return of a dry climate. This period is often referred to as the Medieval Climactic Anomaly (MCA). While the MCA was a period of severe and prolonged drought, shorter periods of extreme precipitation punctuated this climactic period (Young 2005). Pollen from juniper, fir, alder, willow and sedges significantly decline during this time, and pollens from saltbrushes show an uptick. This drought most likely lasted 500 years, as evidenced by tree-ring studies in the Mono Basin, southern Sierra Nevada, and Tahoe Sierra (Wigand 2005). Cool, moist conditions of the “Little Ice Age” returned 400 years ago and lasted to the mid-nineteenth century (Young 2005). Glaciers made small advances in the mountains and Sierra Valley most likely saw a return of marsh-lands on the valley floor. A general drying trend followed the “Little Ice Age”

The results of investigations of Late Holocene-age sites show significant culture change during this environmental epoch. Archaeologists have employed local and regional chronological schemes to identify cultural trends and changes. In California and the Great Basin, these periods are often divided into Early (3,500-5,000 BP), Middle
The Terminal Prehistoric period (500 BP-Contact) describes culture changes around the time of European culture-contact.

**Early Archaic (3,500-5,000 BP).** Archaeological evidence for human occupation in northeastern California and the western Great Basin becomes more visible during this time period. While typological cultural traits are geographically variable during this time period, Martis series projectile points (Elston et al. 1977; Elson et al. 1994; Heizer and Elsasser 1953) have provided the most reliable time-marker for the Early Archaic along the eastern and western flanks of the Sierra Nevada north of Lake Tahoe (McGuire 2007). The Martis complex is often synonymous with large bifacial tools constructed from basalt from upland quarries.

Settlement systems were often located along major east-west trending waterways that extended from lowland valleys and villages to the basalt quarries near the crest of the Sierra Nevada (McGuire 2007).

Early Archaic people focused on small game and plants. In Sierra Valley, several large rock-lined plant processing features have been uncovered and returned radiocarbon dates contemporaneous to this time period and the Martis complex. These features are hypothesized to function as root or plant roasting ovens (Lawrence 2009; Martin 2014; Waechter and Andolina 2005; Waechter and Mikesell 2002).

**Middle Archaic (1,500-3,500 BP).** The transition between the Early to Middle Archaic phases was gradual and not represented by major technological changes. The Middle Archaic is generally contrasted against its predecessor by the increase in archaeological visibility and settlement differentiation. The Martis tradition continues (3,500-1,500 BP), and Late Archaic (500-1,500 BP) (Delacorte 1997; McGuire 2002).
into the Middle Archaic with expanded-base drills, scrapers, mono and matates, and cylindrical pestles. Obsidian production, however, increased dramatically during this time period.

Archaeological investigations in northeastern California indicate many semi-sedentary villages developed during the Middle Archaic, as at the Karlo Site (CA-LAS-7), CA-LAS-206, and CA-LAS-1705/H (McGuire 2007). The proliferation of elaborate villages and basecamps is accompanied by elaboration in material culture, house construction, and ceremonial activity. Obsidian from northeastern California sources soon made its way to distant regions of California and the Great Basin, suggesting an increase in trade and exchange (Hughes 1986).

**Late Archaic (500-1,500 BP).** The transition to the Late Archaic is often associated with major changes in material culture, and subsistence and settlement structure (McGuire 2007; Waechter and Andolina 2005). These changes are often associated with the climactic instability of this culture period, especially marked by the drought conditions during the MCA.

From an assemblage standpoint, the Late Archaic is often typified by the smaller and lighter projectile points associated with the bow and arrow that replaced the atlatl and dart of earlier time periods. The Early Kings Beach phase, dating between A.D. 500 to 1200, is typified by the Eastgate and Rosespring series, while the Late Kings Beach phase, dating between A.D. 1200 to 1800, is recognized by small lightweight projectile points made of cryptocrystalline stone and obsidian. The Washoe culture is often archaeologically recognized by the cultural material associated with the Kings Beach Phase of the Tahoe Lake vicinity culture chronology. The desert side-notched and
cottonwood series point type is a characteristic form of this later phase, and bedrock mortars are common during this time. These artifacts, however, are often associated with Numic cultures expanding into northeastern California and the western Great Basin (Justice 2002; Moratto 1984).

While house structures appear less formal than earlier forms, the Late Archaic saw the largest contemporaneous social aggregations documented in the western Great Basin. These large villages, such as Amadee Village on the north shore of Honey Lake (McGuire 2002), appear to be occupied for very short periods of time. The large Late Archaic villages may have acted as a defense to perceived conflict with other groups. Social conflict appears to be common during this time (McGuire 2002:38-39).

The Late Archaic also saw an expansion of plant-food manufacturing, indicating an increase in resource intensification. Large animal faunal remains from regional sites indicate a significant decline in their use (Carpenter 2002). In Sierra Valley, rock-lined processing and cooking features become even more prevalent, with many of the ovens dating to the later part of the Late Archaic (Martin 2014; Waechter and Andolina 2005).

**Terminal Prehistoric (500 BP-Contact).** The Terminal Prehistoric period in northeastern California has been marked by wholesale shifts in populations, primarily centering on the arrival of Numic groups from southeastern California and the American Southwest approximately 500 years ago (Bettinger and Baumhoff 1982; Fowler 1972; McGuire 2007; Sutton 1986). Larger settlements of the Late Archaic were abandoned and replaced by smaller settlements consisting of one or a few households. The California
groups, while inhabiting larger sites, split up into smaller camps as the threat of war and disease increased.

From an assemblage standpoint, the Terminal Prehistoric period is typified by the presence of desert side-notched (DSN) and cottonwood projectile points (Delacorte 1997; Elston et al. 1994; Hildebrandt and King 2002; McGuire 2007). Obsidian sources increase during this time. McGuire (2007) attributes this to groups savaging past sites for lithic debitage by which to manufacture new tools.

Sierra Valley Archaeology and Prehistory

In the past 60 years, archaeological investigations have significantly contributed to our understanding of Sierra Nevada and western Great Basin prehistory. Much of this research resulted in the creation of region-specific chronologies (e.g., Delacorte 1997; Elston 1986; Heizer and Elsasser 1953; Hildebrandt and King 2002; Kowta 1988; Thomas 1981).

Despite the years of archaeological research in the Sierra Nevada and the western Great Basin, no culture chronology has been established for Sierra Valley. Archaeologists working in Sierra Valley have been obliged to apply chronological sequences (Delacorte 1997; Elston et al. 1977; Elston et al. 1994; Hildebrant and King 2002; McGuire 2007) from well beyond their place of origin to archaeological data collected from Sierra Valley. These chronologies are meant to address localized culture patterns and their application outside their place of origin can create confusion.

The purpose of this section is not to establish a culture chronology for Sierra Valley, but to discuss what is known of the local prehistory. The excavations described
below have been used to establish preliminary frameworks for organizing both the cultural and environmental past of Sierra Valley.

**Archaeology and Prehistory of Sierra Valley**

Formal archaeological studies in Sierra Valley have remained relatively limited. Until recently, only two excavations had been completed in the area: Loyalton Rockshelter (Wilson 1963) and Old Webber Gravel Pit (Payen and Payen 1996). In 1999, Far Western Anthropological Research Group, Inc. excavated four sites on the north side of the valley as part of the State Route 70 Beckwourth West Roadway Rehabilitation Project (Waecher and Andolina 2005; Waechter and Mikesell 2002). Far Western, hired by a private landowner, also excavated part of CA-PLU-363/H in 2003 (Wriston and Waechter 2004). In 2012 the California State University, Chico Advanced Archaeological Field Method class excavated the Sugar Loaf site (Martin 2014).

Excluding Loyalton Rockshelter, all excavated sites in Sierra Valley are located on the valley floor. The Old Webber Gravel Pit (CA-SIE-1059), the Buttes Site (CA-PLU-1485), CA-PLU-1487/H, and the Sugar Loaf site all contain features related to cooking activity. Other sites share artifact assemblages associated with milling activity and lithic reduction. While the proportion of faunal remains at Loyalton Rockshelter is significantly greater than any other site in Sierra Valley, the rockshelter assemblage does contain a considerable collection of milling slabs along with several fire hearths. These artifacts and features connect the Loyalton Rockshelter artifact assemblage to the open-air sites identified on the valley floor. Excavation research questions have continued to surround basic questions of local chronology and prehistoric use of Sierra Valley. Table 3
Table 3

RADIOCARBON DATES IN SIERRA VALLEY

<table>
<thead>
<tr>
<th>Site Name/Number</th>
<th>Feature Number</th>
<th>Radiocarbon Date(s) Conventional and Calibrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Old Webber Gravel Pit CA-SIE-1059 (Lawrence 2009)</td>
<td>1</td>
<td>1050 cal BP (40-55 cm)/ 690 cal BP (30-40 cm)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>960 cal BP (40-50 cm)</td>
</tr>
<tr>
<td>The Buttes Site CA-PLA-1485 (Waechter and Andolina 2005)</td>
<td>1</td>
<td>2580 ± 40/2740 cal BP</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>500 ± 70/ 525 cal BP</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>490 cal BP and 570/580/640 cal BP</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>740 ± 60/ 670 cal BP</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>810 ± 70/ 710 cal BP</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>670 ± 40/ 650 cal BP</td>
</tr>
<tr>
<td></td>
<td>46</td>
<td>640 ± 70 and 1070 ± 60/ 640 and 960 cal BP</td>
</tr>
<tr>
<td>CA-PLU-1487/H (Waechter and Miksell 2002)</td>
<td>1</td>
<td>4590 ± 50 BP/ 5455 to 5060 cal BP</td>
</tr>
<tr>
<td>Sugar Loaf Site (Martin 2014)</td>
<td>10</td>
<td>1430 ± 30 BP/ 1370 to 1290 cal BP</td>
</tr>
<tr>
<td>Loyalton Rockshelter (Wilson 1963)</td>
<td>3D: 0-3”</td>
<td>350 ± 30 BP / Cal BP 500 to 310</td>
</tr>
<tr>
<td></td>
<td>3D: 3-6”</td>
<td>2110 ± 30 BP / Cal BP 2150 to 1995</td>
</tr>
<tr>
<td></td>
<td>3D: 6-9”</td>
<td>2110 ± 30 BP / Cal BP 2150 to 1995</td>
</tr>
<tr>
<td></td>
<td>Cache</td>
<td>400 ± 30 BP / Cal BP 510 to 430, Cal BP 355 to 330</td>
</tr>
<tr>
<td></td>
<td>Cache</td>
<td>400 ± 30 BP / Cal BP 510 to 430, Cal BP 355 to 330</td>
</tr>
<tr>
<td></td>
<td>Cache</td>
<td>490 ± 30 BP / Cal BP 540 to 505</td>
</tr>
</tbody>
</table>

identifies the sites excavated in Sierra Valley along with their associated radiocarbon dates.

In addition to these valley sites, one other rockshelter site has been recorded in Sierra Valley. This site, however, has remained unexcavated. The following sections will provide a brief review of the Echo Rock Rockshelter site along with the excavated sites situated on the floor of Sierra Valley. Their associated artifact assemblages will be presented below to provide prehistoric context for the current study of the Loyalton Rockshelter.
Echo Rock Rockshelter/CA-SIE-1058

Echo Rock Rockshelter was recorded during a 1999 archaeological reconnaissance survey of the eastern rim of Sierra Valley. A basic surface survey of the rockshelter floor along with a survey of the area surrounding the rockshelter entrance was conducted.

As described in the 1999 report, Echo Rock Rockshelter is situated on a south facing slope, at the base of a rocky outcropping, approximately 4.5 miles northeast of the town of Loyalton, California. According to UTM coordinates, the rockshelter sits at an elevation of 5,886 feet above sea level. The entrance to the rockshelter is 20 feet wide, and 4 feet tall at either end, with the center of the entrance only 2.5 feet in height. The rockshelter is 18 feet deep, with an internal width of 36 feet, and the ceiling ranges in height from 3 to 6 feet. Artifacts observed at the site included flakes, bifaces, projectile point fragments, and bone fragments. No milling and grinding implements, perforators, scrapers, or cobbles were observed at the site.

Several flakes, a biface, one point fragment, and three bone fragments were collected during the initial 1999 visit. Lithics were collected for both typological and material identification, as well as hydration testing. No such tests have been completed to date. The survey report also identifies evidence of historic use of the rockshelter: “1993” has been etched into the ceiling of the rockshelter and a piece of plastic wrap was observed. Rock piles associated with historic fences, along with various caliber shells, tobacco tins, tin cans, and glass fragments were noted in the immediate vicinity.
Old Webber Gravel Pit/CA-SIE-1059

Two excavations have occurred at the Old Webber Gravel Pit site. The first excavation in 1995 revealed a feature consisting of a concentration of fire cracked rock approximately one meter in diameter. Included in this feature were three matate fragments, a basalt core, and cobble pounder or pestle (Payen and Payen 1996:13). In addition to this feature, excavation and surface examination also produced 14 projectile points (only 2 complete), 5 bifaces, 13 flake tools, 11 cores, thousands of flakes, 1 mono, 3 matate fragments, and 2 utilized cobbles. Faunal material was not encountered during excavation. Projectile points were assigned to the Martis complex.

More extensive excavation at the Old Webber Gravel Pit site occurred in 2008. This more recent archaeological investigation produced 17 projectile points, 29 bifaces, 12 cores, 122 pieces of groundstone, 46 unifaces, and close to 900 pieces ofdebitage. Faunal material was absent. Three rock-lined features were also encountered during this most recent excavation. Organic samples within the features returned radiocarbon dates ranging from 1050 to 690 Cal BP. (Lawrence 2009). Nine of the projectile points were assigned to the Martis complex, while four are Rose Spring corner-notched, and three are indeterminate (Lawrence 2009).

State Route 70 Beckwourth West Roadway Rehabilitation Project

In 1999, Far Western Archaeological Research Group, Inc. excavated four sites on the north side of the valley as part of the State Route 70 Beckwourth West Roadway Rehabilitation Project (Waecher and Andolina 2005; Waechter and Mikesell 2002). The oldest of these sites, and indeed the site that has yielded the oldest
radiocarbon date for Sierra Valley is CA-PLU-1487/H, placing the beginnings of human occupation in the valley nearly 5,000 years ago. This site, located just west of The Buttes site near Highway 70, contains three rock-lined cooking features and a few projectile points. Animal bones were present, but very rare.

Just across the road is CA-PLU-1486. This is a small midden deposit that contains a single concentration of fire-cracked rock associated with an unlined pit. This site also contained both flaked and groundstone tools. Eleven projectile points and fragments were found associated with this site, and were later associated with both Martis and Kings Beach traditions. Rose spring types (associated with the Kings Beach complex) make up almost 75 percent of the projectile point types. Radiocarbon dates from charcoal returned calibrated dates of 1135 to 800 B.P., supporting the projectile point distribution.

Another midden (CA-PLU-1484/H) was encountered a few miles east of both CA-PLU-1486 and CA-PLU-1487/H near the town of Beckwourth, California on the far northwestern end of Sierra Valley. Unfortunately, property restrictions limited the excavation. The small portion of the site that was tested did not contribute to the prehistoric record.

Excavation at the Buttes site (CA-PLU-1485) produced a rather small concentration of artifacts (compared to the amount of excavated deposit). Located directly under Highway 70, this site produced a total of 13 projectile points, 13 bifaces, 23 flaked tools, 11 millingstones, 9 handstones, and 3 pestles. Additionally, a remarkable 57 features were encountered during excavation, including 23 small rock-lined basins and
3 large earth ovens. Radiocarbon dates from seven of the features returned dates between 1050 and 600 B.P.

Faunal remains at this site are very limited. Most of the features did not contain any animal bone. Feature 12, however, yielded 55 fragments of faunal bone. Of these, 14 fragments were burnt, 42 were not, and only three fragments could be identified to species. Feature 5 also contained 5 fragments of animal bone. In addition to the animal bones recovered from the rock-lined features, a cache (Feature 3) containing 7 modified bone fragments and 14 unmodified bone fragments was encountered. According to Waechter and Andolina (2001:72): “Five of the modified pieces refit to form a split Artiodactyl’s radius; the other two are also conjoining pieces of a split longbone. In both cases, the used ends are missing, making their function difficult to determine.” The unmodified fragments were submitted for radiocarbon dating and returned dates of 660 to 540 cal. B.P.

Sugar Loaf Site

On the northern end of Sierra Valley is the Sugar Loaf site. Excavated by the California State University, Chico Advanced Field Method class in 2012, this site is the scene of the most recent archaeological investigation undertaken in Sierra Valley. The Sugar Loaf site contained 12 features associated with milling and cooking activities and over 700 pieces of lithic materials. Organic samples collected from a rock-lined hearth (Feature 10) returned calibrated AMS radiocarbon dates of 1370 to 1290 BP (Martin 2014). As Martin (2014:74) explains, “[T]his places the age of Feature 10 in the time period just before or immediately at the transition from Martis to Early Kings Beach phases and at the beginning of the Medieval Climactic Anomaly.”
Conclusions

The archaeological research that has been conducted in Sierra Valley to date has demonstrated a change in subsistence strategies beginning approximately 1000 years ago (Lawrence 2009; Martin 2014; Waechter and Andolina 2005). Some have speculated that these changes may correspond with the expansion of Numic-speaking cultures into the area (Thomas 1981). Others suggest increases in local populations contributed to the transformations in subsistence and settlement in northeastern California approximately 1000 years ago (Basgall 1987; Broughton 1988; Schultz 1981).

Numic Expansion and the Washoe on the Edge of Sierra Valley

Sierra Valley sits on the northwestern periphery of the recognized Washoe culture territory. While Loyalton Rockshelter and its prehistoric archaeological assemblage has been claimed by the Washoe, prehistorically Sierra Valley was most likely occupied by a number of different culture groups, either at the same time, or oscillating between groups through the seasons or years. Ethnographic literature indicates that the Maidu and Northern Paiute also occupied sections of Sierra Valley (Riddell 1978).

Washoe is the only culture in the Great Basin to not speak a Numic language. Similarly, Washoe is not related to the Maiduan or Miwokan stocks of its neighboring culture groups. Washoe is often related to the Hokan stock, which contains language branches in California and in the American Southwest. Based on normal comparative linguistic methods, the Hokan languages of North America have considerable time depth, some nearly 8,000 years old (Golla 2007). Because of the isolated nature of the Washoe,
especially in terms of language, some (Dangberg 1968; Price 1962) posit that the Washoe have been in relatively the same area for an extended period of time.

