EXPLORATION OF PROYECTO ARQUEOLÓGICO CHIHUAHUA (PAC): A ZOOARCHAEOLOGICAL APPROACH TO THE ONTOLOGICAL TURN

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EXPLORATION OF PROYECTO ARQUEOLÓGICO CHIHUAHUA (PAC) AND CASAS GRANDES: A ZOOARCHAEOLOGICAL APPROACH TO THE ONTOLOGICAL TURN

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Abstract

Faunal remains can be used to inform research on many aspects of prehistoric life. This thesis explores the importance of faunal analysis in understanding prehistoric human-animal relations, using faunal evidence collected by the *Proyecto Arqueológico Chihuahua* (PAC) in the Casas Grandes region of Chihuahua, Mexico. I analyzed faunal material from four sites: the Calderón site (CH- 254), the Quevedo site (CH-218), the CH-240 site, and the Santa Rosa site (CH-272). By conducting the first substantive analysis of faunal material collected from multiple sites within the project boundaries, I generated essential data that I was then able to examine through different theoretical approaches to develop a more holistic understanding of ancient lifeways. The research moves beyond the well-established subsistence-based interpretations of the faunal record. Moreover, this research expands our understanding of the ritual system that existed throughout the region by deploying recent theory on ancient ontologies, thereby clarifying the important ritual roles animals had in Casas Grandes society. Additionally, my research contributes to broader discussions about the role human-animal relations played in supporting economic, social, spiritual, and dietary stability not only at the site level but the Casas Grandes region at large.

Acknowledgements

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Table of Contents

Tables

Figures

Chapter 1: Introduction

1.1 Project Introduction

Individuals have long maintained relations with animals as resources to be regulated, hunted, domesticated, and consumed. Researchers in zooarchaeology implicitly acknowledge that their work rests on a predominant theoretic position in which faunal material represents subsistence-based utilization patterns (Gifford-Gonzalez 1991, 219). Researchers in zooarchaeology have recently started systematically interacting with animals outside of traditional subsistence-based methodologies, coinciding with a growing interest in human-animal relations within social science research. Current studies are expanding from traditional species lists and butchering pattern analysis to exploring other understandings of the nature of human-animal relations. Unlike potsherds or stone tools, bones have been alive, and their complexity reflects that origin. Research conducted in Northwestern Mexico, particularly the state of Chihuahua, supplies an opportunity to consider alternate explanations on the meaning of faunal patterns.

At the beginning of the twentieth-century, researchers began to explore the Casas Grandes region of Northwest Chihuahua, Mexico. During this time, work conducted in Casas Grandes was overshadowed by the extravagant Maya sites found in Southern Mesoamerica and Pueblo sites in the American Southwest. Sites within the Casas Grandes region have been interpreted as a part of a complex social system within the boundaries of the American Southwest and Northern Mesoamerica. The combination of the presence of Mesoamerican cultural characteristics such as platform mounds, ball courts, and Ramos polychrome pottery with horned serpent iconography with Pueblo-style architecture indicates close ties to the American Southwest, which led archaeologists to conclude that the Casas Grandes region was a relatively unique cultural phenomenon (Cunningham 2019, 6-7).

The study area for this thesis is in the southern zone of the Casas Grandes region of Northwest Mexico seen in Figure 1. Past human-animal relations are investigated in a zooarchaeological context at four Viejo period sites within the spatial boundaries of the *Proyecto Arqueológico Chihuahua* (PAC), a project headed by the late Dr Jane Kelley and Dr Joe Stewart. The project embarked upon the understanding and reconstruction of sites within the boundaries of Casas Grandes in Northern Chihuahua, Mexico. This research serves as the first full-scale faunal analysis of the faunal material within the study parameters of the PAC since Hodgetts' (1996) study at the El Zurdo site (CH-159). The materials used in this thesis come from a series of excavations run in 1998, 1999, 2000, 2007, 2008, and 2010. My research aimed to explore prehistoric populations of the Viejo period throughout the region targeted by these excavations. Data from faunal material recovered from the El Zurdo site (CH-159) and the site of Paquimé served as reference models. These two sites contribute to much of the earlier work concerning faunal elements and understanding Casas Grandes regional systems. The subject of human-animal relations has been a part of discussions specifically related to iconographic depictions of humans and animals within the Casas Grandes region, as well as ceramic vessel forms recovered from sites such as Paquimé (VanPool 2003, 697; VanPool and VanPool 2016, 312; 2021, 1). Though mentioned throughout the literature, these discussions incorporate little detailed faunal data. To better understand human-animal relations, I considered evidence from faunal analysis.

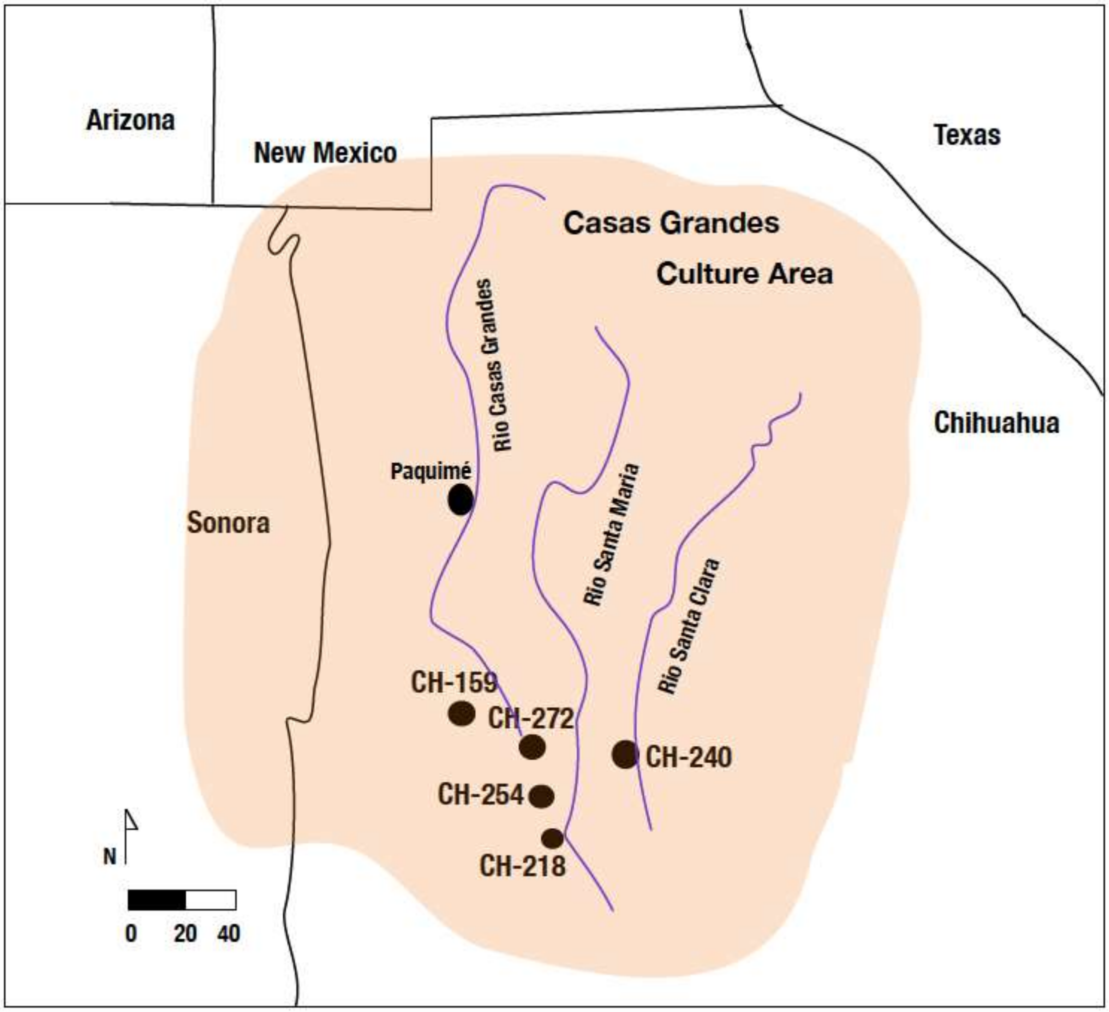

Figure 1. Casas Grandes and sub-region investigated. Adapted from Zborover (2019, 83)

Human-animal relations played a vital role in the ritual system that appeared during the Medio period, which began in the mid-thirteenth century. Animals had an influential role in supporting group solidarity and community social, economic, and spiritual well-being. The studies of ceramic iconography and the context of burial depositions have suggested that animals played a significant role in the new social-political landscape that appeared throughout this occupation. Specifically, animals were important resources in various ritual practices identified throughout these depictions and played an important role in individuals' physical offerings and transformation. Faunal analysis offers an independent way to assess our interpretations of these relations. This thesis builds on earlier published work and expands into a new theoretical understanding of human-animal relations as seen through the faunal record.

1.2 Research Objectives

I aimed to explore how zooarchaeological studies can contribute to reconstructing lifeway patterns in the region by expanding on well-established subsistence-based interpretations of the faunal record. Because of the important ritual roles animals are assumed to have in Casas Grandes society, I hypothesised that further insights could be gained by studying the faunal remains. My approach looked cross-culturally at the situatedness of Casas Grandes between Mesoamerica and the American Southwest and aimed to create a regional-specific spatial and contextual understanding of faunal remains at the sites of study.

The research had four key objectives:

1) Link information gained from published site reports, original level records, and earlier small-scale analysis by reassessing the entire available faunal collection previously amassed by the PAC.
2) Analyze the faunal elements in the collection that were not yet classified, add attribute information to the remains not fully documented, and review the data tabulated from earlier zooarchaeological work.
3) Evaluate the past and current theoretical frameworks and lines of interpretation relating to faunal elements found within the region.

4) Devise an understanding of human-animal relations by introducing two main ontologies, animistic and analogical, and show how each can be supported or rejected with the faunal collections from the study area. This interpretation focused on an analysis of four well-excavated sites: the Calderón site (CH- 254), the Santa Rosa site (CH-272), CH-240, and the Quevedo site (CH-218).

1.3 Organization of Thesis

This thesis contains seven chapters. Chapter 2 includes information about the different sites and cultural assemblage descriptions and an overview of the chronology of the Casas Grandes region. There is an introduction to the environment, including Casas Grandes physiography, climate, geographical range, and earlier botanical evidence presented within the published literature. Chapter 2 also describes the history of research within the Casas Grandes region and reviews the four sites studied in this thesis. Chapter 3 is a summary of the literature regarding previously employed theories relating to faunal analysis in Northwestern Mexico, the American Southwest, and the southern regions of Mesoamerica. Those discussed include environmental, economic, social, and ceremonial models of interpretation. Debates revolving around the multifaceted topic of Mesoamerican versus Southwestern cultural origins of Casas Grandes are addressed. An introduction to the study of ontologies, specifically animism and analogism, is also outlined. Chapter 4 includes the methodological approaches used in this analysis. It outlines the excavation methods and standards set out for the project, element identification, species identification and analysis of the elements within the assemblage, and data quantification. In Chapter 5, has the results of my data analysis, including the overall quantification of the taxa and elements recovered, as well as an evaluation of patterns present at each of the sites and associated structures at an individual level. My interpretations of this data are presented in Chapter 6, including my understanding of how humans interacted with animals and their environment and the implications of these results within the greater Chihuahua culture. Understanding these interactions was possible by incorporating both previously employed models of faunal interpretation and presenting the data in a new light through the ontological turn in zooarchaeology. Chapter 7 includes the conclusive remarks of my research.

Chapter 2: Site Description and Casas Grandes History

Researchers interested in prehistoric human-animal relations must consider the physical environment, and temporal chronology. Understanding human-animal relationships requires considering a variety of factors including the environment, as patterns seen in faunal elements change depending on the prehistoric environment. Variables such as temporal chronology of material culture reveal how variations in faunal element patterns are present throughout distinct time frames. Researchers must also acknowledge the history of research within their chosen region of study to contextualize contemporary investigations and identify future studies that may contribute to the understanding of prehistoric culture. In this chapter, to better understand the chronological contrasts in Chihuahua culture, I'll describe the chronology of the Casas Grandes area. Next, the geographical setting and environmental context are introduced, with a focus on the physiography and climate in the four geographical regions within the project borders to better understand the influence of the environment on the patterns present in the PAC faunal collection. A history of three primary waves of archaeological exploration in the Casas Grandes region follows to contextualize the archaeological datasets recovered from those projects, and the chapter concludes with a discussion of the four sites considered in the thesis, the Calderón Site (CH-254), CH-240, the Quevedo Site (CH-218), and the Santa Rosa Site (CH-272).

2.1 Chronology of Casas Grandes

Sites in the Casas Grandes region fall under two primary periods, the Viejo and Medio periods. Both periods are fundamental in the social, cultural, and economic development of Casas Grandes. The Viejo period is the lesser known of the two temporal ranges of the

Casas Grandes region. Charles Di Peso saw the Viejo period as having a temporal range from 700 A.D. (+/- 50) to 1060 A.D. Since then, several critiques of Di Peso's chronology have been published (Lekson 1999; 2009; Stewart et al. 2005), focusing on the inaccuracy of dendrochronology revealed by discrepancies in ceramic-cross dating and new radiocarbon dates produced throughout the region to address these discrepancies (Pitezel and Searcy 2013, 77-78). In the early 1990s, the line between the Viejo and Medio periods was redefined as between 1150 A.D. and 1250 A.D. (Garvin and Kelley 2017, 30; Whalen and Minnis 2009, 41-44). The Viejo period is characterized by pit-house villages throughout the culture area and plain, textured, and red-on-brown pottery (Kelley and Searcy 2015, 18-19). Work by the individuals affiliated with the PAC contributed to current understandings of the Viejo period as extensive investigations of six Viejo period sites were conducted (CH-159, CH-218, CH-240, CH- 254, CH-272, CH-312) (Pitezel and Searcy 2013, 78). These findings led to the first studies in recent years that aimed to deepen our knowledge of Viejo period occupation and chronology.

This shift from the Viejo to the Medio period is marked by significant changes in population growth and ideological changes associated with new forms of political complexity (Kelley and Searcy 2015, 18-19). During this time, adobe room blocks with pueblo-style architecture replaced pithouses, pottery styles and forms became more diverse, and the designs on pottery show a new religious system (Kelley and Searcy 2015, 20-21; Whalen and Minnis 2009, 41-41). Di Peso defined the Medio period originally as having a temporal range of 1060 A.D. to 1320 A.D. Like the Viejo period, these dates have since been changed to 1200-1450 A.D. Some attempts have been made to divide the Medio period into sub-phases, but archaeologists have rejected further division as there would be too much overlap within sub-phases. Though the Viejo and Medio periods have been subdivided by some researchers (Dean and Ravesloot 1993; Whalen and Minnis 2001; 2009), I have chosen not to do so as there is a lack of evidence to support the chronological distinctions. Thus, the sites included in this thesis fall within the Viejo period, dated between 700 A.D. (+/- 50) to 1060 A.D.

2.2 Environment

2.2.1 Physiography

Chihuahua is the largest state in Mexico, extending over elevations ranging from less than 1000 m.a.s.l (meters above sea level) to more than 3000 m.a.s.l, with 244,938 square kilometres of diverse landscapes (Garvin and Kelley 2017, 12, 14; Webster 2001, 9). The state borders the Mexican states of Coahuila, Sonora, and Durango and the American states of Texas and New Mexico, with a wide range of physiographical, ecological, and climatic zones.

For sites within the Casas Grandes boundaries, the relevant biotic communities include the Chihuahuan Desert scrub, Semi-desert Grasslands, the Plains and Great Basin Grasslands, Madrean Evergreen Woodland, and Madrean Montane Conifer Forests (Merrill and López Gónzalez 2007, 44; Garvin and Kelley 2017). The Plains and Basin Grassland are important to this study, as the area around the sites excavated is characterized by these environmental settings (Garvin and Kelley 2017, 14; Webster 2001, 11). Environments such as these usually have an elevation of 1700-2300 m.a.s.l, and Plains Grasslands are excellent agricultural areas due to the region's level grounds and higher precipitation (Webster 2001, 11-12). Most of the study area is within the

Plains and Basin Grasslands environment and has since been converted to farmland in a modern context (Garvin and Kelley 2017, 15). Though grassland environments dominate, the region does have evidence of Madrean Evergreen Woodland contiguous with the open woodland regions of the middle elevations in the Mexican Sierra Madre regions (Garvin and Kelley 2017, 15; Webster 2001, 11).

The Casas Grandes region can be divided into three geographical zones, the Sierra Madres Occidental mountain range in the west, the basin and range area to the east, and an intermediate district between the mountain range and basin (Rakita 2001, 13). The sites investigated for this thesis are in the west-central region of the state. Therefore, the two geographical zones relevant to this study are the semi-arid basin to the east and the Sierra Madres mountain range to the west (Merrill and López Gónzalez 2007, 44). The state's far west is characterized by the high mountainous elevations and deep canyons of the Sierra Madre Occidental. The Sierra Madre Occidental is a rugged range of mountains running 1,200 km north-south between the state of Chihuahua and Sonora, classified as a Madrean evergreen forest environment (Rakita 2001, 12-13). The region in which the sites included for this thesis are found overlaps the edge of the Sierra Madre Occidental, as the mountain range marks the western boundaries of the study area (Garvin and Kelley 2017, 14). The eastern region encompasses what is referred to as the Northern Interior Drainage Basin, where rivers run from the southwest to the northeast, flowing into seasonally temporary Lagunas (Rakita 2001, 12). The principal rivers among these drainages include; the Ríos Casas Grandes, Ríos del Carmen, and Santa María. This river system occupies much of the state, constituting thirty-three percent of the watershed area of the state of Chihuahua (Garvin and Kelley 2017, 14-15; Webster 2001, 13). The study area includes two internal drained basins, Laguna Babícora and Bustillos, and two large primary river systems, the Santa María and the Santa Clara (Ríos del Carmen in the north) (Garvin and Kelley, 2017, 15; Rakita 2001, 12-13; Webster 2001, 13).

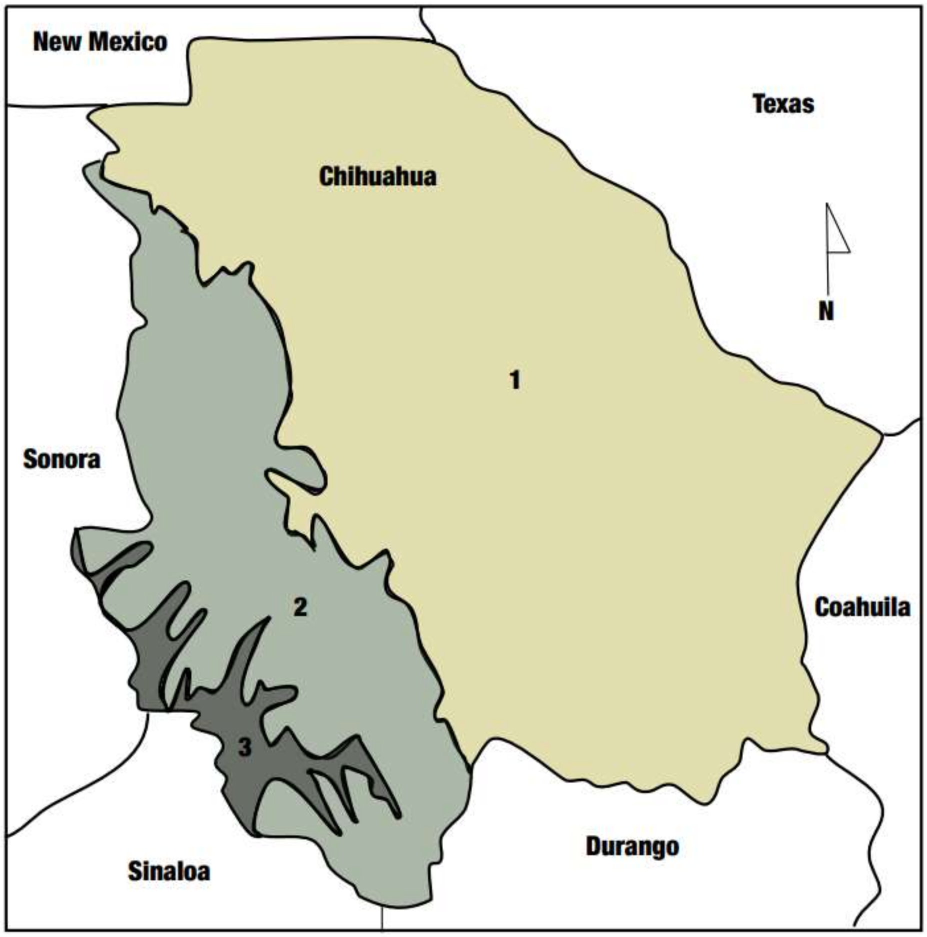

Figure 2. Physiography of Chihuahua. 1 - Chihuahua Desert, 2 – Sierra Madre Occidental, 3 – Cooper Canyon. Adapted from Lemos-Espinal et al. (2017, 105-130).

2.2.2 Climate

Climatic factors, such as temperature and precipitation, influence the landscapes surrounding the sites discussed in this thesis. Garvin and Kelley (2017, 14) divide the Chihuahuan Desert into two subsections; the "hot desert" in the southeast of the state and the "cool desert" to the northeast. Average annual temperatures in the geographical basin zones range from 16 to 18 degrees Celsius. In the mountainous region to the west, temperatures are lower, with an approximate temperature of 10 degrees Celsius (Rakita 2001, 17). These conditions produce an arid, warm desert zone to the east and a moist, cool mountain zone to the west, fitting into the hot and cold desert described by Garvin and Kelley (2017, 14-15). In general, atmospheric humidity in the region is low, and evaporation rates are high, which correlates to the dependable water sources of the region becoming scarce during the dry seasons (Garvin and Kelley 2017, 15; McConnan 2021, 17).

When looking at the precipitation levels, it is important to note that one of the most common observations among studies into the prehistory of Casas Grandes, and the state of Chihuahua as a whole, is the fluctuation in precipitation ranges. Precipitation averages around 300-450 mm per year; however, extremes can be as low as 250 mm and as high as 530 mm (Webster 2001, 11). Annual precipitation in the eastern basin region averages 250 mm, while in the Sierra Madres of the west, it is closer to 450 mm (Rakita 2001, 17). The region experiences its heaviest rainfall between July and August, with the least amount falling between March and April (Garvin and Kelley 2017, 15). The Santa María and Santa Clara drainages are defined as temperate and semi-dry. In contrast, the western region around the Babícora Basin is classified as semi-cold, sub-humid with summer rain (Garvin and Kelley 2017, 26).

2.2.3 Geographical Regions of the PAC

The PAC conducted 13 field seasons in west-central Chihuahua, focusing on four geographical regions: the Bustillo's basin, the Santa Clara Valley, the Upper Río Santa María Valley, and the Babícora basin (Kelley et al. 2012, 83). Each of the four subareas has distinctive topography, geological attributes, and hydrological differences in which prehistoric settlements are found (Garvin and Kelley 2017, 15).

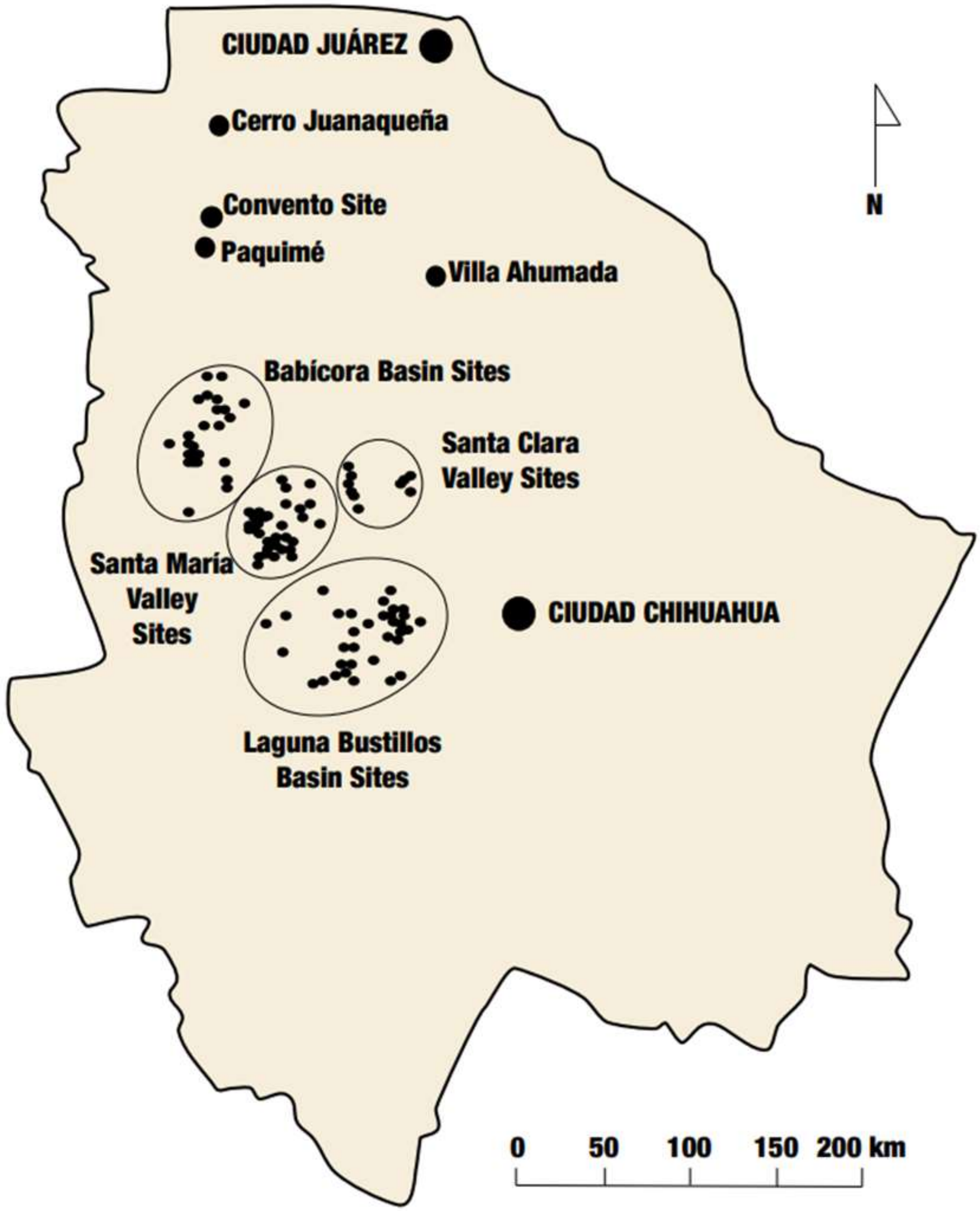

Figure 3. Four subareas of the PAC. Adapted from Kelley (2017, 2).

Babícora Basin

The region furthest west in the project's boundaries is the Babícora Basin, which is part of the Sierra Madre Occidental and the Santa María Valley, including both high-elevation grasslands and an inward-draining valley within the Sierra (Garvin and Kelley 2017, 21). The Babícora Basin, sometimes referred to as "Alta Babícora", has been classified as a single basin with a tendency for temporal and seasonal fluctuation creating two or three basins categorized as central Babícora, Las Varas, and Madera (Garvin and Kelley 2017, 21). The Babícora has semi-cold and sub-humid climates and temperatures, with precipitation confined to the summer months between May and October (Kelley et al. 2012, 89; Garvin and Kelley 2017, 22). The Babícora section measures 30 km north-south and 20 km east-west. The Babícora is an area of internal drainage where the basin floor retains a large marshy area that varies in size and may become a shallow lake, depending on the precipitation in a particular year (Kelley 2008, 3). Today, most of the land on the basin floor and margins, along with the Las Varas Valley, are cultivated or are within the area that the shallow lake can fill. In dry years, cultivation extends farther into the basin's centre (Kelley 2008, 8-10).

The Babícora Basin is the only part of the study area to have received the concerted attention of earlier archaeologists. Many sites throughout the Babícora are classified as having Medio period occupational evidence. Twenty-three sites were recorded between Puerto el Zurdo and the point where the drainage enters the larger Las Varas Valley (Garvin and Kelley 2017, 22). Carey in 1931, Brand in 1933, Sayles in 1936, and Carey in 1931, all recorded mound mounds along the main and side valley of the Babícora region (Garvin and Kelley 2017, 22; Kelley 2008, 1, 6). In more recent years, El Zurdo has been excavated on the west bank of the main arroyo at El Paraíso del Zurdo and is the largest site in the drainage known in this locality outside the main Las Varas Valley (Kelley 2008, 8; Hodgetts 1996, 150-151). Prehistoric sites and modern settlements are often found in the north half of the basin, where farmland and water resources are found. The terrain is rougher in the southern part of the basin, and prehistoric use of that section may have been less intense (Garvin and Kelley 2017, 23). No sites for this thesis are found in the Babícora Basin as there was no Viejo period faunal material available for analysis at the time of this thesis. Notable research previously conducted by Hodgetts (1996) provide the best comprehensive look at faunal material from the Babícora Basin at the site of El Zurdo (CH-159).