Approximately 1,000 years ago, however, cultures throughout northeastern California and the western Great Basin saw a dramatic shift and experienced expanding populations of Numic groups from southeastern California and the American Southwest. Moratto (1984:567) suggests that the “large sweep and minimal diversity of these languages attest to their recent spread.” Archaeological evidence suggests that Numic groups reached parts of the Western Great Basin approximately 500 years ago, during the Terminal Prehistoric period (Bettinger and Baumhoff 1982; Butler 1981; Delacorte 1997; Fowler 1972; Sutton 1986; Young and Bettinger 1992). McGuire (2002) suggests that Numic groups did not enter northeastern California until 500-300 years B.P.

As stated in previous sections, certain artifacts, primarily the small Desert Side-notched and the Cottonwood Triangular arrow points, mark the spread of Numic-speaking cultures north and west (McGuire 2007; Moratto 1984). In addition, Numic cultures may have brought milling equipment as they spread north from southeastern California and the American Southwest.

Sierra Valley may have experienced Numic cultures entering the area starting about 500 years ago. The Washoe occupying Sierra Valley at the time most likely interacted with the Numic groups, and the new culture groups may have begun to establish themselves in the vicinity, incorporating their culture, customs, and beliefs that archaeologists now only see in the archaeological record.

The bighorn sheep features of the American West are strongly associated with Great Basin cultures, particularly Numic speaking groups (Yohe and Garfinkel 2012).
Bighorn sheep play a central role in Numic traditions and ceremonies. In addition, Whitley (1982) has noted the symbolic significance of bighorn sheep in Great Basin oral traditions. Because most of the bighorn sheep ritual features have been found in regions prehistorically occupied by Numic speaking groups, the archaeological features and isolated skeletal elements representing caching and interment of bighorn sheep crania are most likely associated with Numic traditions and culture.

Summary

This chapter provided both the environmental and prehistoric background for the Sierra Valley, including the extent of archaeological research in the area. Based on previous archaeological investigations, Sierra Valley has been occupied consistently for over 5,000 years, with more intensive occupation in the last 1,000 years. The sites that populate the valley floor tend to contain features associated with plant processing and cooking, along with some milling and grinding features. While the deposits from Loyalton Rockshelter yielded an impressive collection of milling slabs and features similar to the valley sites, most of the vast artifact assemblage consist of fragmented faunal remains and lithics, making the site both unique in its location and artifact assemblage. Loyalton Rockshelter is also protected from the taphonomic processes affecting open-air and valley floor sites. This may lend to the vast quantity of preserved faunal remains found at Loyalton Rockshelter versus the sites reviewed above.
CHAPTER IV

THE WASHOE: ETHNOGRAPHIC BACKGROUND

Introduction

This chapter serves a number of roles. The first section will briefly outline the history of culture-contact in California. The influence of Euro-American contact, as well as the biases of ethnographers and their product, will then be examined to understand the impact it had on our understanding of Native cultures. Throughout the section, the ethnographic resources used for this research project will also be reviewed for the proposed biases to better understand the cultural context of the ethnographer and his product. The final section of this chapter will review our knowledge of Washoe lifeways. While the author recognizes that other prehistoric cultures occupied the study area and contributed to the archaeological record, because Sierra Valley sits in the recognized Washoe culture territory, the Washoe culture will be examined for this chapter.

Issues Concerning Ethnographic Literature

Early Spanish explorers entered the New World and modern California during the late 16th and early 17th centuries, documenting and describing Native Americans they encountered (Lightfoot 2005:1). The perceived primitiveness of the Native Americans supported early theories of cultural evolutionism, which assumed the uniformity of
human nature and the progressive development of hierarchical cultural stages, from simple to complex. These types of descriptions persisted through the Mission Period, the Spanish-Mexican Period, and the Gold Rush in California.

Soon after these exploration parties, European and Russian fur trappers migrated into California’s Central Valley and the Sierra foothills. The trappers brought malaria and smallpox with them, which decimated Native populations. Native inhabitants that survived continued to be tormented by greedy trappers raiding Native American villages and capturing them as slaves.

Lightfoot (1995) explains that, until recently, anthropologists’ perception of early interactions between European colonists and Native American groups concentrated solely on the relations between two homogenous groups. In reality, European colonies contained a diverse mix of ethnicities, both from the Old and New Worlds. As colonies and fur trade expanded in North America, settlements became pluralistic communities where people of different ethnicities and nationalities worked and socialized.

Most early non-Native contact occurred along the California coastline. Non-Native contact in northeast California and western Nevada did not occur until the late 19th century. While many early exploration parties entered the area, Stephen Powers was one of the first ethnographers to study the Washoe. Stephen Powers’ original manuscript was completed in 1876 but was not published until 1970 by Don and Catherine Fowler. Powers was appointed by John Wesley Powell and Spenser F. Baird to “make a collection of Indian manufactures, etc., illustrative of Indian life, character, and habits on the eastern slope of the Sierras, and also California, for the Centennial Exhibition of 1876” (Fowler et al. 1970:117). In October of 1875, Powers visited both the Northern
Paiute and Washoe before moving on to the western side of the Sierras to study the Native cultures in western California (Fowler et al. 1970:117). The reports produced from this trip to Nevada and California “marked the end of Powers’ active concern with Indian ethnology” (Fowler et al. 1970:117).

Like today, many early ethnographers were influenced by popular theoretical perspectives. Powers’ 1876 monograph exhibits tones of social evolutionary theory. Social evolution defines cultures based on hierarchical Eurocentric standards, in which cultures are defined by their stage of social development. This theory, based on Darwin’s theory of natural selection, provided a pseudoscientific justification of Euro-American superiority over other ethnic groups. Powers refers to Native Americans as “savages,” describing the Washoe as a “lower race than the Paiute in prowess and in physique, but also in virtue; their women are less chaste than their eastern neighbors and in this respect resemble the California women” (Fowler et al. 1970:120). Powers also describes the Washoe homes as “miserable dwellings,” consistently addressing Native Americans with a tone of distain (Fowler et al. 1970:120). While this attitude is unacceptable in today’s society and scholarship, it is important to be aware of the theoretical framework in which the ethnographer was writing and what biases it could impose on the information presented.

Departing from these theories, Franz Boas popularized the concept of cultural relativism in the early 20th century, explaining that each culture is unique and should not be compared in “degree of development or worth” to any other culture (Trigger 2006:219). American culture-historians soon regarded culture as a recurrent set of shared ideas, values, and beliefs passed on from one generation to another. This approach
promoted a normative model of culture, in which behavioral patterns were the result of adherence to a set of rules, or “norms,” that can be used to classify and describe culture groups. The culture-historical paradigm did not account for or attempt to explain the phenomenon of culture change; the observed culture traits and material artifacts embodied and defined that culture.

Alfred Kroeber, a student of Boas, applied cultural models and research methodologies rooted in Boas’ American School of Anthropology when he entered California at the beginning of the 20th century. Kroeber’s “salvage ethnographies” were prompted by the diminishing populations of Native Americans in California. Due to disease, bounty hunters (“Indian killers”), or enculturation, Native Americans were declining in population and losing their “traditional” life-ways. Kroeber hoped to recover and save as much information of traditional Native American culture as possible. Kroeber’s salvage ethnographies produced the *Handbook of Indians of California* (1925), in which many of today’s culturally recognized Native groups are documented.

Many of the Native American groups described by Kroeber had already had direct contact with non-Natives for over a half century, and been indirectly influenced since the early explorers arrived on the California coast in the late 16th century. This is a confounding variable in the description of Native American groups. In the haste of collecting trait lists and culture descriptions, many ethnographers and early anthropologists, including Powers (1876, in Fowler et al. 1970), Barrett (1917), and Kroeber (1925), were concerned with describing the “aboriginal condition” instead of acknowledging influences of Euro-American contact among Native Americans. Lightfoot (1995:204) explains that written accounts provide a static description of the Native
culture, citing that many ethnographic observations are used as “‘simple’ analogues for reconstructing the past.” Ethnographic records collapse observations into a single description, creating the image of a static, non-changing Native culture.

Kroeber’s ethnographies, which anthropologists continue to use today, also established an ethnographic present, a snapshot of cultural traditions used to describe the “aboriginal condition” of the Native group. Early ethnographic information, gathered from informants and material culture, transformed Native American cultures into normative groups incapable of change, leaving any type of temporal significance in limbo. The ethnographic information and linguistic data was transposed into Kroeber’s 1925 culture map, which designated Native territories. Defined territorial boundaries perpetuate the image of an unchanging culture and fail to recognize temporal culture change. While many of Kroeber’s culture areas continue to be used today, some anthropologists have started to recognize the bias in delineating culture boundaries.

Samuel Alfred Barrett, a student of Kroeber’s and a product of the Berkeley anthropology department, was another early ethnographer interested in documenting the life-ways of the Washoe culture. While completing field research for the Public Museum of the City of Milwaukee to build “one of its series of life-sized groups representing the aboriginal culture areas of America,” Barrett (1917:5) visited the Washoe at Woodfords, California, Gardnerville and Carson City, Nevada, and on Lake Tahoe for a “few days.” The ethnography produced from Barrett’s interactions with and observations of the Washoe provides a brief sketch of the culture group. Barrett (1917:5) acknowledged the shortcomings of his research, stating that the time spent observing the Washoe was “entirely inadequate for a thorough study of this interesting people.” Barrett is also one of
the earliest ethnographers (in my research) to recognize culture change and Euro-American influences on Native culture.

Confounding issues are even more prevalent for later ethnographic works. Lowie (1939), Price (1962), and Downs (1966) produced extensive ethnographic works on the Washoe in the mid-20th century. However, the information collected and observations made must be scrutinized. Like earlier ethnographers, the Native life-ways were influenced by Euro-American culture contact. Entering into the 1940s through 1960s, this aspect is magnified. Price (1962) describes his informants as representing all major sections of the Washoe territory; however, they were all interviewed in 1961, leaving little first-hand knowledge of pre-contact Native life-ways. Similarly, Downs (1966:Forward) states that the information gathered for his ethnography originated from the “memories of the older Washoe together with known history and knowledge of the culture area.” Not only had Downs’ informants experienced enculturation, he claims to supplement his informants’ reports with historical documents and records. Historical records are most often Euro-centrically biased and perpetuate static ideas of Native Americans.

Informants and interpreters introduce multiple challenges for ethnographers. Not only can content and cultural context become lost in translation, but information must first be filtered through informants’ and interpreters’ own biases. Powers, for instance, was informed “by a pioneer of good general intelligence who had had abundant opportunities to learn the correct truth” (Fowler et al. 1970:128). Although the primary use of Native informants is to gain an insider’s view of social patterns, certain cultures may view interaction and cooperation with an outsider as a deviant act, therefore making
the informant or interpreter an outsider or spy. Powers acknowledged some “unwillingness to converse with strangers on certain topics” (Fowler et al. 1970:121). Also, the information gathered from an informant may not necessarily reflect group consensus.

As Rathje and Murphy (1992) demonstrated in the Tucson Garbage Project, the information provided by informants is rarely reflected in the material record. The juxtaposition of an informant’s perception of cultural practices and the reality of human behaviors reflected in the material record demonstrates the importance of evaluating ethnographic accounts for biases.

While anthropologists should be cautious when using ethnographic information, the informant’s perspective is still valuable in understanding Native culture. As anthropologists, it is important to not just observe and record behaviors, but attempt to gain insight into how the Native people perceive and understand their world. Grace Dangberg (1968) was one of the few ethnographers to record Washoe tales and mythology. She admits, that until quite recently, these tales were not freely shared with outsiders (Dangberg 1968:1). Interviewed between 1919 and 1920, Dangberg’s two informants were the few remaining that had resided in Washoe territory before “white men” had settled the area. The information Dangberg collected is invaluable for the preservation of traditional Native stories. Myths and traditional stories “offer an opportunity to anyone who would read them to learn some of the more intimate and subtle aspects of Washoe life and their way of thinking” (Dangberg 1968:1).

Dangberg’s experience capturing traditional stories of the Washoe raises additional questions regarding the bias in the ethnographic record. Ethnographers are
responsible for reporting observed behaviors within a culture. However, ethnographers may lack access to certain realms of the culture. Failure to witness and record behaviors associated with private or sacred life could distort descriptions and interpretations of the culture (Wobst 1978:303).

**The Tyranny of the Ethnographic Record**

When archaeological data is absent or ambiguous, archaeologists are tempted to supplement the gaps in the material record with information supplied by early ethnographic literature. This approach suggests that anthropological theory has remained ethnographic in character; archaeological methods are designed to fit the previously observed behaviors. As Whitaker (2012:61) explains, “California archaeology has benefitted from an abundance of ethnographic literature,” but it is important to understand the history of ethnographic research before applying it to archaeological or faunal material. As anthropologists, we must approach ethnographic material with discretion before adopting the information as an explanatory tool and recognize that archaeological data and ethnographic information can be used in tandem to reconstruct past life-ways. Archaeologists must learn to critically analyze ethnographic sources; by defining the time period, the culture context, the nature of the text, the training of the observer, the method of observation and the degree of corroboration, the historic sources and biases can be brought into context.

The use of ethnographic information must be used in a careful, comparative manner. It is important to recognize the biases inherent in our own culture and the way in which we impose our beliefs and cultural ideas on other groups. There are multiple ways of perceiving and knowing the world, and to better understand and interpret prehistoric
cultures, anthropologists must also be receptive to and respective of differing cultural perspectives. If we consider the culture context of the ethnographers, too, and look past the biases, gems of information may emerge to better inform our understanding of Native American life ways.

**Washoe Ethnographic Background**

A modest number of ethnographers, including Powers (1876, in Fowler et al. 1970), Barrett (1917), Kroeber (1925), Lowie (1935), Price (1962), d’Azevedo (1986), Downs (1966), and Dangberg (1968) have described the Washoe culture of northeast California and western Nevada. These early ethnographic reports were meant to document life-ways of the disappearing Native American cultures. By recording the environment, social organization and customs, and material culture, including housing, food and its preparation, and tools, many ethnographers felt description was adequate for understanding Native American cultures. These early ethnographies have been synthesized, summarized, and standardized to represent the Washoe culture.

This next section will review early ethnographic literature regarding the Washoe culture. As discussed above, many early ethnographies demonstrate cultural biases of the ethnographer. By taking these prejudices into consideration and understanding the cultural context in which the ethnography was composed, we can use ethnographic information to supplement and inform interpretations of past cultures. While the ethnographic information may be incomplete and provide merely an ethnographic present, the information can be used to bring cultural meaning to the material record.
Territory

The Washoe are described as living in two cultural worlds: California and the Great Basin (Downs 1966:8). This duality may be distorted by the state borders the Washoe culture territory straddles, or the variable respondents and time periods from which the ethnographic information was collected. There is some debate of boundaries constituting the Washoe territory. D’Azevedo (1986) describes the territorial range beyond the area surrounding Lake Tahoe shared by Washoe with neighboring culture groups. As anthropologists we must recognize that the ethnographic literature recorded culture boundaries as they existed when the information was collected; cultural boundaries can change through time which may not be reflected in the ethnographic record. Culture boundaries are also not physical entities. While ethnographic literature references some conflict between the Washoe and their neighbors, there is little evidence demonstrating the strict defense of prehistoric cultural boundaries. Taking these thoughts into consideration, I will continue here with a discussion of the Washoe territory, in its various forms.

Lake Tahoe is the center of the Washoe culture territory (Kroeber 1925:570). The crest of the Sierra Nevada Mountain Range typically designates the western boundary of the Washoe territory, with the eastern limit between the Carson and Walker River drainages (Barrett 1917:6; Kroeber 1925:570). D’Azevedo (1986:471) suggests the Pine Nut Mountains provided a natural eastern boundary for the Washoe, separating them from the Northern Paiute. Barrett (1917), along with Kroeber (1925) and Lowie (1939), are unclear of the northern and southern limits of the Washoe culture boundary, however, many other ethnographers have described this boundary in depth (Figure 2).
Stephen Powers (1876, in Fowler et al. 1970) designates the northern habitat of the Washoe as extending as far as the Truckee River and the Truckee Meadows near present-day Reno. During the fishing season, the Paiute would allow the Washoe to cross
the recognized boundary line and descend the Truckee River to Clark’s Station, eighteen miles below the Meadows (Fowler et al. 1970:120). Powers (1876, in Fowler et al. 1970), along with Price (1962), claim that the Washoe held Sierra Valley and certain summit valleys south of Honey Lake. Barrett (1917), however, excluded Sierra Valley entirely from the Washoe territory, and Kroeber (1925) claims that the Washoe and the Maidu shared this valley. A newspaper article from 1854 supports this position: “Sierra Valley appears to have been a favorite resort for the Indians. . . . Two small tribes still remained there when the valley was first discovered by the whites. They are always at war.” (Payen and Payen 1996:6). Price (1962) and d’Azevedo (1986) further describe Washoe sharing the Honey Lake area with Maidu and Northern Paiute. In the south, the Washoe may have resided in Antelope Valley (Price 1962:1), however, this area was excluded from the Washoe territory by the Indian Claims Commission (d’Azevedo 1986:471).

Ethnographically, the native cultures inhabiting lands to the west of the Washoe include the Eastern Miwok, Nisenan, and Maidu. The Northern Paiute occupied the lands to the north and east of the Washoe (Rhode 2012:2). It is clear that Lake Tahoe was the heart of Washoe culture territory, but the periphery lands were not exclusively exploited by the Washoe. Downs (1966:28) reports that Washoe hunters regularly entered Maidu and Miwok territories to hunt deer in late fall and early winter. The Washoe also traveled south to Mono Lake, inside the Mono culture territory, to collect grubs for subsistence, medical, and ritual purposes (Downs 1966:35). According to Downs (1966:37), the Washoe would regularly trade animal hides and other material goods with the Northern Paiutes. Groups of Washoe would also travel to the Pacific coast to collect shellfish. These were brought back to the Washoe territory where they were traded to
cultures in the eastern Great Basin or used to make jewelry or ritual objects (Downs 1966:37).

The Washoe Tribe has names for both the area around Sierra Valley and the valley itself. The place name for Sierra Valley is known as “grass-place dwellers” (?múčim detd?yi?) which is thought to designate an important seed known as ?múčim (the species is unknown) (d’Azevedo 1986:468). The area surrounding Beckwourth (in northwestern Sierra Valley) is designated in Washoe as do?ča? k’ila?am, which roughly translated, means “medicine plant grows here” or “place where it grows down to the water” (Waechter and Andolina 2005:11).

As discussed above, Sierra Valley is disputed as one of the Washoe’s core territories. Washoe elders, however, claim that the Washoe inhabited the valley year-round (Waechter and Andolina 2005:11). Today, there are still Washoe living in Sierra Valley.

Language

The Washoe language is of the Hokan stock, similar to cultures in California and the Southwest. Other Great Basin culture groups speak languages of the Numic family. As Downs (1966:6) explains, the Washoe represent a unique linguistic group in the Great Basin. Jacobsen (1986) recognizes that establishing an origin of the Washoe based on linguistic evidence is confrontational. While there is little significant evidence of the origins or homeland of Hokan, Powers (1876, in Fowler et al. 1970) suggested that the Washoe either crossed the Sierras from California at one point to their current location around Lake Tahoe, or that the Washoe speakers represent an old Hokan stock, formally widespread in the Great Basin.
Relations with surrounding Numic-speaking groups is disputed. Price (1962) claims that the language differences inhibited Washoe interaction with neighboring groups. However, ethnographic accounts report the Washoe sharing territory with the Northern Paiute, Miwok, and Maidu. The Washoe have little dialectical variation within the group, suggesting high levels of intercommunication inside the culture group.

Subgroups

The Washoe culture territory was divided into three main subgroups: the north, or *welmelti*; the south, or *hanelelti*; and the east, or *pauwalu* (Downs 1966:49). A western subgroup existed (called *tangelelti*), but due to the harsh terrain and heavy winter snows, few people regularly inhabited this region (Downs 1966:49). People were identified by the ethnogeographic region in which their winter camp, or *galesdangl*, was located (Downs 1966:49). D’Azevedo (1986) points out that many Washoe resided in the same region throughout their lives. Although the Washoe moved frequently during the year based on seasonally available resources, there was an economic advantage for people to stay in the region in which they were raised. Remaining local allowed socialization and interaction with familiar people and places as well as a continued knowledge of successful hunting and gathering locations (Downs 1966:50).

D’Azevedo’s (1986) map of the early 19th century Washoe culture area provides intergroup differentiations of regional communities. The northern-most extent of the defined Washoe culture area is occupied by the ‘seepweek lake dwellers’ along Long Valley Creek, just south of Honey Lake. Sierra Valley is said to be occupied by the ‘grass-place dwellers.’ Many of the communities occupying major riparian zones take the name of the water body. The Washoe who inhabited the area around present-day Carson
City are said to be the ‘rabbit-drive river dwellers.’ Washoe living in the south, near Antelope Valley, were described as the ‘salt place dwellers.’

**Social Organization**

Within each subgroup were several “bunches” (Downs 1966:44-46). Bunches were a social unit containing several families that held winter households in the same area. Downs (1966:45) more broadly defines a bunch as “consisting of a minimal number of families that could cooperate to do those things which an individual family could not do for itself.” During the year, they tended to move together to environmentally predictable resources. Bunch membership was fluid and was in a “constant state of formation, dissolution, and reformation in response to the environment and the accidents of the individual lives of its members” (Downs 1966:45). Often, a bunch was identified by its leader, a man with a respectable reputation, who would provide hunting and gathering advice, as well as lead rabbit drives or dances (Downs 1966:45). Men of the same bunch would come together to form hunting parties, and several bunches may organize to form war parties (Downs 1966:45).

According to Downs (1966), families were the primary economic unit in Washoe life. There was no rule for the relationships that made up a family, and families usually contained between five and twelve members.

**Settlement Patterns**

According to ethnographic data, the Washoe culture scheduled their activities through the year based on seasonally available resources. Downs (1966:12) describes Washoe settlement patterns, along with other cultures in the Great Basin, as “heavily influenced by the quest for food.” Since no one food source could provide year-round
supply for the Washoe, resource areas, consisting of hunting and fishing spots, nut, berry, and root gathering areas, and winter village sites, were visited annually according to their seasonally available resources.

The Washoe were highly mobile from spring through fall, fishing, gathering nuts, seeds, and berries, and hunting. Temporary camps were occupied throughout the region at different times of the year to exploit nearby resources (d’Azevedo 1986:472). These temporary settlements may have consisted of brush shelters as described by Barrett (1917:10-11). In the winter, each family occupied a permanent house called a gális dáŋal (d’Azevedo 1986:479; Downs 1966:39). Winter settlements were usually located on high ground in the lower valleys of the Washoe territory where resources, especially water and vegetation were easily accessible (d’Azevedo 1986:467). Although intended as a winter settlement, the gális dáŋal was often occupied by some members of the family, usually the elderly and children, year around (d’Azevedo 1986:472,479). Families within a bunch usually built their gális dáŋal in the same area.

Subsistence

Subsistence strategies and religious beliefs/practices are tightly woven in the Washoe culture. This subsection will present basic subsistence strategies of the Washoe as described by ethnographic records. The Washoe scheduled their movements on seasonally available and predictable resources. Most groups hunted and gathered near their localized habitation sites, with smaller groups dispersing in the summer and fall to farther seasonal camps. For purposes of this paper, gathering practices and the significance of plant products to the Washoe diet and ritual activities will not be discussed.
As Price (1962) describes, the Washoe practiced a form of “direct economy;” they generally did not process or store their resources, and the distance between collection and consumption was not great. Game was generally taken whenever and wherever it was encountered, but most hunting occurred from the late summer to the early winter to supply a group with enough meat for the winter (Downs 1966:11). The condition of the game, however, ultimately defined the hunting season.

Ethnographically, fish and small mammals were the main source of protein for the Washoe culture (Downs 1966; Price 1962). In the fall, jack rabbits (*Lepus* spp.) were hunted communally using nets owned and maintained by each family. Kroeber (1925:572) describes the nets reaching 300 feet in length; however, Downs (1966:27) suggests nets reached this length only when multiple families combined their nets. Rabbit drives were organized by the ‘rabbit boss’ and occurred whenever rabbit populations were great (Barrett 1917:11; Downs 1966:27). During these rabbit drives, the Washoe gorged themselves on broiled rabbit, sometimes unable to consume all the meat. The remaining meat was usually hung on drying racks to be stored for the winter (Downs 1966:27). There is no information in the ethnographic literature how the carcass was handled after processing.

Rabbits were not just a source of protein, they were hunted in the fall and early winter when their fur was thick to be used for rabbit skin blanks or capes. These blankets usually lasted two to three years, and were used as a door covering once they were considered too worn (Price 1962:31). Other fur bearing animals were taken when encountered; their meat eaten and their pelts considered useful (Downs 1966:34). Included in the ethnographic list of these animals were the wild cat, muskrat, fox, badger,
porcupine, woodchuck (also known as marmot), squirrels, gopher, mice and moles, and the kangaroo rat (Downs 1966:34). The Washoe were prepared to take game in quantity and never overlooked insect life.

Similar to jack rabbit, pronghorn (*Antilocapra americana*) were also hunted communally with the corralling method. Once the animals were corralled, ritual singing and dancing took place. The loud noises kept the pronghorn running around the corral and by the morning the hunting party could kill the animals at their leisure (Downs 1966:31). For large game, bows and arrows were used (Barrett 1917:12; Downs 1966:26). One communal pronghorn hunt usually exhausted the local population, and another hunt would not be repeated again for several years (Downs 1966:31).

Like the rabbit drive, the communal pronghorn hunt brought together a large group of people. These activities, however, were usually organized by an antelope shaman, who assumed political power for the duration of the antelope drive. The antelope shaman was believed to have special powers over the animal and could either predict their location or control their behaviors (Downs 1966:31). Antelope shamans usually received more meat than other hunters participating in the drive.

The mule deer (*Odocoileus hemionus*) was the most pursued large mammal. As a high-ranking resource, deer served many purposes; sustenance, clothing, and tools could all be derived from this resource. In the fall and early winter, before deep snow had accumulated in the higher elevations, Washoe men, in small groups, would venture west into the Sierra Mountain Range and into the Maidu and Miwok culture territory to hunt deer (Downs 1966:28). It is unclear whether the Washoe were peacefully welcomed by the other culture groups.
Deer were either stalked and shot with bows and arrows, or corralled into pitfalls or snares. Washoe hunters would sometimes disguise themselves with a stuffed deer head and skin draped over their shoulders to gain closer access to the animal (Downs 1966:28). After a kill, hunters would butcher the animal, cutting the meat into strips, and then place the meat on a rack to dry (Downs 1966:30). Deer meat was divided equally among the participating hunters, however, it is unknown how the head and hide were distributed (Price 1962:42). Hunters generally did not consume the heart or the liver of deer, antelope, or rabbits, but would reserve it instead for the young or old (Price 1962:48). Downs (1966:30) describes deer hunting parties drying the entire neck intact to bring back for children and the elderly. After processing, the bones of the animal, especially of large game, were respectfully submerged in a stream (Downs 1966:30). This practice is discussed below in the “Religion” section.

Other large animals, such as bighorn sheep and bear were also pursued by the Washoe (Price 1962:20). Bear were considered sacred and sought for the prestige of killing them (Downs 1966:33). They were usually captured during their hibernation (Downs 1966:33). The social and substantive importance of bighorn sheep is vague in the ethnographic record. Ethnographically, the Washoe would send small groups of men to the higher elevations to hunt bighorn sheep during their seasonal migrations. Bighorn sheep were found west in the Sierras and to the east in the high desert mountains. They were difficult to hunt, preferring rocky and remote outcroppings in high elevations (Downs 1966:32). The early winter snows, however, drove sheep down from their rocky haunts where hunters could more easily hunt them. Price (1962:20) claims that bighorn sheep were “sought as much for their skins and the prestige of killing them as for their
meat.” This sentiment is supported by current Washoe tribal members (Darrel Cruz, personal communication 2014).

Fish and waterfowl were also important resources to the Washoe diet. Fish were pursued from spring through autumn in the many rivers and streams the Washoe resided near (Downs 1966:13). Men, women, and children were responsible for fishing, and during annual spawning runs, everyone assisted in gathering as many fish as possible (Downs 1966:14). Weirs, nets, and fish spears were all employed for this purpose.

Waterfowl were also an important resource. They occupied the springs and swamps on valley floors and were taken whenever available (Downs 1966:33). During migrations, the Washoe would organize drives in which the birds would be herded together and captured with repurposed rabbit nets or small arrowheads (Dangberg 1968:26; Downs 1966:33). Most often, birds were eaten fresh instead of dried. They supplemented the Washoe diet and reduced pressure on winter rations (Downs 1966:34). Predators, such as the magpie and the eagle, were considered sacred and were never eaten (d’Avezedo 1986:478). Their feathers were collected to decorate men’s clothing during wartime (Downs 1966:53).

Price (1962) describes certain taboos associated with subsistence strategies. Hunting emphasized the importance of division of labor between the sexes for the Washoe. Because of this, hunting equipment was taboo to women, especially menstruating women (Downs 1966:35). Men would bathe before hunting and usually rubbed themselves with certain leaves to bring hunting luck (Downs 1966:35). Certain animals were also taboo: meat from the coyote, lizard, snake, frog, and eagle were never eaten, as well as the fetus of any animal (Price 1962:48).
Young boys learning to hunt began their training early in childhood. They practiced their skills first on mice, and graduated to woodrats and squirrels, to marmot and game birds, and finally to rabbits. As Downs (1966:34) describes the porcupine “slow footed and slow witted and easily killed by even a child with a stick, was also a regular food source.” A young, uninitiated boy, however, was not allowed to consume the meat of the animals he killed. Instead, he gave the meat away. By displaying generosity and mutual dependence, the young boy built a number of small debts within his community, which he could call in when he was in need (Downs 1966:36). For a boy to transition to manhood, he was required to kill a buck deer (some ethnographies say he could kill a pronghorn). After the buck was processed, the antlers of the deer would be set on their points and the boy would have to crawl through them without toppling them. If he killed a buck large enough to accomplish this, he entered the status of adult hunter and was eligible to marry. The age at which a boy completed these rituals is unclear in the ethnographic record, however, it does demonstrate the general season in which this rite took place, and gives some indication of the size of the animal required to perform this task, or the size of the boy.

The list of animals in which a boy practices his hunting skills also provides some information of the social aspects that could be reflected in the archaeofaunal record. As Downs (1966:34) points out, gopher, ground squirrel and even porcupines, were considered less than game to hunters, and were often sought by women, children, and the elderly. The presence of these animals in the archaeofaunal record may indeed be cultural and represent a specific demographic within the Washoe culture.
Religion

While it is impossible to separate subsistence and religion, the following section will provide a more detailed discussion of ritual beliefs and practices associated with the human-animal relationship. Downs (1966) provides one of the most in-depth discussions of Washoe religion. As far as religion related to hunting, Downs (1966:26) suggested that uncertainty in the hunt “is the basis of the superstructure of ritual and magic which surrounded Washoe hunting life.” Since chance played an important role in the hunt and a hunter never knew whether his efforts would produce game, he turned to the supernatural for assistance (Downs 1966:26).

In general, Great Basin people recognized animals as a “major class of spirits from whom power in the shamanistic sense as well as in the task-specific sense was readily obtained” (Fowler 1986:96). Spiritual and utilitarian human-animal relationships were often intertwined and established special bonds between the Washoe and the animals they hunted, “often involving a complex set of mutual rights and obligations” (Fowler 1986:96). For example, to ensure continued success in the hunt, ethnographic records reveal that the skeleton of a deer, and possibly other large game animals, was submerged in a stream after the animal had been processed. The Washoe believed animals gave themselves to the hunter, and showing respect to that animal spirit would insure continued hunting success. Therefore, the bones were symbolically placed in a stream so that scavengers could not disturb them. Undeniably, this cultural practice would have an impact on the interpretation of the archaeofaunal record.

Certain individuals, known as shaman, were also believed to possess special powers. While this power would manifest in various forms and in many people, the
Washoe revered the shaman’s abilities. Shamans were solicited by headmen to lead community events, and special shamans often led pronghorn, deer, bighorn sheep, and rabbit hunts.

Ethnographic literature (Elsasser 1961) mentions caves as places where shamans sought power. While some caves were used as regular occupation sites, Elsasser (1961) suggests that caves were used to cache shamans’ paraphernalia. Caves must have had some sort of sacred quality for shamans, if not only to provide a dry place to store their equipment. Pipes and pipe bowls, charm stones, and quartz crystals are some of the items considered to be part of a shaman’s tool kit.

Summary

This chapter served a number of roles. Primarily, it introduced the Washoe culture as anthropologists have described it. The Loyalton Rockshelter site vicinity is well-suited for a broad range of prehistoric activities. While intensive use of the area has not yet been supported by archaeological evidence, ethnographic and historical data suggest that Sierra Valley provided a resource rich environment that contained culturally significant resources.
CHAPTER V

LOYALTON ROCKSHELTER: HISTORY, METHODOLOGY, AND STRATIGRAPHY

Introduction

Loyalton Rockshelter was excavated by Norman Wilson, a master’s degree candidate at Sacramento State College, in 1959. At the time, very little was known about the prehistory of Sierra Valley and northeastern California in general. Wilson’s (1963:3-4) primary objective during survey, and later during excavation of the site, was to test the distribution of the Martis and Kings Beach complexes, as described by Heizer and Elsasser (1953), in the high Sierra basins north of Lake Tahoe. Wilson was also interested in how the faunal assemblage could contribute to archaeological understanding of prehistoric site occupation. Excavation strategies during the 1950s and 1960s have proven to pose difficulties in the analysis and interpretation of archaeological assemblages. However, Wilson’s uncommon foresight to collect faunal remains, has provided an opportunity to address questions of animal utilization and ritual use of the site.

The purpose of this chapter is to introduce the Loyalton Rockshelter site and describe excavation methods and techniques employed by Wilson during the 1958 and 1959 field seasons. This discussion will include a general description of the site,
including stratigraphy, as well as the procedures by which the artifacts were collected and recorded. A brief summary of the features encountered and artifacts collected from the site will be included. This chapter will also address the history of the artifact collection and the issues pertaining to the use of curated assemblages during analysis and interpretation.

Excavation Background, Data Collection, and Assemblage History

Loyalton Rock Shelter is located in northeastern California, just west of the Sierra Nevada Mountain Range, on the western rim of the Great Basin. The rockshelter sits on the southeastern edge of Sierra Valley on the northwest slope of Elephant Head Peak at an elevation of approximately 6,000 feet, 1,000 feet above the valley floor. The town of Loyalton, California is approximately three miles southwest of the site. Currently, Loyalton Rockshelter is located on a small parcel of land managed by the Bureau of Land Management Eagle Lake Field Office. Figure 3 situates the Loyalton Rockshelter archaeological site within the broader region and Sierra Valley.

The rockshelter is 80 feet wide at the drip line, 40 feet wide at the entrance, and approximately 30 feet deep. The entrance to the rock shelter faces south-southeast and, according to Wilson (1963:5), two large open-air sites can be seen from Loyalton Rock Shelter: one on Smithneck Creek to the south and the other near Lombardi Point to the southwest. More sites have been identified, recorded, and in some cases excavated in the area since Wilson’s original report.
Excavation Units

Loyalton Rockshelter was originally surveyed and tested in May of 1958 by Norman Wilson of Sacramento State College. Wilson’s site testing consisted of a 10x10 inch (25x25 cm) test pit near the center of the rock shelter to determine the depth and density of cultural deposition. Cultural material from the surface of the test pit was collected and added to the main artifact assemblage after excavation.
Excavation of Loyalton Rockshelter commenced a year later in July 1959. The crew, consisting of Norman Wilson, Dr. Louis Payen, Arthur Payen, Jim McNillin, and David Boloyan, spent ten days excavating Loyalton Rockshelter under a permit from the Bureau of Land Management with the [California] State Indian Museum as a sponsoring institution.

For the excavation, a 5x5 foot (152x152 cm) square grid was laid out over the entire surface of the rock shelter based on a datum point (0-A) established in the western wall of the rockshelter (Wilson 1959:6). A north-south trench (Units 4A and 5A), measuring 5x10 feet, was initially excavated with trowels to determine the stratigraphy and depths of the midden deposit. Five natural and cultural stratigraphic levels were recognized (Wilson 1963:18):

1. Surface
2. Stratum 1: Soil Creep
3. Stratum 2: Midden Deposit
4. Stratum 3: Yellow Subsoil
5. Stratum 4: Floor of the Cave

The surface level consisted mostly of small fragments of roof fall. The material in this level was only 1 to 2 inches deep. Concentrations similar to the roof fall present in the surface level were not noted anywhere in the underlying levels. Projectile points and broken bone were observed on the surface, as well as evidence of recent animal savaging and borrowing activity. A small hearth was noted on the surface level with several recently burned branches.

Stratum 1 consisted of small rocks and brown granular soil originating from both the east and west walls of the rockshelter. This level was especially prevalent in 5-D
and 5-E but did not span the entirety of the site. No cultural artifacts were present in this stratigraphic level.