Upper Rio Santa Maria Valley

The Upper Rio Santa Maria Valley is a linear north-south valley, which includes the Río Santa Maria fed by the northern drainage basin (Webster 2001, 10). The Río Santa María flows south to north, with the valley covering 4,395 kilometres (Garvin and Kelley, 2017, 23). The Santa Maria study area falls within the Sierra Madre Occidental and has a sub-province of Plains Grassland environments (Garvin and Kelley 2017, 23). The Upper Rio Santa Maria Valley is also characterized by a middle elevation consistent with Maderean Evergreen Woodland (Webster 2001, 10-11). The study area falls in the climate zone with an average annual temperature range from 12 to 18 degrees Celsius. Though the average temperatures throughout the region are relatively steady, fluctuations are seen in January, as temperatures can dip to as low as -3 and remain as high as 18 degrees Celsius (Garvin and Kelley 2017, 23). Precipitation within the Upper Rio Santa Maria Valley is more variable than in other regions throughout the study area. The placement of settlements and farmlands was based on the availability of arroyos, rivers, and springs, as the Santa Maria Valley is an area with uncertain annual rainfall. There is an average range of 300 to 600 mm per year of precipitation, and most rain comes from June through October, with April being the driest month of the year (Garvin and Kelley 2017, 24; Webster 2001, 10).

Viejo and Medio period sites are found along a linear line of tributary drainage, clustered along the western edge of the valley where the groundwater levels are relatively high. These locations extend across the valley from Ejido Cerro Pelón (near the location of CH-272) to the west to Ejido Guadalupe Victoria on the east (near the location of CH-156) (Garvin and Kelley 2017, 24). The Upper Rio Santa María Valley is where three of the four sites for this thesis are found. CH-272, the Santa Rosa site, is near the west edge of the valley along the previously present channels of Arroyo La Matanza (Garvin and Kelley 2017, 24). CH-254, the Calderón site, and CH-218, the Quevedo site, are found near the big bend in the Santa María River and a short distance from the Picacho drainage along the main Santa Maria Channel (Garvin and Kelley 2017, 24). Kelley et al. (2012, 92) believed that springs played a significant role in the occupational resource management of individuals in prehistoric times as many of the sites found within the Santa Maria Valley are near springs. The geographical relationships to subsistence management practices and a ritualistic ideology will be further be discussed in the later chapters.

Santa Clara Valley

The Santa Clara Valley marks the southeast boundary of the PAC. While having a similar range of geographical zones as the Santa María, Santa Clara has a much larger grassland area (40 km in width). Therefore, the valley's centre is farther from the adjacent Sierra

Mountains (Garvin and Kelley 2017, 25). The Santa Clara Valley is semi-temperate, with two defined climate types; the Middle to Upper Santa Clara Valley bottom is a drier climate with lower temperatures relative to precipitation, and hot summers, whereas the higher elevations, including the upper valley, are characterized by a less dry, moister climate (Garvin and Kelley 2017, 25). The average temperature for the Santa Clara Bottom Valley is between 12 to 18 degrees Celsius, and the average annual temperature for the Santa Clara Upper Valley is 14 degrees Celsius. The coldest months of the year have temperatures like those found in the Santa Maria Valley, between -3 and 18 degrees Celsius. The Santa Clara Valley has a total annual precipitation range between 300 to 800 mm. Most precipitation occurs during the summer, but there is evidence of some winter moisture in the region (Garvin and Kelley 2017, 25-26; Kelley et al. 2012, 92).

As is the case in the Santa Maria Valley, sites within the Santa Clara Valley are placed in a linear pattern along the main drainage basin near springs (Kelley et al. 2012, 92). Santa Clara begins as several small drainages in the mountains south of the Sierra Benito Juárez and Sierra Santa Catalina de Villela (Garvin and Kelley 2017, 26). Most prehistoric settlements follow the river, and many sites are around springs, in both prehistoric and modern contexts. The Santa Clara Valley is where Kelley and colleagues found the first known Viejo period site from surface collections, CH-240. CH-240 is on a high terrace next to the main channel of the river just south of the town of Santa Clara (Garvin and Kelley, 2017, 26).

Bustillos Basin

The Bustillo Basin, also known as the “Laguna Bustillos”, is described as an irregular closed basin with a drastic drainage pattern situated within the Sierra Madre Occidental

(Sierra Pedernales, the Sierra San Juan, and the Sierra Chuchupate), Tarahumara Mountain Range, and Plains sub-province (Garvin and Kelley 2017, 26). The climate of the Bustillos region is mild, moderate, and semi-dry, with summer rains a climate staple throughout the region. The average annual temperature of the Bustillos Basin region is 14 degrees Celsius, and the region presents fluctuations in temperature based on the season (Garvin and Kelley 2017, 26). The hottest period lasts through the summer months of June to September, and the coldest temperatures are recorded during January. Though the temperature of the Bustillos Basin fluctuates, like other sub-regions within the study area, the lowest recorded temperatures are significantly higher on average. Instead of having averages within the colder months of -3 to 18 degrees Celsius, the Bustillos basin has an average temperature during these colder months of 6 degrees Celsius. The average annual precipitation is 465 mm, and the rainy season lasts from June to September; February and March are the driest months (Garvin and Kelley 2017, 26-27).

Evidence points toward a diverse temporal range of occupations throughout the Bustillos Basin. A single Clovis point was found in this region, along with surface evidence of Archaic sites from the Middle to Late Archaic periods (Kelley et al. 2012, 89). Art MacWilliams' work in the 2001 field season additionally identified sites within the newly defined "La Cruz" phase. Though within the boundaries of the Chihuahua culture area, Kelley hesitated to classify these sites as a part of the Chihuahua culture due to the lack of understanding of these sites' temporal and geographical ranges. These La Cruz sites gave researchers a glimpse of the dispersed groups in the lightly populated areas south of the Chihuahua culture area, along the eastern front of the Sierra Madre Occidental mountain range (Kelley et al. 2012, 89; Garvin and Kelley 2017, 26).

2.1.4 Botanical Evidence

The geographical and environmental descriptions of the current study area, and Casas Grandes region at large, show that the area is marked by fluctuations between hot and dry climates and cold and wet periods. These different environmental zones create a "buffer" against the scarcity of resources within the area (Webster 2001, 13). Botanical work includes modern ecological studies and macro-botanical samples from the Viejo and Medio period sites. Kelley et al. (2012, 95-96) argue that agriculture was present throughout the region during the Viejo and Medio periods, focused on maize, beans, and squash. These three staple crops are documented throughout Mesoamerica and north into the American Southwest. Irrigation was not used in the region but was present around the site of Paquimé, and water use was dependent on springs or wells (Kelley et al., 2012, 95). During his 2009 fieldwork in the Rio Santa Clara, Jerimy Cunningham (2017) suggested labour investments in land for irrigation agriculture around Paquimé may have contributed to the emergence of inequality in its hinterland.

A diverse range of grasses, forbes, low shrubs, and some cacti can be found throughout the study area (Webster 2001, 13). More specifically, the basin areas are characterized by the presence of creosote (*Larrea tridentata*), yucca (*Yucca* sp.), mesquite (*Prosopis glandulosa*), Cheno-Am, wild gourds (Lagenaria siceraria), grass seeds, prickly pear (*Opuntia phaeacantha*), cholla cacti (*Opuntia imbricata*), and various types of grass (*Bouteloua breviseta*, *Agropyron spicatum* (Rakita 2001, 15; Webster 2001, 13-14). Alternatively, throughout the region categorized as being a part of the Sierra Madre Occidental and Madrean evergreen forest zones, botanical remains recovered can be classified as oak (*Quercus gambelii*), juniper berries (*Juniperus* sp.), piñon nuts (*Pinus* *edulis*), Ponderosa pines (*Pinus ponderosa*), gourd (Lagenaria siceraria), cotton (Gossypium hirsutum), and possibly agave or mescal (Agave sp.) and Douglas fir (*Pseudotsuga menziesii*) (Rakita 2001, 15; Webster 2001, 13-14).

2.3 Culture-History

Northern Mexico is largely overlooked in the history of American archaeology. Work in Southern Mesoamerica dominated the interest of early archaeologists due to the belief that societies considered "worth exploring" are characterized by extravagant architecture. As a result, archaeology in Northern Mexico was hindered by expeditions to the south. It was not until the beginning of the twentieth century where research in Northern Mexico, specifically the state of Chihuahua, began to be conducted. In the following sections, I introduce what Kelley (2017, 2-7) considers the three primary "waves" in the history of Chihuahua archaeology.

2.3.1 First Wave: Uncovering Chihuahua Culture

Edgar Lee Hewett was the first to conduct research throughout what today is called the Casas Grandes region of Northern Mexico. Hewett travelled through the southern zone of Casas Grandes in 1906, conducting a horseback reconnaissance along the eastern flank of the Sierra Madre Occidental (Kelley 2017, 2). This original survey was a part of a larger reconnaissance survey from the Mesa Verde region in Colorado to the Valley of Mexico (Phillips 1991, 3). Hewett was primarily concerned with the distribution of Pueblo-style architecture remains and pottery styles (Phillips 1991, 3). In his 1908 dissertation he recognized the Chihuahua cultural area as part of the American Southwest, with the

Babícora Basin region being the southern limit of the Pueblo culture area (Kelley 2017, 3).

Following Hewett's initial explorations of the Casas Grandes region, the Mexican Revolution (1910-1920) put archaeological studies on pause (Kelley 2017, 3; Phillips 1991, 2). During the 1920s and 1930s, several researchers from the U.S. took an interest in Northern Mexico, but few Mexican archaeologists showed any interest in the north (Kelley 2017, 5). Archaeologists involved in these early projects include H.A. Carey in 1931, E.B. Sayles in 1936, A.V. Kidder in 1924 and 1939, and Donald Brand in 1933, 1935, and 1943. A.V. Kidder, who was the first to explore the region following the revolution. Like Hewett, he saw cultural links between Chihuahua and the American Southwest (Kelley 2017, 3-4). The leading question at the time was the boundary between the Mesoamerican and Southwestern culture areas.

American archaeologists often visited the Babícora Basin region in the 1920s and 1930s. The Las Varas ranch headquarters of the Hearst Ranch was a base of operation for many visitors, and the ranch manager came to double as a guide to nearby archaeological sites. Consequentially, sites in the Babícora Basin received attention from early professional archaeologists, including Kidder in 1924 and Carey in 1928, 1929, and 1931 (Kelley and Garvin 2013, 6). Kidder's fieldwork focused on sites along the Arroyo Garabato within the Sierra Madre and Arroyo Las Varas in the Babícora Basin (Kelley 2017, 4). Kidder primarily studied a group of partially excavated mounds in the Las Varas area and gave a good summary of the architecture and artifacts in the area. Carey’s surveys revealed five mound sites in the vicinity of Las Varas, which he later excavated, smaller than those found in the Northern Basin region (Kelley 2008, 6). Carey excavated a six-room structure with two occupations based on distinct floors (Kelley 2008, 6). To this day, this room block is the most completely excavated Medio period architecture in the southern zone of Chihuahua (Kelley 2017, 5).

In 1928, Donald Brand visited the Babícora Basin, the Upper Santa María Valley, and the Santa Clara Valley. Brand was the only researcher at the time to record both Viejo period sites and Medio period sites. However, the distinction would not become clear until chronological sequencing of the region became established in the latter half of the twentieth century. Brand's primary research was conducted for his doctoral dissertation under the guidance of Carl Sauer, and one of his primary goals was to define prehistoric cultures based on the prevalence/distribution of pottery types (Kelley 2017, 5; Minnis and Whalen 2015, 4). E.B. Sayles later conducted the most thorough survey of the southern zone of Chihuahua, recording sixteen or seventeen sites within what later became the boundaries of the PAC study area (Kelley 2017, 5). Sayles mentioned in his 1933 published report that sites within this area, including what is now known as the El Zurdo site, were distinct for their sizable outside hearths. Sayles's research was funded by the Gila Pueblo Archaeological Foundation, and focused, like many during that time, on the boundary between the American Southwest and Mexico (Minnis and Whalen 2015, 4). Modern archaeology in Chihuahua thus began with the reconnaissance surveys by Donald Brand and E. B. Sayles during the 1930s. Brand and Sayles are responsible for the description of hundreds of archaeological sites. However, few excavations of these sites were conducted at the time (Kelley 2008, 7; Minnis and Whalen 2015, 5). This pioneering work throughout the southern zone of Chihuahua concluded before World War II, and decades passed before archaeologists turned their attention to the area again (Kelley 2008, 7).

2.3.2 Second Wave: Di Peso and the JCGE

The Joint Casas Grandes Expedition (JCGE) conducted by Charles Di Peso and Eduardo Contreras at the site of Paquimé is considered the most important project in the history of Chihuahua archaeology (Kelley 2017, 6). Between 1958 and 1961, the Amerind Foundation, which funded the JCGE with the partnership of the Republic of Mexico, spent three years continuously excavating the site of Paquimé. In the end, Di Peso and his crew uncovered nearly 42% of Paquimé (Doyle 1994, 11). Paquimé is still considered the largest site within Northern Mexico and appears to reflect the apex of Casas Grandes social complexity. The site has many examples of public architecture and multistoried domestic/ceremonial Pueblo units built around a large central plaza (Doyle 1994, 11; Ravesloot 1988, 3). Di Peso's methods at the time were unique, as the dominant paradigm in American archaeology stemmed from a culture-historical approach (Doyle 1994, 12). While culture-historical approaches emphasize methods such as diffusion and chronological sequencing to explain patterns found in material culture, Di Peso's methods emphasized a qualitative approach, including methods from all fields capable of understanding prehistory (Doyle 1994, 12). Excavations at Casas Grandes documented extensive changes in material culture between the Viejo and Medio periods, the later dated by Di Peso to 1060-1340 A.D. As previously discussed, Di Peso's chronology has been repeatedly questioned. The current date of the Medio period ranges from 1200-1400/1450 A.D. The differences between the Viejo and Medio periods are inferred to represent changes in the social, economic, and political organization (Minnis and Whalen 2015, 7).

Di Peso's interpretation of Casas Grandes is based on an approach he called "archaeohistory," described as a highly detailed historical account of the rise and fall of Paquimé (Minnis and Whalen 2015, 12). Di Peso's (1974) approach is captured in a massive eight-volume report of the site, *Casas Grandes: A Fallen Trading Center of the Gran Chichimeca*. Di Peso created a summary of the excavated material culture from Paquimé, which focused on analyzing the culture's spatial and temporal relations across the site (Minnis and Whalen 2015, 12-13). The first three volumes focused on cultural sequencing from the Paleoindian to the post-contact period. The final five volumes are organized based on the artifact type found such as lithics, groundstone, and ceramics (Doyle 1994, 11).

Di Peso saw the site's origins as direct trade and migration between Mesoamerica and the Northwest region of Mexico (Minnis and Whalen 2015, 12). Mesoamerican "pochteca" arriving in the Casas Grandes region stimulated the development of political complexity at the site (Ravesloot 1988, 6). Di Peso believed that trade, conquest, and religion were linked, and that the material culture of Paquimé showed that the region's religious and cultural foundation was based on Mesoamerican influence. The pochteca are specifically long-distance traders in Aztec society (Minnis and Whalen 2015, 12), which Di Peso suggests were present earlier in Mesoamerica per his chronology.

These pochteca introduced cults based on specific deities with associated ritual systems that organize relations between and within sites (VanPool and VanPool 2015, 83). These cults included Quetzalcóatl, the Xiuhtecutli complex, the Xipe Tótec complex and the Tláloc cult. Quetzalćoatl is the old creator god, who was the giver of all things, the Xiuhtecutli complex represented the Mesoamerican "Lord of Fire," Xipe Tótec complex focused on what was referred to as the nature of regeneration, and Tláloc was the water deity which controlled the rain (VanPool and VanPool 2015, 83-84). Di Peso seems to have been fascinated by Quetzalcóatl, and he believed the other cults at Paquimé were supplementary to the Quetzalcóatl cult. Quetzalćoatl's domain included water and the ballgame and is reflected in anthropomorphic images on pottery (VanPool and VanPool, 2015, 96). Di Peso argued that Paquimé was a trade centre in which economic, political, and social relations during the Medio period were structured by the priesthoods of the four cults introduced to the region through the pochteca traders (VanPool et al. 2005, 25; VanPool and VanPool 2015, 85). Di Peso's willingness to tie the economy to religion was a radical move in the mid-1970s. Di Peso (1974, 574-586) emphasized distinguishing the difference between priests and shamans, as priests are defined as religious practitioners who conduct state-controlled ceremonies, while shamans are described as private practitioners who conduct rituals outside of the dominant cult organization (VanPool and VanPool 2015, 85). His focus on the interplay of economics and religion forced a shift from the materialist emphasis of processual archaeology, which appeared between his late 1950s excavations and his 1974 publication (Doyle 1994, 12). The work of the JCGE changed the way archaeologists view chronologies and societal organization in the Casas Grandes region. Di Peso's work was so extensive that it has not yet faded into the background of studying Chihuahua culture (Kelley 2017, 6). Subsequent projects are often defined by short bursts of activity followed by several years of inactivity. The random nature of excavation is partly due to the shifting interest of archaeologists working within the region (Kelley et al. 2012, 83-84; Minnis and Whalen 2015, 13-14). The sporadic nature of the work meant that knowledge of Chihuahua archaeology tended to lag behind the research being done in many adjacent areas (Minnis and Whalen 2015, 14-15).

2.3.3 Third Wave: Introducing the Proyecto Arqueológico Chihuahua (PAC)

A new wave of research took place in Casas Grandes starting in 1989, where alongside Minnis and Whalen (2015) and Whalen and Minnis (2001; 2009) in the valleys surrounding the site of Paquimé, the *Proyecto Arqueológico Chihuahua* (PAC) focused on the long-term interest of understanding the cultural boundaries of the southern uplands between the core region of Paquimé and cultures to the south (Kelley 2017, 6-7; Kelley et al. 2012, 83). The study area of the PAC was virtually unknown until 1989-1990 but offered potentially valuable information for understanding the Casas Grandes culture. Co-directors Dr Jane Kelley and Dr Joe Stewart believed the PAC offered an opportunity to understand the development, fluorescence, and end of the culture in an area not in the shadow of Paquimé (Kelley 2017, 7). Between 1990 and 2010, 13 field seasons were conducted in west-central Chihuahua. Their work makes up a significant Canadian contribution to the archaeology of Northwest Mexico (Kelley et al. 2012, 83). The project focused on four geographical regions: the Bustillos Basin, the Santa Clara Valley, the Upper Río Santa María, and the Babícora Basin (Kelley et al. 2012, 83). The main goal is to increase our knowledge of the people that lived in the regions south of Casas Grandes during the Viejo and Medio periods. The project undertook one of the largest explorations of the Chihuahua culture area since Charles Di Peso's work at Paquimé, and the first focused on the southern regions of Casas Grandes (Kelley et al. 2012, 83).

During the early 1990s, several projects began in Chihuahua, coinciding with the work conducted by researchers affiliated with the PAC. The undertaking of multiple projects during this time resulted in the newly established permanent Mexican archaeological presence in the Instituto Nacional de Antropologíae Historia (INAH) throughout the Casas Grandes region (Kelley et al. 2012, 84). Two of these research projects have contributed a substantial knowledge of the Casas Grandes region. First, Paul Minnis and Mike Whalen undertook research around the site of Paquimé. Second, Robert Leonard, Dave Phillips, Gordon Rakita, Christine VanPool, and Todd VanPool, affiliated with the University of New Mexico, started conducting research north and east of Paquimé in the Janos and Villa Ahumada regions. All these investigations remained a collective response to Di Peso's influential work but brought new ideas to the table and significantly broadened the arena of discussion (Kelley et al. 2012, 84). Although the previously described model of interpretation put forth by Di Peso suggests Mesoamerican influence in the cultural developments of Chihuahua was challenged by many, archaeologists working in Chihuahua continue to ponder the relationship between Mesoamerica and the Casas Grandes culture area (Kelley 2017, 7).

Work taking place across the southern region of the Chihuahua culture area has played an integral role in defining the origins and characteristics of what is often called the Casas Grandes Regional System (Kelley et al. 2012, 98). Kelley and colleagues have revealed chronological sequences, settlement patterns, subsistence strategies, and trade and exchange relations during the Viejo and Medio periods (Kelley et al. 2012, 98).

2.3.4 Mesoamerica VS Southwest Influence

In the Casas Grandes region, a continuing focus of research among North American archaeologists is the relationships between the populations of Northern Mexico, the neighbouring American Southwest, and the central and western regions of Mesoamerica (Dean and Ravesloot, 1993, 83). Much of the work by early archaeologists at the time pertained to excavations to reveal the core and origin of Casas Grandes culture. McGuire (1980, 3-4) explained this phenomenon as one of separating and distinguishing the origins from which this cultural phenomenon would have spread. Scholars often have treated the American Southwest, Northwest Mexico, as well as Central and Southern Mesoamerica as bounded units that exchanged cultural traits (McGuire 2011, 23). Early archaeologists in Chihuahua, such as Hewett and Kidder, claimed that the origins of this region came congruently through the American Southwest. These views were based largely on evaluating architectural styles, ceramic elements, and the periphery areas in which these early sites were identified.

The early work of Hewett and Kidder concluded that the Casas Grandes culture was Southwestern rather than Mesoamerican (Kelley 2017, 2-3). In 1924 Kidder, as quoted in Phillips (1991, 3), argued that the cultures of Northern Mexico originated locally: “Now that transitions are beginning to be found, it is becoming increasingly evident that the Southwest owes to its outside sources little more than germs of its culture, and that its development from those germs has been locally and almost wholly independent.” Even the few archaeologists from Mexico who ventured to these northern regions saw Chihuahua as related to the U.S. Southwest and not Mesoamerica (Kelley 2017, 5). Since Kidder's work, many individuals have disavowed connections between Mesoamerica and the Southwest, making a point to find the local origins of cultural patterns present throughout the region (Phillips 1991, 4). From 1930 to 1950, archaeologists investigated these proposed connections between the American Southwest and Northern Mexico by Hewett and Kidder, which was often linked under the common term "Greater Southwest" (Doyle 1994, 12). This perspective was and still is, seen as successful in analyzing Chihuahua culture. Many archaeologists continue to downplay how Mesoamerica influenced the Casas Grandes region.

Though research throughout this time is dominated by this Southwest perspective, throughout the 1940s, there was a notable shift to a greater awareness that Mesoamerican influences may have had a more extensive influence than previously thought (Phillips 1991, 3). It was not until work was done by J. Charles Kelley, that we see an alternate perspective that the northern frontier of Mesoamerica, and the prehistory of Northern Mexico, could be understood as an appendage of events happening throughout Central and Southern Mesoamerica (Phillips 1991, 3). Kelley made the "pochteca model" a key mode of understanding the origins of Casas Grandes within the Gran Chichimeca area. The term Chichimeca referred to the region of Northern Mexico where there was a lack of understanding relating to the cultural phenomena evident in material culture. Like Di Peso, Kelley assumed that Mesoamerican traders reached deep into Northern Mexico and relied on a few specific locations to obtain resources in the Gran Chichimeca (Phillips 1991, 7).

Many of the archaeological, chronological, and behavioural concepts used to investigate relationships among the populations of Casas Grandes are based upon the pioneering work of Charles Di Peso. Di Peso's controversial ideas, structured by the systematic collection of new chronology, undermined virtually all previous ideas about the origins of Casas Grandes culture and provided a radically new perspective to those previously suggested about the influence of the "Greater Southwest" region on Casas Grandes (Dean and Ravesloot 1993, 86). When Di Peso began his career, culture-history was the dominant paradigm in American archaeology. As described in the earlier sections, culture-historical methods emphasized diffusion, chronology, and factual recording. Di Peso was dissatisfied with the preceding interpretations of the region and replaced the "Southwest" with the more culturally relevant and geographically more encompassing "Gran Chichimeca."

We see the proposition of the pochteca-derived model as a key part in the work of Charles Di Peso in the late 1950s and early 1960s. The pochteca concept is central to Di Peso's perspectives on Casas Grandes society, as it supplied the mechanism and the stimulus for cultural development in the Southwest (Dean and Ravesloot 1993, 87; Phillips 1991, 7). McGuire (1993, 108-110) noted the importance of understanding general economic processes and their influence on prehistoric culture. In this sense, we see a shift in the work of Di Peso to include described operations of layered economies, which he came to view as a part of a "world-systems" model. Di Peso noted similarities in process and structure between the Old and New Worlds and discussed the role of trade in each (Doyle 1994, 12). In this model, economic exchange is still the primary part of interregional contact. However, the specific exchange mechanism is not necessarily analogous to the Central and Southern Mesoamerica region. In Di Peso's interpretive approach, what is kept from the pochteca model is the assumption that Mesoamerican cultures instigate direct contact between themselves and Northern Mexico (Phillips 1991, 7-8). These economic linkages reinforced common belief systems, cultural traits, and lifestyles that crosscut the Gran Chichimeca. These efforts led to the formulation of several modes of possible interactional systems and social mechanisms that could have carried out the postulated integrations on such a grand geographical scale (Dean and Ravesloot, 1993, 101).

Di Peso's interpretation of the social and religious complexity of Casas Grandes is the subject of considerable controversy. The validity of the pochteca model as an explanation for cultural change in the Casas Grandes and its use as a general archaeological analogue for the social, religious, and economic organization is seriously questioned (Ravesloot 1988, 7). Stephen Lekson is one individual who offered an alternative explanation to the proposed pochteca models. Lekson proposed that instead of pochteca traders, Paquimé fluoresced as Chacoan migrants arrived in the Casas Grandes Valley in the late thirteenth century as part of a wider aggregation pattern throughout the Southwest. Lekson’s (1999) work noted that Paquimé was found on the same meridian as the Chaco Canyon in New Mexico (Kelley 2017, 10-11). Therefore, he put forth that the fluorescence of Paquimé is the result of an influx of population and a significant infusion of ideas from that source influencing the social and cultural developments of Casas Grandes (Kelley 2017, 10). Like Di Peso, the key to Lekson's argument is the notion that Chihuahua was not populated enough to produce a local emergence of complexity (Cunningham 2019, 6).

Though many individuals countered these proposed Mesoamerican influences by Di Peso, some archaeologists still view these proposed origins as relevant in understanding the cultural complexity of Northern Mexico. Polly Schaafsma argues that the Katsina Complex is the northernmost manifestation of the Mesoamerican rain god, Tláloc

(McGuire 2011, 26). The Katsina Complex is derived from Mesoamerican concepts that integrated the spirits of ancestors with natural forces to transform the deceased into rainmakers (McGuire 2011, 26). Schaafsma suggests that people in the northwestern regions of Mexico and the American Southwest associated feathered and horned serpents with the unity of the earth and sky as manifested in floods, rain, earthquakes, and landslides. Carroll Riley (2005) argues that Paquimé appeared due to Mesoamerican influences and shares Di Peso's uncertainty for narrow cultural labels such as the "Greater Southwest." Riley proposes that Northern Mexico and the Southwest be combined into an "Aztlan" regional entity. The "Aztlan complex" is based on local interpretations of Mesoamerican deities such as Tlaloc and Quetzalcoatl (VanPool and VanPool 2015, 101). Though their ideas differ slightly, Di Peso, Lekson, Schaafsma, and Riley suggest that settlements within Casas Grandes arose from migration into the region, either from the north or south. Their theories tend to attribute the cultural complexity of Casas Grandes to foreign influences, which in turn reveals a paradox where we can identify a profound degree of shared cosmology, iconography, metaphor, and ritual between the two regions (McGuire 2011, 29).

Core/periphery models are one of the more recently accepted modes of interpretation applied to Chihuahua archaeology. These models focus on evaluating relations held between the core of Casas Grandes and the neighbouring regions to the north and south. Undoubtedly Mike Whalen and Paul Minnis present the most well-developed model of the region since Di Peso's work. Whalen and Minnis (2001, 177) argued strongly for regional peer polities, presented through designated intermediate zones of the periphery (inner and outer zones). They divide the Casas Grandes region into three "zones" based on the distance from Paquimé, using rank-size analysis to characterize the relationships between settlements within each zone (VanPool et al. 2005, 26). VanPool et al. (2005) moved the core/periphery models from what was fundamentally a social and economic model to argue that the Casas Grandes region was integrated through ritual and religion, with Paquimé as a major religious centre for the surrounding peripheries. With Paquimé as a ritual, not an economic centre, expected economic integration within the region is simple. A community's relationship with Paquimé should reflect shared symbols and ritual structures, reflecting participation in the ritual system.

Researchers involved with the PAC excavations have brought new perspectives to the forefront of discussions relating to the origin and connection of Casas Grandes with neighbouring regions. Specifically, Cunningham (2019) proposed that the traditional core-periphery approaches throughout the Casas Grandes region may not fully explain the phenomena, presenting a new theory to address results from his 2009 work in the Santa Clara Valley. Cunningham suggested that Casas Grandes can be better understood through Kohl’s (2008) description of “social fields.” Drawing upon inspiration from Eric Wolf’s (1982) analysis of the emergence of capitalistic relations throughout global societies, Cunningham (2019) proposed that defining Casas Grandes as a "social field" allows a more detailed analysis of inequalities present throughout the region.

In general, recent research has placed little emphasis on Mesoamerican contacts and influences and more on regional variability with a strong focus on the local development and continuity within Casas Grandes. There is a need for current research to supply a much stronger framework to understand the entirety of Chihuahua Culture. Thus, the research goal for this thesis is to build upon the outlooks identified by researchers involved with the PAC and introduce a different potential avenue of interpretation through ontological perspectives. To do this, I analysed the faunal remains collected by the PAC teams and evaluated the datasets withing this theoretical framework, specifically addressing human-animal relations.

2.4 Site Descriptions

2.4.1. CH-272: The Santa Rosa Site

The Santa Rosa Site, CH-272, initially recorded in in 1999, is situated along the Arroyo la Vuelta near the mountains at the western edge of the Ro Santa Maria Valley, close to the deserted *ejido* of Santa Rosa (Kelley and Garvin 2014, 1; Stewart et al. 2005, 178). CH-272 is a Viejo period site determined based on ceramic analysis as no architecture was found in excavation trenches, but the PAC crew did find an external hearth (Kelley and Garvin 2014, 5; Stewart et al. 2005, 178).