Stratum 2, the midden deposit, ranged from 9 to 14 inches deep and contained the majority of cultural artifacts uncovered from Loyalton Rockshelter. The soil in this level was fairly loose with a greasy feel when wet. There is a clear distinction between the midden deposits and the yellowish-subsoil (Stratum 3) below. Wilson noted extensive rodent activity in this level, but fire hearths and other features were apparently undisturbed.

Stratum 3 consisted of gritty yellow subsoil. This level ranged in depth from 0 to 16 inches. Several of the cache pit features extended into this strata. Little cultural material was observed in this level. This level rested on Stratum 4, the bedrock of the rockshelter.

Since the midden layer was thin, and no significant cultural stratigraphy was present within it, the remainder of the excavation was dug in arbitrary levels. These arbitrary levels were loosely based on the natural and cultural (midden) stratigraphy of the rock shelter and consisted of the “surface level” (0-2 inches), 2 inches to 6 inches, and 6 inches to the top of the yellow subsoil. The yellow subsoil was also excavated. In total, 18 5x5 foot units were excavated from Loyalton Rockshelter. Figure 4 shows Wilson’s excavation unit layout for Loyalton Rockshelter. Excavated units include 3A-3F, 4A-4F, and 5A-5F.

Wilson’s excavation strategies are considered outdated by today’s standards and could pose limitations to certain research questions. However, the methods Wilson employed to record and collect archaeological data from Loyalton Rockshelter
Figure 4. Excavation grid prior to excavation at Loyalton Rockshelter.


demonstrates sufficient stratigraphic control for this thesis research. The stratigraphy of the rockshelter deposits appears to be well understood by the excavation team. Because the deposits were methodologically and systematically removed, site features were easily detected and recorded.

Prior to excavation, Wilson noted the presence of two wall features within the rockshelter boundary. Both walls were located on the ground surface and were recorded
as such. Wilson (1963:25) described Wall 1 as starting from the datum point (0-A), curving to the northeast in a just inside the drip line of the rockshelter, and ending against the back wall near unit 6-E. Wall 2 is enclosed by Wall 1. Wall 2 curves from unit 3-D southeast to unit 5-C, where it joins Wall 1. The walls can be seen in Figure 3. Both walls were noted to be about one to two feet in height and constructed from “slabs” of columnar basalt found around the rockshelter. Wall 1 was constructed of larger rocks than Wall 2. Wall 1 appeared to be constructed on the bedrock of the rockshelter, with midden deposits filling in the enclosed rockshelter space after the wall was built (Wilson 1963:25).

No artifacts were observed in association with the outer wall (Wall 1). Wall 2, however, was constructed of 40 culturally modified basalt “slabs.” Wilson (1963:50-51) later classified these culturally modified slabs as either matates, anvil stones, or polished slabs associated with plant grinding and animal hide processing.

The inner wall (Wall 2) also enclosed a basin-shaped depression within which all the fire hearths and cache pits were uncovered. Wilson notes that during excavation the crew experienced extremely strong gusts of wind coming from the west in the afternoon. The walls were most likely constructed as a protective barrier. Brush may have been piled on top of the walls to provide additional shelter.

**Screening and Collection**

The bulk of the rockshelter deposits were excavated. Wilson estimated that excavation removed a total of 800 cubic feet (22.65 cubic meters) of midden and subsoil. Wilson felt that once excavation commenced, the chance for vandalism and theft at the rockshelter would increase (Wilson 1963:8). Modern use of the shelter was already
indicated by the presence of small hearth with recently burned sticks and branches, beer
cans, and ammunition. A 2014 visit to the site by the author, Marilla Martin (BLM), and
Darrel Cruz (Washoe THPO) confirmed Wilson’s original observations; the area
surrounding Loyalton Rockshelter contains graffiti and appears to be visited frequently.
Figure 5 is a photo taken by the author demonstrating the frequency of graffiti found
surrounding the Loyalton Rockshelter archaeological site.

Figure 5. December 10, 2014 visit to Loyalton Rockshelter (arrow indicates
approximate location of rockshelter).

All excavated material was screened through ¼ mesh, and all cultural
material, “including unmodified flakes . . . and bone fragments that did not pass through
the screen,” were collected and bagged according to their provenience (Wilson 1963:7).
All groundstone, pecked, and polished stones were recorded in place, then moved to a
pile outside of the excavation area, where they were then measured. Wilson (1963:8)
states: “special notes were made on all features and caches pits.” Charcoal was collected from some hearths, and cache contents were saved.

The screening methods were uncommonly advanced for the time period. Wilson’s foresight to collect fragmented faunal remains, in addition to the cache pit contents, amassed an archaeological assemblage unique to Sierra Valley and the western Great Basin. The use of ¼ inch mesh, for example, to screen the deposits may bias the archaeological sample against smaller lithic artifacts, as well as smaller archaeofaunal remains, such as small fish and bird bones. Because this method was employed all through data collection, however, these biases are consistent throughout the entire archaeological assemblage.

Assemblage Summary

Wilson’s 1959 excavation uncovered thousands of artifacts, within which thousands of faunal remains and lithic artifacts were recorded and collected. These artifacts, however, have remained unexamined and unidentified by modern methodological standards until now. A large assemblage of faunal material was collected from the site. Over 9,000 fragments of unmodified bone (including the cached bighorn sheep cranial remains) were collected. Wilson noted the presence of a number of species: marmot, porcupine, rabbit, deer, and mountain sheep, along with squirrel and other rodents.

Sixteen modified bone artifacts were also uncovered at Loyalton Rockshelter. These include splinter perforators, bipointed splinters, polished bone fragments, flaking tools, a bone bead, a metatarsal pin and a biopointed bone pin. Notable lithic artifacts recovered include: 165 projectile points or projectile point fragments, 10 blade
midsections, 21 bifacially worked tools, 5 drills, 2 gravers, 49 grinding slabs (not collected), 1 lemon shaped charmstone, a stone pipe bowl, and hundreds of pieces of flaked debitage. Several human bone fragments were also found in the rockshelter deposits.

During excavation, Wilson noted the presence of fire hearths and cache pits. These features may have affected the stratigraphic integrity of specific excavation units. Fragments of ceiling fall were also observed throughout the excavated deposits. The rockshelter surface, however, contained a considerably larger proportion of ceiling fall than the lower levels, “indicating a fairly continuous and relatively rapid buildup of the midden and a considerable length of time since cessation of midden accumulation” (Wilson 1963:19). We must consider the possibility of occupants clearing the living space.

Cache Pits

A total of nine caches were encountered during excavation at Loyalton Rockshelter. Five cache pits contained the cranial remains of multiple bighorn sheep; four did not. All caches were encountered in the midden enclosed by Wall 2 and began in Strata 2 (Midden) and extended into the yellow subsoil of Strata 3 or down to the bedrock of the rockshelter (Strata 4). The dimensions of each of the caches was recorded and the contents of each of the caches was recorded and collected. Figure 6 shows the locations of the caches within Loyalton Rockshelter. Because the bighorn sheep caches are significant to the topic of this thesis, the contents of the caches, as well as their radiocarbon dates, will be addressed in detail in Chapter VII.
Figure 6. Loyalton Rockshelter cache pit locations.


Post-Excavation: The Loyalton Rockshelter Artifact Collection

After excavation, the archaeological assemblage from Loyalton Rockshelter was in the possession of the California State Indian Museum in Sacramento, California. Records dating from 1987 to 1992 indicate an inventory was conducted on the Loyalton Rockshelter artifact assemblage in association with the California Department of Parks and Recreation Burial Inventory Project. Under the Native American Graves Protection
of 1990, federal agencies were required to return all Native American human remains and associated funerary material to the corresponding Native American group. The Burial Inventory Project was conducted in accordance with this law. The artifact inventory indicates 24 fragments of human bone were collected from the site. These remains, along with the associated lithic and faunal artifacts are no longer present in the collection.

During the Burial Inventory Project, it is possible that artifacts were separated from their original provenience. Often, as more people handle or manipulate artifacts or the records in a collection, the likelihood for human error and mistakes increases. This appears to be the case for the bighorn sheep caches, as will be discussed in Chapter VII. The archaeological assemblage was examined with this in mind, but the documented provenience was preserved.

In 1992, the possession of the assemblage was transferred from Sacramento to the Nevada State Museum. In 2012, the Susanville Bureau of Land Management (BLM) contracted CSU, Chico’s Archaeological Research Program to examine the Loyalton Rockshelter archaeological assemblage. The assemblage, along with catalogue information and Norman Wilson’s excavation notes, were transferred from the Nevada State Museum to California State University, Chico in January of 2012. While on loan, the artifacts are being reviewed and analyzed by university students and staff. Appendix A provides the transfer and loan documents for the Loyalton Rockshelter artifact assemblage.

Since receiving the Loyalton Rockshelter archaeological assemblage in 2012, the faunal remains have been thoroughly examined by students in the 2013 and 2014
Zooarchaeology course at California State University, Chico under the supervision of Dr. Frank Bayham. Faunal remains were also examined by students in the 2013 and 2014 Zooarchaeology and Field Ecology Field School at Eagle Lake, led by Dr. Jack Broughton of the University of Utah. These courses have been designed to train students to identify and analyze faunal material by comparing and matching bone fragments to known elements and taxa from the comparative collection.

The lithic artifacts uncovered and collected from Loyalton Rockshelter are currently being analyzed by CSU, Chico students in the Anthropology Department’s Lab Methods course under the direction of Dr. Mathew O’Brien. The results from both the lithic and faunal analysis will be included in a report composed by the CSU, Chico Archaeological Research Program and sent to the Susanville BLM upon completion.

Summary

This chapter began with an overview the location of the Loyalton Rockshelter site, as well as a description of the 1959 field season. Wilson’s excavation, recording, screening, and collection methods were provided, along with a brief summary of the artifact collection.

The next chapter will focus on the archaeofaunal remains collected from Loyalton Rockshelter. The faunal identification procedures utilized by the author and students in both the CSU, Chico Zooarchaeology course and the Zooarchaeology and Field Ecology Field School at Eagle Lake will be described. The next chapter will also provide a taxonomic overview of the faunal remains that have been examined thus far.
CHAPTER VI

METHODS AND RESULTS: REPORT OF
FAUNAL REMAINS FROM LOYALTON
ROCKSHELTER

Introduction

The previous chapter outlined the history of Loyalton Rockshelter as an archaeological site. Norman Wilson’s 1959 excavation procedures and archaeological findings, as reported in his 1963 master’s thesis, were described. In addition, the previous chapter provided a brief history of the artifact assemblage and how it came into possession of the Anthropology Department at CSU, Chico.

The aim of this chapter is two-fold. First, the methods by which the archaeofaunal remains from Loyalton Rockshelter were examined and recorded will be described. Procedures for quantifying the identified faunal remains and calculating the minimum number of individuals (MNI) will also be reviewed. The second section of this chapter will provide a taxonomic overview of the faunal identifications made by the author.

Methods for Examining Faunal Materials

Identification of the Loyalton Rockshelter faunal remains used for this research was conducted during the 2012 and 2013 CSU, Chico Zooarchaeology course
led by Dr. Frank Bayham and during the 2013 and 2014 field seasons of the Zooarchaeology and Field Ecology Field School at Eagle Lake, administered by Dr. Jack Broughton of the University of Utah. The author was a student in the 2012 CSU, Chico Zooarchaeology course, and a graduate student teaching assistant during the 2013 Zooarchaeology course. This section will outline the identification procedures used during the faunal analysis stage of data collection.

Students were assigned a catalogue number that corresponded to a bag of animal bones collected from a specific provenience within Loyalton Rockshelter. The assignment process was somewhat random, and the allocation of bone bags was made based on the quantity of bones within each bag. Some catalogue numbers correspond to a single bone; these bags were avoided in an attempt to minimize the number of bags of bones transferred to a student (which is often met with confusion and disorganization) and maximize the number of bones being examined.

Once a student was assigned a bag of bones, the bag would be emptied into a sorting tray. Because each bag of bones was assigned a unique catalogue number, and therefore held a specific provenience, only one bag of bones was emptied into a sorting tray at a time. Once the bones were in the tray, students often began sorting the bones based on size and level of taxonomic identifiability. Larger bones were often grouped with other large bones, while small bones were placed together. More complete or intact bones were also grouped together, as these elements were easier to identify and determine taxonomic affiliation. If a student could identify the taxonomic class immediately, these bones were grouped together.
All examined faunal material from the Loyalton Rockshelter has been assessed using California State University, Chico’s zooarchaeological comparative collection. This comparative collection houses thousands of mammalian, avian, reptilian, amphibian, and fish species to which archaeofaunal remains can be evaluated. When examining the Loyalton Rockshelter assemblage, each archaeofaunal element was compared to the same element of other similar sized and locally known species in the comparative collection. This process allowed for maximum taxonomic certainty by utilizing a process of elimination. When diagnostic characteristics were not present to achieve identification to a discrete taxa, the element was identified to a more general clade.

The Loyalton Rockshelter faunal specimens have been identified to the most specific element and taxon possible. When examining a bone fragment, the specimen is “identifiable” if it can be classified to at least the taxonomic level of order. If this identification cannot be completed, the bone fragment is labeled “unidentifiable.” When possible, unidentifiable specimens are categorized by their class (i.e. Mammal, Aves, etc.) and/or to the size of the animal (small, small/medium, medium, etc.).

When a bone fragment was identifiable to the taxonomic level of order, or a more specific taxon, an attempt was made to define the element, what portion, side, size, age, percentage of completeness, and any natural or cultural modifications present. The frequency was also noted during this process. The portion of the element included the anterior, posterior, proximal, distal, medial, and lateral aspects. When an element was whole, it was labeled as complete. Determination of the side was made by utilizing diagnostic skeletal markers that are indicative of either right, left, or axial. The size of the
element is derived from the relative size of the taxa to which the element is identified. The age was determined by the presence or absence of epiphyseal fusion. It was noted when fusion had occurred but epiphyseal lines were still present. The percentage of completeness was made based on the amount of the element that was present. Natural modifications consisted of general condition of the bone (weathering), as well as rodent gnawing and carnivore chewing. Cultural modifications were noted when butchery marks, burning, spiral or horizontal fracturing, and tool use was present. The frequency was noted at the end. Due to inconsistencies in teaching styles between the Zooarchaeology course and the Field School course, the weight was not recorded for all identified specimens. Because of this discrepancy, this field of analysis is not included in the current research. Identification of faunal remains was confirmed by either course instructors or the author for accuracy. This method of analysis created the faunal sample used in this research.

After students completed an identification, the identified bone(s) were placed into a new achievable resealable plastic bag with a tag that identified the catalogue number, site number, provenience, material, and taxonomic identification. In addition, all identifications were recorded on a faunal recording form, as shown in Figure 7. Bones were recorded on a single form if they shared the same catalogue number, provenience, and taxon. Dissimilar bones were recorded on a separate data recording form. The author collected these forms after each course, verified identifications, and entered the information into a Microsoft Excel 2013 datasheet.
Quantification Methods

One of the goals of this research is to analyze the faunal remains and reconstruct the caches that were uncovered at Loyalton Rockshelter. In addition to identifying bones, reporting their morphological features, size, side, and cultural modifications, the frequency of examined specimens is also important for quantifying data. Two commonly used methods for quantifying faunal remains are NISP (number of identified specimens) and MNI (minimum number of individuals).
NISP is the most basic quantification procedure for measuring specimen count and taxonomic abundance. However, it is difficult to discern the importance of certain species based on values produced by NISP (Reitz and Wing 2008:212). This is also true for weight quantification of archaeofaunal remains. Because this research does not require an elaborate analysis of the general faunal assemblage, the analyzed faunal remains will be reported by NISP.

MNI is a more realistic and analytical quantification method. Like NISP, MNI is not without its biases and limitations, but it provides a realistic estimate of the minimum number of a given species within an assemblage. The concept of MNI is based on the fact that most vertebrates are symmetrical, possessing a right and a left of each element (except for axial elements). To calculate MNI, the analyst should “separate the most abundant element of the species found into right and left components and use the greater number as the unit of calculation” (White 1953:397).

This method of quantification will be used for the reconstructed cache faunal remains. The purpose is to compare the number of bighorn sheep individuals present in the reconstructed caches to Wilson’s original description. The petrous portion of the temporal bone is the only bone in the collection that is 1) identifiable, and 2) has anatomical symmetry. Chapter VII will provide the results from this quantification process.

Loyalton Rockshelter Faunal Assemblage:
Taxonomic Overview

The archaeological excavations conducted at Loyalton Rockshelter in 1959 resulted in the recovery of 9,227 vertebrate faunal remains. Faunal remains from Units
3E, 3F, 4B, 4D, 4E, 4F, 5B, 5D, 5E, and 5F, along with the cache contents, make up the analyzed faunal data-set. To date, 6,433 faunal specimens in the total faunal assemblage have been examined. A total of 1,016 (15.7%) faunal specimens were identified to at least the taxonomic level of order. A summary of the taxa identified from Loyalton Rockshelter archaeofaunal assemblage is presented in Table 4.

Twenty genera, representing both birds and mammals, have been identified in the Loyalton Rockshelter faunal assemblage. Wilson reported one fish bone, but this specimen has remained unexamined. Avian specimens constitute 2.3 percent of the identified specimens and 0.5 percent of the total examined faunal assemblage. Mammals represent 99.4 percent of the faunal assemblage, with 97.6 percent of the identifiable animal bones being mammal. It is safe to say that the Loyalton Rockshelter faunal assemblage is dominated by mammalian animal remains. Table 5 provides the taxonomic frequencies for the Loyalton Rockshelter assemblage, along with a percentage based-frequency. An important note: the cache contents are included in the faunal assemblage frequencies which may skew the general faunal assemblage results in favor of bighorn sheep.

**Aves**

Avifaunal remains made up a small fraction of the total faunal assemblage. In total, 35 avian bones were analyzed within the faunal assemblage. Of the total, 24 specimens were identifiable to at least the taxonomic level of order. A number of avian orders were present within this class, including Anseriformes, Galliformes, Strigiformes, Accipitriformes, and Passeriformes. Compared to the mammalian specimens, bones
<table>
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<tr>
<th>Class</th>
<th>Order</th>
<th>Family</th>
<th>Genus and Species</th>
<th>Common Name</th>
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<td>Anatidae</td>
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<td>Goose</td>
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<td><em>Centrocercus urophasianus</em></td>
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<td><em>Buteo jamaicensis</em></td>
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<td>Geomyidae</td>
<td><em>Thomomys spp.</em></td>
<td>Pocket gophers</td>
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<td><em>Lepus spp.</em></td>
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<td></td>
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<td>Felidae</td>
<td><em>Lynx rufus</em></td>
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<td>Cervidae</td>
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<td>Antilocapridae</td>
<td><em>Antilocapra americana</em></td>
<td>Pronghorn</td>
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### Table 5

**LOYALTON ROCKSHELTER TAXONOMIC NIPS AND FREQUENCY VALUES**

<table>
<thead>
<tr>
<th>Taxa Identification</th>
<th>NISP (n)</th>
<th>(% total ID’ed)</th>
<th>(% total)</th>
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</tr>
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<td>-</td>
<td>-</td>
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<td>-</td>
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<td>0.0155</td>
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Table 5 (continued)

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<th>(n)% total ID'ed*</th>
<th>(n)% total**</th>
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*Values derived by dividing each NISP by the total number of identifiable specimens.

**Values derived by dividing each NISP by the total number of specimens within the assemblage.

identified to the class Aves were generally less fragmented, with 35 percent of the total avian samples being complete elements.

Nine bones were identified within the order Anseriformes. This order generally includes ducks, geese, and swans. Three faunal specimens could only be identified to the ordinal level. The family Anatidae is represented by a fragmented cervical vertebrae and a coracoid. A first phalanx and an ulna are also present. One complete phalanx and a proximal radius were identified to the genus *Chen*. This is most likely the Snow Goose (*Chen caerulescen*), whose winter range is located in northeastern California and western Nevada.

The order Galliformes is represented by 6 bone fragments. Galliformes are generally heavy-bodied ground-feeding birds and are often considered to contain many New and Old World game birds, including turkey, grouse, quail, and pheasant. An ulna and a humerus were identified as Galliformes. Four other elements, including two tarsometatarsus, a carpometacarpus, and a scapula fragment were present and identified
as belonging to the Greater sage-grouse (*Centrocercus urophasianus*). This species of grouse is the only one that maintains a habitation range near Loyalton Rockshelter.

The proximal end of a tarsometatarsus was identified by the author as belonging to a Great horned owl (*Bubo virginianus*), a species within the order Strigiformes. The Great horned owl has a habitation range across the whole of North America, except for the far arctic regions of Canada and Alaska.

The order Accipitriformes, which includes eagles, hawks and vultures, is represented by a single element in the Loyalton Rockshelter faunal assemblage. A phalanx belonging to a red-tailed hawk (*Butea jamaicensis*) is present in the faunal collection. This species is commonly found throughout most of the United States. They migrate north during breeding season and occupy most of Canada and the northern region of the United States during this time.

The order Passeriformes is represented by seven bones. Six of the bones could not be identified past the ordinal level. One proximal humerus was identified as *Pica hudsona*, or the black-billed magpie. This species of magpie is the only one located in the study area and can be found year-round near Loyalton Rockshelter.

**Mammalia**

Mammal remains comprise the majority of the faunal specimens examined in the Loyalton Rockshelter archaeological assemblage. A total of 992 mammalian specimens were identified to at least the ordinal level. Orders identified include Rodentia, Lagomorpha, Carnivora, and Artiodactyla. Animals within these orders correspond to animals one would expect to inhabit the environment surrounding Loyalton Rockshelter.
Elements belonging to smaller mammals, such as rodents and rabbits, were more complete than bones from larger animals.

**Rodentia**

A total of 127 specimens were identified within the order Rodentia. This comprises 12.4 percent of the identified mammal specimens from Loyalton Rockshelter. Within the order Rodentia, the families Sciuridae (squirrels), Geomyidae (pocket gophers), Cricetidae (New World mice and rats), and Erethizontidae (porcupines) are represented.

A total of 32 specimens were identified as Sciuridae, with 19 of the 32 specimens belonging to the species Marmota flaviventris (Yellow-bellied marmot). Yellow-bellied marmots are the largest species within the Sciuridae family, so identification to the species-level was not a difficult task. Identifications were not extended to any other species within this family. There is not much information in Washoe ethnographies about the importance of yellow-bellied marmots, or woodchucks to the culture or subsistence regime, however Northern Paiute inhabiting Surprise Valley and the Goose Lake area were called “woodchuck eaters” (Bengson 2003:6)

The family that comprises New World rats and mice (Cricetidae) contained a total of 11 identified specimens. Only one element was identified to the taxonomic level of family. Three bone fragments were identified to the genus Microtus (voles), and 7 specimens were identified to the genus Neotoma (woodrats or packrats). Species-level identifications could not be made for either genera because multiple species in each genus occupy overlapping geographic ranges within which Loyalton Rockshelter is located. For the genus Microtus, for example, three separate species have been
documented within the study area: *M. californicus* (California vole), *M. montanus* (Mountain vole), and *M. longicaudus* (Long-tailed vole). These three species of vole share overlapping body size, making differentiation by size impossible. The three *Microtus* elements were mandibles, all identified by their unique “zipper teeth.”

Similarly, there are two species within the genus *Neotoma* that share the same geographical range. *Neotoma cinerea* (Bushy-tailed woodrat) and *Neotoma fuscipes* (Dusky-footed woodrat) share similar morphological features, making a species-level identification nearly impossible.

A total of 28 specimens were identified as Geomyidae, with 25 of the 28 specimens belonging to the genus *Thomomys*. A species-level identification was not made for these elements because of the geographic overlap, as well as average body size overlap, occurring between four species of pocket gopher. *T. talpoides* (Northern pocket gopher), *T. bottae* (Botta’s pocket gopher), *T. townsendii* (Townsend’s pocket gopher) and *T. manicola* (Mountain pocket gopher) all share geographic ranges, within which Loyalton Rockshelter is located (Kays and Wilson 2009). In addition, all species have overlapping body size that would make them virtually indistinguishable to the species level (Kays and Wilson 2009).

Pocket gophers are a common taphonomic element to archaeological sites, with their extensive borrowing activity often affecting the cultural deposition of artifacts. Wilson (1963) described rodent burrows occurring in the midden level of the rockshelter deposits. The presence of *Thomomys* in the Loyalton Rockshelter archaeofaunal assemblage is most likely not indicative of cultural activity.
Finally, the family Erethizontidae was represented by three incisor fragments belonging to the North American porcupine (*Erethizon dorsatum*). This is the largest rodent species that occupies the study area and a dental comparison confirmed the identification of porcupine incisor fragments at the Loyalton Rockshelter. No other skeletal elements have been identified to this species besides incisors.

**Lagomorpha**

Rabbits and hares make up 18.8 percent (*n* = 192) of the identified mammal remains. Within this order, 30 elements were identified to the taxonomic level of family (Leporidae), 87 elements were identified to the genus *Lepus*, and 58 specimens were assigned to the species of *Sylvilagus nuttallii* (Mountain cottontail).

A species-level identification could not be made for *Lepus* because multiple species share overlapping ranges within the study area. Two species of *Lepus* are present in the study area: *L. californicus* (Black-tailed jackrabbit) and *L. townsendii* (White-tailed jackrabbit). The white-tailed jackrabbit is generally larger than the black-tailed jackrabbit, but overall they have overlapping size ranges (Kays and Wilson 2009). The CSU, Chico zooarchaeological comparative collection does not contain a white-tailed jackrabbit skeletal sample, so all faunal samples were compared to *L. californicus* during the identification process. Of the skeletal fragments identified as *Lepus*, 15 fragments were labeled “large.” These are mostly appendicular elements including identifications of the humerus (*n* = 1), femur (*n* = 2), tibia (*n* = 4), astragalus (*n* = 1), calcaneus (*n* = 2), metapodial (*n* = 4), and one large anterior mandible fragment. Many of these elements (*n* = 7) were complete bones. The elements labeled as “large” may belong to the white-
tailed jackrabbit, but a shared habitat with the black-tailed jackrabbit and the lack of comparative evidence makes it impossible at this time to make a definitive distinction.

Species-level identifications could be extended for skeletal elements representing *Sylvilagus* species. There is only one species of cottontail inhabiting the study area: *Sylvilagus nuttallii* (Mountain cottontail). A total of 58 skeletal fragments were identified to this species.

**Carnivora**

A total of 34 specimens were identified within the order Carnivora, which makes up only 3.3 percent of the identifiable assemblage. Elements representing bobcats (*Lynx rufus*), cougars (*Puma concolor*), coyotes (*Canis latrans*), weasels (*Mustela spp.*), and badgers (*Taxidea taxus*) were identified.

Eleven specimens were identified to only the ordinal level. These specimens were all carnassial teeth that often could not easily be differentiated to any other taxonomic level than order. Two deciduous carnivore teeth were observed within this order.

The family of cats (Felidae) was represented by two species: *Lynx rufus* (bobcat) and *Puma concolor* (cougar). At this time, eight skeletal fragments have been identified as belonging to bobcats. Seven of the eight bobcat skeletal fragments in the Loyalton Rockshelter faunal assemblage are cranial (cranial, maxilla, mandible, molars). A single distal radius fragment has been identified as belonging to a cougar.

The dog family (Canidae) was represented by 12 specimens, 6 of which were only identified to the family level, with the other 6 identified to the species *Canis latrans* (coyote). The skeletal remains that could not be identified past family shared similar
characteristics with other canid species, making a confident identification difficult, if not impossible. The elements identified to the species level contained diagnostic characteristics specific to the coyote species. For example, a cranial element displayed the typical V-shaped sagittal crest typical of coyote skeletal morphology.

The genus Mustela is represented by one left mandible. Two species of weasel are found commonly in the study area: the Long-tailed weasel (Mustela frenata) and the Ermine (Mustela erminea). While the long-tailed weasel is generally larger than the ermine, they have overlapping size ranges and populations that inhabit similar habitats. Because of these similarities, it was determined by the author to identify the mandible to the genus Mustela instead of making the distinction between species.

One anterior cranial fragment was identified to the species Taxidea taxus (American badger). This animal is typically a burrowing animal, hunting ground squirrels and other small and medium sized prey. Badgers are commonly found throughout western North America and are especially prevalent near Loyalton Rockshelter.

Artiodacyla

The order Artiodactyla (even-toed ungulates) made up the majority of the identified faunal specimens (62.8%). A total of 635 skeletal fragments were identified either to the order of Artiodactyla or to a more specific taxa within the order. Because the cache contents are included in the elemental frequencies, this percentage may be misrepresentative of the proportion of Artiodactyls present in the general faunal assemblage. Within the order Artiodactyla, the families Bovidae (bovids), Cervidae (deer and elk), and Antilocapridae (pronghorn) are represented. Species within each of these families were also identified, including Bighorn sheep, Mule deer, and Pronghorn.
A total of 229 skeletal fragments from the Loyalton Rockshelter faunal assemblage were identified to the order Artiodactyl. These fragments could not be identified to a more specific taxa but showed diagnostic characteristics particular to Artiodactyl skeletal morphology.

The family of Cervidae, which contains species of deer, elk, and moose, is represented by four molars. Cervid teeth are selenodont with slightly shorter with sharper cusps than species within other artiodactyl families. Cervid teeth have a distinct separation between roots and enamel cusps, and a ridge of cingulum with a cementum-enamel junction (CEJ) is present just above the alveolar cavity. Comparatively, *Ovis canadensis* possess pillared or columnar hypsodont teeth. Cingulum and a cementum-enamel junction are absent. All four molars identified to the family of Cervidae are low-cusped selenodont teeth with a clear CEJ.

Within the family of Cervids, 11 skeletal fragments from the Loyalton Rockshelter were identified as Mule deer (*Odocoilius hemionus*). These skeletal elements consist mostly of cranial fragments, as well as one carpal and one calcaneus fragment.

Four teeth were identified to the family Bovidae, and 390 skeletal fragments were identified to the species *Ovis canandensis* (Bighorn sheep), a species within the Bovid family. A major portion of the 390 identified bighorn sheep skeletal fragments belong to the caches Wilson uncovered during field excavation at Loyalton Rockshelter in 1959. These remains will be discussed in detail in the next chapter.

One skeletal element was identified to the species *Antilocapra americana* (Pronghorn). This element is a third phalanx and the author agreed with the
zooarchaeology student that certain morphological characteristics of this element were more similar to the pronghorn species than any other Artiodactyl species.

**Descriptions of the Unidentifiable Faunal Remains**

Over 84 percent of the reviewed faunal assemblage was determined unidentifiable or indeterminate \((n = 5,417)\). Unidentifiable specimens are bones that cannot be identified to at least the taxonomic level of order. Faunal specimens in this category may have the potential to be identified by a more advanced and knowledgeable individual, but identifications were made conservatively based on the author’s own skill set.

All faunal remains that were unidentifiable were recognizable to the taxonomic level of class. Within each class, faunal remains were divided into categories describing the size of the animal: small, small/medium, medium, medium/large, large, and indeterminate. Of the 5,417 unidentifiable remains, only eleven belonged to the class of Aves, but no size determination was determined for these specimens. The remaining unidentifiable elements were Mammal. Indeterminate Mammal made up the largest group \((n = 3,691)\) of unidentifiable animal remains. These remains were indeterminate because, in their fragmentary state, it was impossible to discern the size of the animal. See Table 5 for the NISP values for each of the size ranges within the “unidentifiable” category.

**Summary**

The data sets provided in this chapter outline the general taxonomic frequencies found in the Loyalton Rockshelter faunal assemblage. Of the animal bones examined from Loyalton Rockshelter, only about 15 percent of the archaeofunal
assemblage has been identified to at least the taxonomic level of order. This leaves an overwhelming majority of the assemblage as “unidentifiable.” Of the “identifiable” bones, the taxa represent animals that are commonly found in the environment surrounding Loyalton Rockshelter. In addition, most of the identified taxa represent animals identified in the Washoe subsistence regime. Seventy percent of the catalogued faunal remains from the Loyalton Rockshelter archaeofaunal assemblage have been examined so far. Continued identification and analysis will yield more detailed results in the future. This data set, however, provides an excellent sample of the animals present at the rockshelter during the prehistoric period.

The next chapter will examine the bighorn sheep cranial caches in detail. Although elemental distribution and MNI was not calculated for the general assemblage, the petrous portions of bighorn sheep in the caches demonstrates the estimated number of individuals present in the special deposits. The next chapter will also examine the radiocarbon date sampling strategy and provide the results from such analysis.
CHAPTER VII

THE CACHES: TAXONOMIC OVERVIEW AND RADIOCARBON DATES

Introduction

The previous chapter detailed the methods by which the Loyalton Rockshelter faunal remains have been examined. It also outlined the findings from this analysis in the form of a taxonomic overview. Many of the taxa identified in the Loyalton Rockshelter assemblage are consistent with animals described in the Washoe subsistence regime. Other animals may have been part of natural taphonomic processes or deposited by predators. The spectrum of taxa, however, is representative of the range of animals one would find in the environment of Sierra Valley.

The purpose of this chapter is to examine the Loyalton Rockshelter bighorn sheep cranial caches. Because catalogue data was vague or missing, the author had to recreate the cache contents based on Wilson’s (1963) original descriptions. The methods and results of the cache reconstruction will be provided in the first section of this chapter. The next section will offer a taxonomic overview of the reconstructed caches, as well as a more detailed elemental distribution for the bighorn sheep present in the reconstructed caches. This chapter will conclude with a discussion of radiocarbon dating and the results from samples selected from the Loyalton Rockshelter archaeofaunal collection.
Reconstructing the Caches

Inconsistencies were encountered while examining faunal artifacts associated with the Loyalton Rockshelter caches. The cache contents that Wilson reported are not accurately represented in the artifact catalogue. “Cache Pit #1” and “Cache Pit” are the only notes provided for ten separate artifact bags. This causes uncertainty as to which artifact bag is associated with which cache feature. Secondly, the contents of the “cache” artifact bags are not entirely consistent with the description Wilson provided: cranial fragments of bighorn sheep are present but in extremely poor and fragmented condition. Additionally, only two fetal cranial specimens are present the artifact assemblage. Lastly, several artifact bags, outside those labeled either “Cache Pit #1” or “Cache Pit” contain cranial elements precisely as Wilson described. Question marks are written on the catalogue tags associated with these bags.

Because of the discrepancies between the artifact assemblage and the catalogue, the author could not definitively associate faunal remains with each specific cache feature. To reconstruct the caches, the author considered all artifacts labeled in the artifact catalogue with “Cache Pit #1” (162-1226) and “Cache Pit” (162-1126, 162-1158, 162-1180, and 162-1181) to be cache contents. In addition to these samples, the author chose the faunal remains from catalogue numbers 162-1150, 162-1151, and 162-1209 to represent contents from the caches. While the provenience for the specimens within 162-1150 and 162-1151 are listed as “4B, 6-12,” a question mark is present on the provenience card. Both 162-1150 and 162-1151 contain multiple bighorn sheep individuals, represented by the posterior portion of the skull, primarily the occipital and basioccipital bones. Because of the similarity between Wilson’s (1963) description of the
bighorn caches and these bones, it is intuition that leads the author to consider the contents of these catalogue numbers as misplaced portions of the bighorn caches. No provenience is associated with catalogue 162-1209, but the faunal remains are also consistent with descriptions of the cache pits. One fetal specimen (162-1113) lacked provenience; this individual will also be considered part of the caches. The faunal specimens are consistent with Wilson’s original description and common sense leads the author to conclude that these are misplaced cache remains.

There are several possible sources for the inconsistencies in the Loyalton Rockshelter artifact collection. Sometime between the original curation and 2012, when the collection was loaned to the CSU, Chico Anthropological department, faunal remains from the Loyalton Rockshelter artifact assemblage were taken out of context. Often, the more artifacts are used for different projects, the more likely it is for artifacts to be misplaced or taken out of context. The only recorded handling of the Loyalton Rockshelter assemblage occurred between 1987 and 1992, when the California State Parks and Recreation Burial Inventory Project reviewed the contents of the artifact collection. The discrepancies between the artifact catalogue and Wilson’s report illustrates some of the challenges of working with curated materials. We must take these discrepancies into account when reconstructing and examining the caches, as well as interpreting the general faunal assemblage.

Taxonomic Overview of the Loyalton Rockshelter Caches

As discussed above, discrepancies between the artifact catalogue, the artifact assemblage, and Wilson’s original description of the caches limits the identification and
analysis of the Loyalton Rockshelter bighorn sheep caches. Along with the two relatively-complete fetal cranial specimens in the faunal assemblage (162-1113 and 162-1126), the artifacts labeled in the artifact catalogue with “Cache Pit #1” and “Cache Pit” were considered part of the caches. Three other catalogue entries were considered part of the cached remains. None of the faunal material that is considered to be part of the caches can be associated with any specific cache since provenience has been lost.