In 2000, 31 shovel tests and six excavated units uncovered an occupation surface, presenting several small pit features and many artifacts (Stewart et al. 2005, 177). The six excavated units were placed where surface observations and shovel tests showed the greatest promise of subsurface remains (Kelley and Garvin 2014, 3-5). These shovel tests and test units will be discussed in Chapter 4. Additionally, three samples of domestic plants from the Santa Rosa site were collected for radiocarbon dating (Kelley and Garvin 2014, 9-10). These dates are provided in Table 1.

Table 1. Radiocarbon dating CH-272. Adapted from Kelley and Garvin 2014 (2014, 10).

Lab Code	Sample No.	Lot No.	Provenience	Sample Material	Conventional C14 Age B.P.	Calibrated Age C.E.
TO-8910	Ch-14C-81	4037	Shovel Test 22, Level 1	*Zea* cob with 3 attached cupules	1220 +/- 50	685-898, 0.951
TO-8911	Ch-14C-82	4039	Shovel Test 24N, Level 1	*Zea* cob with 3 attached cupules	1400 +/- 60	538-723, 0.952
TO-8912	Ch-14C-83	4048	Test 3 (Trench 1) Level 1, fire pit	*Phaseolus cortyledon* fragments	960 +/- 50	995-1151, 0.991

2.4.2. CH-254: The Calderón Site

The Calderón Site (CH-254) was found on a tributary entering the Santa Maria Valley from the southwest. It is in a locality with good farmland currently planted with maize (Stewart et al. 2005, 179). CH-254 covers 2 hectares of an 8 m high terrace on the west bank of a tributary of the Río Santa María (Kelley et al. 2014, 2). The site surface slopes east toward an arroyo that defines the site's east side and a second arroyo on the north side of the site (Kelley et al. 2014, 2). Researchers first visited the site in 1996, which coincided with initial work at the Quevedo Site (CH-218) – later recognized as the first Viejo period site investigated (Kelley et al. 2014, 3). In 1999, CH-254 was revisited, and twenty-seven shovel tests, seven auger tests, and two test excavations produced burnt daub and adobe evidence (Stewart et al. 2005, 179). In 2000, researchers excavated four-round pit structures, and two added structures were uncovered in later field seasons (2008, 2010). These structures are further explained in Chapter 5.

There was no evidence of surface architecture detected at CH-254. However, like other sites excavated in the region, the combination of polychrome pottery and a lack of architecture puts the Calderón site into a late Viejo or transitional period (Kelley et al.

2014, 2). This site is critical to understanding later cultural developments, as it has intact deposits that provide various datable materials (Kelley et al. 2014, 2). Twenty-six samples were collected for radiocarbon dating from Structures 1-5. Added dates were taken from Structure 6, excavated in the 2010 season, but these were not included in the information provided by Kelley et al. (2014, 191). These results are important in developing Viejo period chronology, as the dates confirm that Viejo period sites were established between 700 and 800 A.D and continue to the beginning of the Medio period at around 1250 A.D. (Kelley et al. 2014, 191).

2.4.3. CH-218: The Quevedo Site

The Quevedo Site (CH-218) is situated along an unplowed terrace about 10 meters above the Rio Santa Maria River and is 6 km south of Oscar Soto Maynez on *Ejido* Rodrigo M. Quevedo (Kelley and Garvin 2013, 4; Stewart et al. 2005, 178). The larger-scale setting of CH-218 includes characteristics typically associated with the Santa Maria Valley, such as a riparian zone of the main valley and surrounding sierras with woodlands and evergreens (Kelley and Garvin 2013, 5). CH-218 covers significantly less area than the previously described Calderón site, covering less than one hectare of land (Stewart et al. 2005, 179).

CH-218 was first recorded in the 1991 field season during the first surveys of the upper Santa Maria Valley. The first explorations of CH-218 in 1996 were to obtain radiocarbon samples and more precise information about an exposed structure within an adobe barrow pit (Stewart et al. 2005, 178). Structure 1 was completely excavated by 1998, then in the following field seasons (2008, 2010), Structure 2 and Structures 3 & 4 were also excavated. There were four radiocarbon dates produced from the Quevedo Site. These include two analyzed after the 1996 field season by the laboratory at the University of Arizona and two after the 2008 field season at the 14Chrono Centre at Queens University in Belfast (Kelley and Garvin 2013, 59). The results presented dates that were alike (Table 2).

Table 2. Radiocarbon dating CH-218. Adapted from Kelley and Garvin (2013, 59).

Lab Sample Number	Structure	Material	Radiocarbon Age	2 Sigma Calibrated Age (C.E.)
AA-27385	1	*Zea* kernel	860 +/- 50	1150-1266
AA-30282	1	*Phragmites* stem	955 +/- 60	988-1214
UBS 10439	2	*Zea*	941 +/- 19	1063-1155
UBS 10440	2	*Zea*	936 +/- 10	1033-1155

2.4.4. CH-240:

CH-240 is the easternmost Viejo period site within the project boundaries, along a farmed terrace of the Rio Santa Clara Valley (Stewart et al. 2005, 184). CH-240 is found along the west side of the Santa Clara River, just south of the *ejido* of Santa Clara (Kelley and Garvin 2014, 19). CH-240 was first detected during the 1993 field season on a trip to the Santa Clara valley, searching for the previously documented mounds dated to the Medio period by E.B. Sayles in 1933 (Kelley and Garvin 2014, 19). Shovel testing was done during the 2000 field season, and the main unit excavation resulted from the expansion of these tests within the site (Kelley and Garvin 2014, 21). The stratigraphy presented more complexity than at other locations as there were two destroyed pits, with many features superimposed within (Stewart et al. 2005, 184). I analyzed faunal material collected from Structures 1, 2 and 3 are analyzed. Later excavations by Jerimy Cunningham focused on a pithouse and attached square structure southeast of Structures 1, 2 and 3. However, faunal materials were deposited with INAH in Chihuahua City and could not be analyzed for this thesis. Four radiocarbon dates were obtained from the early excavations at CH-240. One was from a surface sample and the rest were maize cob fragments collected within the stratigraphic context of the main excavation area (Kelley and Garvin 2014, 34; Stewart et al. 2005, 185). These dates are given in Table 3 and have calibrated dates between the late tenth and twelfth centuries (Kelley and Garvin 2014, 34-36).

Table 3. Radiocarbon dating CH-240 site. Adapted from Kelley and Garvin (2014, 36).

Lab Code	Sample Code	Lot No.	Context	Conventional age B.P.	Calibrated Date C.E.
TO-8913	Ch-14C-84	4112	Test 14; N240-242/E200-201; 94-118 cm BD	980 +/- 50	995-1191
TO-8914	Ch-14C-85	4098	Test 15; N241-243/E200-203; Level 4 89-119 cm BD; Feature 8	920 +/- 40	1024-1193
TO-8916	Ch-14C-87	4074	Test 8A; N242-243/E200-203, east half; Level 2, 65-121 cm BD	950 +/- 50	1015-1192
TO-8917	Ch-14C-88	4109	Test 11; N242-243/E199-200; Level 5, 94-118 cm B.D.	980 +/- 40	991-1160

2.5 Faunal Use at Other Sites

Comparable faunal materials are present at Paquimé and El Zurdo (CH-159) in the Casas Grandes region. Notably, the bulk of the faunal assemblage from these sites come from Medio period contexts, contrasting with the Viejo settings covered in my analysis. Generally, animals such as deer, rabbits, and an excess of bird species are found throughout these areas (Webster 2001, 13). Charles Di Peso suggested that the individuals who would have resided throughout the Casas Grandes region would have been “virtually vegetarians”, who, in addition to the ever-present corn dishes, would have primarily counted on lesser quantities of cultivated squash, gourds, and certain amounts of beans (Di Peso 1974, 327-329). Though there were suggestions of a largely plant-based diet, there is faunal evidence found throughout the area, including species such as pronghorn antelope (*Antilocapra americana*), white-tailed deer (*Odocoileus virginianus*), bison (*Bison bison*), black bear (*Ursus americanus*), domesticated dog (*Canis familiaris*), fox species (*Vulpes macrotis*), coyote (*Canis latrans*), raccoons (*Procyon lotor*), skunks (*Mephitis* sp.), and bobcat (*Felis rufus*), and peccary (*Dicotyles tajacu*) (Hodgetts 1996, 155-158; Merrill and López Gónzalez 2007, 49-52; Rakita 2001, 16). A significant amount of larger mammal and bird bone was recovered from Paquimé. This prevalence of bird elements is attributed to the large numbers of articulated turkeys (*Meleagris gallopavo*) and macaws (*Ara macao* and *Ara militaris*) found in burial contexts (Hodgetts 1996, 157).

El Zurdo has a similar yet slightly more diverse faunal assemblage than those found throughout Paquimé. Hodgetts (1996, 155) classified 73 different vertebrate taxa in the assemblages collected at the site, where mammals and birds are heavily represented. Identified specimens at El Zurdo included jackrabbits (*Lepus sp*.), cottontails (*Sylvilagus sp*.), a variety of rodent species (*Spermophilius sp., Cynomys sp., Neotoma sp*.,), pronghorn antelope (*Antilocapra americana*), white-tailed deer (*Odocoileus virginianus*), small, medium and large-sized mammals, domesticated dog (*Canis familiaris*), fox species (*Vulpes macrotis*), coyote (*Canis latrans*), turtles (*Testudines*), and fish (*Pisces*) (Hodgetts 1996, 155-158). Like the site of Paquimé, El Zurdo had a high diversity of bird species and articulated turkey burials. This diverse range of bird species includes waterfowl (Anseriformes), duck (*Anas* sp.), American coot (*Fulica americana*), quail (*Phasianidae.*), and wild turkey (*Meleagris gallopavo*). Small mammals, like rabbits and many rodents, are frequently found in or around cultivated fields, and a wide range of larger mammals are also found throughout these areas as they are known to raid fields for maize, as well as prey on the smaller mammals as a food source (Merrill and López Gónzalez 2007, 53). Large herbivores reported from these sites, including pronghorn antelopes, bison, and white-tailed deer, live in ranges of open plains or rugged areas that would not have been ideal for cultivating crops (Merrill and López Gónzalez, 2007, 55).

2.6 Summary

The environmental setting of Casas Grandes played an important role in cultural activities of the region. The four geographical regions included in this research (the Bustillo's Basin, the Santa Clara Valley, the Upper Río Santa María Valley, and the Babícora Basin), present overall and sub-regional environment patterns, highlighting the diversity of the regions environmental setting. The chronological sequencing of Casas Grandes culture, which includes the Viejo and Medio periods, are associated with distinct differences of material culture found throughout the region. Though there are clear distinctions between both the Viejo and Medio periods, previous challenges associated with developing these temporal ranges are evident throughout the literature. The southern regions of Casas Grandes have received little interest in the past; instead, the larger Medio period sites to the north, including Paquimé, have received most of the attention. It is not until the PAC excavations, as well as other notable projects starting in the late 20th century that we observe a change in the regional focus of Casas Grandes archaeology. Though there has been previous faunal analysis conducted in Casas Grandes, including the sites of Paquimé and El Zurdo, my current research introduces additional sites within the PAC boundaries including the Calderón site (CH-254), the Quevedo site (CH-218), CH-240, and the Santa Rosa site (CH-272). With the inclusion of these four sites, I outline the gaps present in the current understanding of faunal material within the Casas Grandes region, which are addressed in the following chapters.

Chapter 3: Theoretical Models of Faunal Analysis

There are many potential approaches to understanding identified patterns in faunal material. The focus of faunal studies has primarily revolved around theories correlated with exploiting animal resources for human development, including subsistence, social and economic importance, environmental influences, and ritualistic importance. In this chapter, I evaluate the dominant theoretical trends presented in the literature. Discussions of neoclassical economic models, including subsistence practices and exchange networks, are presented, along with the social and ritual organization and environmental change-based models. Theoretical debates on the cultural origins of the Casas Grandes region, introduced in Chapter 2, are expanded on to contextualize the evaluation of faunal elements through different ontological perspectives.

3.1 Environmental Models

Faunal analysis allows for a reconstruction of ancient environments. Natural and anthropogenic environmental change can reduce the suitability of landscapes for some animals while enhancing the food sources and livable habitat of others. Human activities such as clearing land for fields and gardens, planting different crops, and hunting, for example, have a significant impact on animal populations (Schollmeyer 2018, 57). Some species decline in abundance in response to these changes, while others can survive and reproduce successfully despite changes seen throughout their habitats (Schollmeyer 2011, 412). Schollmeyer and Driver (2013, 454-455) noted that farmers make substantial changes in settlement strategies in response to climatic stress and environmental changes. Settlement reorganization seems to have been a response to reduced levels of precipitation at various times in the American Southwest. Such changes led to the prevalence of smaller animal species in assemblages as small animals, with high reproductive rates and nonspecialized habitats and dietary requirements, continued to be a resilient food resource (Schollmeyer and Driver 2013, 454). It is recognized that species at higher trophic levels are more vulnerable to environmental disturbances because they have specialized diets which are more susceptible to anthropogenic changes in local landscapes (Schollmeyer and Driver 2013, 452). Research in archaeology can thus supply long-term perspectives on the balance between the needs of people, their anthropogenic impact on habitat, and the persistence of animal populations, including the increased prevalence of specific small animal element patterns within an assemblage (Schollmeyer 2018, 61).

Population density is another factor influencing the geographic range of species and the abundance of a species within that geographical range (Muir and Driver 2004, 170). Taxa with limited geographic ranges are particularly vulnerable to extinction. Such species may have fewer opportunities to meet and reproduce within a given area and fewer and smaller source populations from which to replenish dwindling populations (Muir and Driver 2004, 174). Population density is highly variable for mammal species in regions with differing topography, precipitation levels and vegetation, which reflect animal population density (Schollmeyer 2018, 65). Shifts in climatic change that trigger changes in mobility, demography, and subsistence occur across all climatic phase transitions. Variability in subsistence practices due to climatic and anthropomorphic change can be detected through the analysis of faunal elements (Hockett 2015, 300).

Faunal studies can be used to reconstruct different environments by analyzing species representation within an assemblage. Certain species can be categorized as "indicator species" based on their links to environmental changes. For example, the Northern San Juan Basin of the American Southwest had high rainfall and more mesic vegetation that supported higher cottontail populations than the arid southern regions, where jackrabbits tend to be more common. As a result, cottontails tend to outnumber jackrabbits in faunal assemblages from the regions (Badenhorst and Driver 2009, 1834). Ecological data shows that as the amount of precipitation in an arid area increases, so does mammalian taxonomic richness (Lyman and O'Brien 2005, 279). Alternatively, we see changes in the abundance levels of animals who cannot adapt when aridity increases (Lyman and O’Brien 2005, 279-280). Most notable are the type and abundance of small-bodied mammals whose ecological preferences and physiological tolerances are controlled by their chosen habitats' temperature and moisture levels (Schmitt and Lupo 2017, 493).

The diverse small animal populations in the ecological regions of the American Southwest included species adapted to moist and grassland settings. Remains of these animals provide evidence for their persistence throughout these habitats (Schmitt and Lupo 2017, 493-494). Studying rodent species is an increasingly prominent research approach to reconstructing these environments. Schmitt and Lupo (2012, 99) have outlined that finding rodent species within faunal material aids in investigating the timing and nature of changes in regional climates. Rodents are reliable indicators due to their common residency throughout arid low elevations and their adaptive capabilities to cool and moist environmental changes. The desert woodrat (*Neotoma lepida*) and the bushy-tailed woodrat (*Neotoma cinereal*) have been highly prominent in past studies as their adaptive behaviours increase their resiliency. These species are well-adapted to hot and dry settings and cool and moist settings (Lyman and O'Brien 2005, 275). Bushy-tailed woodrats are widely distributed in western North America down into the regions of the American Southwest, prominently in the New Mexico region, which were important Puebloan centres (Grayson 2006, 2977). Knowledge of the lifeway patterns and preferred habitat locations have been critical to understanding and developing a biogeographic model derived from these animals' past environments (Grayson 2006, 2984).

Throughout the American Southwest and regions of Northern Mexico, there is a collective understanding that intentional breeding or domestication caused variations in the morphology and osteometric traits of turkeys raised for subsistence purposes (Fothergill 2016, 562-564). The size and morphology of prehistoric turkeys may be more a reflection of environmental factors due to the phenotypic plasticity in response to the environment rather than the result of changes caused by the domestication and breeding of these species (Senior and Pierce 1989, 245). Bird species are highly susceptible to local climatic conditions, often expressed in their growth patterns (Fothergill 2016, 559). Senior and Pierce (1989, 255) suggested that the variables of diet and climate and the morphology of the turkey need to be explored in greater depth as their vulnerability to environmental changes may be expressed phenotypically within an individual during its growth and development. Migratory patterns of turkeys are also important indicators of environmental and climatic shifts. Cordero (2018, 87) proposed that the turkey elements in faunal assemblages from the American Southwest can allow archaeologists to explore the impact of climatic period transitions on migratory patterns of bird species prominent within the region, specifically increased or decreased prevalence.

3.2 Economic models

Economic perspectives on material culture are well represented in earlier research about faunal analysis. Two primary avenues of economic interpretation are prominently presented throughout the literature. First, a view of human-animal relations through the study of subsistence patterns is a large part of an economic perspective, where much of this work centres around understanding the evolution of culture and occupation. Second, faunal elements are examined through a perspective dominated by the patterns of production and trade of commodities within the region. Centring on these discussions is the acquisition of commodities, production of resources, and domestication practices.

3.2.1 Subsistence Models

Many researchers base their understanding of faunal data on evidence of subsistence practices. Hodgetts (1996) published a single faunal-focused report of material collected with the PAC. Hodgetts offers meaningful detail about the species range and use patterns associated with subsistence at the El Zurdo site (CH-159). There have also been studies of subsistence patterns elsewhere in the Casas Grandes region at the site of Paquimé (Di Peso 1974; Minnis and Whalen 2015; Kelley et al. 2012; Whalen and Minnis 2009). To interpret the kinds of subsistence patterns, and models of subsistence theory needed to comprehend faunal evidence, the analysis of the materials from the study sites used in this thesis relies on information found across the literature. In addition to studies within the boundaries of the PAC, literature interpretating faunal elements from a subsistence perspective is available throughout the American Southwest, and in the southern regions of Mesoamerica.

When examining subsistence practices, a number of different analytical methods can be used to compare the various ways that animal species are exploited. Foraging theories focus on quantitative measurements in optimality models, such as the costs and benefits of dietary utility that guide traditional zooarchaeological analyses (Zeder 2012, 242). The results of some analyses show critical changes in foraging efficiency. They have wide-ranging implications for several prehistoric studies, such as overexploitation of prey, declining foraging efficiency, and resource intensification (Cannon and Meltzer 2004, 1974). Models of foraging theories are effective in understanding prehistoric behavioural variability and trends in diet breadth (Broughton et al. 2011, 404). One might employ foraging theory models stemming from the over-arching study of behavioural ecology. The basic idea of behavioural ecology is that organisms are designed by natural selection to optimize reproductive success. Because of that, environmental conditions draw a parallel to behaviour shifts in species (Lupo 2007, 144). Research in the last few decades has been shaped by a rapid rise in the use of foraging models derived from behavioural ecology to explain fundamental differences in faunal assemblages, as animal bones can provide a tangible reflection of dietary breadth and choice (Lupo 2007, 143).

Originally developed using the framework of behavioural ecology to explain non-human foraging behaviour, the principles and modelling of the optimal foraging theory were embraced in the early 1980s. Anthropologists and zooarchaeologists hoped to introduce new scientific foundations surrounding the study of traditional predator vs prey ideologies in association with human and non-human animal relations (Lupo 2007, 146; Zeder 2012, 242). The objective of studies using optimal foraging theory is to determine the cost-benefit ratio that foragers consider (Zeder 2012, 244). A core assumption of the optimal foraging theory is that foragers will select environments and animal species based on the understanding of the benefits of maximizing the net rate of returned energy or nutrients per allocated foraging time (Zeder 2012, 244). Some locations are deemed more ideal by their inhabitants and act as centers for regional development (Zeder 2012, 244). In doing so, prehistoric occupants would have increased foraging efficiency and the likelihood of coming across prey species (Dean 2001, 279).

In anthropology and archaeology, the prey choice model is the most widely used foraging theory posed by researchers. The prey choice model outlines that a forager would travel through a habitat consuming prey as it goes so that the cost of transporting resources is decreased or eliminated (Cannon 2000, 322). Thus, according to this model, a forager looks for all kinds of prey at once and comes across them randomly in the environment (Cannon 2000, 323; Lupo 2007, 147). Within the prey choice model, foraging time is partitioned into two mutually exclusive categories, search, and handling. The time devoted to searching for a resource is generalized across all studies. In contrast, handling time often includes the time spent pursuing, processing, and consuming the prey after it has been encountered (Dean 2001, 278). The basic assumption is that foragers try to maximize the long-term rate of energy acquisition by adding resources into their diet based on chance interaction. (Cannon 2000, 340-341; Lupo 2007, 148-149).

Another model that is widely used among scholars is the patch choice model. The patch choice model outlines that some resources occur in patches, clumps, or clusters in specific habitats (Lupo 2007, 149). This model assumes a habitat that consists of several resource patches located at varying distances from a central resource and evaluates which of the available patches will maximize the rate of energy delivery to the central resource place

(Cannon 2000, 320-321). Resource patches are spatially bounded entities characterized by the set of prey, of one or more types, contained within it and by the predictable return rate curve or gain function" (Lupo 2007, 150). Ethnographic research concludes human hunters frequently opt to take advantage of certain locations for prey, and to use hunting techniques that are suitable for the anticipation of coming across specific species (Lupo 2007, 151). Originally, the patch choice model was developed to predict which patches a forager will exploit. However, whenever resources are distributed in patches, foragers face the problem of deciding which patches to include in their foraging routes which could lead to subsistence-related issues seen from a human forager standpoint (Cannon 2000, 320).

Resource depression is the final subsistence foraging theory to be examined. The use of faunal analysis to assess the effects of resource depression on the lifeway patterns of individuals has been an ever-growing research interest among modern scholars. Clear patterns and trends related to subsistence usage are presented across numerous studies of resource depression, which is backed by assemblage-specific data (Ugan 2005, 241). It is possible to correlate changes in behaviour patterns linked to shifting settlements using the type and quantity of faunal elements observed throughout the archaeological record. This has been particularly useful when looking at regions where there is evidence of more intensive agricultural activity. Due to more intensive agricultural practices, specifically in the American Southwest and throughout Mesoamerica, human dependence on maize increased. A seasonal protein supplement would therefore be necessary, having a higher impact on animal populations with ongoing predation and high human populations (Badenhorst and Driver 2009, 1838; Dean 2001, 279). Thus, depending on the increased presence or absence of specific species within an assemblage, researchers can pinpoint trends in the variability of subsistence patterns.

3.2.2 Production and Trade of Commodities

Modern economic perceptions of faunal remains highlight how animal species might act as commodities. The structure and scale of these identified patterns can influence how archaeologists measure past societies' socioeconomic and political characteristics (Minnis 1988, 181). Earlier studies show that exotic goods are especially important to the Casas Grandes economy (Di Peso 1974; Minnis 1988; Whalen 2013; Whalen and Minnis 2003). This evidence is seen in the larger Medio period sites to the north, including Paquimé. Casas Grandes is one of the best examples of specialized production in northern Mesoamerica (Minnis 1988, 181). The trade for exotic goods points to trade relations with regions to the north in the American Southwest, as well as coastal regions to the west in Mexico. Kelley et al. (2012, 96-97) contend that while there is limited material evidence of Mesoamerican imports identified in the PAC study area, there is little doubt that trade would have occurred with people to the south and eastern region of Mesoamerica.

Shell and avian species are two primary exotic commodities imported through specialized trade and distribution systems. Shell artifacts were produced throughout the region and seems to be sourced from Mexico's Pacific and Gulf of California coast (Rakita and Cruz 2015, 73). What makes the identification of shell resources throughout the Casas Grandes region particularly interesting is the sheer amount of shell elements and worked ornaments present in many northern sites, primarily Paquimé, which had over 3.5 million pieces (Minnis 1988, 185-186). Di Peso concluded that imported shell was further worked within the site of Paquimé either in what he identified as "slave" workshops and also by individuals recognized as "shell artisans" who specialized in the production of shell ornaments (Minnis 1988, 185; Rakita and Cruz, 72). The number of elements recovered, as well as the significant amount found within ritualistic contexts such as shrines and burials, highlights the political, ritual, and economic importance to the occupants of the Casas Grandes region.

Original excavations by Charles Di Peso found evidence of macaw husbandry at Paquimé, as three-hundred and twenty-two scarlet macaws were found (Di Peso 1974, 275; Rakita and Cruz 2015, 79). Eighty-one military macaws and one-hundred macaws of undesignated species were also discovered (Rakita and Cruz 2015, 79). Di Peso interprets this high volume of faunal material as indicative of full-time, specialized aviculture. Stable isotope analysis shows where macaw elements recovered from Paquimé would have originated. There is no doubt that macaws were an exotic good that came into the Casas Grandes region due to trade and exchange with regions to the south. No native populations are found throughout the regions of northwestern Mexico. The stable isotope analysis of the macaw elements suggests that the birds were raised on diets heavily enriched with C4 plants, presumably corn (Rakita and Cruz 2015, 79). It seems that the site's occupants during the Medio period both imported these birds farther west and south in Mexico and established and maintained a breeding population within the site of Paquimé (Rakita and Cruz, 2015, 80). Macaws are notoriously destructive of cages, and therefore much of the evidence of macaw breeding throughout the Casas Grandes region comes from evidence of what researchers have called "macaw stones." The occupants of sites such as Paquimé built cages with stone ring doorways and stone plugs that the birds could not destroy with their powerful beaks (Rakita and Cruz 2015, 79). Macaws were found to have significant economic impacts throughout the site and essential aspects of ritual and social hierarchy, as the extravagant and rich colours of their feathers were used and admired throughout society.

Di Peso concluded that reasonably large-scale turkey domestication and production levels are evident at Paquimé (Rakita and Cruz 2015, 67). While the turkey is a food source in areas surrounding Casas Grandes, such as the American Southwest, the faunal remains of the birds found within the site boundaries of Paquimé suggest that they were not used as a food source. The importance of turkey feathers to the people of Casas Grandes is clear through limited cut marks and the context of the bone elements. More than 85% of turkey bones were fully articulated within prepared burials (Holeman 2013, 14). Sacrifice and feather harvesting for ritual and ceremonial purposes is the primary motivation for turkey domestication (Rakita and Cruz 2015, 68-69). A by-product of these activities was harvesting turkey feathers, which were used to create various objects, including robes, blankets, and ritual paraphernalia.

3.3 Social and Ceremonial Models

Complex societies are understood as maintaining well-developed social and political hierarchies. When looking at the study of faunal elements from an economic perspective, many attest (Di Peso 1974; Kelley et al. 2012; Minnis and Whalen 2015; Whalen and Minnis 2009) that the identification of differences in social and political status is primarily correlated to the abundance and type of taxa identified throughout faunal assemblages. Zooarchaeologists often hypothesize that if there is evidence of political and social differences in a society, they may be expressed in faunal remains. Evidence of large and small-scale food production can be viewed as a demonstration of the types of social activities that would have occurred during occupational periods. To better understand animals' social use, it is essential to outline the typical characteristics associated with faunal elements' food versus non-food utilization indicators.

The most commonly examined indicators of animal utilization, as described by Crabtree (1990, 171-172) and Senior and Pierce (1989, 250-252), include differences in the quality, amount, and range of species types consumed as well as distinct proportions of meat consumed. These differences are measured by examining element frequencies' variances and the elements' anatomical representation. The presence of articulated versus non-articulated skeletons is another important indicator, as it would be impossible to consume animals without disarticulating and processing the bone elements. Lastly, measures of taxonomic abundances are often used to assess differences in species frequencies. Axial and appendicular skeletal representation and the distribution of low versus high-utility elements can attest to the interpretation of the faunal elements utilized in a socioeconomic context (Jackson 2014, 110).

Zooarchaeologists suggest that these various indicators of faunal utilization attest to differences in social hierarchy and control of ceremonial practices expressed through access or consumption of certain species (Badenhorst et al. 2019, 193). The remains of large mammals are reliable sources of data for examining the changes in social organization. Throughout the American Southwest, the hunting and distribution of meat were tied to social events and rituals, including feasting (Dean 2001, 280). Feasting refers to the public consumption of generous amounts of food, primarily for individuals or social groups to develop or maintain social status (Badenhorst et al. 2019, 195). Feasts from large animal hunts may attract followers to individual leaders who successfully produce meat surpluses, especially if other potential leaders in the community are unable to respond in kind (Dean 2001, 280-281). The increased proportion of larger mammals could be a larger issue related to society's social organization and ritualistic structure. Rituals aimed at individual attempts to gain authority and prestige often focused on hunts, feasts, and the production of paraphernalia through large game hunting (Badenhorst et al. 2019, 195; Dean 2001, 282). This in turn opens a new interpretational avenue that goes beyond conventional subsistence perspectives and is centred on the idea that large animal hunting is a good proxy for social hierarchy.

Zooarchaeologists consider that spatial and contextual patterns of bones contribute to understanding the social and ceremonial significance of animals. Reliance on whole animals, skulls, paws, skins, and claws of a range of species formulate the organization of ritualistic ideologies involved with ritual practices throughout the region (Bishop and Fladd 2018, 297). Some individuals or groups may have exclusive or near-exclusive access to certain taxa, body parts, skins, or feathers. These resources support ideological beliefs and were often manipulated by ruling elites to uphold legitimacy. Rituals can be a mode of social communication that creates authority and a context for controlled and manipulated access to elements with symbolic meanings (Badenhorst et al. 2019, 195). Groups of individuals practised distinct rituals that utilized specific elements of faunal remains based on regionality, which can, in turn, produce a greater understanding of faunal assemblages.

3.4 Introduction to Ontologies

One of the most significant developments in the advancement of theoretical thought in archaeology is the explicit incorporation of notions of relationality and meaning (Mills 2017, 381). The knowledge of relationality in the archaeology provides a foundation to explore beyond traditional means of analysis, particularly in the study of zooarchaeology. Relationality in archaeology is defined by Skousen and Buchanan (2015, 1) as "a set of approaches aimed at conflating the abstract and undisputable dualities of modernist ontologies." Correlated to relational approaches within archaeological and ethnographic research is what some have coined the "Ontological Turn." Anthropologists traditionally assumed that they could account for cultural differences globally by taking for granted western divisions of nature vs culture, thing vs person, and humans vs animals (Charbonnier et al. 2016, 1). The ontological turn calls anthropologists to alter traditional modes of inquiry to account for lifeways that may not adhere to these categories. Ontologies predicated on different foundations are present worldwide, and these are coeval and contrastable to one another (Charbonnier et al. 2016, 3). Archaeologists interested in the study of ontology must recognize that ancient societies may function in radically different conceptual worlds where fundamental categories of what exists and what beings constitute nature depart from a Euro-American mainstream position.

One area of recent study has emphasized relations between humans, non-humans, and spiritual beings (VanPool and VanPool 2016, 312). These relations appear from the phenomenological consequences of defining things around us as diverse types of beings (Descola 2013b, 37). As Swenson (2015a, 678) explains, comparative to traditional social theory, investigating relational ontologies enables archaeologists to pay more attention to questions of meaning and ideology. Relational ontologies thus focus on experiences of being and becoming that is mediated by the material world. This appreciation of the new holistic nature of archaeological evidence reveals a potential to investigate previously unknown relations by tracing similar or dissimilar qualities in materiality that may have been the basis of relationality.

Two individuals have been instrumental in drawing attention to the importance of ontology. Bruno Latour's actor-network theory (ANT) has been influential to many scholars. ANT is based on a relational ontology which stipulates that the existence of things or beings of the world is based upon the strength of their articulations (Alberti 2016, 166). Many researchers have applied his ideas to show the holistic importance of humans and non-humans as equal partners in the social world (Alberti 2016, 164; Marshall and Alberti 2014, 347). Eduardo Viveros de Castro argues that while Euro-American ontologies suggest a single nature and many cultures, Amazonia Amerindians live in a world characterized by a single culture shared across many different natures (Candea 2012, 2).

In addition to the field developments by Latour and Viveros de Castro, French anthropologist Philippe Descola established four ontological categories of the modern and ancient world. Descola defines ontology as "a concrete expression of how the contrastive qualities detected in human surroundings are organized into systems, suggesting how beings establish differences between one's self and others" (Tola and Dos Santos 2020; 6). Descola's understanding of ontology is a direct result of his fieldwork among the Achuar people. These conceptual insights about the nature of relationality were subsequently applied to the study of Amazon, Mesoamerica, North America, Central

Asia, and Siberia in his celebrated book *Beyond Nature and Culture (2013; see* Scott 2014, 8; Tola and Santos 2020, 5-6). In this work, Descola explains cultural phenomena that stem from modes of identification, explaining the composition of human society on a universal scale (Chamel 2019, 9).

The categorization of different ontologies stems from the lumping together or distancing elements of the lived world based on their possession of similar or dissimilar qualities (Descola 2009, 150). These qualities may represent an "interiority", or the soul/inner essence of being, or "physicality", the body or outward expression of different beings (Descola 2006, 210-211). Using this theoretical framework, Descola proposes that anthropologists can recognize continuity and discontinuity between beings in the world according to a given ontology's "modes of identification" (Salmon and Charbonnier 2014, 569). Each mode of identification is the foundation on which various collectives of humans and non-humans are acknowledged. These may be based on attributes of physical appearances, behaviour, or unseen qualities that link a self to other beings (Charbonnier et al. 2016, 15; Descola 2009, 150-151). Such relational matrixes challenge conventional western understandings of humans versus non-humans.

Descola's comparative study characterises four ontologies: totemism, naturalism, animism, and analogism. If members of a culture recognize similarities in interiority between beings but dissimilarity in their physicality, they have an animistic ontology. Totemism is defined by situations when beings share similar interiority and physicality. People have a naturalist ontology if they recognize different interiorities but identify similar physicalities. Lastly, if there are differences in the interiority and physicality of different beings, it reflects an analogical ontology. Descola argues that naturalism is now recognized globally and is a mode of identification that can be classified as "our ontology" based on the historical development of modernity (Scott 2014, 7; Tolas and Santo 2020, 1).

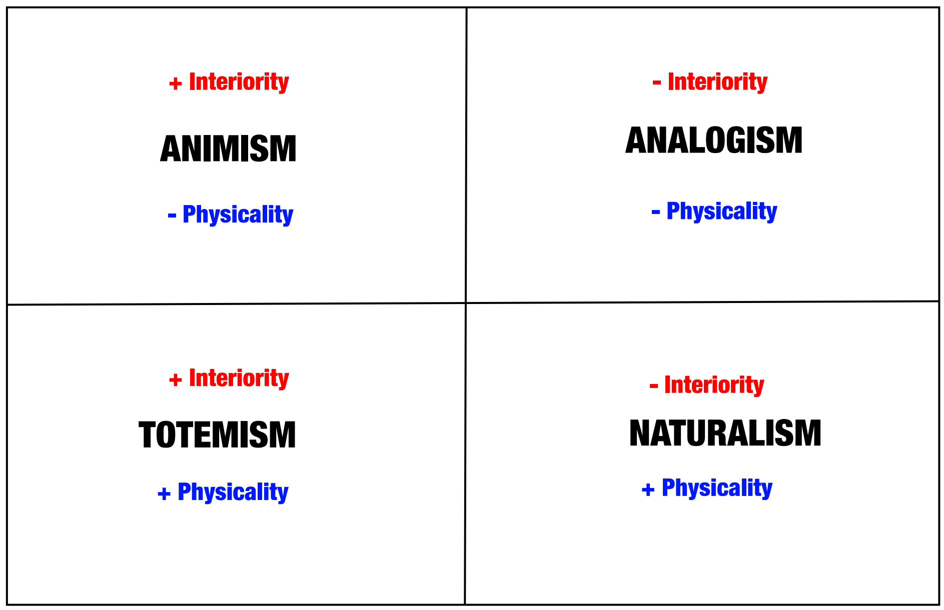

Figure 4. Descola's Modes of Identification. Plus symbolizes shared interiority or physicality, and minus shows where interiority and physicality differ—adapted from Descola (2013a).

Ontologies recognized up to this point are built upon ideas which branch from naturalism (Tolas and Santos 2020, 1-2). Within the study of zooarchaeology, the place of animals in different societies often does not conform to the traditional Western ideologies of nature vs culture (Alaica 2018, 864). Descola's work offers a sharp critique of the economic models of interpretation, based upon the components of modern naturalism, typical in faunal studies. Descola acknowledges that the fundamental basis of non-western cultural relations is formed through a perspective based on how human and non-human beings engage with their environments (Willerslev 2013, 48). Within his proposed ontological categories, different principles shape the unique way beings understand the world. His work supplies the inspiration for exploring the anomalous patterns in the faunal assemblages collected from the PAC sites. Descola notes that Mesoamerican and Southwestern societies are likely based on distinct ontologies. Mesoamerican cultures are anchored in analogism, while beliefs in the American Southwest are often based on animism. The following sections supply an overview of the two ontologies outlined by Descola that might define human-animal relations in the Casas Grandes region.

3.5.1 Animism

Rituals are often challenging to assess in the archaeological record because of their multilayered nature. Still, ritual is implicated in archaeological studies of prehistoric societies to better understand past humans and non-humans, including animals, spirits, and landscapes (Costa and Fausto 2010, 94). In this context, we have seen animism, an anthropological concept used to define the religious beliefs of several cultural groups, become more prominent within the study of prehistoric cultures. Evidence of animistic ontologies is apparent through the archaeological inference of rituals such as offering deposits, shrines, and burials (Groleau 2009, 398-399).

The traditional definition of animism emphasizes that in its earliest form, religion is characterized by ideas concerning a plurality of supernatural phenomena (Insoll 2011, 1005). Drawing on second-hand accounts of individuals, E.B. Tylor initially observed in the late nineteenth-century, that many prehistoric cultures attribute life and personality to inanimate objects such as animals and plants (Bird-David 1999, 67-68). In the early 1990s, after decades of little emphasis on animistic perspectives, there was a return to an animistic ontology within anthropology presented in the work of Bird-David and Descola. With this re-introduction, a key attribute of animism is the challenging of existing categories and relations of being (Bird-David 1999, 67-68; Willerslev 2013, 43). In archaeology, animism is often interpreted as an extension of social relationality between humans to include non-humans (Harrison-Buck and Freidel 2021, 2). Animism recognizes all beings as persons, where animals and spirits have a kind of interiority comparable to a human being but are differentiated by their physical appearance. In other words, non-humans are believed to also perceive themselves as humans despite having different exterior forms, so they all have similar interiorities, souls, and spirits despite distinct physicalities (VanPool and VanPool 2016, 313). As proposed originally by E.B. Tylor, animism hints at the idea of a singular soul (Sillar 2009, 369; Willerslev 2011, 506). Recent discussions of animism focus on the soul as signifying the ability of individuals to travel beyond their experiences in their immediate physical world (Insoll 2011, 1005). Descola (2013a, 129) argues that if one strips the definition of animism to the term's etymology, the fundamental attribution of being for humans and non-humans is the recognition of a shared interiority. Descola describes this shared interiority as personifying all beings of the world, justifying the extension of social norms and ethical precepts of the human world to non-humans who share interiorities (Descola 2013a, 129). Descola considers metamorphosis as a classic feature of an animist ontology, in which a human or non-human being sheds its actual physicality to reveal an alternative interiority to another being (Descola 2013a, 135-136; Scott 2014, 10). This metamorphosis is one of the most prominent lines of interpretive evidence in work on animist perspectives in Casas Grandes, specifically surrounding depictions of human-animal relations in iconography at the site of Paquimé.

Todd and Christine VanPool's analysis of Casas Grandes religion emphasizes animism as the core of the region's ontology. The VanPool's work examines forms of animistic relationships within the Casas Grandes region by identifying the practice and importance of shamanism and shaman-priests throughout the Medio period ideology (VanPool 2003, 697; VanPool and VanPool 2016, 312; 2021, 1). Studies have focused on shamanism; particularly as iconographic depictions display shamans as playing an integral role in the overall spiritual well-being of occupants throughout the region. VanPool and VanPool (2016, 312) view an animistic perspective as vital to understanding archaeological material patterns, including iconography, botanical material, ceramics, lithics, and landscape features. They suggest that the concept of shamanic metamorphic transformation was the underlying theme reflected in the iconography of much of the material culture uncovered at Paquimé, especially in architecture and pottery (VanPool and VanPool 2021, 5). Shamanism, as previously described by Di Peso, revolves around the central idea that shamans were not individuals who were "state-controlled", such as priests, but rather those whose sole purpose within society was to act as a mediator between what individuals deemed the "seen" and "unseen" worlds (VanPool and VanPool 2015, 85-86). Based on a detailed analysis of imagery present on Ramos polychrome vessels, they argue that ritual leaders at Paquimé were likely shamans.

Ceramic vessels from the Medio period were frequently decorated with iconographic depictions of events described as a "soul flight" of shaman-priests (VanPool 2003, 697). These were said to be evident through the presence of pound signs on these effigy vessels and asserted that the pound signs reflect individuals who have transformed from the physical body of a human being to one of a non-human horned serpent entity

(Cunningham 2009, 3; VanPool 2003, 697; VanPool and VanPool 2015, 91). Animals depicted on ceramic vessels often reflect their importance to shamanism and the ability of ritual practitioners to commune with supernatural beings during spirit flights after their body has entered a ritual trance (VanPool and VanPool 2021, 5). Shamans transform into liminal beings through fauna regalia, including feathers and hallucinogens (Cunningham 2019,11; VanPool 2003, 699). They staged performances on platform mounds that included avifauna's sacrifice, primarily turkeys and macaws. The sacrifice of turkeys would involve cutting the head while the rest of the skeleton would have remained untouched. Shamans successfully merged existing Southwestern cosmic ideologies with Mesoamerican Shamanistic beliefs of travel beyond the present world and the spirit worlds (VanPool and VanPool 2015, 92-93). Not only may human spirits travel to other worlds, but material culture and architecture may be given a spiritual essence that can, in turn, act upon human beings (Wallis and Carocci 2021, 3-4). Shamans are thus those who can guide individuals' everyday activities and provide help, knowledge, and healing through their ability to shed their exteriority (VanPool 2003, 699).

Scholars incorporating animistic perspectives pose a divergent viewpoint to a traditional reliance on naturalism, shifting away from the rigid dualistic binaries typically seen in naturalistic perspectives of prehistoric culture (nature vs culture, thing vs person) (Haber 2009, 418). While the strength of a scholar's animistic perspective concerning shamanism is the conclusion that the shaman-priest is an anthropological construct, not reflecting emic roles within cultures, there is a challenge of recognizing the full scope of religious complexity through an animistic perspective (Haber 2009, 418). Harrison-Buck and Freidel (2021, 4-5) highlight that explanations of culture falling within the realm of an animistic model tend to emphasize a paradigm where a shift in cultural complexity corresponds with a transformation of religious traits. Consequently, the shift from shaman to priest represents a movement towards greater social and cultural complexity (Harrison-buck and Freidel 2021, 5). In turn, this creates a materialistic stance among scholars rooted in the belief that shamanism is representative of so-called “primitive” societies, portraying shamanism as performative and imagistic (Harrison-Buck and Freidel 2021, 5; Swenson 2015b, 340). Therefore, scholars are challenged to engage with animistic perspectives without sliding to ethnocentrism.

The work of Descola (2013a) offers an alternate hypothesis to address the issues stemming from animistic perspectives. Descola describes four ontological categories but emphasizes the application of analogism to the study of prehistoric culture (Descola 2013a, 230-231; Scott 2014, 11). One example of change in ontology proposed by Descola is the shift from an animist ontology to an analogical ontology. He describes the foundation of this shift as based upon the introduction of the domestication of animals (Vilaça 2015, 9). Descola outlines this shift as setting up a "vertical" relationship in which protective domination exists among relations held between human and non-human beings (Vilaça 2015, 9).

Consequently, six basic modes of relations are present in the cultures that make up the world. Descola identifies these relations as those which have the potential to be reversible (exchange, predation, and gift), as seen in the study of animism and those constituted by relations founded upon in-equitable connections (protection, production, and transmission), seen in the study of analogism (Descola 2013a, 310-311; Vilaça 2015, 8). Descola uses examples of ethnographic accounts found in Siberia, where individuals practised traditional hunting activities but supported domesticated herds of animals usually smaller in size (Scott 2014, 22). This example suggests that an increased role for protection along a vertical relationship between beings may move an animistic perspective towards one of analogism within a prehistoric culture. Scott (2014, 22) put forth that even the slightest change in relations between beings can alter culturally described modes of identification. With the broadening recognition of varied species and more diverse representations, the shift in ontology presented by Descola offers the ability for scholars to view the relations between humans and animals in the Casas Grandes region as falling more under the category of an analogical ontology.

3.5.2 Analogism

Scholars studying through the perspective of analogism look to explain the similarities and dissimilarities of entities, producing an understanding of the relations held between beings. In this sense, a person's analogical ontology is predicated on the notion that certain characteristics define beings in both their interiority and exteriority (Descola 2013a, 201). An analogical perspective, therefore, presents an interpretive avenue for explaining the similarities and differences of the entities which make up the past and present world (Descola 2013a, 201). Analogism, therefore, frames the world as a complex web of analogous substances present in multiple beings that creates a network of continuities and discontinuities in both the interiorities and physicalities of beings (Chamel 2019, 12-13; Descola 2013b, 41). The great diversity of these modes and types of being makes each entity of the world, classified as human or non-human, connected but also quasi-unique (Corona 2020, 325). From a zooarchaeological perspective, evidence of ritualistic behaviour patterns throughout the archaeological record can suggest that humans, animals, and other natural and supernatural beings all share a fundamental nature.

The idea that the physical universe is multilayered is a foundational principle of Mesoamerican cosmology and religion (Reilly 2012, 1; Lucero 2018, 333). This multitiered world consists of three principal and intersecting realms; the above realm of the heavens, the earthy middle realm, home to the world's living humanity, and the watery beneath realm home to ancestors (Reilly 2012, 2; Lucero 2018, 333-334). This multitiered world can be described as having complementary oppositions and reciprocal obligations between human and non-human beings. These described oppositions and obligations are acknowledged by the scales of differences marked in existing beings, manifested by the gradual distribution along a continuum in which there is a specified place for humans and non-humans (Lucero 2018, 333). Each cosmic layer possessed deities, and they were linked by an Axis-Mundi that could take the form of a world tree or mountain, temple, or sacred fire (Bostwick et al. 2010, 87; Reilly 2012, 1). Descola argued that an analogical ontology is a framework used by cultures in ancient Mesoamerica (Descola 2006, 7; 2013b, 41), which may be different from the belief system used by "Mexico of Conquest.” The central features of an analogical ontology are the grouping of existing entities and the development and variability of what constitutes the different beings of the world (Descola 2013a, 212). Descola argues that the complex web of beings presented in an analogical perspective of Mesoamerican culture results from a discontinuity of body and soul, not only between humans and non-humans but within all beings inhabiting the three cosmological realms of the world (Scott 2014, 11).

Descola (2013b, 40) described analogism as possessing specialized agencies assigned to social units, space, and time subdivisions in life habits known as "deities". In an analogical ontology, humans and animals do not share the same culture, as in animism, but share common substances with deities (Descola 2013b, 38). A classic feature of these deities' presence is their occasional embodiment in material objects through metamorphosis and possession of humans and non-humans (Descola 2013b, 41-42). Deities are depicted as being affixed to physical objects and locations, in contrast to animists' theories that spirits, and souls travel around society through the sporadic incarnation of different entities. Deities belong to a section of the collective from which eventually emerge the ritual experts charged with its celebration, and specialized spheres of involvement are delegated to them (Descola 2013b, 41). Deities are often associated with features of environmental landscapes such as water, rocks, and shrines, as well as embodied through material representations such as statues or figurines (Descola 2013b, 41).

According to the Mesoamerican cosmological view, people live in the middle world and communicate with other realms through environmental and architectural characteristics used for sacrificial rituals (Reilly 2012, 2; Lucero 2018, 333). An analogist approach to faunal material explores human and non-human exteriorities and interiorities not as singular but as reflecting an accumulation of multiple entities that create relations between humans, supernatural forces, animals, and landscape parts based on their shared elements. As a result, an analogical approach presents a chain or series of otherwise unrelated entities to become connected through a common being (Prado et al., 2022, 11). From this perspective, we can see that those different animals with specific principles and forms of being having a special ability to move between the three realms of the world. Faunal material can thus encompass an overarching ritual significance through presented patterns based on context and species representation. These patterns highlight the qualities certain animals share with humans and their place among the complex web of beings presented through analogical perspectives of material culture.

3.6 Summary

The dominant understanding of human-animal relations within the Casas Grandes region to this point in time relies on traditional models of understanding faunal material, including largely naturalistic approaches such as subsistence-based models. Though these traditional models of understanding faunal material provide tangible explanations for a large majority of the material evidence, there are alternate approaches explored in recent decades which address present anomalies.

Animistic perspectives of Casas Grandes iconography are seen in the work of Christine and Todd VanPool. Through an animistic perspective, the VanPool's address previous anomalies presented in patterns of material culture concerning Medio period iconographic depictions of human-animal relations at the site of Paquimé. The VanPool's approach regarding animism provides an alternate understanding of human-animal relations in the region, which can explain parts of the cultural phenomena seen within the study region of this thesis. While much recent work on Casas Grandes religion has focused on animism (VanPool 2003; VanPool and Newsome 2012; VanPool and VanPool 2016), reconstructions of Casas Grandes religious traditions highlight their connections to Mesoamerican belief systems that diffused into Northern Mexico during the late Classic and early Post-Classic periods. Descola's characterization of Mesoamerican ontologies as based on analogism, and the fact that Casas Grandes ideology is frequently understood as triggered by the diffusion of Mesoamerican religious beliefs into Northern Mexico, means that analogism may present a different approach to understanding human-animal relations in the Chihuahua culture area.

I considered whether the PAC faunal assemblage exhibits patterning, which can be understood through traditional modes of inquiry, such as those related to subsistence practices and the environment, as well as through Descola's ontological categories of animism and analogism. I also evaluated how individuals within the Casas Grandes region might have understood human-animal relations.

Chapter 4: Methods

In this chapter, I present a composite dataset of faunal material from several archaeological sites within the region, representing many collections from previous excavation projects over nearly 25 years. Fieldwork has been conducted at different sites, on different scales, and led by many individuals associated with multiple organizations. Consequently, my aim was to generate a comprehensive data set of faunal material that can be used to better understand human-animal relations. The methods used are described in three sections: (1) Excavation methods and procedures, (2) Identification and analysis of bone elements, and (3) Quantification methods utilized for data generation.

4.1 Excavation Methods and Procedures

The data collected for this project came from the four sites within the study parameters discussed in Chapter 2 and exclusively from previous excavations. Co-Directors Dr Jane H. Kelley and Dr Joe Stewart, as well as their research team, conducted these excavations, which comprise the collection analyzed for this thesis. Field seasons associated with these collected elements have a date range from 1998 up until the 2010 field season. Original field notes and the published site reports available through the Maxwell Museum (Garvin and Kelley 2013; 2014; Kelley 2008; Kelley et al. 2014) were relied on for provenience and contextual data generation. The field procedures were identified primarily using these resources, providing the ability to identify the original contexts and compile an overall perspective of what these sites would have looked like before and after excavations. The information available in these sources outlines important points on field methods and standards.

Collection and documentation of material from the project were recorded in a standardized form provided at the beginning of each field season. The unit number, size, level designation, datum, vertical coordinates (below surface or below datum), horizontal coordinates, and the type of level (arbitrary 5 cm, arbitrary 10 cm, or natural) were all recorded on these original level records. Screening strategies were identified as being screened per quadrant or per unit, where most records indicate that the material was screened per unit. Mesh size for the project was standard throughout all study sites, using either 1/8" or ¼" mesh, with the majority being ¼". The excavation method was also recorded and included a trowel, brush, dental pick, and picks, to name a few. Documentation of the type of artifacts found within each unit was categorized as lithics, ceramics, fire-cracked rock (FCR), bone (both human and faunal), botanicals, and an "other" category for those artifacts that did not fall under any of the previously described artifact types. All artifacts found within the assigned units were documented.

Descriptions of the units, including the patterns found, prominent artifact types, contexts, and description issues presented throughout the excavations, were recorded for each level record sheet. These were extremely useful for a secondary analysis of the methods and field procedures, as they provided the ability to generate a more holistic picture of what individuals involved in these excavations would have been presented with throughout the field seasons. Lastly, a drawing of each unit to scale was provided with each level record. Each study site followed similar sampling strategies to identify units to be excavated within the site boundaries. Reconnaissance surveys and shovel and test pits were among the sampling strategies used by the project. Units range in size but were 1-x-1 m to 1-x-2 m and were never larger than 1-x-2 m. The sampling strategies used to collect the faunal elements followed no direct outline. The collection of these elements from the sites of the study was amassed from multiple units, and shovel tests were assigned to each site randomly.

All standardized methods and collection of material were conducted in previous field seasons. Therefore, the examination and interpretation of information found through field notes and site reports published by Kelley and colleagues became extremely important in data formulation from a secondary perspective. These circumstances present challenges associated with possible methodological errors, missing information which will never be available for this project, and there is scarce information available for some aspects of the study.

It is important to note that there were inconsistencies in the excavation methods and data collection. The project included a diverse pool of individuals from around the world who approached the research from many specialties. One shortfall with this is seen in the documentation of information on the standardized sheet. Differences in excavation style, for example, are apparent, which made my work from a secondary perspective more challenging, as information was included on other records throughout the project that were not present within these specific structures. Though standardized-level records were to be kept, there were variations and inconsistencies in the type and level of information identified and recorded on each sheet. Specifically, this can be seen with Structure 5 at the Calderón site. There was significantly less information recorded regarding the units, lots, and levels during the excavation process. Including more information would have made identifying the elements within Structure 5 and the associated contexts simpler.

Kelley et al. (2011, 177-178) outlined two primary struggles regarding the preservation of sites within the region. As is evident in many areas of the world, looting and land disturbances are two issues archaeologists face. In the case of many sites within the Casas Grandes region, looting has implications for formulating results, as many of the sites in previous years have been described as targets of looting activity. Second, land alteration has been seen as the primary struggle in which researchers have faced. Again, this is not unique to Chihuahua per se but has had implications on the project's development, progress, and accessibility over the years. The faunal collection for this project was impacted by these two preservation-related factors in a few significant ways. First, a considerable portion of the damaged pieces (fractured, crushed, and shattered) in the faunal material that was processed to create the data set reported in Chapter 5 were clearly post-depositional, a result of possible looting and land disturbance activities. Second, it may be argued that the land alteration in the area, which hampered the project’s development and advancement to an extent, had an impact on the delayed examination of the faunal elements in general.

4.2 Identification and Analysis Elements

4.2.1 Identification

A review of the literature presented the reliance of faunal-based studies on the formulation of basic data through both previous works published as well as new data formulated. The projects faunal collection had a large majority of unanalyzed specimens, other than the small-scale analysis conducted in 2004 (University of Calgary) and 2012 (University of Lethbridge). Therefore, all identified elements were classified and analyzed by the author, and this thesis serves as the first complete analysis of the faunal assemblages since excavations. Data collection and analysis of the faunal elements from the four study sites were carried out from July 2021 to December 2021 at the University of Lethbridge. The remains were categorized into valid taxa, which included the classification of previously unidentified elements. When starting the identification and analysis of this collection, guidelines were followed to aid this process, which includes the comparative analysis of the faunal collection with three main academic aids.

First, I collected all available skeletal material housed at the University of Lethbridge to use as comparative specimens in the identification process. One limitation of the comparative collections at the University of Lethbridge was the lack of smaller species present throughout north-western Mexico, as most of the collection included larger species prominent in the Great Plains. Though there were challenges with the acquisition of comparative resources in this manner, I obtained some important comparative material. A skeleton of a domesticated dog, a skeleton of a frog, a skeleton of a grouse which was particularly important to determine small vs medium size birds, a turkey skeleton, and a white-tail deer. Though these skeletons housed at the University of Lethbridge were useful comparative material, there was a need to acquire additional comparative material for the identification process.

Second, the assemblages were analyzed using comparative elements from previously catalogued collections housed at the University of Lethbridge. This was accomplished by going through the element classification data that Collen Haukaas generated for her honors thesis she completed in 2012. Haukaas transported the elements from Structure 6 in the Calderón site to Simon Fraser University to use their comparative collection. This proved to be extremely important as I not only used her assignments to determine my own, but it also ensured a standardized analysis of the faunal assemblages included in this project.

Third, I used several osteology publications to identify and analyze the bone elements in the assemblages, which primarily included Olsen (1964; 1968; 1971; 1979; 1982; 1985; 1971), and Evans and De Lahunta (2017). I compiled these resources based on an initial literature review of species native to the Casas Grandes region and commonly identified throughout Northern Mexico, the American Southwest, and Mesoamerica.

4.2.2 Analysis of Elements

Once the taxon of each element was identified, all specimens underwent a formal analysis. First, every element recorded (or group of elements in the case of fragments, such as rib fragments) was assigned a specimen number based on the site, year of excavation, lot number, unit number, and level, as well as the features associated with the context of each bone, which was all documented in the original site reports and level record in ascending values (i.e. CH-254: 9184-1 to 9184-9). In the 2010 field season, collected elements were assigned an ID number in the field, but I assigned my own ID numbers to most of the bones as I processed them.

I designed a standard catalogue to record the context and attributes of each element collected from all four study sites. The date and the individual who collected the elements were recorded, along with information regarding the year collected; N/A was used if the collector was not listed. The catalogue sheet also included the provenience, taphonomy, and quantity of the faunal remains. The standardized provenience information was taken from the bags that held the elements and Kelley and colleagues' available level records and site reports. Provenience data include the lot, unit, level, context, structure, and depth.

The standardized quantification information recorded for each bone was based on several biological modifications and a count of the number of bones, as some were placed together in a bag or were broken, resulting in a count higher than one. The taxon each bone belonged to, the anatomical element name of each bone (skull, humerus, femur, to mention a few), the side of the body each belonged to (left, right, axial, inner), and the proximal and distal fusion of each element was recorded to generate the age category of each. Where possible, sex was assigned, though this was challenging to assess due to the fragmentary nature of most recovered elements. The portion of bone was recorded to generate an accurate minimum number of individuals (MNI) calculation, including the classification of complete, mostly complete, fragmented, or extremely fragmented. The weight of each specimen was additionally recorded for quantification purposes, including the calculation of the percentage of identified bone in each taxon or species.

Observations of taphonomy were also recorded. Several factors can influence faunal assemblages before and after deposition, which must be noted during the excavation and analysis process. These observations were separated into post-mortem modifications as well as antemortem modifications. Post-mortem modifications include evidence such as heat treatment, disarticulation, butchery, scraping, worked bone, root marks, insect holes, polishing, cut marks, carnivore gnawing, and burning. Antemortem attributes recorded included morphological changes related to maturation, pathologies, trauma, and bone diseases.