According to Wilson (1963), Cache Pit 1 contained the posterior portions of three adult bighorn sheep crania with articulated atlas vertebrae and Cache Pit 2 held the occipital portions of two adult bighorn also with articulated atlas vertebrae. The rear portion of one adult bighorn skull, with articulated atlas, and the cranial remains from one fetal bighorn was uncovered in Cache Pit 3. Cache Pit 4 contained two adult bighorn skulls, one fetal bighorn skull, five unarticulated atlas vertebrae, two axis vertebrae, and several long bone fragments. Included in the Cache Pit 5 was one adult bighorn skull with articulated atlas vertebrae, one fetal sheep skull, multiple long bone fragments, charcoal, and the base of a projectile point.

Four additional caches were observed during excavation. Cache Pit 6 did not contain cranial remains, but held a pipe bowl, a perforated bone pin, and a bi-pointed pin. Cache Pit 7 contained one jasper projectile point covered with a large rock slab. Cache Pit 8 and 9 were described as large storage pits extending to the bedrock of the rockshelter.

Although the provenience for the individual caches has been lost, the faunal remains from the reconstructed caches (see discussion above) provide a similar
description of the general cache contents. Table 6 provides a summary of the caches as described by Wilson in his master’s thesis (1963).

**Table 6**

**SUMMARY OF LOYALTON ROCKSHELTER CACHE CONTENTS AND LOCATIONS**

<table>
<thead>
<tr>
<th>Cache Pit</th>
<th>Unit</th>
<th>Faunal Remains</th>
<th>Other Remains</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4D</td>
<td>3 adult mountain sheep skulls with articulated atlas vertebrae</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>4D</td>
<td>2 adult mountain sheep skulls with articulated atlas vertebrae</td>
<td>none</td>
</tr>
<tr>
<td>3</td>
<td>4D</td>
<td>1 adult mountain sheep skull with articulated atlas vertebrae, fetal mountain sheep skull</td>
<td>none</td>
</tr>
<tr>
<td>4</td>
<td>4E</td>
<td>2 adult mountain sheep skulls, 5 unarticulated atlas vertebrae, 2 axis vertebrae, fragments of long bones, 1 fetal mountain sheep skull</td>
<td>none</td>
</tr>
<tr>
<td>5</td>
<td>5E</td>
<td>1 adult mountain sheep skull with articulated atlas vertebrae, fetal mountain sheep skull, fragments of long bone</td>
<td>ovate projectile point</td>
</tr>
<tr>
<td>6</td>
<td>4E</td>
<td>Perforated bone pin, bi-pointed bone pin</td>
<td>Pipe bowl</td>
</tr>
<tr>
<td>7</td>
<td>5C</td>
<td>none</td>
<td>Jasper ovate projectile point covered with a large flat slab</td>
</tr>
<tr>
<td>8</td>
<td>4C</td>
<td>none</td>
<td>Pit capped with large flat slab</td>
</tr>
<tr>
<td>9</td>
<td>5B</td>
<td>none</td>
<td>Pit capped with large flat slab</td>
</tr>
</tbody>
</table>

Faunal remains identified in the reconstructed caches represent both birds and mammals. A summary of the identified faunal remains from the Loyalton Rockshelter caches is provided in Table 7. Only two elements were identified to the ordinal level within the class of Aves. The rest of the cached faunal remains are mammalian and represent animals within the orders Rodentia, Lagomorpha, and Artiodactyla. Unidentifiable bones (Medium/Large Mammal and Indeterminate Mammal) were found
Table 7

FAUNAL IDENTIFICATION FROM THE RECONSTRUCTED LOYALTON ROCKSHELTER CACHES

<table>
<thead>
<tr>
<th>Taxa Identification</th>
<th>NISP (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IDENTIFIABLE – Aves</strong></td>
<td></td>
</tr>
<tr>
<td>Anseriformes</td>
<td>1</td>
</tr>
<tr>
<td>Passeriformes</td>
<td>1</td>
</tr>
<tr>
<td><strong>IDENTIFIABLE – Mammalia</strong></td>
<td></td>
</tr>
<tr>
<td>Rodentia</td>
<td>2</td>
</tr>
<tr>
<td><em>Marmota flaviventris</em></td>
<td>1</td>
</tr>
<tr>
<td>Lagormorpha</td>
<td>-</td>
</tr>
<tr>
<td><em>Lepus spp.</em></td>
<td>2</td>
</tr>
<tr>
<td>Artiodactyla</td>
<td>1</td>
</tr>
<tr>
<td><em>Ovis Canadensis</em></td>
<td>271</td>
</tr>
<tr>
<td><strong>Identifiable Subtotal</strong></td>
<td>279</td>
</tr>
<tr>
<td><strong>UNIDENTIFIABLE – Mammalia</strong></td>
<td></td>
</tr>
<tr>
<td>Small Mammal</td>
<td>3</td>
</tr>
<tr>
<td>Medium/Large Mammal</td>
<td>65</td>
</tr>
<tr>
<td>Mammal – Indeterminate</td>
<td>124</td>
</tr>
<tr>
<td><strong>Unidentifiable Subtotal</strong></td>
<td>192</td>
</tr>
<tr>
<td><strong>CACHE TOTAL</strong></td>
<td>471</td>
</tr>
</tbody>
</table>

associated with the bighorn sheep cranial elements, but these bone samples were in such fragmentary condition to eliminate confident identification to the ordinal level.

**Aves**

Only two avifaunal remains were identified in the reconstructive caches. These belonged to the orders Anseriformes and Passeriformes. A single furculum was identified as belonging to the order Anseriformes. This order contains migrating waterfowl such as ducks, geese, and swans. A complete right humerus was identified as belonging to the order Passeriformes. This order comprises half of all bird species which are commonly referred to as perching birds, and less accurately named songbirds.
Mammalia

The remaining archaeofaunal remains identified in the reconstructed caches belong to the class of Mammals. A total of 469 specimens were identified to this class. Three orders are represented in this class: Rodentia, Lagomorpha, and Artiodacyla. The next sections will outline the frequencies of specimens identified within each order.

Rodentia

Three specimens were identified to the order of Rodentia. A single humerus, as well as a first phalanx, belonged to the order of Rodentia. A fragmented illium could be identified to the species *Marmota flaviventris* (Yellow-bellied marmot). Both the order Rodentia and the marmot species are represented in the general faunal assemblage of Loyalton Rockshelter.

Lagomorpha

Two archaeofaunal specimens in the reconstructed caches were identified to the genus *Lepus*. The genus *Lepus* contains a number of species of hare. The white-tailed jackrabbit (*Lepus townsendii*) and the black-tailed jackrabbit (*Lepus californicus*) both share habitat ranges within the study area, so neither species can be eliminated in the identification process. This genus was also identified within the general faunal assemblage.

Artiodacyla

Faunal remains from the order Artiodacyla made up the majority of the identified specimens within the reconstructed caches. A total of 272 archaeofaunal remains were labeled within this order. Only one premolar was identified to the ordinal level. All other remains (*n* = 271) were identified as bighorn sheep (*Ovis canadensis*).
Table 8 provides an elemental distribution for adult bighorn sheep in the Loyalton Rockshelter caches.

Table 8

<table>
<thead>
<tr>
<th>ELEMENTAL DISTRIBUTION FOR ADULT BIGHORN SHEEP (Ovis canadensis) IN RECONSTRUCTED LOYALTON ROCKSHELTER CACHES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Element</strong></td>
</tr>
<tr>
<td>Atlas</td>
</tr>
<tr>
<td>Axis</td>
</tr>
<tr>
<td>Cranium</td>
</tr>
<tr>
<td>Mandible</td>
</tr>
<tr>
<td>Tooth – Premolar</td>
</tr>
<tr>
<td>Tooth – Indeterminate</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

Calculating Bighorn Sheep MNI

To examine the minimum number of individual bighorn within the reconstructed caches, the petrous portion of the temporal bone, a small, dense cranial bone, was used. As explained in the previous chapter, MNI is a quantitative method for estimating the minimum number of a given species within an assemblage.

The petrous portion of adults was tallied first. In the reconstructed caches, there are 2 right and 7 left adult petrous portions. According to White’s (1963) definition, the MNI of adult bighorn sheep is 7. Next, the fetal bighorn sheep petrous portions were tallied. In total, there were 4 right and 0 left. This indicates that 4 fetal bighorn sheep are present in the cached faunal remains. Contrasted against Wilson’s original tally (9 adult,
3 fetal), the author’s MNI calculation suggests that there were two less adult bighorn and 1 more fetal bighorn in the caches than originally observed.

This calculation may be skewed by the “reconstruction” process. Wilson, however, did not describe the method he used to identify individuals in his original report. He may have identified individual crania based on their completeness. This could prove problematic because many bones in the skull is very fragile, especially the anterior portions, so calculating MNI based on general completeness may not take into consideration taphonomic processes affecting more fragile cranial bones.

Bighorn sheep cranial elements occur the most frequently in the reconstructed caches. While the cranial elements are in varying degrees of fragmentation, several complete occipital and basioccipital portions are present (similar to what Wilson originally described). Most of the cranial bones identified to bighorn sheep represent the posterior portions of the skull, with butchery marks appearing on two separate specimens. The first two cervical vertebrae, the atlas and the axis, are also found in the recreated cached faunal remains in varying degrees of fragmentation. Two atlas fragments and four axes fragments display signs of significant butchery.

The two complete fetal crania present in the Loyalton Rockshelter artifact assemblage were identified to the species *Ovis canadensis* using the one fetal bighorn sheep specimen present in the CSU-Chico’s Zooarchaeology Comparative Collection. These specimens are extremely fragile and many of the cranial bones have yet to fuse. To verify the age of the comparative sample, Sisson et al.’s (1975) *The Anatomy of the Domestic Animals Volume 1* was consulted. By birth, the squamous (flat portion) and the petrous parts of the temporal bones is fused in ruminants (bighorn sheep being a
ruminant) (Sisson et al. 1975:765). In the comparative sample, as well as the zooarchaeological specimens, the petrous part and the squamous portion of the temporal bone is not fused, indicating that the comparative sample and the zooarchaeological specimens are fetal (prenatal) animals. Additionally, comparing the sphenoid of the comparative sample to the cache specimens, the sphenoid in the comparative sample is significantly larger and ossification appeared to be at a more advanced stage than the specimens recovered from Loyalton Rockshelter. It is unclear how old the cached fetal bighorn sheep are, but they are most definitely underdeveloped and prenatal.

What’s Missing?

Horn sheaths and horn cores are absent in the Loyalton Rockshelter caches, along with the anterior portions of adult bighorn sheep crania. The lack of evidence for these elements and cranial features may be due to post-depositional taphonomic processes (Reitz and Wing 2008), however this is incredibly unlikely due to the survival of the fragile fetal cranial bones. While the anterior cranial bones are generally less robust than horns or posterior cranial elements, the xeric conditions and protective environment of Loyalton Rockshelter most likely would have preserved these cranial portions.

These missing elements are most likely not associated to post-depositional taphonomic processes, since the fetal crania were so well preserved. The absence of these elements may be an indicator of how the skulls were processed prior to being deposited in the cache pits. Prehistorically, horn sheaths were valued for both their shape and material. In their original form they could be used as cups, bowls, or other types of
containers. If boiled, the keratinized epidermal horn sheath was pliable and could be molded into any form.

Radiocarbon Dating: Sampling and Results

To adequately examine the temporal breadth of the archaeological deposits at Loyalton Rockshelter, bone fragments from the site were selected for radiocarbon dating. Radiocarbon dating is a method used to date organic, carbon-based materials by measuring the amount of radioactive carbon-14 ($^{14}$C) remaining in the sample. When a plant or animal dies, that organism stops exchanging of carbon with its environment. At that point, the amount of $^{14}$C decreases at a measurable rate. The amount of carbon-14 remaining in an organic sample can be used to calculate when the organism died (Taylor 1987). Developed in the late 1940s by Willard F. Libby, this method is now commonly used to date archaeological material and determine known age (Trigger 2006:382).

There are two methods of radiocarbon dating: the standard (or conventional) radiometric method and accelerator mass spectrometry (AMS) dating. These two methods utilize different techniques to achieve the similar results. AMS dating, however, has proven to be more precise and requires a smaller sample size (Taylor 2000:15). For purposes of this research, the AMS dating method was used to determine both the stratigraphic date range and the dates of the bighorn sheep caches.

Choosing AMS Samples

Six non-random bone fragments were selected from the Loyalton Rockshelter faunal assemblage to be radiocarbon dated, utilizing the AMS dating method. Funding from the BLM allowed for only 6 organic samples to be measured. All bone samples
were selected based on Beta Analytic’s suggested sample size (2-10 grams) and bone type (cortical bone from the shaft of long bones, skull plate, jaw, or ribs).

Of the 6 samples, 3 bone fragments were selected from three different stratigraphic levels within one excavation unit to test the temporal breadth of the general archaeological deposit. Faunal remains from Unit 3D were selected based on the three clear stratigraphic levels (0-3”, 3-6”, and 6-9”) listed in the artifact catalogue and on the basis that no ground disturbing features (caches) were noted in the unit. All faunal remains were examined from Unit 3D, and the largest and densest specimens that were identified as long bone shaft fragments representing the category “medium/large mammal” were selected. Table 9 lists information for each faunal sample selected for radiocarbon dating from Unit 3D.

<table>
<thead>
<tr>
<th>Catalogue Number</th>
<th>Unit</th>
<th>Level</th>
<th>ID</th>
<th>Element</th>
<th>Count</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>162-343</td>
<td>3D</td>
<td>0-3”</td>
<td>Med/Large Mammal</td>
<td>Long bone shaft fragment</td>
<td>1</td>
<td>5.28 g</td>
</tr>
<tr>
<td>162-435</td>
<td>3D</td>
<td>3-6”</td>
<td>Med/Large Mammal</td>
<td>Long bone shaft fragment</td>
<td>1</td>
<td>6.48 g</td>
</tr>
<tr>
<td>162-1086</td>
<td>3D</td>
<td>6-9”</td>
<td>Med/Large Mammal</td>
<td>Long bone shaft fragment</td>
<td>1</td>
<td>4.27 g</td>
</tr>
</tbody>
</table>

Three bone fragments were also selected from the reconstructed caches for AMS dating. The right petrous portion from three adult bighorn sheep were selected. The petrous portion is an extremely dense internal cranial bone responsible for protecting the inner ear. Because of its density, these elements appeared to have the least amount of damage. Additionally, the selection of the right side guaranteed radiocarbon dates from
three separate individuals. Due to the inconsistencies in the artifact catalogue, as discussed above, it is impossible to discern whether the three samples are representative of three separate caches (and therefore separate events). Table 10 lists the information for the cache faunal samples chosen for radiocarbon dating.

Table 10

<table>
<thead>
<tr>
<th>Catalogue Number</th>
<th>Unit</th>
<th>Level</th>
<th>ID</th>
<th>Element</th>
<th>Side</th>
<th>Count</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>162-1150</td>
<td>4B</td>
<td>6-12&quot;</td>
<td><em>Ovis canadensis</em></td>
<td>Petrous portion</td>
<td>Right</td>
<td>1</td>
<td>2.90 g</td>
</tr>
<tr>
<td>162-1151</td>
<td>4B</td>
<td>6-12&quot;</td>
<td><em>Ovis canadensis</em></td>
<td>Petrous portion</td>
<td>Right</td>
<td>1</td>
<td>3.85 g</td>
</tr>
<tr>
<td>162-1180</td>
<td>4D</td>
<td>Cache</td>
<td><em>Ovis canadensis</em></td>
<td>Petrous portion</td>
<td>Right</td>
<td>1</td>
<td>4.84 g</td>
</tr>
</tbody>
</table>

To prepare the archaeological faunal samples, the methods described by Beta Analytic were followed. After taking photographs of each selected bone fragment, the samples were washed with distilled water and a sterile, soft toothbrush to remove excess sediment and contaminants. The samples were laid out to dry for two days. When dry, each sample was placed into separate achievable resealable plastic bags. The provenience information (as indicated by the artifact catalogue) was written with permanent marker on the outside of the plastic bag, and a paper tag with the same provenience information was stapled onto the outside of bag, making sure to not puncture the section that contained the faunal sample. All bagged samples were packed into a small box and mailed to Beta Analytic for testing. Results from AMS dating of the samples is provided in the next section.
Results

The three bone fragments selected from Unit 3D were selected to assess the temporal breadth of the rockshelter deposits. The results demonstrate that there were two distinct periods of occupation at Loyalton Rockshelter. The faunal sample selected from the lowest level, 6-9”, of Unit 3D returned AMS radiocarbon dates ranging between 2150 to 1995 B.P. The faunal sample selected from the 3-6” level in Unit 3D returned AMS radiocarbon dates of the same age. The upper-most level of Unit 3D, 0-3”, returned a more recent date of 500 to 310 B.P.

The right petrous portion of the temporal bone from three bighorn sheep was selected from the cache pit remains for AMS radiocarbon dating. Two of the cache pit faunal samples returned dates ranging between 540 to 505 B.P. and the other sample returned a date ranging between 510 to 430 BP. Table 11 summarizes the results of radiocarbon dating for samples from Unit 3D and the cache samples. Please consult Appendix B for the complete Beta Analytics report.

Table 11

<table>
<thead>
<tr>
<th>Catalogue Number</th>
<th>Unit</th>
<th>Level</th>
<th>ID</th>
<th>Count</th>
<th>Radiocarbon Date(s) Conventional and Calibrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>162-343</td>
<td>3D</td>
<td>0-3”</td>
<td>Med/Large Mammal</td>
<td>1</td>
<td>350 ± 30 BP/Cal BP 500 to 310</td>
</tr>
<tr>
<td>162-435</td>
<td>3D</td>
<td>3-6”</td>
<td>Med/Large Mammal</td>
<td>1</td>
<td>2110 ± 30 BP/Cal BP 2150 to 1995</td>
</tr>
<tr>
<td>162-1086</td>
<td>3D</td>
<td>6-9”</td>
<td>Med/Large Mammal</td>
<td>1</td>
<td>2110 ± 30 BP/Cal BP 2150 to 1995</td>
</tr>
<tr>
<td>162-1150</td>
<td>4B</td>
<td>6-12”</td>
<td>Ovis canadensis</td>
<td>1</td>
<td>400 ± 30 BP/Cal BP 510 to 430 and Cal BP 355 to 330</td>
</tr>
<tr>
<td>162-1151</td>
<td>4B</td>
<td>6-12”</td>
<td>Ovis canadensis</td>
<td>1</td>
<td>400 ± 30 BP/Cal BP 510 to 430 and Cal BP 355 to 330</td>
</tr>
<tr>
<td>162-1180</td>
<td>4D</td>
<td>Cache</td>
<td>Ovis canadensis</td>
<td>1</td>
<td>490 ± 30 BP/Cal BP 540 to 505</td>
</tr>
</tbody>
</table>
Summary

The primary purpose of this chapter was to provide a taxonomic overview of the faunal remains contained in the reconstructed caches. In addition, the methods employed by the author to reconstruct the caches were discussed. Because working with curated archaeological collections can pose some problems, especially in terms of inconsistencies in documentation, the author felt it necessary to reconstruct the Loyalton Rockshelter caches based on the descriptions provided by Wilson, rather than relying exclusively on the accession records or catalogue descriptions.