I noted cases where first or second-order changes were observed in the original level record. First-order changes are defined as biotic disturbances such as bioturbation, the reworking of soils and sediments by animals, and soil pH and intrinsic factors affecting bone densities. First-order changes can also include abiotic disturbances, including natural and environmental processes such as rain or exposure to sunlight. They can additionally include conditions which result in different levels of bone preservation, such as moisture/humidity, arid conditions and possibly certain cave conditions depending on the location of the deposit.

Second-order changes are categorized as those which are controllable by the archaeologists. These can include the location of excavation pits and structures, which might yield a difference in the diversity of taxa recovered. Commonly identified second-order changes include the screening strategy, including using various mesh sizes and skimming, described as selectively recovering elements during excavation, and the sample size chosen. Faunal remains differ in many respects from other material culture remains recovered from archaeological sites, as animal bones are typically more susceptible to first and second-order changes, which may not be equally severe on other artifacts such as pottery, stone, and metal tools, structures or human graves (Badenhorst 2008, 28). Often zooarchaeologists have little to no control over the first order changes that bones undergo.

4.3 Quantification

Standard quantification methods, including the formulation of database sets, are crucial in faunal analysis. Standard database sets have been described as using “species lists”

(Lyman 2015, 42). These set “species lists” are part of a common methodological approach aimed at an initial understanding of element composition and taxonomic abundance and include data analytically valuable in assemblage analysis. Summary skeletal data include calculations of the number of individual specimens (NISP), the minimum number of individuals (MNI), minimum anatomical units (MAU), and the minimum number of elements (MNE). This basic information about species quantity typically stems from research questions in zooarchaeology attempting to determine the abundance of each identified taxon within an assemblage and to compare animal use throughout different periods and localities (Badenhorst 2008, 29).

It is important to note that the faunal quantification frequencies were not generated using a consistent quantification method. Rather, these were constructed almost ad hoc, depending on what was recovered, the technical skill of the researcher, and the questions being asked of the dataset. Though a flexible methodology is needed, it is important to recognize the connection between it and the results, along with the advantages and shortcomings of adjusting to suit research questions. The decision of which counting measure to use in zooarchaeological analyses must be made considering the faunal assemblage being addressed, and the method used must be defined explicitly. For this study, NISP and MNI were the two main quantification values assigned to the faunal material at each study site.

4.3.1 NISP

The most fundamental technique for zooarchaeological quantification is NISP (number of individual specimens), which has long served as the accepted indicator of taxon and species abundance in archaeological assemblages and still does (Badenhorst 2008, 29).

NISP is described as the number of bones or bone fragments assigned to a taxon, either to a species, genus, family, or order, and is the basis for more detailed quantification methods that expand past basic counts of whole elements and fragments, such as MNI, MNE, and MAU (Badenhorst 2008, 28-29). Because the foundational method associated with zooarchaeological analysis is NISP, it is no surprise that most published reports included, to some level, a basic or in-depth NISP dataset formulation. Keeping in mind the prevalence of NISP throughout zooarchaeological research, one must consider both the limitations of its use and the impacts it might have on the development of usable and accurate data on top of its popularity and the basis of many zooarchaeological studies. NISP values cannot be used to determine species interdependence within an assemblage, which means that we cannot get a full picture of which skeletal parts came from different individual animals (Cannon 2000, 331). NISP counts generated from faunal assemblages excavated from the American Southwest, are difficult to compare because researchers inconsistently included fragmented specimens in their calculations. This is partly because NISP is affected by butchery patterns, therefore, values may reflect the level to which some animals were retrieved whole and those that were not (Badenhorst 2008, 29).

4.3.2 MNI

MNI (minimum number of individuals) is the minimum number of individual animals necessary to account for all the identified elements within an assemblage. The most popular methods used to calculate MNI require the differentiation of the sides of the body and identification of age and sex, as well as disease and size Researchers use MNI to address differences in the number of skeletal elements between species and differing degrees of identifiability between taxa (Badenhorst 2008, 30)**.** As with using NISP and any other foundational method of quantification, there are limitations and problems associated with using MNI. Species that are rare in a faunal assemblage tend to be overrepresented by MNIs, whereas there is an under-representation of species with higher element counts. This can be explained by the fact that an MNI calculation is based upon how many of the elements classified as a specific species represent single or multiple individuals. For example, if you are presented with a species that had a total NISP count of n=1, and another species total NISP count of n=15, these two species with clear differences in NISP calculations could both have a total MNI of n=1. Additionally, fragmented bone assemblages almost always result in sample inflation regarding MNI calculation (Badenhorst 2008, 31).

4.4 Summary

Overall, the methods and excavation procedures used for the PAC were consistent but there is individual variation seen in the site forms and style of documented information. Nevertheless, these site records served as the means to record provenience data, as well as contextual information. The quantification methods applied to the faunal material from the study area were carried out at the University of Lethbridge between July and December 2021 and include the calculation of NISP and MNI. NISP provides an overall idea of the abundance and species variation of elements collected, which can contribute to understanding variabilities and similarities throughout not only the four sites of study, but the Casas Grandes region as a whole. MNI abundances provide a clearer picture contextually of the elements presented throughout the four sites of study. NISP and MNI were selected as basic quantification methods to be included in this analysis because of the consistent use of these two strategies at other sites. In the following chapter I present the results generated from the analysis of the faunal material.

Chapter Five: Faunal Analysis Results

A number of animal species lived within the study area, which are reflected through the faunal remains recovered and examined. In this chapter the information I generated from my analysis of the faunal assemblages from CH-254, CH-240, CH-218 and CH-272 are presented. These data were subsequently interpreted at the site level. Specifically, I considered the species present, variability in the elements and animals, and context, to offer suggestions for the use and purpose of these remains.

5.1 Overall Analysis: CH-254, CH-240, CH-218, CH-272

Excavated faunal material came from a range of field seasons, including 1998, 1999, 2000, 2007, 2008, and 2010. Elements from CH-254, CH-240, CH-218, and CH-272 were associated with several contexts, such as unit, level, and features according to published site reports and original level records kept by Kelley (2008), Kelley and Garvin (2013; 2014) and Kelley et al. (2012; 2014). A total of 3566 specimens were recovered and catalogued, weighing a total of 4275.1 g. The NISP and weights for each taxon are listed in Table 4. Detailed data for the taxa categories are included in Tables 5-14. Most elements came from CH-254, with 66% of the collection excavated from structures within the site boundaries. CH-240 had the second most abundant collection of faunal elements, with 31% of the total collection being from excavations within the site's boundaries. CH-218 and CH-272 had the two lowest number of total collected elements, with 2% and 0.005% of the total collection respectively. The NISP counts per site are presented in Figure 5.

Table 4. Faunal NISP, Weight (g), % of Bone.

TAXON	COMMON NAME	TOTAL NISP	TOTAL WEIGHT (g)	% OF IDENTIFIED BONE
Artiodactyla	**Even-toed ungulates**	**351**	**2282.31**	**9.84%**
UD Artiodactyla	Undefinable Artiodactyla	113	570.95	3.17%
Cervidae	Deer	48	155.12	1.35%
Odocoileus virginianus	White-tail deer	165	1417.34	4.63%
Antilocapra americana	Pronghorn	8	72.30	0.22%
Capra hircus	Goat	1	0.76	0.03%
Bison bison	Bison	16	65.84	0.45%
Mammalia	**Mammals**	**2247**	**1486.95**	**63.02%**
UD Large Mammal	Undefinable large mammal	287	603.13	8.05%
UD Small Mammal	Undefinable small mammal	398	173.55	11.16%
UD Mammal	Undefinable mammal	271	84.60	7.60%
Canis familiaris	Dog	620	354.10	17.39%
Mephitidae	Skunk	1	1.10	0.03%
Conepatus leuconotus	American Hog-nosed Skunk	204	99.29	5.72%
Sylvilagus sp.	Cottontail	65	23.80	1.82%
Lepus sp.	Jackrabbit	163	102.51	4.57%
UD Rodentia	Rodents	118	23.21	3.31%
Spermophilius sp.	Ground squirrels	72	10.03	2.02%
Cynomys sp.	Prairie Dog	7	3.26	0.20%
Cricetidae	Voles, Rats, Mice	17	6.51	0.48%
Eutamias	Chipmunk and Squirrels	24	1.86	0.67%
Aves	**Bird species**	**128**	**51.79**	**3.60%**
Aves, Medium	Medium Bird	17	2.58	0.48%
Aves, Small	Small Bird	48	7.78	1.35%
Anseriformes	Waterfowl	48	26.23	1.35%
Columbiformes	Pigeons and Doves	10	1.44	0.28%
Meleagris gallopavo	Common Turkey	5	13.76	0.14%
Amphibian	**Frogs, Toads, Salamander**	**25**	**4.32**	**0.70%**
Anura	Frogs	8	1.04	0.22%
UD Amphibian	Undefinable Amphibian	17	3.28	0.48%
Reptiles	**Turtles, snakes**	**138**	**75.51**	**3.87%**
Serpentes	Snakes	8	0.60	0.22%
Testudines	Turtle	130	74.91	3.65%
Mollusca	**Shell**	**44**	**10.16**	**1.23%**
Undefinable		**633**	**364.11**	**17.75%**
	TOTAL	**3566**	**4275.10**	**100.00%**

Table 5. PAC Overall Artiodactyla, Cervidae, and *Odocoileus* element NISP and Weight (g).

	UD Artiodactyla		**Cervidae**		***Odocoileus***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	3	6.04	-	-	4	18.02
Atlas Vertebra	1	32.61	-	-	-	-
Axis Vertebra	-	-	-	-	1	18.30
Calcaneum	-	-	-	-	4	47.58
Cervical Vertebra	-	-	1	4.79	-	-
Femur	1	3.16	-	-	4	48.89
First Phalanx	3	2.50	2	11.36	11	43.57
Second Phalanx	2	9.12	3	2.68	12	27.47
Third Phalanx	1	0.14	-	-	3	6.32
Humerus	1	22.00	1	16.81	12	300.43
Long Bone Fragment	37	127.95	23	78.82	12	50.54
Lumbar Vertebra	-	-	-	-	2	50.67
Mandible	-	-	-	-	4	23.54
Metacarpal	6	87.16	-	-	9	109.4
Metapodial	1	3.90	1	2.33	4	14.81
Metatarsal	1	7.00	-	-	3	25.48
Pelvis	-	-	-	-	8	70.51
Radius	2	18.56	1	1.48	9	105.79
Rib	16	38.98	2	1.13	7	14.22
Sacrum	-	-	-	-	4	8.37
Scapula	3	26.04	-	-	7	43.99
Skull	8	30.55	6	10.49	10	19.34
Teeth	11	12.80	3	1.67	5	7.11
Tibia	11	115.71	-	-	26	345.07
Ulna	2	21.52	1	3.82	1	3.17
UD Vertebrae	3	5.21	1	7.55	1	6.65
Total	**113**	**570.95**	**48**	**155.12**	**165**	**1417.34**

Table 6. PAC Overall, *Antilocapra*, *Capra hircus*, and *Bison bison* element NISP and Weight (g).

	Antilocapra		***Capra hircus***		***Bison bison***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	1	10.30	-	-	-	-
Calcaneus	1	12.80	-	-	-	-
Femur	-	-	-	-	-	-
Fragments	-	-	-	-	-	-
Humerus	1	0.10	-	-	-	-
Long Bone Fragments	-	-	-	-	-	-
Metacarpal	1	18.90	-	-	-	-
Metapodial	1	6.80	-	-	-	-
Pelvis	1	1.90	-	-	-	-
Radius	1	13.20	-	-	-	-
Rib	-	-	-	-	-	-
Skull Fragments	-	-	-	-	16	65.84
Thoracic Vertebra	1	8.30	-	-	-	-
Teeth	-	-	1	0.76	-	-
Total	**8**	**72.30**	**1**	**0.76**	**16**	**65.84**

Table 7. PAC Overall, Undefinable Mammal, Undefinable Large Mammal, and Undefinable Small Mammal element NISP and Weight (g).

	UD Mammal		**UD Large Mammal**		**UD Small Mammal**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Humerus	-	-	-	-	2	1.06
Femur	-	-	1	1.66	2	0.71
Long Bone Fragments	14	7.30	217	489.04	247	107.57
Mandible	-	-	2	12.00	-	-
Metapodial	-	-	-	-	3	0.30
Pelvis	-	-	2	12.00	11	7.01
Phalanx	-	-	-	-	1	0.49
Ribs	-	-	6	7.27	20	5.27
Sacrum	-	-	-	-	1	1.18
Scapula	-	-	2	1.20	9	3.76
Skull	3	7.00	56	62.85	59	25.97
Teeth	-	-	1	0.10	-	-
Tibia	-	-	-	-	2	3.22
Ulna	-	-	-	-	1	1.74
UD Fragments	254	70.30	-	-	38	14.64
UD Vertebra	-	-	-	-	2	0.63
Total	**271**	**84.60**	**287**	**603.13**	**398**	**173.55**

Table 8. PAC Overall, *Canis familiaris*, *Conepatus leuconotus*, and Mephitidae element NISP and Weight (g).

	Canis familiaris		***Conepatus leuconotus***		**Mephitidae**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	2	2.30	3	0.97	-	-
Atlas Vertebra	-	-	1	0.70	-	-
Calcaneum	10	11.84	5	1.59	-	-
Femur	10	16.18	7	12.42	-	-
Fibula	13	3.17	9	2.32	-	-
First Phalanx	32	11.83	5	0.36	-	-
Second Phalanx	21	3.18	4	0.29	-	-
Third Phalanx	1	0.20	2	0.18	-	-
Humerus	8	16.20	3	3.00	-	-

	Canis familiaris		*Conepatus leuconotus*		Mephitidae	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Lumbar Vertebra	-	-	14	14.00	-	-
Long Bone Fragment	5	2.79	-	-	-	-
Long Bone Epiphysis	9	0.54	-	-	-	-
Mandible	6	25.38	6	8.38	1	1.10
Maxilla	-	-	2	12.13	-	-
Metacarpal	9	6.63	7	0.82	-	-
Metapodial	7	2.17	1	0.18	-	-
Metatarsal	39	19.98	6	0.62	-	-
Navicular	-	-	1	0.54	-	-
Pelvis	8	22.79	7	5.74	-	-
P3/Pes	8	1.00	-	-	-	-
Radius	10	20.27	6	2.82	-	-
Rib	165	41.00	25	3.41	-	-
Sacrum	-	-	1	0.62	-	-
Scapula	8	7.42	1	0.23	-	-
Scraps	50	6.70	-	-	-	-
Sesamoid	8	0.90	-	-	-	-
Skull	37	15.24	3	0.92	-	-
Tarsals	14	2.44	-	-	-	-
Teeth	59	27.80	4	1.53	-	-
Tibia	15	52.40	6	7.07	-	-
Ulna	8	8.82	5	4.05	-	-
UD Vertebra	30	3.69	8	3.26	-	-
Caudal Vertebra	3	0.74	30	8.03	-	-
Cervical Vertebra	-	-	14	5.39	-	-
Lumbar Vertebra	1	2.10	-	5.22	-	-
Thoracic Vertebra	24	18.40	18	4.63	-	-
Total	**620**	**354.10**	**204**	**99.29**	1	1.10

Table 9. PAC Overall, *Lepus sp.*, *Sylvilagus sp.*, and UD Rodentia element NISP and Weight (g).

	Lepus sp.		***Sylvilagus sp.***		**UD Rodentia**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	3	0.94	1	0.26	-	-
Atlas Vertebra	1	0.43	-	-	-	-
Axis Vertebra	1	0.47	-	-	-	-
Calcaneum	3	1.39	6	2.61	-	-
Caudal Vertebra	1	0.48	1	0.04	-	-
Cervical Vertebra	-	-	-	-	1	0.08
Femur	16	15.62	5	2.53	4	0.77
Fibula	3	0.33	-	-	-	-
First Phalanx	5	0.85	10	1.23	-	-
Second Phalanx	1	0.10	-	-	-	-
Humerus	13	13.10	4	1.70	4	1.33
Long Bone Fragment	-	-	1	0.16	9	0.70
Lumbar Vertebra	-	-	3	0.87	-	-
Mandible	8	5.93	4	2.41	14	4.42
Maxilla	2	0.36	-	-	6	3.91
Metacarpal	5	0.53	-	-	-	-
Metatarsal	10	1.22	1	0.86	-	-
Patella	1	0.46	-	-	-	-
Pelvis	10	7.52	4	1.01	14	4.42
Radius	19	10.20	3	0.96	1	0.50
Rib	8	1.32	3	0.37	12	0.30
Sacrum	3	2.32	1	0.17	1	0.06
Scapula	14	6.32	4	2.75	4	1.00
Skull	4	2.02	2	0.38	16	2.98
Thoracic Vertebra	1	0.31	-	-	-	-
Tibia	19	22.02	5	2.91	5	0.81
Teeth	1	0.03	1	0.11	8	0.85
Ulna	8	6.50	6	2.47	2	0.11
UD Fragments	-	-	-	-	1	0.30
UD Vertebra	1	0.49	-	-	16	0.97
Total	**163**	**102.51**	**65**	**23.80**	**118**	**23.21**

Table 10. PAC Overall, Cricetidae, *Spermophilius sp*., and *Cynomys sp*. element NISP and Weight (g).

	Cricetidae		***Spermophilius sp.***		***Cynomys sp.***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Caudal Vertebra	-	-	1	0.10	-	-
Cervical Vertebra	-	-	2	0.05	-	-
Cranium	1	1.11	-	-	-	-
Femur	-	-	13	1.74	2	1.01
Humerus	1	0.09	6	0.71	1	0.80
Long Bone Fragment	-	-	-	-	-	-
Mandible	4	2.40	6	1.57	-	-
Maxilla	2	0.66	-	-	-	-
Navicular	-	-	1	0.10	-	-
Pelvis	4	0.27	5	0.68	-	-
Radius	-	-	6	0.94	-	-
Rib	-	-	6	0.34	-	-
Scapula	-	-	2	0.31	1	0.40
Skull	-	-	3	0.83	2	0.85
Tibia	2	0.12	13	1.92	1	0.20
Teeth	-	-	2	0.19	-	-
Ulna	-	-	3	0.30	-	-
UD Vertebra	2	0.36	3	0.25	-	-
Full Skeleton	1	1.50	-	-	-	-
Total	**17**	**6.51**	**72**	**10.03**	**7**	**3.26**

Table 11. PAC Overall, *Eutamias*, Mollusca, and Undefinable element NISP and Weight (g).

	Eutamias		**Mollusca**		**Undefinable**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	-	-	-	-	-	-
Calcaneus	-	-	-	-	-	-
Femur	7	0.70	-	-	1	1.40
Humerus	1	0.10	-	-	-	-
Long Bone Fragments	**1**	0.10	-	-	19	4.19
Mandible	1	0.10	-	-	-	-
Metacarpal	-	-	-	-	-	-
Metapodial	-	-	-	-	-	-
Pelvis	-	-	-	-	-	-
Radius	1	0.10	-	-	-	-
Rib	5	0.20	-	-	2	1.85
Skull Fragments	1	0.02	-	-	18	5.17
Thoracic Vertebra	-	-	-	-	-	-
UD Fragments	-	-	44	10.16	588	343.04
Ulna	1	0.10	-	-	-	-
Worked Bone	-	-	-	-	5	8.46
Total	**24**	**1.86**	**44**	**10.16**	**633**	**364.11**

Table 12. PAC Overall, Aves Sm., Aves Med., and Anseriformes element NISP and Weight (g).

	Aves Sm.		**Aves Med.**		**Anseriformes**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Carpometacarpus	-	-	-	-	1	0.84
Cervical Vertebra	4	0.30	-	-	-	-
Coracoid	2	0.41	1	0.10	5	3.79
Femur	7	1.71	3	0.82	8	3.11
Humerus	1	0.23	7	1.18	6	5.70
Long Bone Fragment	5	0.67	6	0.48	2	0.82
Lumbar Vertebra	4	0.30	-	-	-	-
Metapodial	8	1.77	-	-	10	3.13
Pelvis	1	0.07	-	-	-	-
Phalanx	6	0.16	-	-	1	0.03
Radius	-	-	-	-	2	1.72
Rib	1	0.08	-	-	-	-
Scapula	-	-	-	-	1	0.50
Skull	2	0.41	-	-	-	-
Tibia	3	0.77	-	-	-	-
Tibiotarsus	1	0.23	-	-	3	1.94
UID Fragment	1	0.20	-	-	-	-
Ulna	2	0.47	-	-	7	4.65
Total	**48**	**7.78**	**17**	**2.58**	**48**	**26.23**

Table 13. PAC Overall, Columbiformes, *Meleagris gallopavo*, and Serpentes element NISP and Weight (g).

	Columbiformes		*Meleagris gallopavo*		Serpentes	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Carpometacarpus	2	0.30	1	0.69	-	-
Coracoid	-	-	2	2.47	-	-
Cranium	1	0.12	-	-	-	-
Femur	2	0.39	-	-	-	-
Humerus	1	0.07	1	8.70	-	-
Metapodial	3	0.46	-	-	-	-
Rib	-	-	-	-	2	0.20
Skull	-	-	-	-	1	0.10
Thoracic Vertebra	-	-	1	1.90	5	0.30
Ulna	1	0.10	-	-	-	-
Total	**10**	**1.44**	**5**	**13.76**	**8**	**0.60**

Table 14. PAC Overall, Amphibian, Anura, and Testudines element NISP and Weight (g).

	Amphibian		Anura		Testudines	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	-	-	3	0.64	-	-
Calcaneum	1	0.22	-	-	-	-
Carapace	-	-	-	-	100	68.01
Cervical Vertebra	-	-	-	-	1	0.33
Femur	-	-	-	-	2	2.20
Humerus	1	0.09	2	0.10	8	1.52
Mandible	1	0.20	-	-	-	-
Metacarpal	1	0.09	-	-	-	-
Metapodial	-	-	1	0.10	1	0.13
Metatarsal	-	-	-	-	1	0.16
Pelvis	9	1.43	-	-	8	1.15
Second Phalanx	-	-	-	-	1	0.03
Skull	-	-	-	-	5	0.75
Thoracic Vertebra	-	-	2	0.20	-	-

	Amphibian		Anura		Testudines	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Tibia	-	-	-	-	1	0.25
Ulna	1	0.10	-	-	2	0.38
UD Vertebra	3	1.15	-	-	-	-
Total	**17**	**3.28**	**8**	**1.04**	**130**	**74.91**

Eight different taxa are represented in the collection. Variation in the relative frequency of these taxa is evident between the sites, which is discussed in greater detail later in this chapter. In the following section, a quantitative breakdown of these identified taxa is supplied.

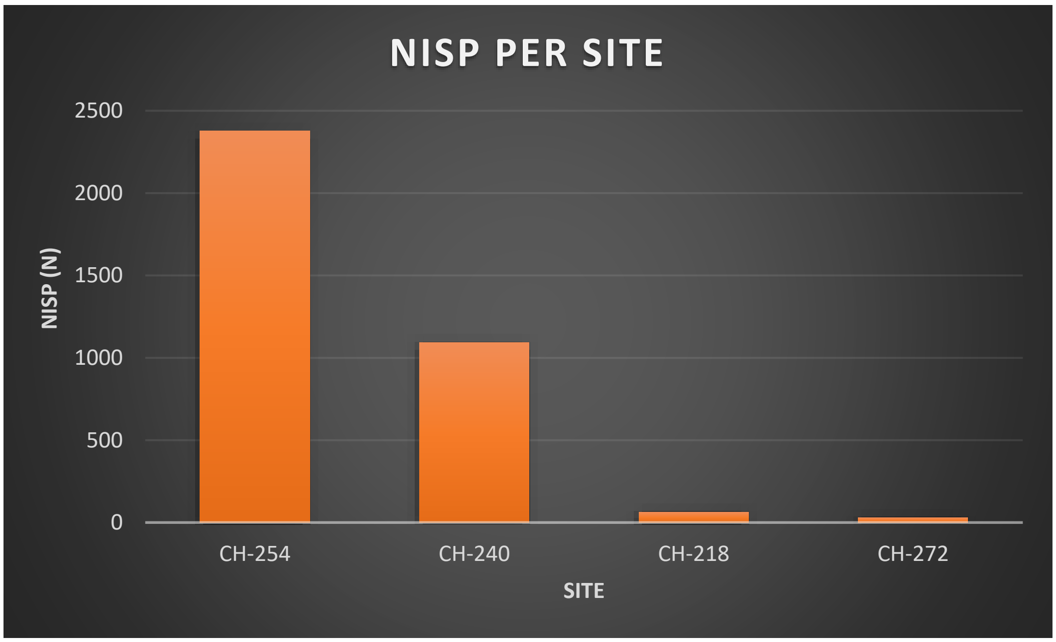

Figure 5. NISP (N) per site.

<u>Mammals</u>**.** Mammalia are the dominant class of vertebrates. There are n=2247 elements classified as mammals, making up 63.02% of the overall assemblage. Many of these elements were classified as either UD large mammals or UD small mammals, making up 19.21% of the identified mammals. UD small mammals have a total NISP of n=398, and UD large mammals a total of n=287. Other mammal elements include UID mammals, totalling n=271. Those elements classified as UID were too fragmented to identify further. 34.8% of the identified mammals present in the assemblages are of the *Canidae* family (n=620). Specifically, these faunal remains are classified as belonging to the *Canis familiaris,* more commonly known as the domestic dog. The domestic dog is morphologically one of the most variable mammal species in the archaeological record, which causes difficulty in classifying the exact breed to which elements would have belonged (Vilà et al. 1999, 71). It should be noted that like Hodgetts' (1996, 158) analysis of the El Zurdo faunal assemblage, canid remains could represent either dogs or coyotes. Skunks, also belonging to the mammal family, were identified throughout the study region. The family Mephitidae has a total NISP of n=205, and most elements belonging to the skunks were identified as *Conepatus leuconotus* with a total NISP of n=204. *Conepatus leuconotus* is commonly called the white-backed or American hog-nosed skunk.

Artiodactyla. A total of n=351 Artiodactyla elements were identified in the overall assemblage. These elements make up 9.84% of the overall assemblage, constituting one of the higher taxa representations; however, 32.2% (n=113) could not be classified into species or class, therefore were classified as representing the artiodactyla order. Of the artiodactyla remains recovered, 67.8% (n=238) could be identified beyond the order level. The family Cervidae has a total NISP of n=48. These elements are likely from either pronghorn (*Antilocapra americana*) or deer (*Odocoileus sp.),* both commonly identified throughout the study region. The level of fragmentation and the lack of specific attributes influenced the inability to determine species for these elements. At the species level, white-tail deer (*Odocoileus virginianus)* have a total NISP of n=165, pronghorn (*Antilocapra americana)* has a total of n=8, goats (*Capra hircus*) has a total of n=1, and bison (*Bison bison*) has a total of n=16. The 16 identified bison bones all belong to the cranial section of the skeleton.

Lagomorphs. Lagomorphs, represented by jackrabbits and cottontails (both *Leporidae* family), are one of the predominant mammalian orders throughout the study region. Lagomorphs represent 6.39% of the total assemblage (n=228). All the elements identified as lagomorphs were assigned to the genus level. Overall, elements belonging to the genus *Lepus* sp. (jackrabbits) occur more frequently and in higher numbers (n=113) than those belonging to the family *Sylvilagus sp.* (cottontails) (n=43). Lagomorphs are important throughout the neighbouring areas of the sites of study, such as El Zurdo examined by Hodgetts (1996) and Paquimé examined by Whalen and Minnis (2009). Lagomorph species' significance provokes questions regarding their influence on subsistence, as well as response to environmental change, and will be discussed further in the subsequent discussion chapter.

Rodentia. Rodents make up 6.68% of the identified taxa, with a total NISP of n=238, and 10.6% of the total mammal elements identified. Those identified as UD Rodentia are based on morphological attributes consistent with rodents but that could not be identified past their order; total n=118. A total of n=120 elements could be identified to the level of genus (n=120). Species identified include *Cynomys sp.* n=7, *Eutamias* n=24, *Spermophilius sp.* n=72, and Cricetidae n=17. The overwhelming majority of the rodents identified at the genus level are the ground squirrel species *Spermophilius sp.* These identifications do reveal some patterns in the relative frequencies of the various kinds of rodents discovered throughout the sites of study.

Aves. The total NISP classified as birds for the sites of study came to n=128 with a total percentage of 3.59%. Five remains were recovered from the genus *Meleagris gallopavo* or the common turkey (n=5) and n=48 represent the Aves order Anseriformes or waterfowl. N=10 elements were also identified to the Aves order, a widespread order that includes smaller birds, such as doves and pigeons. Of the remaining 65 elements, n=48 represent the class Aves smaller size and n=17 represent the class Aves medium in size. These elements had characteristics consistent with those of the Aves class but could not be identified to order or genus. The presence of significant numbers of waterfowl in the faunal remains from the sites of study within the region may well reflect the prominence of birds. These identified taxa are consistent with those identified at El Zurdo (Ch-159) and those found at Paquimé (Hodgetts 1996, 156-157; Merrill and Lopez Gonzalez 2007, 47-48).

Amphibians. The class of elements categorized as amphibians have a total NISP of n=25, though 68% (n=17) could not be classified to species or class. 32% (n=8) were identified as the order Anura. Elements classified as the amphibian taxa represent less than 1% (0.70%) of the identified elements in the overall assemblage.

Reptiles. The class of elements categorized as reptiles have a total NISP of n=138, including two different orders belonging to snakes and turtles. The total number of elements identified in the order Serpentes (snakes) comes to n=8, and the order Testudines (turtles) have n=130. These elements total 3.87% of the identified elements within the overall assemblage. Though the percentage of elements is not high compared to the rest of the collection, the presence of these elements is significant and relates to the utilization of this animal order throughout the study region. This will be discussed to a greater extent later in the following discussion chapter.