The results of faunal analysis show that a significant portion of the reconstructed caches contain bighorn sheep cranial and vertebral remains. The unidentifiable archaeofaunal remains are most likely fragments from the bighorn sheep crania, but because identification to the ordinal level could not be attained for these minute fragments, they were categorized as either unidentifiable medium/large mammal or indeterminate mammal.

The bighorn sheep caches uncovered by Norman Wilson and his colleagues during the 1959 field excavation at Loyalton Rockshelter are features unique in their contents and location. Based on the author’s research, no other features similar to the Loyalton Rockshelter bighorn sheep caches have been uncovered in North America. The results from radiocarbon dating indicate that prehistoric occupation of Loyalton Rockshelter began over 2,000 years ago. Bighorn sheep remains are present in the rockshelter’s deeper deposits. These bones, however, do not appear to be associated with ritual activity. In addition, fetal bones have not been identified in the lower stratigraphic levels. This evidence suggest that bighorn sheep played an important role to those who
occupied the rockshelter, however there is no indication that bighorn sheep remains were given preferential treatment during the earliest occupation of the rockshelter.

The radiocarbon dates from the caches are nearly contemporaneous with the upper-most level of the rockshelter deposit. Because all three cranial samples returned similar AMS dates, I would like to argue that the ritualized treatment of both adult and fetal bighorn sheep crania occurred in the last 500 years.

The next chapter will draw on information provide in this chapter, and previous chapters, to discuss the Loyalton Rockshelter bighorn sheep caches. The expectations outlined in Chapter II to test the caches as ritual deposits will be addressed.
CHAPTER VIII

THE USE OF FAUNAL REMAINS

IN RITUAL

Introduction

The goal of this thesis is to examine the role of animals in ritual and discuss the ways in which archaeofaunal remains can be used to assess the phenomenon of ritual. The focus of this research was the Loyalton Rockshelter bighorn sheep caches, which may hold evidence for the ritual use of bighorn sheep in northeastern California. The last chapter revealed that prehistoric occupation of the Loyalton Rockshelter began over 2,000 years ago, and while this site type is unique to Sierra Valley, it is consistent with the general time frame of occupation in the region.

The purpose of this chapter is to interpret the overall results from this research. The results will be evaluated against the expectations proposed in Chapter II. This chapter will also provide a discussion of the research findings, address limitations to the research, and identify future avenues of research. Finally, the chapter will close with a summary of the research and general conclusions.

Interpretation and Discussion

The Loyalton Rockshelter bighorn sheep caches represent a unique collection of archaeofaunal features. At first glance, the specialized treatment of the adult and fetal
bighorn sheep cranial remains appear to be ritual in nature. However, this research is an attempt to depart from these assumptions and draw conclusions based on a systematic and objective examination of the cranial deposits.

Revisiting the Expectations

Expectations were established in Chapter II to assess the Loyalton Rockshelter caches and determine if they displayed characteristics associated with the ritual use of animals. The author adapted a list of taxonomic and depositional patterns associated with ritual, first introduced by Reitz and Wing (2008), to establish an objective set of characteristics of the ritual use of animals by which archaeofaunal deposits could be assessed. Based on these characteristics, the author created an expectation for the Loyalton Rockshelter caches. The expectation stated if the Loyalton Rockshelter bighorn sheep cranial caches are products of ritual activity, they should exhibit a similar number and type of distinguishing characteristics of ritual animal use as other Western American prehistoric bighorn sheep ritual features. Some examples have been presented of the prehistoric ritual use of bighorn sheep crania in the American West. The sites containing the ritual deposits of bighorn sheep crania exhibited a minimum of 10 and a maximum of 12 characteristics of the ritual use of animals.

The Loyalton Rockshelter bighorn sheep caches contain 13 characteristics of ritual animal use. Table 12 lists all the ritual characteristics present in the Loyalton Rockshelter caches (Note: the total number of characteristics does not include repeating criteria found in Categories B and C of both Sections I and II). The results show that the Loyalton Rockshelter caches contain more characteristics of the ritual use of animals than any other bighorn sheep cranial deposit in the West. The majority of the ritual
Table 13

RITUAL CHARACTERISTICS PRESENT IN THE LOYALTON ROCKSHELTER BIGHORN SHEEP CACHES

<table>
<thead>
<tr>
<th>I. The individual taxa deposited as a result of ritual behavior might:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Animal’s nutritional value</strong></td>
</tr>
<tr>
<td>be large bodied; ( x )</td>
</tr>
<tr>
<td>be satisfying in terms of fat, taste, tenderness, calories, or nutrients ( x )</td>
</tr>
<tr>
<td><strong>B. Accessibility to the animal</strong></td>
</tr>
<tr>
<td>be unpredictable; ( x )</td>
</tr>
<tr>
<td>exhibit anomalous or atypical behavior; ( x )</td>
</tr>
<tr>
<td>be available infrequently or for short periods of time; ( x )</td>
</tr>
<tr>
<td>be found in only a few locations; ( x )</td>
</tr>
<tr>
<td>be rare or exotic ( x )</td>
</tr>
<tr>
<td>be present in low numbers ( x )</td>
</tr>
<tr>
<td>be highly mobile ( x )</td>
</tr>
<tr>
<td>be from habitats otherwise seldom utilized ( x )</td>
</tr>
<tr>
<td>require considerable time to find, pursue, or capture; ( x )</td>
</tr>
<tr>
<td>be costly to acquire in terms of time, energy, or technology; ( x )</td>
</tr>
<tr>
<td><strong>C. Skill to acquire animal</strong></td>
</tr>
<tr>
<td>involve risk of personal injury or failure ( x )</td>
</tr>
<tr>
<td>require considerable time to find, pursue, or capture; ( x )</td>
</tr>
<tr>
<td>require a high degree of skill to acquire; ( x )</td>
</tr>
<tr>
<td>be costly to acquire in terms of time, energy, or technology; ( x )</td>
</tr>
<tr>
<td><strong>D. Culture’s perception of the animal</strong></td>
</tr>
<tr>
<td>exhibit behaviors inspiring fear or respect, or embodying admirable attributes; ( x )</td>
</tr>
<tr>
<td>exhibit unusual features such as bright colors or soft fur; ( x )</td>
</tr>
<tr>
<td>reinforce social norms, such as the divisions of labor, kinship, political structure, or group identity ( x )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Patterns of deposits containing ritually-significant animals might:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Animal’s nutritional value</strong></td>
</tr>
<tr>
<td>contain a large percentage of high-quality body parts, often measured as food utility</td>
</tr>
<tr>
<td><strong>B. Accessibility to the animal</strong></td>
</tr>
<tr>
<td>exhibit an age and sex distribution weighted in favor of a specific age class or sex ( x )</td>
</tr>
<tr>
<td>exhibit an unusual distribution among animal classes</td>
</tr>
<tr>
<td>contain animals from a higher or lower mean trophic level</td>
</tr>
<tr>
<td><strong>C. Skill to acquire animal</strong></td>
</tr>
<tr>
<td>be skeletally complete</td>
</tr>
<tr>
<td>contain animals from a higher or lower mean trophic level</td>
</tr>
<tr>
<td><strong>D. Culture’s perception of the animal</strong></td>
</tr>
<tr>
<td>contain high quantities of food residue that cannot be explained by preservation</td>
</tr>
<tr>
<td>show signs of roasting, ritual sacrifice, or other modifications</td>
</tr>
<tr>
<td>contain an unusual quantity or type of butchering debris</td>
</tr>
<tr>
<td>contain human remains ( x )</td>
</tr>
</tbody>
</table>
characteristics displayed in the Loyalton Rockshelter caches are consistent with other ritual bighorn sheep cranial deposits found throughout western North America. These characteristics include the individual taxa (in this case bighorn sheep) are large bodied; are satisfying in terms of fat, taste, tenderness, calories, or nutrients; are highly mobile; be from habitats otherwise seldom utilized; require considerable time to find, pursue, and capture; be costly to acquire in terms of time, energy and technology; involve risk of personal injury or failure; require a high degree of skill to acquire; exhibit behaviors inspiring fear or respect, or embodying admirable attributes; reinforce social norms; and contain an unusual quantity or type of butchering debris.

The bighorn sheep deposited in the Loyalton Rockshelter caches display two ritual characteristics that are not present in any of the other bighorn sheep cranial deposits. The ritual characteristics that make the Loyalton Rockshelter deposits unique are that the taxa present 1) are available infrequently or for short periods of time, and the deposits 2) exhibit an age and sex distribution weighted in favor of a specific age class or sex.

In regards to the first characteristic unique to the Loyalton Rockshelter bighorn sheep caches, the fetal cranial remains represent a component that is ‘available infrequently or for short periods of time.’ The presence of fetal bighorn sheep reflect the time of year when the adult animal was pursued. As stated in Chapter III, ewes give birth to their lambs in the summer months, often in the most rugged terrain to protect the newborn from predators (Matheny et al. 1997). The size and skeletal completeness of the fetal bighorn sheep in the Loyalton Rockshelter caches suggest that these animals were in their final stages of development and close to birth. The presence of mature fetal bighorn
sheep represents a restricted time period in which the Loyalton Rockshelter caches were created and is a distinctive characteristic of the ritual use of animals not found in other ritual bighorn sheep cranial deposits.

The Loyalton Rockshelter caches also ‘exhibit an age and sex distribution weighted in favor of a specific age class or sex.’ This characteristic directly references the high number of fetal bighorn crania found in the caches, especially when compared to other bighorn sheep cranial deposits in the West. While it is impossible to determine the sex of the adult crania in the Loyalton Rockshelter bighorn caches, the simplest explanation would suggest that many of them were pregnant females. Considering this theory, the sex distribution of the bighorn sheep caches would contain mostly, if not all, female adult bighorn remains.

These results show that the Loyalton Rockshelter bighorn sheep cranial cashes were most likely produced during a ritual activity. The characteristics of ritual animal use provide a method to objectively and systematically evaluate the ritual use of animals based on both the taxa and archaeological patterning. The Loyalton Rockshelter bighorn caches display 13 characteristics of the ritual use of animals, more than any other archaeological deposit reviewed for this research. Based on the archaeofaunal evidence, the skulls of both adult (possibly female) and fetal bighorn sheep crania were severed from their bodies near the first cervical vertebrae (atlas) and interred in five separate localities in Loyalton Rockshelter as part of an unknown ritual.

Fetal Animals in Zooarchaeology

The presence of fetal remains is probably the most intriguing aspect of the Loyalton Rockshelter caches. The occurrence of fetal animals in the archaeological
record is rare. On the northwest Plains, archaeologists have found fetal pronghorn and bison, however these are often associated with mass kill sites, such as bison jumps. The fetal remains provide information regarding site seasonality, but are seen mostly as an inevitable consequence of the hunting pattern (Davis et al. 2000; Hill et al. 2011; Johnson and Holliday 1980; Nicholson and Playford 2009).

The only archaeological evidence for the special disposal of fetal animals comes from Peru. Fetal camalids are often found under the floor of house structures (Shimada and Shimada 1985). This ritual continues to be practiced today and is thought to bring good luck and safety to a home.

There is no evidence of the symbolic importance of fetal animals in the Washoe culture or other Great Basin cultures. In addition, fetal animals were taboo to eat in the Washoe culture (Downs 1966). The presence of fetal bighorn demonstrates a limited understanding of prehistoric activities. Ethnographic literature indicates that Washoe and other Great Basin hunters pursued bighorn sheep in the late fall and early winter after the first snows brought bighorn down from their rocky cliffs where hunters could more easily hunt them (Matheny et al. 1997). The fetal cranial bones in the Loyalton Rockshelter caches are obviously problematic with regards to this timeline.

Whether the gravid ewes were being pursued due to environmental stressors or for undocumented ritual activities, the fetal remains in the Loyalton Rockshelter caches are evidence of unique prehistoric practices outside the ethnographic and archaeological record. The Washoe hunting ritual may have been modified to include the skulls of both the adult and unborn bighorn, and the caches containing fetal remains may
reflect the power that the prehistoric cultures ascribed to adult bones, mimicking the traditional interment rituals.

Evidence for Numic Spread into Sierra Valley

Archaeological evidence suggests that Numic-speaking groups expanded into northeastern California approximately 300 to 500 years ago (Bettinger and Baumhoff 1982; Fowler 1972; McGuire 2007; Sutton 1986). Three radiocarbon dates from the Loyalton Rockshelter bighorn caches (see Chapter VII) are consistent with the time of Numic expansion into the study area. Combining the results from radiocarbon dating with the shared ritual characteristics displayed between the bighorn sheep caches at Loyalton Rockshelter and other bighorn sheep features in the west, the Loyalton Rockshelter caches may have been products of ritual activity of Numic groups entering Sierra Valley and northeastern California approximately 500 years ago.

Evidence for the social and economic importance of bighorn sheep in the Washoe culture is generally absent. Price (1962:20) claims that bighorn sheep were pursued for just as much for their meat as for the prestige of killing them. This is supported by ethnographic records and personal communication with Darrel Cruz, the Washoe Tribal Historic Preservation Officer (THPO). The selective disposal of bighorn sheep at Loyalton Rockshelter may have been the subject of ritual or a symbolic offering to the animal for continued hunting success, similar to the respectful disposal of deer remains in streams. However, the lack of evidence in both the archaeological record and ethnographic documents describing the symbolic importance or ritual use of bighorn sheep by the Washoe is problematic.
Numic groups of the Great Basin, however, held the bighorn sheep in high regard, both for its economic value and its symbolic importance. As Vander (1997) describes, Great Basin groups ordered their world into three distinct strata, upper, middle and lower, which correspond to the different forms of Animal People. Based on Native taxonomy, animals are categorized based on the environment they inhabit and the behaviors they display. Bighorn sheep inhabit the highest, most rugged mountain cliffs, which many native Great Basin people associate with the uppermost level of the cosmos (Yohe and Garfinkel 2012). Bighorn sheep are thus a chief symbol in many Great Basin groups.

In addition, some Great Basin cultures associate the color white with the sky (clouds, snow, smoke, fog), or the uppermost and most spiritually powerful, realm. The bighorn sheep’s white rump is often associated with this symbolic color and recognized as sacred (Yohe and Garfinkel 2012). The color white is often also associated with the white underside of the eagle – the boss of the sky. The eagle’s place in the sky is considered a metaphor for the hovering spiritual energy of the cosmos. Therefore, the eagle is considered the most important symbol and associated with healing, curing, hunting, shamanism, and vision questing (Yohe and Garfinkel 2012). Bighorn sheep, although not winged soaring through the sky, occupy a realm just slightly lower than that of the eagle. It could be argued that similar symbolic power is attributed to bighorn sheep.

Because of the symbolic value of bighorn sheep in Numic cultures, the bighorn sheep plays a significant role in Numic traditions and ceremonies. For purposes of this research, only traditions of the Northern Paiute will be considered, since their
culture territory encompasses the entire eastern side of the Washoe culture area. As discussed in Chapter IV, Native American cultural boundaries are highly disputed ethnographically, and modern boundaries are the construct of salvage ethnographer’s interpretation based on very little information. Tribal boundaries most likely shifted prehistorically making the assignment of culture groups to territories problematic.

The bighorn sheep is associated with both hunting ritual as well as shamanistic activities. Ethnographic literature (Lowie 1924) describes pre-hunt dances and songs performed by traditional Northern Paiute animal-human sprits of Cow, Eagle, Wildcat, Yellow-hammer, and Big Rat. These supernatural characters would chant, “I am going to shoot the mountain sheep” (Lowie 1924; Vander 1997). To heal, Northern Paiute doctors would dream of “mountain sheep which gave them the power to suck out and blow away disease” (Steward 1941:259). This is consistent with the reverence of bighorn sheep in the broader context of Numic Great Basin groups.

It is well known that caves were places where shamans sought power. While some caves were used as regular occupation sites, they were also used to cache shamans’ paraphernalia (Elsasser 1961). Pipes and pipe bowls, charm stones, and quartz crystals are some of the items considered to be part of a shaman’s tool kit. Artifacts contained in Cache 6 at Loyalton Rockshelter could represent aspects of a shaman’s toolkit. Its spatial association with the cranial caches suggests a connection between bighorn remains and shamanistic activities. It is quite possible that the bighorn caches represent a shamanistic ceremony absent in ethnographic records.

Other bighorn sheep features of the American West are strongly associated with Great Basin cultures, particularly Numic speaking groups (Yohe and Garfinkel
2012). Bighorn sheep play a central role in Numic traditions and ceremonies. In addition, Whitley (1982) has noted the symbolic significance of bighorn sheep in Great Basin oral traditions. Because most of the bighorn sheep ritual features have been found in regions prehistorically occupied by Numic speaking groups, the archaeological features and isolated skeletal elements representing caching and interment of bighorn sheep crania, and possibly Loyalton Rockshelter, are likely associated with Numic traditions and culture.

Table 13 shows the dates associated with known bighorn sheep cranial features in the American West. Evidence for the ritual use of bighorn sheep crania dates as far back as 8,800 radiocarbon years BP at Mummy Cave in Wyoming and as recent as the Loyalton Rockshelter caches. This broad timeframe shows that the caching and interment of bighorn sheep skulls has occurred for thousands of years in areas prehistorically occupied by Numic groups.

**Table 13**

**RITUAL BIGHORN SHEEP DEPOSITS IN THE AMERICAN WEST AND ASSOCIATED DATES**

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Site Number</th>
<th>Approximate Age (reported)</th>
<th>Approximate Age (calibrated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mummy Cave</td>
<td>48PA201</td>
<td>8,800 R CYBP</td>
<td>10,440 Cal BP</td>
</tr>
<tr>
<td>Dry Valley, NV</td>
<td>26Wa2460</td>
<td>3,700 to 2,800 Cal BP</td>
<td>3,700-2,800 Cal BP</td>
</tr>
<tr>
<td>Rose Spring Site</td>
<td>CA-INY-372</td>
<td>ca. A.D. 500</td>
<td>1,450 Cal BP</td>
</tr>
<tr>
<td>Creation Cave</td>
<td>CA-KER-508</td>
<td>ca. A.D. 600 to contact</td>
<td>1,350 Cal BP to contact</td>
</tr>
<tr>
<td>San Rafael Swell Headdress</td>
<td>None</td>
<td>ca. A.D. 1050 to 1150</td>
<td>900 to 800 Cal BP</td>
</tr>
<tr>
<td>Loyalton Rockshelter Caches</td>
<td>CA-SIE-46</td>
<td>510 to 430 Cal BP</td>
<td>510 to 430 Cal BP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>355 to 330 Cal BP</td>
<td>355 to 330 Cal BP</td>
</tr>
<tr>
<td>Nopah Cave</td>
<td>None</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Skull Cave</td>
<td>None</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Ovis Cave</td>
<td>None</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Limitations of Research

There is tremendous potential in the examination of archived archaeological collections. These ‘old’ collections can be re-examined using new theoretical approaches and technological research methods to address current archaeological questions of the past. The archaeological collections, however, can pose certain problems when attempting to analyze the assemblage based on modern techniques. Excavation and recordation procedures of the past are often considered archaic by today’s standards. However, in the case of Loyalton Rockshelter, Norman Wilson had enough foresight to collect faunal material, a method seldom heard of at the time of excavation.

Future Studies

The potential for future lines of inquiry into the Loyalton Rockshelter artifact assemblage is vast. This thesis simply investigates one aspect of the prehistoric site. To continue examination into the seasonal use of the site, cementum increment analysis can be conducted on adult animal dentition. There is a great number of bighorn sheep molars identified in the archaeofaunal assemblage; an analysis of these remains compared to the stratigraphic deposition could indicate changes in seasonal use of the site through time. This would aid in the archaeological knowledge of seasonality of site use in northeastern California and the western Great Basin.

In the broader context of this research, it is essential that the growing field of zooarchaeology continue to examine faunal remains from a social perspective. Cultural beliefs and social constructs often informed subsistence strategies and diet. These aspects of culture cannot be ignored. Methods for the identifying the ritual use of animals, such
as those utilized in this research, should to be incorporated into both excavation procedures and zooarchaeological analysis. The contextual evidence for ritual activity may not be as obvious as the deposits at Loyalton Rockshelter, and meticulous comparison between secular animal remains and the suspected ritual remains is essential to distinguish between which behaviors created the archaeofaunal deposits.

Conclusions

Prehistoric occupation of Sierra Valley began over 5,000 years ago, as evidenced by radiocarbon dates from Feature 1 at CA-PLU-1487/H (Waechter and Andolina 2005). Based on archaeological evidence compiled and completed by Martin (2014), occupation of Sierra Valley intensified approximately 1,500 years ago, with the most substantial evidence of prehistoric activity occurring after 1,000 BP. There are few archaeological sites in Sierra Valley dating after 500 BP.

Based on our understanding of Late Holocene climactic conditions, the drought conditions caused by the Medieval Climactic Anomaly significantly affected subsistence strategies. The intensification of plant foods is demonstrated by the increase of plant processing and cooking features in Sierra Valley. Large animal faunal remains from regional sites indicate a significant decline in their use during this time (Carpenter 2002). However, bighorn sheep were obviously present in the mountains surrounding Sierra Valley during the Late Archaic and Terminal Prehistoric periods, and these animals were pursued and killed by prehistoric people.

Loyalton Rockshelter was used by prehistoric people beginning over 2,000 years ago. The proportion and diversity of taxa present in the lower levels of the midden
deposits suggest that the rockshelter was used as a hunting base camp during the pursuit of bighorn sheep and deer. However, smaller game animals, such as rabbits and hares, and marmots were also hunted, their bones evidence of butchery in the rockshelter.

Approximately 500 years ago, skulls of pregnant bighorn ewes were severed from their body and, along with the skulls of their unborn fetuses, were interred together in the midden of Loyalton Rockshelter. The exact meaning and purpose for this ritual treatment of both adult and fetal bighorn sheep is still unclear. The characteristics, however, shared between the Loyalton Rockshelter caches and other bighorn sheep cranial deposits in traditional Numic territories suggest that the deposits of this study may be associated with Northern Paiute or other Numic groups cultural traditions. Radiocarbon dates from the Loyalton Rockshelter caches are consistent with the timeframe proposed for the expansion of Numic groups into the Washoe culture territory during the Terminal Prehistoric period.

The hunting of bighorn sheep, butchering, and the specialized disposal of the skull most likely is associated with significant ritual activities. These practices were probably considered both practical and spiritual activities among the prehistoric people who created the Loyalton Rockshelter deposits. It is clear, though, that in addition to the theoretical approaches and archaeological data presented in this thesis, continued archaeological investigation into the ritual use of bighorn sheep is needed to further our understanding of the complex relationship between humans and animals in prehistoric northern California and the western Great Basin.
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Brück, Joanna

Buechner, H. K.

Bulmer, Ralph

Butler, B.R.

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Dangberg, Grace


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Hall, E. R., and K. R. Kelson

Hamayon, Roberte N.

Hayden, Julian D.

Haury, Emil W.

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Insoll, Timothy

Jacobs, Mike

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Moratto, Michael J.

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Reitz, Elisabeth J., and Elizabeth S. Wing

Rhode, David (ed.)

Riddell, Francis A.

Russell, Nerissa

Schultz Peter D.
Schultz, Peter D., and Dwight D. Simons

Seton, E. T.

Shimada, Melody, and Izumi Shimada

Sisson, Septimus, James Daniels Grossman, and Robert Getty

Smith, Thomas S.

Sopyan, Erwin

Steward, Julian H.

Sutton, Mark Q.

Sutton, Mark Q., and Robert M. Yohe II

Tanner, Adrian
Taylor, Royal E.  

Thildervisk, J.  

Thomas, David H.  

Treganza, A. E.  

Trigger, Bruce G.  

Valdez, R.  

Vander, Judith  

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LOYALTON ROCKSHELTER ARCHAEOLOGICAL ASSEMBLAGE TRANSFER

AND LOAN DOCUMENTS

Outgoing Receipt

Date 1/31/2013

Loan X Return Other

Object(s)
Quantity Description Condition

Loyalton Rocks Shelter (431E141a)
10 boxes

Recipient
Name Frank E Bayham
Address Dept. of Anthropology
California State Univ., Chico Chico, CA 95929
Phone (530) 898-4360; 84540; 845692
Email bayham@csuchico.edu

Recipient's Signature Frank E Bayham Date 1/31/2013

Approved By Racer E. Moore Date 1/31/2013

Nevada State Museum

Date Object Returned Received By

Remarks Entire collection on loan except human remains
Outgoing Loan Agreement

Lender
Nevada State Museum
600 North Carson Street
Carson City, NV 89701-4004

Contact Name Rachel K. Malloy
Telephone 775-687-4810 x229 Fax 775-687-4168 Email rmalloy@nevadaculture.org

Borrower
Name of Organization or Individual California State University, Chico
Street 400 West First Street City Chico State CA Zip 95929-0400
Contact Name Kevin Dalton
Telephone 530-898-4360 Fax
Email kd dalton@csuchico.edu

Purpose of Loan Research


Objects on Loan

<table>
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<th>Description</th>
<th>Condition</th>
<th>Insurance Value</th>
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<td>Faunal Material</td>
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Total Number of Objects Total Insurance Value

Insured By CSU, Chico

Packing and Transportation Arrangements Hand-carry

Credit Line See Terms of Agreement number 8 on the reverse.

Special Instructions

Borrower Approval
I have read and agree to comply with all terms of this loan agreement, as stated above and on the reverse.

Signature
Title Archaeological Collection Manager

Nevada State Museum Approval

Signature Rachel K. Malloy
Title Anthropology Collection Manager

Date 2/20/2013
Date 1/25/2013

B 5-9-5
Nevada Department of Tourism and Cultural Affairs
Nevada State Museum
600 N. Carson St., Carson City, NV, 89701-4004, (p) 775-687-4810, (f) 775-687-4168, www.nevadaculture.org

Outgoing Loan Agreement

Lender
Nevada State Museum
600 North Carson Street
Carson City, NV 89701-4004

Contact Name: Rachel K. Malloy
Telephone: 775-687-4810 x229
Fax: 775-687-4168
Email: rmalloy@nevadaulture.org

Borrower
Name of Organization or Individual: California State University, Chico
Street: 400 West First Street
City: Chico
State: CA
Zip: 95929-0400

Contact Name: Kevin Dalton
Telephone: 530-898-4360
Fax:
Email: kddalton@csuchico.edu

Purpose of Loan: Research


Objects on Loan

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Condition</th>
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<tr>
<td>4SIE46</td>
<td>Faunal Material</td>
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Total Number of Objects ___________________ Total Insurance Value ___________________

Insured By: CSU, Chico

Packing and Transportation Arrangements: Hand-carry

Credit Line: See Terms of Agreement number 8 on the reverse.

Special Instructions:

Borrower Approval
I have read and agree to comply with all terms of this loan agreement, as stated above and on the reverse.

Signature: ___________________________ Date: 4/30/2014
Title: Archaeological Collections Manager

Nevada State Museum Approval

Signature: ___________________________ Date: 11/5/2014
Title: Archaeology Collections Manager

B 5-9-5
Nevada Department of Tourism and Cultural Affairs

Nevada State Museum
600 N. Carson St., Carson City, NV 89701-4004, (p) 775-687-4110, (f) 775-687-4168, www.nevadaculture.org

Outgoing Loan Agreement

Lender
Nevada State Museum
600 North Carson Street
Carson City, NV 89701-4004

Contact Name Rachel K. Malloy
Telephone 775-687-4810 x229 Fax 775-687-4168 Email rmalloy@nevadaculture.org

Borrower
Name of Organization or Individual California State University, Chico
Street 400 West First Street City Chico State CA Zip 95929-0400
Contact Name Kevin Dalton
Telephone 530-898-4360 Fax Email kdalton@csuchico.edu

Purpose of Loan Research


Objects on Loan

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Condition</th>
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<tr>
<td>4SIE46</td>
<td>10 boxes of artifacts/specimens from Loyalton Rock Shelter</td>
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Total Number of Objects

Total Insurance Value

Insured By CSU, Chico

Packing and Transportation Arrangements Hand-carry

Credit Line See Terms of Agreement number 8 on the reverse.

Special Instructions

Borrower Approval
I have read and agree to comply with all terms of this loan agreement, as stated above and on the reverse.

Signature [Signature]

Date 1/22/2015

Title ARCHAEOLOGICAL COLLECTION MANAGER

Nevada State Museum Approval

Signature [Signature]

Date 1/14/2015

Title Anthropology Collection Manager

B 5-9-5
February 11, 2015

Mr. Kevin Dalton/ Miss Christine O’Neill
California State University, Chico
Anthropology Department
400 W. First Street
Chico, CA 95929-0400
USA

RE: Radiocarbon Dating Results For Samples 162-343-9, 162-435-9, 162-1086-9, 162-1150-9, 162-1151-9, 162-1180-9

Dear Mr. Dalton & Ms. O’Neill:

Enclosed are the radiocarbon dating results for six samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a csv spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result.

When interpreting the results, please consider any communications you may have had with us regarding the samples. As always, your inquiries are most welcome. If you have any questions or would like further details of the analyses, please do not hesitate to contact us.

Our invoice has been sent separately. Thank you for your prior efforts in arranging payment. As always, if you have any questions or would like to discuss the results, don’t hesitate to contact me.

Sincerely,

[Signature]

Darden Hood
### REPORT OF RADIOCARBON DATING ANALYSES

Mr. Kevin Dalton/Christine O'Neill

California State University, Chico

Report Date: 2/11/2015

Material Received: 1/27/2015

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Measured Radiocarbon Age</th>
<th>13C/12C Ratio</th>
<th>Conventional Radiocarbon Age(*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta - 402954</td>
<td>250 +/- 30 BP</td>
<td>-18.6 o/oo</td>
<td>350 +/- 30 BP</td>
</tr>
<tr>
<td>SAMPLE : 167-343-9</td>
<td>ANALYSIS : AMS-Standard delivery</td>
<td>MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali</td>
<td>2 SIGMA CALIBRATION : Cal AD 1450 to 1640 (Cal BP 500 to 310)</td>
</tr>
</tbody>
</table>

| Beta - 402955 | 2030 +/- 30 BP | -20.0 o/oo | 2110 +/- 30 BP |

| Beta - 402956 | 2010 +/- 30 BP | -18.9 o/oo | 2110 +/- 30 BP |

| Beta - 402957 | 310 +/- 30 BP | -19.4 o/oo | 400 +/- 30 BP |
| SAMPLE : 162-1150-9 | ANALYSIS : AMS-Standard delivery | MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali | 2 SIGMA CALIBRATION : Cal AD 1440 to 1520 (Cal BP 510 to 430) and Cal AD 1595 to 1620 (Cal BP 355 to 330) |

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 100% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard. The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 14C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by **. The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.
## REPORT OF RADIOCARBON DATING ANALYSES

Mr. Kevin Dalton/Christine O'Neill  
Report Date: 2/11/2015

<table>
<thead>
<tr>
<th>Sample Data</th>
<th>Measured Radiocarbon Age</th>
<th>13C/12C Ratio</th>
<th>Conventional Radiocarbon Age(*)</th>
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<tbody>
<tr>
<td>Beta - 402958</td>
<td>310 +/- 30 BP</td>
<td>-19.6 o/oo</td>
<td>400 +/- 30 BP</td>
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<tr>
<td>SAMPLE : 162-1151-9</td>
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<td>ANALYSIS : AMS-Standard delivery</td>
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<tr>
<td>MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali</td>
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</tr>
<tr>
<td>2 SIGMA CALIBRATION : Cal AD 1440 to 1520 (Cal BP 530 to 430) and Cal AD 1595 to 1620 (Cal BP 355 to 330)</td>
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</tbody>
</table>

| Beta - 402959       | 390 +/- 30 BP            | -18.9 o/oo   | 490 +/- 30 BP                   |
| SAMPLE : 162-1180-9 |                          |              |                                 |
| ANALYSIS : AMS-Standard delivery |            |              |                                 |
| MATERIAL/PRETREATMENT : (bone collagen): collagen extraction: with alkali |  |              |                                 |
| 2 SIGMA CALIBRATION : Cal AD 1410 to 1445 (Cal BP 540 to 505) |  |              |                                 |

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 90% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 14C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by **. The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -18.6 o/oo : lab. mult = 1)

<table>
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<th>Laboratory number</th>
<th>Beta-402954</th>
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<tr>
<td>Conventional radiocarbon age</td>
<td>350 ± 30 BP</td>
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<tr>
<td>Calibrated Result (95% Probability)</td>
<td>Cal AD 1450 to 1640 (Cal BP 500 to 310)</td>
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<tr>
<td>Intercept of radiocarbon age with calibration curve</td>
<td>Cal AD 1500 (Cal BP 450)</td>
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<tr>
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<td>Cal AD 1500 (Cal BP 440)</td>
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<tr>
<td></td>
<td>Cal AD 1510 (Cal BP 440)</td>
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<tr>
<td></td>
<td>Cal AD 1600 (Cal BP 350)</td>
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<td></td>
<td>Cal AD 1615 (Cal BP 335)</td>
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<tr>
<td>Calibrated Result (68% Probability)</td>
<td>Cal AD 1471 to 1625 (Cal BP 480 to 435)</td>
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<td></td>
<td>Cal AD 1555 to 1630 (Cal BP 395 to 320)</td>
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</table>

Database used
INTCAL13

References
Reference to INTCAL13 database

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)982-7102 • Fax: (305)693-9694 • Email: beta@radiocarbon.com
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -20 o/oo : lab. mult = 1)

Laboratory number Beta-402955
Conventional radiocarbon age 2110 ± 30 BP
Calibrated Result (95% Probability) Cal BC 200 to 45 (Cal BP 2150 to 1995)

Intercept of radiocarbon age with calibration curve Cal BC 185 (Cal BP 2115)
Cal BC 125 (Cal BP 2070)
Cal BC 120 (Cal BP 2070)

Calibrated Result (68% Probability) Cal BC 180 to 90 (Cal BP 2130 to 2040)
Cal BC 65 to 60 (Cal BP 2015 to 2010)

Database used
INTCAL13

References
Mathematical model for calibration scenario
Mathematical model for calibration scenario
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -18.9 o.l.o.o : lab. mult = 1)

Laboratory number Beta-402956

Conventional radiocarbon age 2110 ± 30 BP

Calibrated Result (95% Probability) Cal BC 200 to 45 (Cal BP 2150 to 1995)

Intercept of radiocarbon age with calibration curve Cal BC 185 (Cal BP 2115)
Cal BC 125 (Cal BP 2075)
Cal BC 120 (Cal BP 2070)

Calibrated Result (68% Probability) Cal BC 180 to 90 (Cal BP 2130 to 2040)
Cal BC 65 to 60 (Cal BP 2015 to 2010)

Database used INTCAL13

References
Math村:used for calibration scenario
References to INTCAL13 database
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -19.4 o/oo : lab. mult = 1)

Laboratory number Beta-402957

Conventional radiocarbon age 400 ± 30 BP

Calibrated Result (95% Probability) Cal AD 1440 to 1520 (Cal BP 510 to 430)
Cal AD 1595 to 1620 (Cal BP 355 to 330)

Intercept of radiocarbon age with calibration curve Cal AD 1455 (Cal BP 495)

Calibrated Result (68% Probability) Cal AD 1445 to 1485 (Cal BP 505 to 465)

Database used
INTCAL13

References
References to INTCAL13 database

Beta Analytic Radiocarbon Dating Laboratory
4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305) 697-5461 • Fax: (305) 693-9994 • Email: beta@radiocarbon.com
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -19.6 o/oo : lab. mult = 1)

Laboratory number Beta-402958

Conventional radiocarbon age 400 ± 30 BP

Calibrated Result (95% Probability) Cal AD 1440 to 1520 (Cal BP 510 to 430)
Cal AD 1595 to 1620 (Cal BP 355 to 330)

Intercept of radiocarbon age with calibration curve Cal AD 1455 (Cal BP 465)

Calibrated Result (68% Probability) Cal AD 1445 to 1485 (Cal BP 505 to 465)

Database used
INTCAL13

References
References to INTCAL13 database
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -18.9 o/oo : lab. mult = 1)

Laboratory number  Beta-402959

Conventional radiocarbon age  490 ± 30 BP

Calibrated Result (95% Probability)  Cal AD 1410 to 1445 (Cal BP 540 to 505)

Intercept of radiocarbon age with calibration curve  Cal AD 1440 (Cal BP 500)

Calibrated Result (68% Probability)  Cal AD 1415 to 1440 (Cal BP 535 to 510)

Database used  INTCAL13

References
Mathematical used for calibration scenario
References to INTCAL13 database