Shell. Elements classified as shell were assigned to the phylum Mollusca and totalled an NISP of n=44. These elements could not be classified beyond phylum due to their fragmentary nature and the lack of distinguishing attributes to differentiate them with certainty. Mollusca make up 1.23% of the overall identified elements in the overall assemblage.

Undefinable. The category 'Undefinable Taxa' was included in the overall NISP count, totalling n=633, constituting 17.75% of the bone elements. These fragments could not be assigned to a taxon. Overall, these elements, particularly the ribs, long bones, and cranial elements, were highly fragmented. This resulted in higher NISP counts for the unassigned taxa than the assigned.

Low Proportion/Absent Taxa. There are notable taxa absent from the assemblages in comparison to those recovered from excavations at Paquimé and those from the neighbouring site of El Zurdo examined by Hodgetts (1996). Few bison elements are present in this assemblage. At Paquimé́, bison were prominent, constituting 10% of all the artiodactyla recovered from the site (Merrill and Lopez Gonzalez 2007, 52). Bison make up less than 1% of the identified elements in the overall assemblage (0.45%). Another primary family of notable absence are the felids. No members of the *Felidae* family are in the faunal assemblage of any of the four sites of study. This is a contrast to the assemblages at both El Zurdo and Paquimé, as both bobcats (*Lynx rufus*) and pumas (*Puma concolor*) were present at these sites (Hodgetts 1996, 156-157; Merrill and Lopez Gonzalez 2007, 52).

When looking at the total number of elements identified as belonging to birds, there is one main difference of note in comparison to other assemblages, which is the volume of bird bones found at each site. El Zurdo identified a total NISP of n=370 bird elements, with an additional five turkey burials with a total NISP of n=314 (Hodgetts 1996, 162-163). Researchers at Paquimé identified n=929 individual birds; 251 were turkeys (*Meleagris gallopavo*) and 322 Scarlet macaws (*Ara macao*) (Hill 2000, 368-369; Rakita and Cruz 2015, 79). Thirty-seven different bird species were additionally identified within the boundaries of Paquimé, including ducks, loons, eagles, and hawks, to name a few (Hill 2000, 366). Compared with the overall bird NISP at the four sites in this project, these differences are notable and may reflect varying cultural activities and relations with birds.

***MNI*.** The overall MNI count for the fauna collected from the study region came to n=92. The MNI counts for the different taxa identified within the assemblages are presented in Tables 15, 32, 43, and 51. A few aspects of these calculations require contextual explanation. Except for dogs (*Canis familiaris*), lagomorphs *(Lepus sp.* and *Sylvilagus sp.),* and white-tail deer (*Odocoileus virginianus)*, the MNI counts for genus/species level are very low at all four sites. This is partly due to the presence of burials in the case of the elements classified as *Canis familiaris* and the higher abundance of whole versus fragmented elements for both *Lepus sp.* and *Sylvilagus sp.*, as well as *Odocoileus virginianus*. It is important to recognize that there will be significant variation in MNI values calculated for species with a majority of broken bones (long bone fragments or skull fragments) versus those with a higher number of whole elements present.

Taphonomy. Out of the full collection, three hundred and seven elements (n=307) show evidence of burning, providing essential insight into the processing and subsistence practices of the individuals who occupied the region at the time. There is cut mark evidence on thirty-five of the elements (n=35). Bone elements making up the assemblage exhibited variable evidence of differing fractures, some of which could be attributed to butchering practices such as spiral fractures. Artiodactyla bones for example, commonly display cut and chop marks associated with the smashing or opening of bone to extract the marrow. Though there are prominent levels of fragmentation, butchering practices cannot be the only possible explanation for this. We must consider other influencing factors, such as other animal disturbances, looting, and agricultural activity, to name a few**.**

In contrast, bones from smaller animals often have evidence of being bitten or chopped off for similar marrow extraction purposes. There is little to no evidence of marrow extraction within the assemblage. This could be correlated to the types of animals used for subsistence related purposes or the level of preservation and associated activities since the time of utilization. The faunal remains in the collection were generally in a good state of preservation, though differential sedimentation tended to preserve some faunal remains and not others.

5.2 CH-254: Calderón Site

Most of the faunal elements analyzed came from the Calderón site (CH-254), having a total NISP of n=2377 weighing 1826.21 g. The highest element count is the genus *Canis familiaris* (domestic dog), making up 18.89% of the identified bone in the Calderón collection, with a total NISP of n=449. This is tied to burials found within the site. Other notable species in terms of the total NISP counts within this collection include UD small mammals (n=341), UD large mammals (n=168), lagomorph species including *Sylvilagus sp*. (cottontails) with a total of n=43, and *Lepus sp.* (jackrabbit) n=113, *Conepatus leuconotus* (American hog-nosed skunk) with a total of n=200, as well as Testudines (turtles) with a total of n=92. Other species, including various rodents, birds, and artiodactyls, were also identified. A breakdown of the species-specific totals of bone elements is presented in Tables 15-24.

The elements making up the assemblage from the Calderón site came from the 1999, 2007, 2008, and 2010 field seasons. These excavations focused on six identified structures and resulted in several elements recovered. Most material came out of the 1999 excavations, which focused on structures identified in the field surveys in years prior, including Structures 1, 2, 3, and 4. The 2007-2008 field seasons focused on the excavation of Structure 5, which was identified through GPR surveying in the 2005 field surveys. The 2010 field season produced the second most plentiful amount of faunal data, which came from the excavations of Structure 6, the last structure to be identified at the Calderón site. Each of these identified structures were evaluated individually to examine faunal element patterns, species diversity, and the context in which elements were found. Information regarding excavation processes, site locality, and element context were compiled through the site report published by Kelley et al. (2014).

Table 15. CH-254 Overall assemblage NISP, MNI, Weight (g).

TAXON	NISP	MNI	WEIGHT (g)	% OF BONE
Artiodactyla	**146**	**4**	**615.55**	**6.14%**
UD Artiodactyla	66	-	226.54	2.78%
Cervidae	16	-	42.49	0.67%
Odocoileus virginianus	55	1	273.46	2.31%
Antilocapra americana	8	2	72.30	0.34%
Capra hircus	1	1	0.76	0.04%
Mammalia	**1760**	**(6) 29**	**1021.19**	**74.04%**
UD Mammal	271	-	84.60	11.40%
UD Large Mammal	168	-	266.65	7.07%
UD Small Mammal	341	-	138.23	14.35%
Canis familiaris	449	(2) 4	318.60	18.89%
Mephitidae	1	1	1.10	0.04%
Conepatus leuconotus	200	(3) 1	97.21	8.41%
Sylvilagus sp.	43	2	13.97	1.81%
Lepus sp.	113	7	71.24	4.75%
UD Rodentia	101	-	17.19	4.25%
Spermophius sp.	33	6	3.46	1.39%
Cynomys sp.	7	1	3.26	0.29%
Cricetidae	9	(1) 1	3.82	0.38%
Eutamias	24	6	1.86	1.01%
Aves	**111**	**1**	**45.17**	**4.67%**
Aves, Medium	11	-	1.84	0.46%
Aves, Small	46	-	7.43	1.94%
Anseriformes	42	-	23.86	1.77%
Columbiformes	10	-	1.44	0.42%
Meleagris gallopavo	2	1	10.60	0.08%
Mollusca	**42**	**2**	**10.09**	**1.77%**
Amphibian	**21**	**2**	**3.59**	**0.88%**
UD Amphibian	16	-	3.19	0.67%
Anura	5	2	0.40	0.21%
Reptiles	**100**	**4**	**58.41**	**4.21%**
Serpentes	8	1	0.60	0.34%
Testudines	92	3	57.81	3.87%
Undefinable	**197**	**-**	**72.21**	**8.29%**
Total	**2377**	**(6) 42**	**1826.21**	**100.00%**

Table 16. CH-254, *Canis familiaris, Conepatus leuconotus*, and Mephitidae element NISP and Weight (g).

	Canis familiaris		***Conepatus leuconotus***		**Mephitidae**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	2	2.30	3	0.97	-	-
Atlas Vertebra	-	-	1	0.70	-	-
Calcaneum	9	10.85	5	1.59	-	-
Femur	6	13.00	6	11.83	-	-
Fibula	11	3.03	9	2.32	-	-
First Phalanx	25	11.01	5	0.36	-	-
Second Phalanx	19	3.13	4	0.29	-	-
Third Phalanx	1	0.20	2	0.18	-	-
Humerus	5	12.44	3	4.87	-	-
Lumbar Vertebra	-	-	14	5.22	-	-
Long Bone Fragment	5	2.79	-	-	-	-
Mandible	6	25.38	4	7.00	1	1.10
Maxilla	-	-	2	12.13	-	-
Metacarpal	8	6.38	7	0.82	-	-
Metapodial	7	2.17	1	0.18	-	-
Metatarsal	30	18.30	6	0.62	-	-
Navicular	-	-	1	0.54	-	-
Pelvis	7	22.44	7	5.74	-	-
P3/Pes	8	1.00	-	-	-	-
Radius	7	15.92	6	2.82	-	-
Rib	121	37.68	24	3.30	-	-
Sacrum	-	-	0	0.62	-	-
Scapula	2	4.49	1	0.23	-	-
Scraps	50	6.70	-	-	-	-
Sesamoid	8	0.90	-	-	-	-
Skull	4	7.83	3	0.92	-	-
Tarsals	10	2.18	-	-	-	-
Teeth	43	25.90	4	1.53	-	-
Tibia	13	51.50	6	7.07	-	-
Ulna	6	7.83	5	4.05	-	-
UD Vertebra	8	2.36	8	3.26	-	-
Caudal Vertebra	3	0.74	30	8.03	-	-
Cervical Vertebra	-	-	14	5.39	-	-
Lumbar Vertebra	1	2.10	-	-	-	-
Thoracic Vertebra	24	18.40	18	4.63	-	-
Total	449	**318.60**	**200**	**97.21**	1	1.10

Table 17. CH-254, UD Artiodactyla, Cervidae, and *Odocoileus* element NISP and Weight (g).

	UD Artiodactyla		**Cervidae**		***Odocoileus***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	1	2.99	-	-	-	-
Axis Vertebrae	-	-	-	-	1	18.30
Calcaneum	-	-	-	-	1	3.30
Cervical Vertebra	-	-	1	4.79	-	-
Femur	1	3.16	-	-	1	9.64
First Phalanx	3	2.50	1	3.88	5	19.40
Second Phalanx	1	0.82	2	2.56	3	8.28
Third Phalanx	1	22.00	-	-	2	4.78
Long Bone Fragment	15	35.93	1	3.11	5	25.16
Lumbar Vertebra	-	-	-	-	1	48.83
Metacarpal	2	30.30	-	-	-	-
Metapodial	1	3.90	1	2.33	2	10.81
Metatarsal	-	-	-	-	1	19.90
Pelvis	-	-	-	-	4	4.36
Rib	13	29.74	2	1.13	6	13.04
Sacrum	-	-	-	-	4	8.37
Scapula	1	7.40	-	-	2	11.6
Skull	8	30.55	4	7.36	8	6.10
Teeth	8	4.20	-	-	1	2.00
Tibia	6	30.12	2	5.96	7	52.94
Ulna	1	14.82	1	3.82	-	-
UD Vertebrae	3	5.21	1	7.55	1	6.65
Total	**66**	**226.54**	**16**	**42.49**	**55**	**273.46**

Table 18. CH-254 *Antilocapra*, Mollusca, and Undefinable elements NISP and Weight (g).

	Antilocapra		**Mollusca**		**Undefinable**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	1	10.30	-	-	-	-
Calcaneus	1	12.80	-	-	-	-
Femur	-	-	-	-	1.00	1.40
Fragments	-	-	44	10.16	155.00	51.93
Humerus	**1**	0.10	-	-	-	-
Long Bone Fragments	-	-	-	-	18.00	3.83
Metacarpal	1	-	-	-	-	-
Metapodial	1	-	-	-	-	-
Pelvis	1	-	-	-	-	-
Radius	1	-	-	-	-	-
Rib	-	-	-	-	2.00	1.85
Skull Fragments	-	-	-	-	16.00	4.74
Thoracic Vertebra	1	8.30	-	-	-	-
Worked Bone	-	-	-	-	5.00	8.46
Total	**8**	**72.30**	**44**	**10.16**	**197.00**	**72.21**

Table 19. CH-254, *Lepus sp., Sylvilagus sp.*, and UD Rodentia element NISP and Weight (g).

	Lepus sp.		***Sylvilagus sp.***		**UD Rodentia**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	1	0.30	-	-	-	-
Atlas Vertebra	1	0.43	-	-	-	-
Axis Vertebra	1	0.47	-	-	-	-
Calcaneum	2	0.60	3	0.59	-	-
Caudal Vertebra	1	0.48	1	0.04	-	-
Cervical Vertebra	-	-	-	-	1	0.80
Femur	11	9.45	3	1.91	4	0.77
Fibula	2	0.26	-	-	-	-
First Phalanx	4	0.75	4	0.40	-	-
Second Phalanx	1	0.10	-	-	-	-
Humerus	9	10.22	3	1.03	3	1.20
Long Bone Fragment	1	0.39	1	0.16	9	0.70
Mandible	6	2.39	1	0.49	12	3.86
Maxilla	2	0.36	-	-	4	1.16
Metacarpal	1	0.15	-	-	-	-
Metatarsal	9	0.97	1	0.86	-	-
Pelvis	9	6.83	3	0.82	10	2.71
Radius	15	8.56	3	0.96	1	0.50
Rib	5	1.03	3	0.37	12	0.30
Sacrum	2	0.75	1	0.17	1	0.06
Scapula	8	3.45	3	1.13	4	1.00
Skull	3	1.48	2	0.38	14	2.64
Thoracic Vertebra	1	0.31	-	-	-	-
Tibia	12	16.97	2	1.56	3	0.21
Teeth	1	0.03	1	0.11	6	0.81
Ulna	5	4.51	5	2.12	2	0.11
UD Vertebra	**-**	**-**	-	-	14	0.78
Total	**113**	**71.24**	**43**	**13.97**	**101**	**17.19**

Table 20. CH-254, Cricetidae, *Spermophilius sp.*, and *Cynomys sp.*, element NISP and Weight (g).

	Cricetidae		***Spermophilius sp.***		***Cynomys sp.***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Caudal Vertebra	-	-	1	0.10	-	-
Cervical Vertebra	-	-	-	-	-	-
Femur	-	-	9	0.84	2	1.01
Humerus	-	-	2	-	1	0.80
Long Bone Fragment	-	-	-	-	-	-
Mandible	1	1.22	2	0.26	-	-
Maxilla	1	0.47	-	-	-	-
Navicular	-	-	1	0.10	-	-
Pelvis	4	0.27	2	0.18	-	-
Radius	-	-	4	0.37	-	-
Rib	-	-	3	0.30	-	-
Scapula	-	-	1	0.10	1	0.40
Skull	-	-	-	-	2	0.85
Tibia	-	-	6	0.84	1	0.20
Teeth	-	-	1	0.10	-	-
Ulna	-	-	1	0.08	-	-
UD Vertebra	2	0.36	-	-	-	-
Full Skeleton	1	1.50	-	-	-	-
Total	**9**	**3.82**	**33**	**3.46**	**7**	**3.26**

Table 21. CH-254, Aves Sm., Aves Med., and Anseriformes element NISP and Weight (g).

	Aves Sm.		**Aves Med.**		**Anseriformes**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Carpometacarpus	-	-	-	-	3	0.84
Cervical Vertebra	4	0.30	-	-	-	-
Coracoid	2	0.41	1	0.10	4	3.41
Femur	7	1.71	2	0.52	7	2.90
Humerus	1	0.23	2	0.74	5	5.09
Long Bone Fragment	4	0.55	6	0.48	2	0.82
Lumbar Vertebra	4	0.30	-	-	-	-
Metapodial	8	1.77	-	-	9	2.89
Pelvis	1	0.07	-	-	-	-
Phalanx	6	0.16	-	-	1	0.03
Rib	1	0.08	-	-	-	-
Skull	2	0.41	-	-	-	-
Tibia	3	0.77	-	-	-	-
Tibiotarsus	-	-	-	-	3	1.94
UID Fragment	1	0.20	-	-	-	-
Ulna	2	0.47	-	-	5	3.72
Total	**46**	**7.43**	**11**	**1.84**	**42**	**23.86**

Table 22. CH-254, Columbiformes, *Meleagris gallopavo*, and Serpentes element NISP and Weight (g).

	Columbiformes		***Meleagris gallopavo***		**Serpentes**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Carpometacarpus	2	0.30	-	-	-	-
Cranium	1	0.12	-	-	-	-
Femur	2	0.39	-	-	-	-
Humerus	1	0.07	1	8.70	-	-
Metapodial	3	0.46	-	-	-	-
Rib	-	-	-	-	2	0.20
Skull	-	-	-	-	1	0.10
Thoracic Vertebra	-	-	1	1.90	5	0.30
Ulna	1	0.10	-	-	-	-
Total	**10**	**1.44**	**2**	**10.60**	**8**	**0.60**

Table 23. Amphibian, Anura, and Testudines element NISP and Weight (g).

	Amphibian		**Anura**		**Testudines**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Calcaneum	**1**	0.22	-	-		
Carapace	**-**	-	-	-	72	54.38
Cervical Vertebra	**-**	-	-	-	1	0.33
Humerus	-	-	2	0.10	4	1.03
Mandible	1	0.20	-	-	-	-
Metacarpal	1	0.09	-	-	-	-
Metapodial	1	0.10	-	-	-	-
Metatarsal	-	-	-	-	1	0.16
Pelvis	9	1.43	-	-	8	1.15
Second Phalanx	-	-	-	-	1	0.03
Skull	-	-	-	-	2	0.10
Thoracic Vertebra	-	-	2	0.20		
Tibia	-	-	-	-	1	0.25
Ulna	1	0.10	-	-	2	0.38
UD Vertebra	3	1.15	-	-	-	-
Total	**16**	**3.19**	**5**	**0.30**	**92**	**57.81**

Table 24. CH-254, Undefinable Mammal, Undefinable Large Mammal, and Undefinable Small Mammal element NISP and Weight (g).

	UD Mammal		UD Large Mammal		UD Small Mammal	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Humerus	-	-	-	-	1	0.40
Femur	-	-	1	1.66	-	-
Long Bone Fragments	14	7.30	120	198.26	218	84.99
Mandible	-	-	2	12.00	-	-
Metapodial	-	-	-	-	3	0.30
Pelvis	-	-	-	-	8	5.88
Ribs	-	-	3	12.99	16	4.35
Scapula	-	-	2	1.20	8	5.88
Skull	3	7.00	39	40.44	45	19.10
Teeth	-	-	1	0.10	-	-
Tibia	-	-	-	-	2	3.22
Ulna	-	-	-	-	1	1.74
UD Fragments	254	70.30	-	-	38	14.64
UD Vertebra	-	-	-	-	1	0.01
Total	**271**	**84.60**	**168**	**266.65**	**341**	**138.23**

5.2.1. CH-254 Structure 1: 1999

Structure 1 was one of the first identified structures at CH-254. Kelley et al. (2014, 29) described that the SW pit wall of Structure 1 was found during the excavation of Test Unit 5 (T5) early in the 1999 season. Structure 1 was one of the largest identified during the excavations at CH-254 and needed the 29 units varying in size from 1-x-1 m to 2-x-2 m to expose the entirety of the structure (Kelley et al. 2014, 29). Kelley et al. (2014, 31) described the size of this structure compared to others, suggesting that it could have served as a community structure and was like those described by Charles Di Peso at the Convento Site. Structure 1 was built in a shallow pit, with two floors detected (Figure6). Kelley et al. (2014, 31) indicated that the features of the structure, such as the symmetrical subfloor pit, are further supportive evidence of exclusive use for this structure.

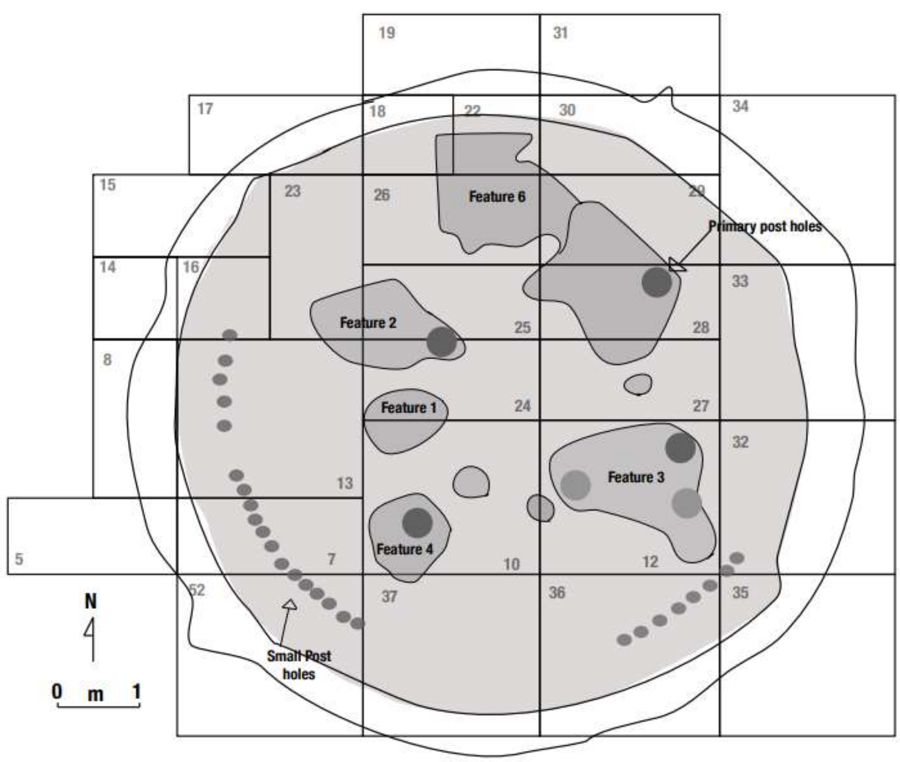

Figure 6. CH-254 Structure 1. Adapted from Kelley et al. (2014, 30).

Based on the vertical distribution of ceramic sherds collected from the upper levels of the structure, Kelley et al. (2014, 32, 36) concluded that the structure went through an orderly abandonment, after which its primary purpose was that of an area for trash disposal. Faunal elements were recovered from Levels 2 through 5. The faunal evidence supports the conclusions reached by Kelley et al. (2014, 36) as we see a more sizeable number of bones, fragmented in nature, in the upper levels (Level 2: n=18; Level 3 n=81). The total distribution of elements based on assigned stratigraphy and level designation can be seen in Figure 7.

Five primary levels were encountered in terms of the stratigraphy presented across the units: Level 1 - loose soil from the upper plough zone; Level 2 - the lower part of the plough zone; Level 3 - partly disturbed by ploughing but compact and more coherent than previous levels; Level 4 - fill immediately above the identified floor, and Level 5 - the designation given to sub-floor features which were individually numbered (Kelley et al. 2014, 30). The pit house floor of Structure 1 was about 70 cm below the surface, with associated post holes and pits below the depth of the floor (Kelley et al. 2014, 30).

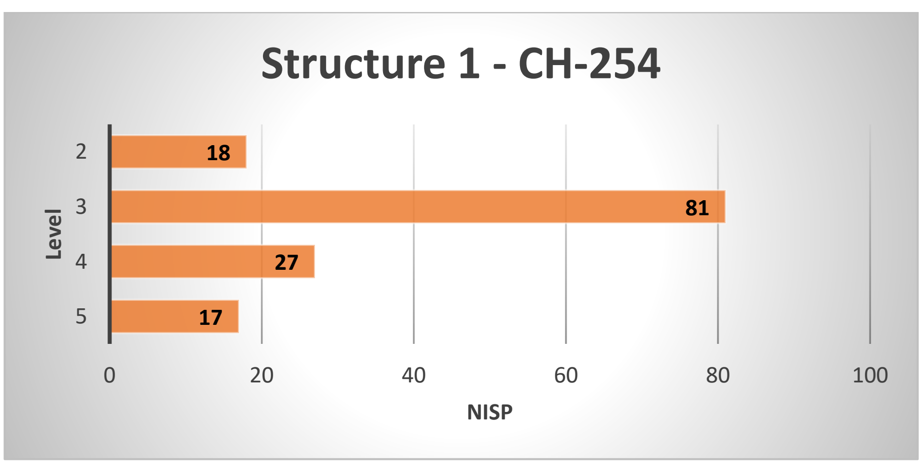

Figure 7. CH-254 Number of faunal elements (NISP) per level of Structure 1.

The faunal elements which came from Structure 1 have a total NISP of n=143. Faunal elements were found in nine of the twenty-nine excavated units. Table 25 lists these remains according to taxa and context. Most identified elements were recovered from Unit 10 (n=40), where Features 4 and 5 were identified, as seen in Figure 6. The most prominent taxa identified in this unit is Mollusca (n=14). The unit which had the least amount of faunal material was Unit 32, where a single element belonging to *Lepus sp.* was identified (n=1). Test Unit 5, as mentioned previously, was the unit in which Structure 1 was first identified and had a total NISP of n=1. Overall, most elements (n=69) were found in units in the centre of the structure (Units 10, 24, and 25). The most abundant taxa represented are Mollusca (n=22), UD Rodentia (n=22), *Sylvilagus sp.* (n=20), UD small mammals (n=18), UD large mammals (n=14), and Testudines (n=13). The faunal remains from these contexts indicate varying uses of animals, including those used for subsistence, such as genus *Lepus sp.* and *Sylvilagus sp.*, economic commodities such as phylum Mollusca, and those used in potential rituals, such as Testudines.

Table 25. CH-254, taxa per unit/feature/test unit, Structure 1.

	UNIT/ FEATURE/ TEST UNIT										
TAXON	**U10**	**U15**	**U23**	**U24**	**U25**	**U26**	**U32**	**U 33**	**U37**	**F2**	**T5**
Cervidae	2	-	-	-	-	-	-	-	-	-	-
Odocoileus virginianus	1	-	-	-	1	-	-	-	-	-	-
UD Large Mammal	4	-	9	-	-	-	-	1	-	-	-
UD Small Mammal	5	-	1	3	1	5	-	1	1	-	1
Canis familiaris	2	-	1	-	1	-	-	-	-	-	-
Sylvilagus sp.	-	-	4	3	-	-	-	-	-	13	-
Lepus sp.	1	2	1	-	-	4	1	-	1	-	-
Rodentia	4	-	8	-	6	-	-	-	-	4	-
Spermophilus sp.	-	-	-	-	2	-	-	-	-	-	-
Aves, Med	-	-	-	-	1	-	-	-	-	-	-
Aves, Small	2	-	-	-	-	-	-	-	-	-	-
Anseriformes	-	-	2	-	-	3	-	-	2	-	-
Columbiformes	-	-	3	-	1	-	-	-	-	-	-
Mollusca	14	-	-	-	7						-
Testudines	5	-	1	3	-	-	-	4	-	-	-
Undefinable	-	-	1	-	-	-	-	-	-	-	-
Total	**40**	**2**	**31**	**9**	**20**	**12**	**1**	**6**	**4**	**17**	**1**

5.2.2 CH-254 Structure 2: 1999

Kelley et al. (2014, 38) described Structure 2 as a rounded house placed in a shallow pit, measuring about 7-x-6.5 m. It was equated its construction to a similar technique outlined by Charles Di Peso at the Convento site. Structure 2 is significantly smaller than Structure 1, requiring only fourteen units varying in size from 1-x-1 m, 1-x-2, and 2-x-2 m to expose it (Kelley et al. 2014). Structure 2 yielded ceramic sherds that were used to support the contention that it was the oldest structure excavated in 1999 (Kelley et al. 2014, 47, 56). Kelley et al. (2014, 45) proposed that Structure 2 was deliberately abandoned and burned, possibly following the placement of a burial found in the southwest quadrant of the house.

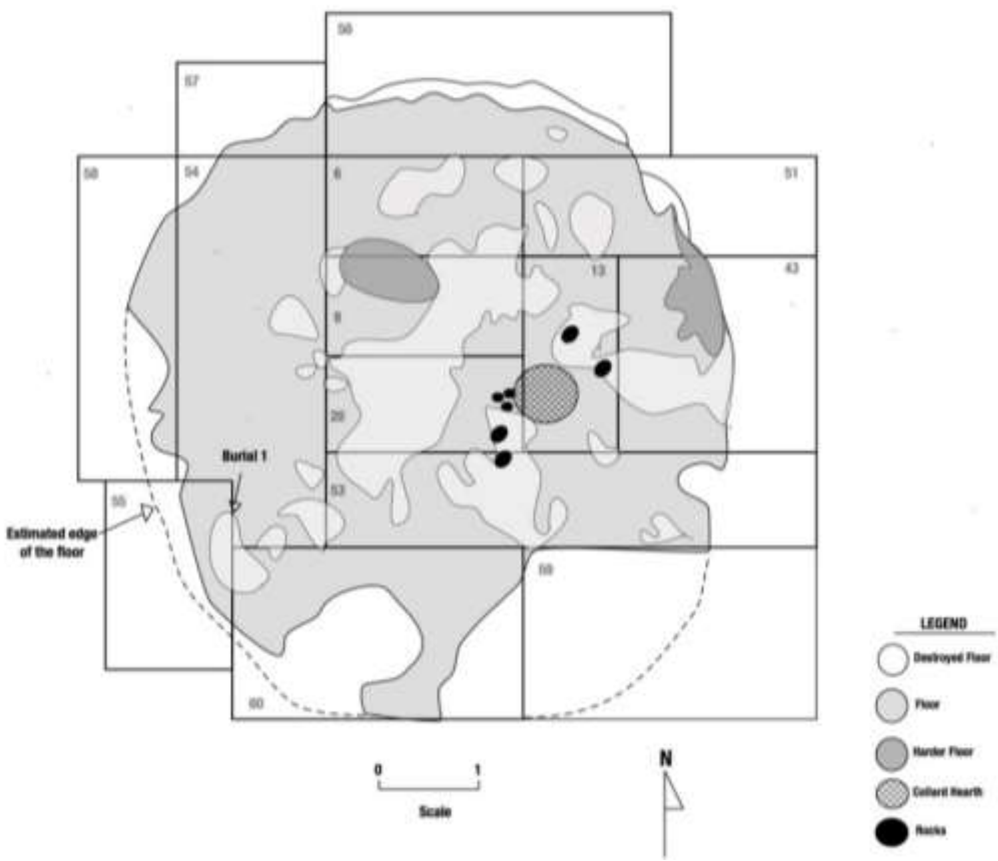

Figure 8. CH-254 Structure 2. Adapted from Kelley et al. (2014, 38).

There were seven levels identified during the excavation of Structure 2: Level 1- surface and loose upper plough zone; Level 2 -compact lower plough zone; Level 3 - compact soil equivalent to the outdoor work area of Structure 4; Level 4 - consisted of construction debris mixed with sandy loose soil; Level 5 - fill directly above the floor of Structure 2; Level 6 - sub-floor features and tests, and Level 7 - north adobe wall base (Kelley et al. 2014, 37). Most of the faunal elements from the Structure 2 excavations were found in or above Levels 3 and 4. This element distribution can be seen in Figure 9.

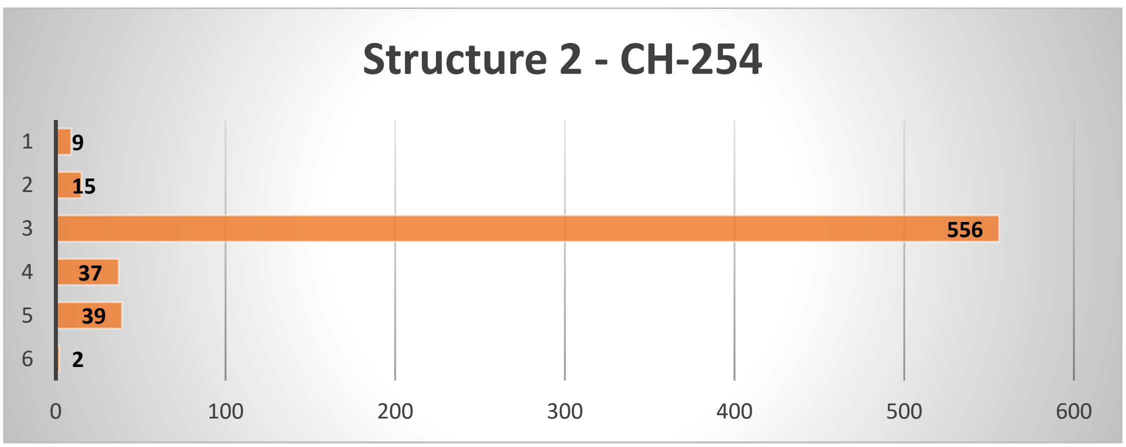

Figure 9. CH-254 number of faunal elements (NISP) per level of Structure 2.

Structure 2 contained the second highest NISP of faunal elements (n=658). The excavations yielded bones from various vertebrate species, including artiodactyla, mammals, birds, amphibians, and reptiles. Faunal elements were found in eleven of the fourteen total excavated units and Test Unit 6 and Feature 6. Table 26 lists these remains according to taxa and context. Most identified elements were recovered from Unit 51 (n=243), in the NE quadrant of the structure, seen in Figure 8. The most prominent taxa identified in this unit is that of *Conepatus leuconotus* (n=200), due in part to the discovery of three partially articulated skeletons. Since these elements were recovered from an upper level, the animals could have ventured into the region after site abandonment and died in abandoned structures.

Table 26. CH-254, taxa per unit/feature/test unit, Structure 2.

	UNIT/ FEATURE/ TEST UNIT												
TAXON	**U6**	**U9**	**U10**	**U13**	**U20**	**U43**	**U51**	**U53**	**U54**	**U57**	**U60**	**F6**	**T6**
UD Artiodactyla	-	-	-	-	-	-	1	-	-	-	-	-	-
Cervidae	-	-	-	2	-	2	-	-	-	-	-	-	-
Odocoileus virginianus	1	-	1	-	-	-	-	-	-	-	9	-	-
Capra hircus	-	-	-	-	-	-	1	-	-	-	-	-	-
Sylvilagus sp.	-	-	-	-	-	1	-	-	-	-	-	-	-
Lepus sp.	7	1	-	2	-	9	20	1	-	1	1	-	-
Conepatus leuconotus	-	-	-	182	-	17	1	-	-	-	-	-	-
Mollusca	-	-	-	-	-	3	1	-	-	-	1	-	1
Aves, Medium	-	-	-	-	-	-	3	-	-	-	-	-	-
Aves, Small	-	3	-	-	-	2	2	-	-	-	-	-	-
Anseriformes	1	1	-	-	4	2	5	-	-	3	2	-	-
Columbiformes	-	-	-	-	-	-	-	-	-	-	3	-	-
UD Large Mammal	-	5	-	2	-	1	6	-	-	7	1	-	-
UD Small Mammal	2	18	-	12	4	9	51	-	2	-	11	4	4
Canid familiaris	-	8	-	2	1	3	73	2	-	3	1	-	-
UD Rodentia	3	1	-	4	2	-	2	-	-	-	-	-	-
Spermophilius sp.	-	-	-	1	1	1	6	1	-	1	4	-	1
Cynomys sp.	-	-	-	-	-	-	1	-	-	-	-	-	-
Cricetidae	-	-	-	1	-	-	1	-	-	-	-	-	-
Eutamias	2	-	-	-	-	-	1	-	-	-	-	-	-
Amphibian	-	-	-	-	-	5	3	-	-	-	-	-	-
Testudines	-	7	-	3	-	2	3	-	-	-	-	-	1
Undefinable	-	2	-	5	-	1	62	-	-	1	-	-	-
Total	16	46	1	216	12	58	243	4	2	16	33	4	7

There was no evidence of human subsistence on the bones (cut marks and burning). Females and young are commonly found together, which could be one reason there were three articulated partially articulated skunks found (Dragoo and Sheffield 2009, 5). The elements showed morphological variability attributed to maturation differences between the identified animals. The unit which provided the least amount of faunal evidence was Unit 10, where a single element belonging to *Odocoileus virginianus* was identified (n=1). Overall, most elements (n=517) were found throughout units in the NE quadrant of the structure (Units 13, 43, and 51). The most plentiful taxa represented were UD small mammals (n=117), *Canis familiaris* (n=93), *Lepus sp.* (n=42), Anseriformes (n=18), UD large mammals (n=14), Testudines (n=15), and Undefinable taxa (n=71).

The faunal remains from these contexts can be tied to multiple uses of animals. A variety of mammal bones were found in fragmentary states of preservation, and some showed evidence of burning (n=24). This suggests potential processing activities within the house (Kelley et al. 2014, 53-54). When examined with associated artifacts recovered in the same unit, such as ceramic animal heads found in Unit 51, faunal elements offer a tantalizing hint of cultural activity during the Viejo Period. One could suggest that the type of elements recovered in Unit 51, including a large number identified as *Canis familiaris* (n=73), an animal outlined in previous research as a domesticated animal, could offer alternate avenues of explanation for potential ritual activities present in Structure 2. Elements found can also be tied to subsistence practices, such as the genus *Lepus sp.* and other mammals, as well those used in potential rituals, such as Testudines and amphibians. Bone artifacts are rare throughout the region, but most identified artifacts came from the Structure 2 excavations. Of interest are the eyed needle (Figure 10), which was one of two encountered, and the fishhook (Figure 11), which was the only one found in the study region.

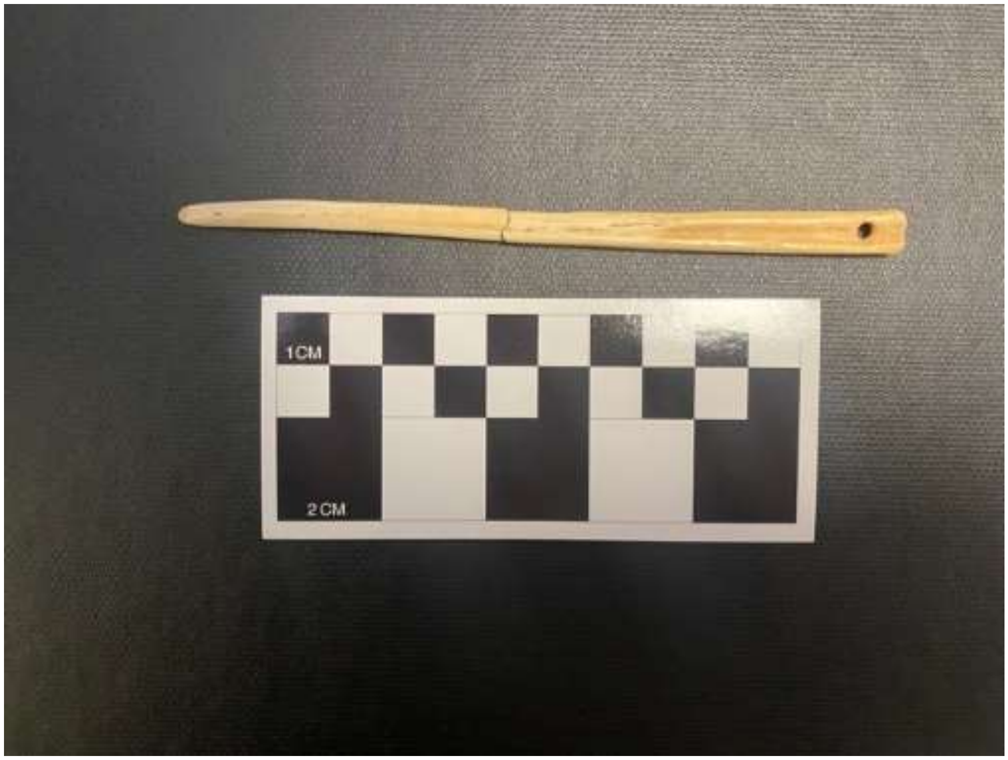

Figure 10. Eye-needle recovered from Unit 9 in Structure 2 at CH-254.

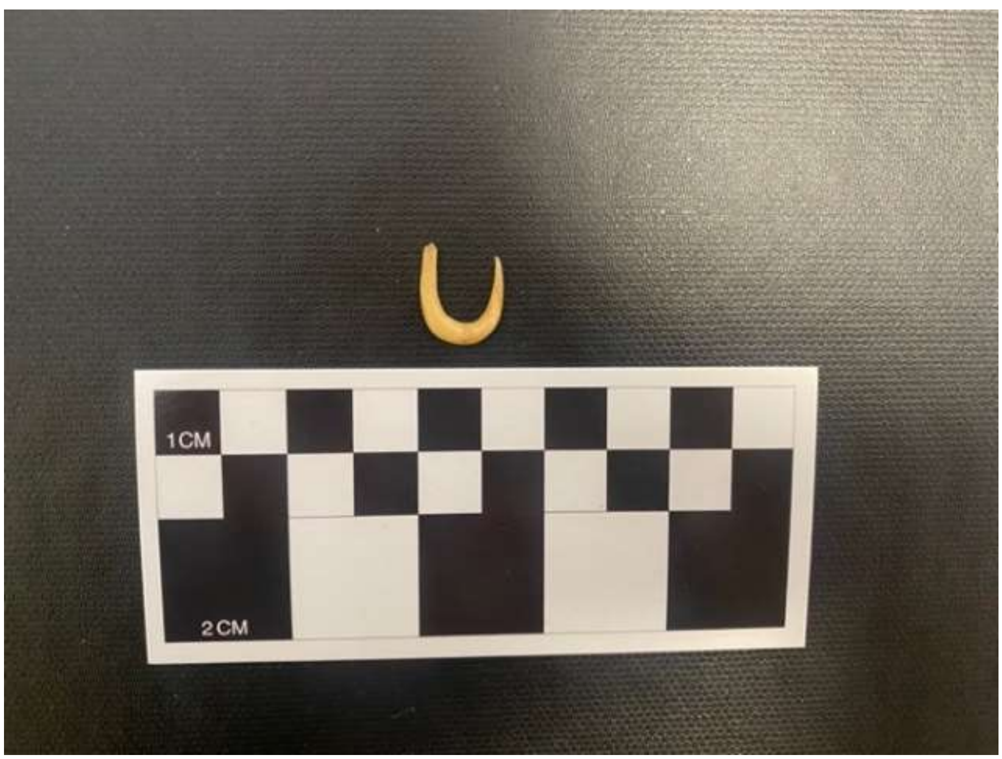

Figure 11. Fishhook recovered from Unit 57 in Structure 2 at CH-254**.**

5.2.3. CH-254 Structure 3: 1999

Structure 3 was found south of Structures 1 and 2, on an identical low rise as these previously identified structures (Kelley et al. 2014, 57-58). Twelve units were excavated, varying in size from 1-by-1 m to 2-by-2 m (Figure 12). Structure 3 was acknowledged as a habitation structure, which was built and occupied later in the history of CH-254. The information in the published site reports and field notes is limited regarding this structure. Kelley et al. (2014, 60) noted that information about this structure is incomplete due to the field season ending before the structure could be completely excavated. Three levels were identified at Structure 3. Kelley et al. (2014) explained these levels as Level 1 - loose soil which was a part of the plough zone, Level 2 - compact soil disturbed by ploughing activity, and Level 3 - red/orange soil extending to the identified floor 35 to 45 cm below the surface. Most of the identified faunal elements in Structure 3 came from Level 3 (n=53). The distribution of elements by level can be seen in Figure 13.

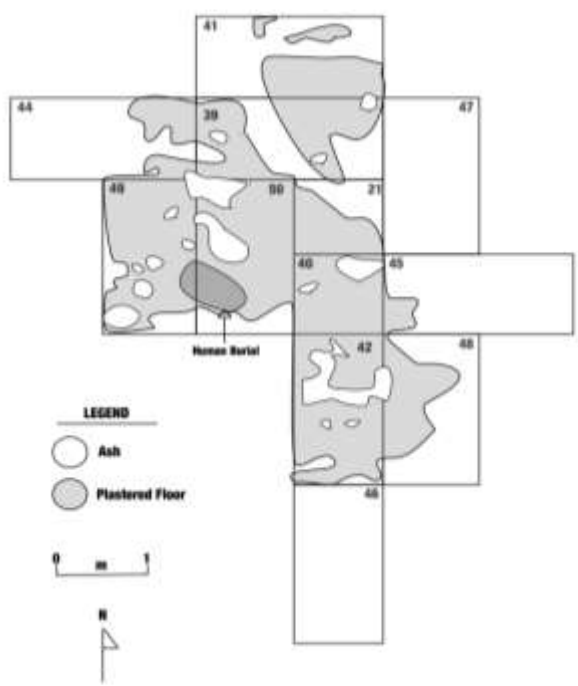

Figure 12. CH-254, Structure 3. Adapted from Kelley et al. (2014, 57).

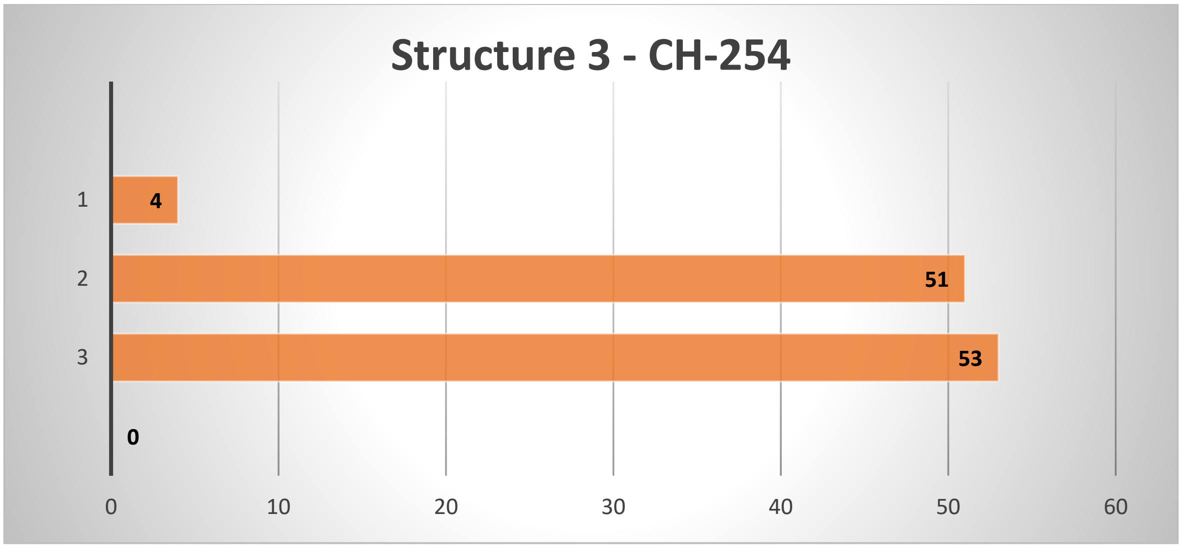

Figure 13. CH-254, number of faunal elements (NISP) per level of Structure 3.

Structure 3 produced the lowest NISP with n=103. Though the total elements identified were few, the excavations yielded bones from various vertebrate species, including artiodactyls, both UD small and large mammals, birds, amphibians, and reptiles. Faunal elements were found in seven of the twelve total excavated units. Table 27 lists these remains according to taxa and context. Most identified elements were present in Unit 41 (n=26), which is the unit furthest north of the structure seen in Figure 12

Table 27. CH-254, taxa per unit of Structure 3.

	UNIT						
TAXON	**U21**	**U39**	**U41**	**U44**	**U45**	**U46**	**U48**
UD Artiodactyla	-	-	7	1	-	-	1
Cervidae	1	-	-	-	-	-	-
Odocoileus virginianus	-	-	-	5	17	2	1
UD Large Mammal	1	5	-	-	3	-	-
UD Small Mammal	4	6	1	3	3	1	1
Canis familiaris	-	-	6	-	3	1	-
Sylvilagus sp.	-	1	8	-	1	3	-
Lepus sp.	5	-	-	-	-	-	-
UD Rodentia	-	-	2	1	-	1	1
Cynomys sp.	-	-	1	-	-	-	-
Aves, Medium	-	-	-	-	1	-	-
Aves, Small	-	1	-	1	-	-	-
Amphibian	-	2	1	-	-	-	2
Testudines	1	-	-	-	-	2	-
Total	**12**	**15**	**26**	**11**	**28**	**10**	**6**

The most prominent taxon identified in this unit is *Odocoileus virginianus* (n=25). The unit which contributed the fewest faunal remains is Unit 48, which included n=6 identified elements from taxa, including Artiodactyla (n=1), species *Odocoileus virginianus* (n=1), UD small mammals (n=1), Rodentia (n=1), and Amphibians (n=2). The most abundant taxa represented were small mammals (n=19), *Sylvilagus sp.* (n=13), *Canis familiaris* (n=10), and *Lepus sp.* (n=5).

One of the few tools found during excavations came from Structure 3, which seems to be a large-eyed needle or awl (Figure 14). This was one of two identified in the faunal collection. It is significantly larger than the other one found from Structure 2. Its size may relate to bone material availability at the time it was made. There is a difference in the number of *Odocoileus virginianus* collected from Structure 3 (n=25) versus those found within Structure 2 (n=11). This is important as the number of elements identified between the two structures differs significantly; Structure 2 has almost twice the amount.

I was able to explore potential avenues for interpreting human-animal relations during the time Structure 3 would have been occupied using information from earlier site reports and level records. I believe animals were being used for subsistence related purposes based on the number of *Odocoileus virginianus, Sylvilagus sp.,* and UD mammal elements present. Though there are elements that could point toward other cultural activities, such as ritual use, including those belonging to Testudines (n=3), more extensive excavations of Structure 3 are needed to support an alternative utilization pattern beyond subsistence.

Figure 14. Bone tool, large eyed needle, from Unit 45 of Structure 3.

5.2.4. CH-254 Structure 4: 1999

Structure 4 partly overlaid the previously described Structure 2 in a south/southeast direction. It was first identified during the excavation of Unit 53 in Structure 2 (Kelley et al. 2014, 63). The fact that this structure lies above Structure 2 suggests that it would have been occupied later. This is supported by stratigraphic evidence collected during the 1999 field season, which indicated that the top edge of the floor within the structure was around 45 cm above Structure 2, and the central region 17 cm above (Kelley et al. 2014, 63). Structure 4 was described as a shallow circular pit house with a fire pit towards the east side of the house. It was somewhat more extensive than Structures 1 and 2. A similar field scenario for Structure 3 was outlined for Structure 4. Due to time constraints only three-quarters of the structure was exposed. About 7 m^2 of the identified floor was excavated.

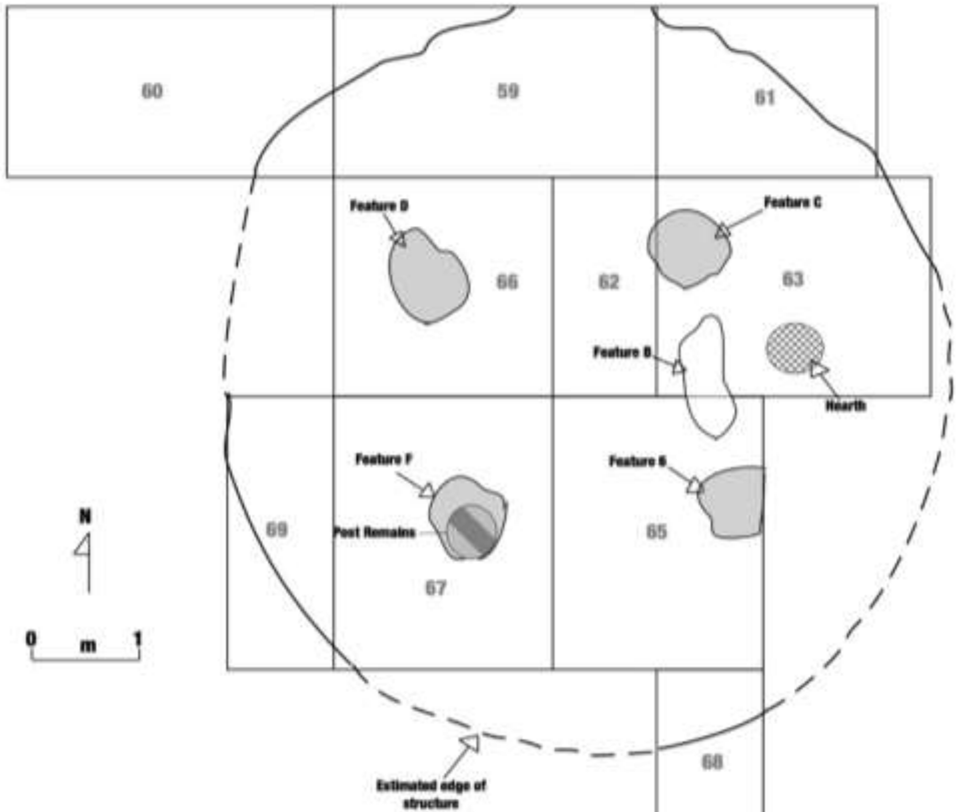

Figure 15. CH-254 Structure 4. Adapted from Kelley et al. (2014, 64).

The stratigraphy of Structure 4, which partially match Levels 1-3 above Structure 2, was described by Kelley et al. (2014, 63) as follows. Level 1 - loose plough zone, Level 2 - loose plough zone and roof and wall fall, Level 3 - structural debris, Level 4 - fill above the floor, and Level 5 - sub-floor tests. Most of the faunal elements identified within the Structure 4 assemblage came from Level 4 (n=84). There were many elements to which we could not assign a level (n=127) due to the lack of available information in the level records and site reports. The distribution of elements based on level is presented in Figure 16.

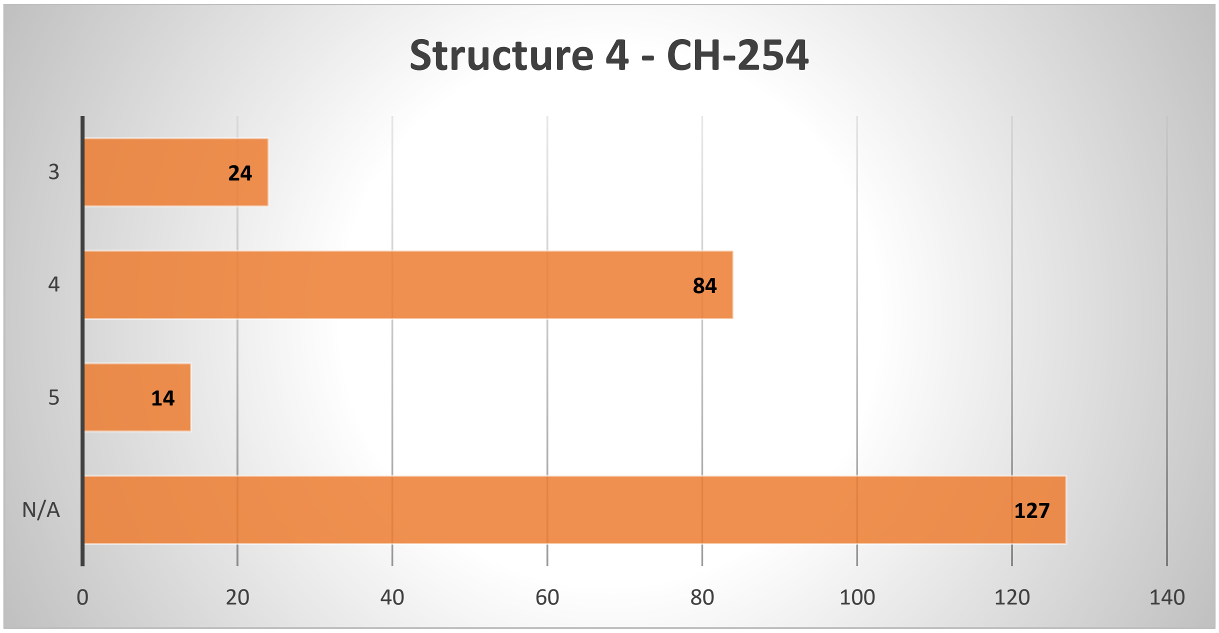

Figure 16. CH-254, number of faunal elements (NISP) per level of Structure 4.

Structure 4 housed a variety of faunal elements with a NISP of n=249. Faunal elements were found in three of the ten excavated units and there are elements that have no unit context in the available records. Table 28 lists these remains according to taxa and context. Unfortunately, most identified elements had no assigned unit context (n=127). However, most elements in an assigned unit were found in Unit 60 (n=86), which can be seen in the unit furthest northwest of the structure seen in Figure 15. The unit which produced the least amount of faunal evidence was Unit 66, which included n=6 identified elements from taxa, including UD small mammals (n=2), *Canis familiaris* (n=1), and UD Rodentia (n=3).

Many of the bones in the assemblage from Structure 4 were fractured and classified as either UD large or UD small mammals (n=88 and n=11) or Undefinable (n=52). The most abundant taxa represented were UD Rodentia (n=28), *Canis familiaris* (n=26), and *Lepus sp.* (n=16).

Table 28. CH-254, taxa per unit of Structure 4.

	UNIT			
TAXON	**U60**	**U66**	**U67**	**N/A**
Cervidae	7	-	2	-
Odocoileus virginianus	3	-	-	-
Large Mammal	6	-	2	3
Small Mammal	31	2	7	48
Canis familiaris	-	1	2	23
Lepus sp.	14	-	2	-
UD Rodentia	22	3	3	-
Spermophilius sp.	-	-	9	-
Aves, Small	1	-	-	1
Columbiformes	1	-	-	-
Anseriformes	-	-	1	-
Testudines	1	-	2	-
Undefinable	-	-	-	52
Total	**86**	**6**	**30**	**127**

A total of n=24 of the bones from Structure 4 were burned. No butchering marks were observed on any specimens. Only a few elements are present in the assemblage, each from a relatively wide range of taxa, considering the size of the assemblage. One of the primary uses for the faunal elements found in Structure 4 is subsistence, resulting from the practice of what would be considered "garden hunting" aimed primarily at genus/species such as *Lepus sp., Odocoileus virginianus*, and possibly even *Canis familiaris*. It can also be concluded that there was a high amount of post-depositional disturbance occurred within Structure 4 based on the high number of rodent elements present, even a mummified rodent was found (Figure 17), as well as the fragmentary nature of the rest of the assemblage.

Figure 17. CH-254, Mummified mouse found in Unit 13 of Structure 4.

5.2.5. CH-254 Structure 5: 2007-2008

The 2007-2008 field season focused on areas within a structure identified from the 2005 ground survey season labelled Structure 5. The portions of Structure 5 included floor designations 5A, 5B-I, 5B-II, and 5C (Kelley et al. 2014, 101, 109, 115, 131; Zborover 2019, 87-96). Structure 5A was classified as part of the first phase of occupation, 5C to the second phase, 5B II to the third phase, and 5B I to the fourth phase (Kelley et al. 2014, 101, 109, 115, 131; Zborover 2019, 87-96). 5A was assigned a radiocarbon date of 667-766 A.D., the earliest date recorded for CH-254 and one of the earliest contexts for the Viejo culture in general (Kelley et al. 2014, 192-193). Individuals involved in the excavation of Structure 5 pointed out that the excavated floor assemblage was one of the most complete in the whole project. Most of the identified features of Structure 5 were *in situ* artifacts and clusters. The PAC team revealed that Structure 5 went through several phases of remodelling/rebuilding, shown through stratigraphic level differentiation (Zborover 2019, 86).

As mentioned previously, the stratigraphy in Structure 5 is complex, including designated Levels 1-8. Levels 1-2 exposed Structure 5A, Levels 3-5 exposed the floor of Structure 5B-I, Level 6 was dug to expose the floor of Structure 5B-II, and Levels 7-8 were dug to expose the floor of Structure 5C. The level that contained the highest number of faunal elements was Level 7 (n=48), and the lowest were Levels 5 and 8, both having a NISP of n=1. The stratigraphy of Structure 5 included Levels 1-8, and the breakdown of element representation can be seen in Figure 18.

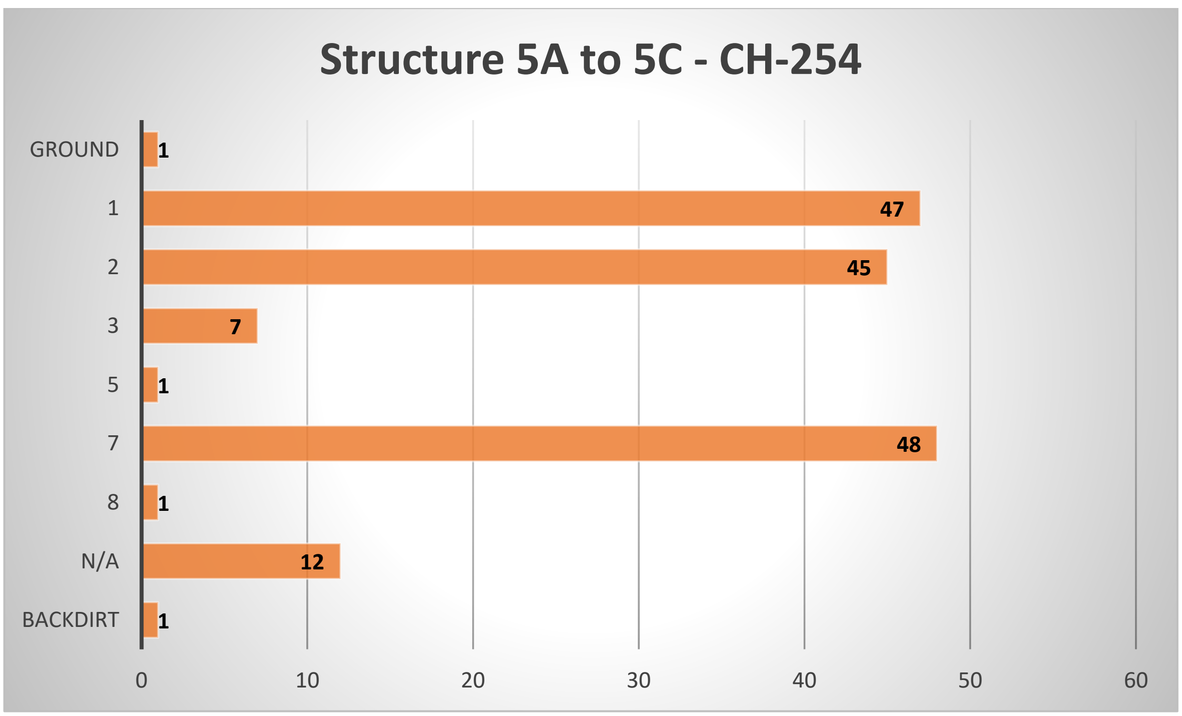

Figure 18. CH-254, number of faunal elements (NISP) per level of Structure 5A-C.

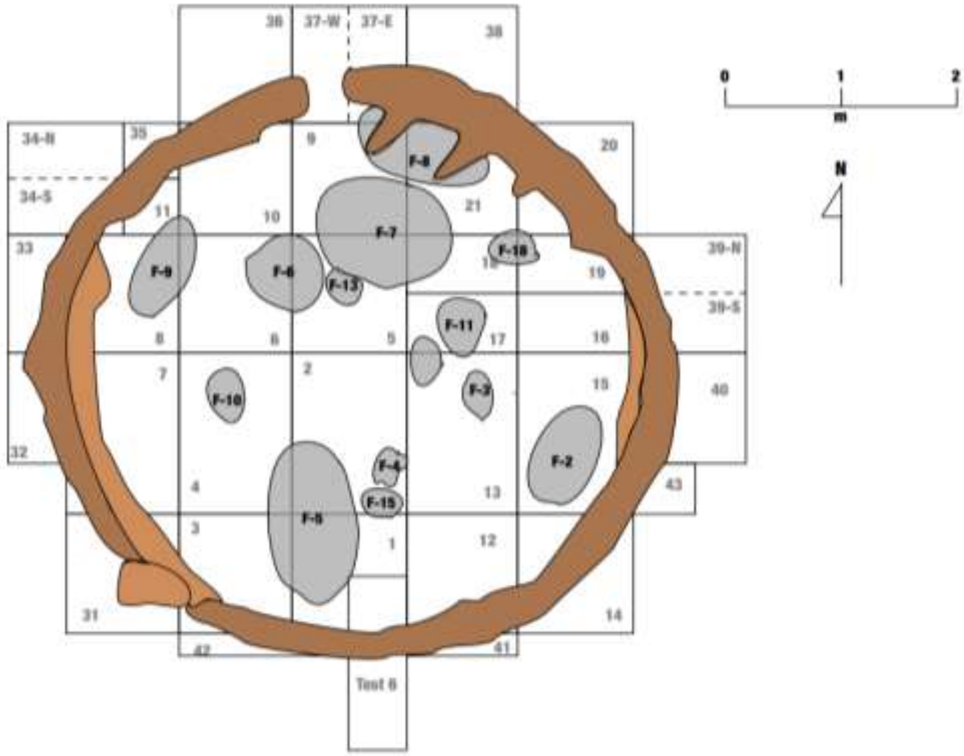

Figure 19. CH-254 Structure 5A. Adapted from Kelley et al. (2014, 131).

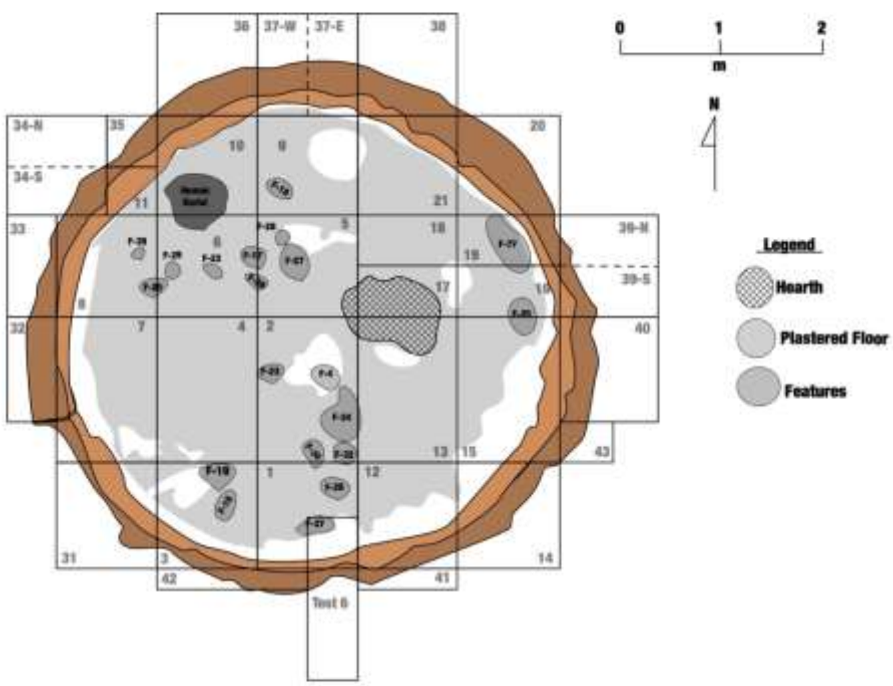

Figure 20. CH-254 Structure 5BI. Adapted from Kelley et al. (2014, 115).

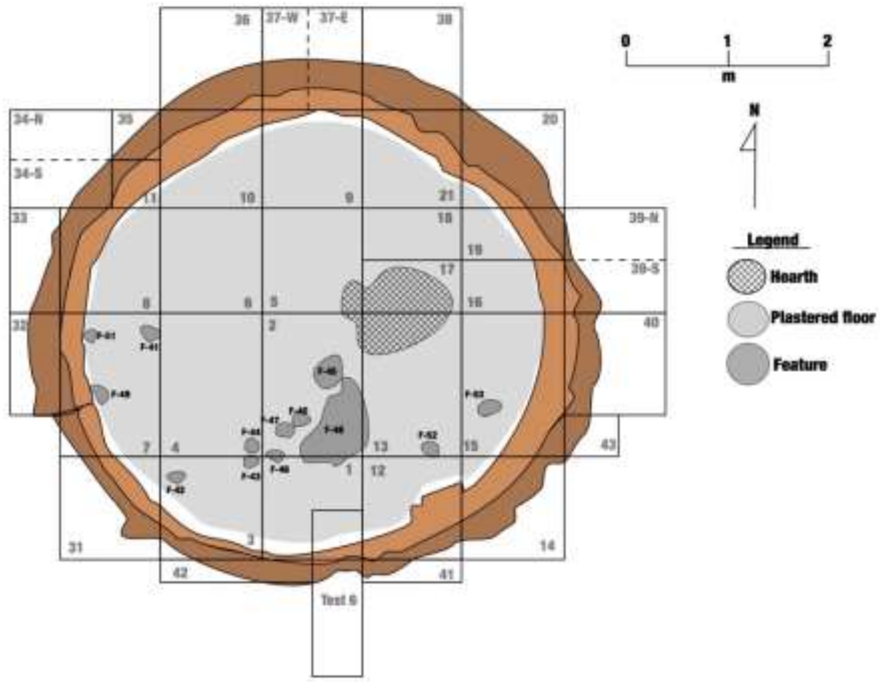

Figure 21. CH-254 Structure 5BII. Adapted from Kelley et al. (2014, 109).

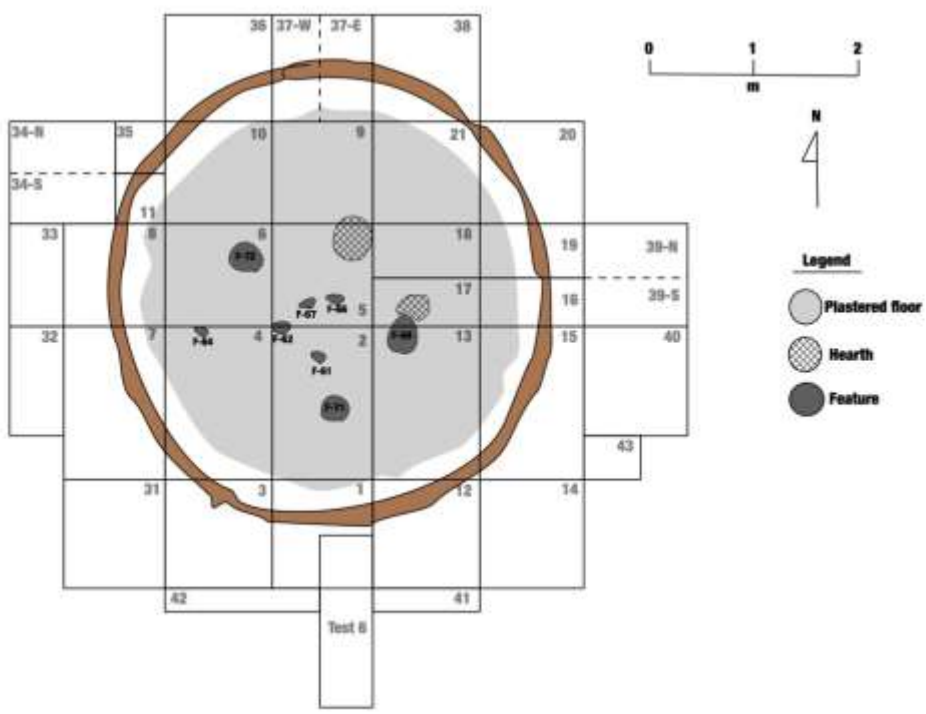

Figure 22. CH-254 Structure C. Adapted from Kelley et al. (2014, 101).

The excavation of Structure 5 produced a variety of faunal elements with a total NISP of n=163. The number of faunal elements varied but bone was present in eighteen units, one test unit (Test Unit 5), and one feature (Feature 9). Additionally, bones were identified as coming from Structure 5 but had no unit context in the available records. Table 29 lists the identified elements according to taxa and context. Most identified elements were present in Units 13-17 (n=68) and Unit 11 (n=64). Units 2, 5, 24, 28, 34 each had a single faunal element (n=1). Additionally, Test Unit 5 also produced only a single faunal element (n=1).

The most prominent bone grouping found throughout Structure 5 were UD large mammals (n=47). The taxa with the fewest remains included *Sylvilagus sp.* (n=1), UD Rodentia (n=1), and the species *Spermophilius sp*. (n=1). Compared to other structures in the region, there were only a few *Odocoileus virginianus* remains (n=2). The most plentiful taxa represented were Aves, small *(*n=24), Artiodactyla (n=13), *Lepus sp.* (n=12), *Canis familiaris* (n=10), Testudines (n=11). There are twenty-four elements (n=24) classified as undefinable. Zborover (2019, 81) proposed that the continuous construction activity and associated structured deposits within and around Structure 5 denotes a special-purpose function of the structure throughout time. This can be supported by the faunal elements, including Aves, Testudines, Mollusca, and other cultural remains, which relate to ritual activities primarily in mortuary context.

Table 29. CH-254, taxa per unit of Structure 5.

	UNIT/ FEATURE/ TEST UNIT														
TAXON	**U2**	**U3**	**U5**	**U6**	**U8-10**	**U11**	**U13-17**	**U24**	**U28**	**U34**	**U37**	**U39**	**F9**	**T5**	**N/A**
UD Artiodactyla	-	-	-	-	-	5	8	-	-	-	-	-	-	-	-
Odocoileus virginianus	-	-	-	-	-	-	1	1		-	-	-	-	-	-
UD Large Mammal	-	-	-	-	-	10	37	-	-	-	-	-	-	-	-
UD Small Mammal	-	1	-	-	-	-	3	-	-	-	-	-	-	-	-
Canis familiaris	-	1	-	-	2	-	3	-	-	1	-	-	-	-	1
Sylvilagus sp.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Lepus sp.	1	-	-	1	5	-	4	-	-	-	-	1	-	-	-
UD Rodentia	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Spermophilius sp.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Cricetidae	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-
Aves, Small	-	-	-	-	-	22	-	-	-	-	-	2	-	-	-
Anseriformes	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Mollusca	-	-	-	-	-	-	1	-	-	-	-	-	5		-
Testudines	-	-	-	-	2	4	3	-	-	-	1	-	1		-
Undefinable	-	-	-	-	-	23	-	-	-	-	-	-	-	1	-
Total	**1**	**2**	**1**	**2**	**9**	**64**	**68**	**1**	**1**	**1**	**1**	**4**	**6**	**1**	**1**

5.2.6. CH-254 Structure 6: 2010

Structure 6 was the most recently excavated at the Calderón site. Structure 6 was regarded as a "twin structure" due to its proximity to the previously discussed Structure 5. Excavation levels were separated into three primary contexts; above the house, within the house, and outside of the house (Kelley et al. 2014, 161, 165-166). The excavation levels above the house included Levels 1, 2, and 2C, with a depth of 72 cm below datum. Excavation levels within the house included Levels 3 and 4, 76-86 cm below datum. Excavation outside the house included Levels 5, 6, and 7, reaching a depth of 142 cm below datum (Kelley et al. 2014, 161, 165-166). The stratigraphy of Structure 6 includes Surface, Levels 1-5, and primary features such as Features 7, 8, and 19. The breakdown of faunal elements recovered from the structure can be seen in Figure 23. The level which contained the highest number of faunal elements was Level 2 (n=298), and the lowest was Level 1, having a NISP of n=1.

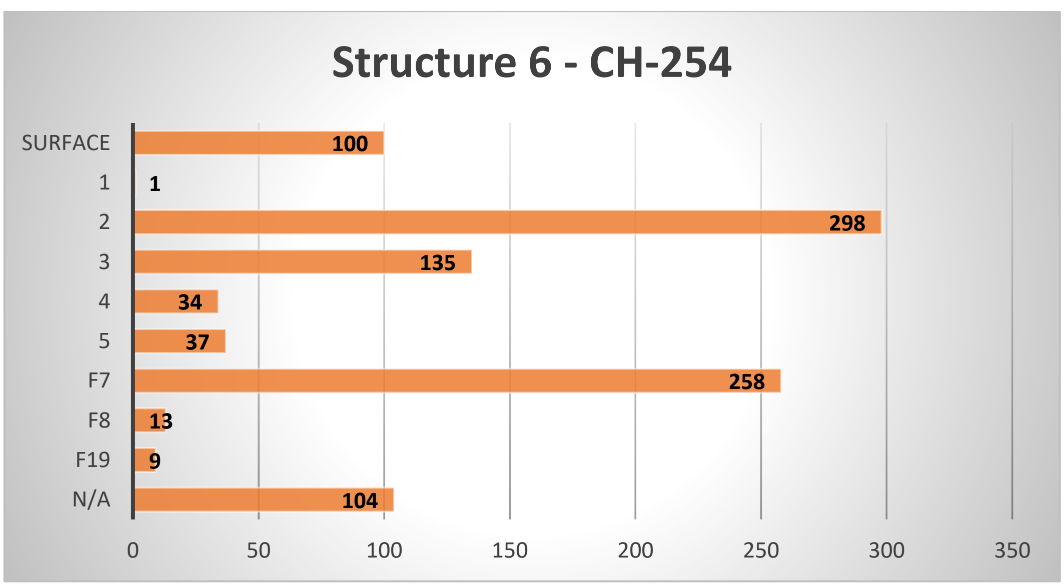

Figure 23**.** CH-254 number of faunal elements (NISP) per level/feature of Structure 6.

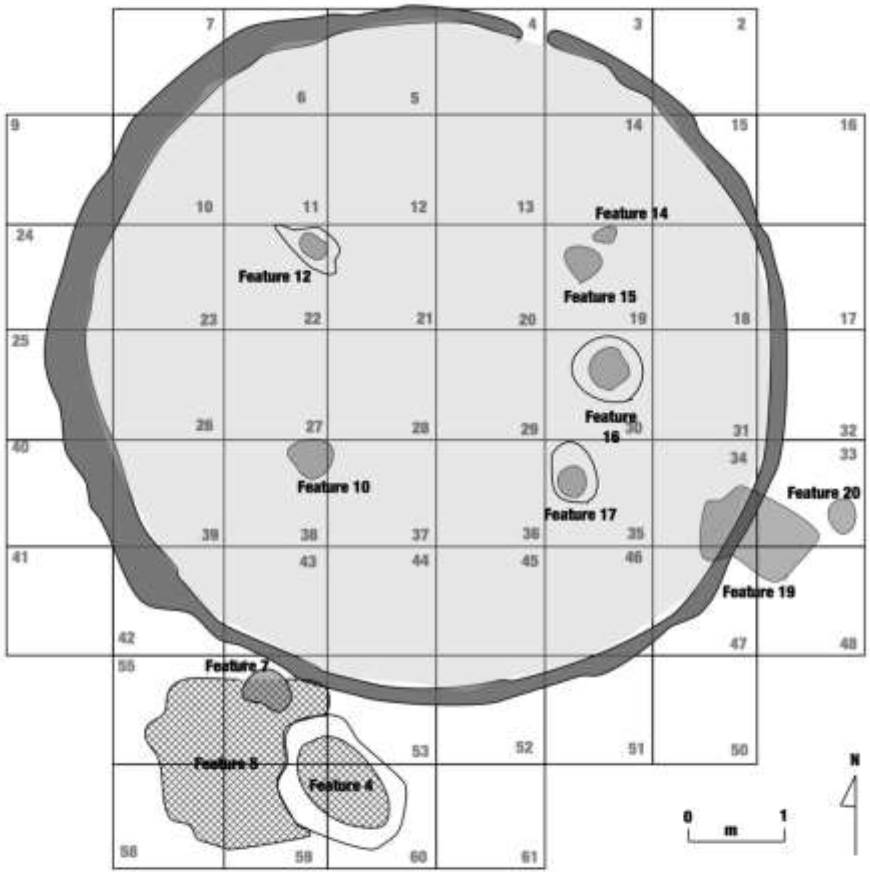

Figure 24. CH-254 Structure 6. Adapted from Kelley et al. (2014, 101).

Faunal elements recovered from Structure 6 at CH-254 came to a total NISP of n=983. The number of faunal elements varied but was present in 53 units, the highest amount seen throughout the entire study area. Table 30 lists the identified elements according to taxa and context. Most identified elements were present in Unit 54 (n=267), with large numbers of elements found in Units 30-39 (n=163), as well as Units 20-29 (n=142). Unit 61 produced the lowest number of faunal elements (n=2). Most faunal elements found throughout Structure 6 could only be classified as UD large and UD small mammals (n=409). The taxa which were the least common were Amphibians (n=3). Many

Testudines remains were recovered from Structure 6 (n=43). Most of these elements were from the carapace (n=40), but there were some long bone fragments (n=3).

The most plentiful taxa represented were *Canis familiaris* (n=300), *Lepus sp.* (n=26), and Anseriformes (n=16), Aves, small (n=24), and Artiodactyla (n=13). Two (n=2) elements recovered from the genus *Meleagris gallopavo* or the common turkey. This is one of the only turkey elements within the study sites for this project. The absence of turkey elements differs from earlier studies done in the Casas Grandes region, as most of those projects produced large numbers of turkey burials and elements.

Table 30. CH-254 taxa per unit of Structure 6.

	UNITS										
TAXON	**U1**	**U3-7**	**U10-19**	**U20-29**	**U30-39**	**U40-48**	**U50-53**	**U54**	**U55**	**U60**	**U61**
UD Artiodactyla	-	-	3	4	3	2	-	-	2	-	-
Odocoileus virginianus	-	-	3	2	3	-	-	-	1	-	-
Antilocapra americana	-	2	3	-	2	1	-	-	-	-	-
UD Mammal	5	12	34	68	73	17	23	-	3	-	-
UD Large Mammal	-	4	4	17	10	-	9	-	1	-	-
UD Small Mammal	1	2	11	15	13	8	-	8	-	-	1
Canis familiaris	-	3	5	9	8	1	8	258	-	-	-
Sylvilagus sp.	-	1	1	-	4	-	-	-	-	-	-
Lepus sp.	-	1	4	6	4	1	-	1	-	2	-
Mephitidae	-	-	-	1	-	-	-	-	-	-	-
UD Rodentia	-	-	7	3	2	1	-	-	-	-	-
Spermophilius sp.	-	-	10	4	1	-	-	-	-	-	-
Cynomys sp.	-	-	3	1	1	-	-	-	-	-	-
Eutamias	-	3	3	3	9	1	-	-	-	-	-
Aves, Medium	-	-	5	-	1	-	-	-	-	-	-
Aves, Small	-	-	3	-	2	1	-	-	-	-	1
Anseriformes	-	-	3	3	4	-	-	-	-	-	-
Columbiformes	-	-	1	-	1	-	-	-	-	-	-
Meleagris gallopavo	-	-	1	-	1	-	-	-	-	-	-
Mollusca	-	-	1	-	2	-	-	-	-	-	-
UD Amphibian	-	-	-	-	1	-	2	-	-	-	-
Testudines	-	-	6	5	18	1	-	-	-	2	-
Undefinable	-	-	-	1	-	-	1	-	-	-	-
Total	**6**	**28**	**111**	**142**	**163**	**34**	**43**	**267**	**7**	**4**	**2**

Unit 54 (which housed Feature 7) was identified as a burial of a small dog. This was the second dog burial found by the PAC team. This burial made up a sizable part of the identified faunal elements (n=258). The faunal remains did not exhibit evidence of butchering or processing practices. Moreover, elements such as the sesamoid bones, which are rarely found in archaeological contexts due to their small size and tendency to be disturbed through post-depositional processes, are present. The burial feature points to a companionship relation between humans and dogs. This interpretation is further supported by the piece of worked bone identified as a rasp fragment (Figure 25). According to Di Peso (1974, 272), rasps played an important role in rituals carried out by people conducting funeral rites for warriors. A ritualistic human-animal relation seems to be reflected in Structure 6.

Figure 25. CH-254 Scapula rasp found in Level 2 of Unit 11.

Test units and surface finds produced a total NISP of n=176. This data is presented in Table 31. Crew members walked surface units at 1 m intervals and the collected surface bones adding to a total of n=101. Test Units 1 and 2 produced a total NISP of n=3 each. Of the features identified as having faunal elements present, Feature 8 contained the highest number of remains with a total NISP of n=23. One of the most significant finds related to animal ritual use was present in Feature 8, which included a cluster of artifacts, bones, and pieces of broken bajareque. This find was interpreted as a partly decomposed basket. The faunal remains from this context included turtle carapace, the femur of an Anseriformes, the axis vertebra of a *Odocoileus hemionus* (mule deer), a fragment of shell likely from the phylum Mollusca, as well as two elements identified as *Canis familiaris*. These animals are associated with cosmological practice within the site boundaries of Paquimé, all having a symbolic connection to water.

Table 31. CH-254 taxa per unit/feature of Structure 6.

	TEST UNIT/ FEATURE									
TAXON	**T1**	**T2**	**F2**	**F4**	**F5**	**F8**	**F10**	**F15**	**F19**	**S**
UD Artiodactyla	-	-	2	-	-	-	1	-	-	25
Odocoileus virginianus	-	-	-	-	-	1	-	-	-	2
UD Mammal	-	-	2	1	2	4	-	-	1	26
UD Large Mammal	-	-	3	-	-	1	-	-	1	13
UD Small Mammal	2	-	1	-	-	-	-	1	4	4
Canis familiaris	-	2	-	-	-	-	-	-	-	6
Sylvilagus sp.	1	-	-	-	-	1	-	-	-	-
Lepus sp.	-	-	-	-	-	-	-	-	4	3
UD Rodentia	-	-	-	-	-	3	-	-	1	2
Spermophilius sp.	-	-	-	-	-	2	-	-	1	-
Eutamias	-	-	-	-	1	-	-	-	1	-
Anseriformes	-	1	1		-	-	-	-	-	2
Mollusca	-	-	-	4	-	1	-	-	1	-
Anura	-	-	-	-	-	-	5	-	-	-
Serpentes	-	-	-	-	-	-	-	-	8	-
Testudines	-	-	-	-	-	10	-	-	-	1
Undefinable	-	-	-	-	-	-	-	-	-	17
Total	**3**	**3**	**9**	**5**	**3**	**23**	**6**	**1**	**22**	**101**

5.3 CH-240

The elements making up the assemblage from CH-240 came from the 2000 field season. Excavations in 2000 focused on various shovel testing, which led to the identification of three structures. In addition to the elements collected and catalogued during the shovel tests, two of the identified structures had faunal elements within them. The identified structures were evaluated separately to examine faunal element patterns, species diversity, and the contexts in which the elements were found. Information regarding excavation methods, site locality, and context were found in site report published by Kelley and Garvin (2014).

The CH-240 site yielded the second most plentiful number of faunal elements recovered, reaching a total NISP of n=1094, weighing 2133.76 g. The highest identified genus/species element count came from the genus *Canis familiaris* (domestic dog), making up 14.72% of the identified bone in the CH-240 collection, with a total NISP of n=161. Many bones could not be identified to genus or species as this assemblage was quite fragmentary. Unidentified elements make up 39.85% of the total collection, having a total NISP of n=436. The majority of elements classified as an Artiodactyla taxa were found at CH-240 (n=191), broken down to have Cervidae (n=32), the species *Odocoileus virginianus* (n=97), and *Bison bison* (n=16). Other notable species in terms of the total NISP counts within this collection include large mammals (n=112), lagomorph species including *Sylvilagus sp*. (n=17) and *Lepus sp.* (n=29), as well as Testudines (n=33). Other species, including various rodents, birds, and artiodactyla, were also identified. A breakdown of the total species, including NISP, MNI, and weight, are presented in Table 32, and element breakdown per species in Tables 33-39.

Table 32. CH-240 NISP, MNI, Weight (g), % of Identified Bone.

TAXON	NISP	MNI	TOTAL WEIGHT (g)	% OF IDENTIFIED BONE
Artiodactyla	**191**	**8**	**1419.32**	**17.46%**
UD Artiodactyla	46	-	333.92	4.20%
Cervidae	32	-	112.63	2.93%
Odocoileus virginianus	97	7	906.93	8.87%
Bison bison	16	1	65.84	1.46%
Mammalia	**417**	**(1) 11**	**406.36**	**38.12%**
UD Large Mammal	112	-	310.19	10.24%
UD Small Mammal	46	-	31.04	4.20%
Canis familiaris	161	(1) 1	29.70	14.72%
Sylvilagus sp.	17	2	7.65	1.55%
Lepus sp.	29	3	13.39	2.65%
Conepatus leuconotus	4	1	2.08	0.37%
UD Rodentia	15	-	5.54	1.37%
Spermophilius sp.	25	2	4.08	2.29%
Cricetidae	8	2	2.69	0.73%
Aves	**11**	**-**	**2.47**	**1.01%**
Aves, Medium	5	-	0.44	0.46%
Aves, Small	2	-	0.35	0.18%
Anseriformes	4	-	1.68	0.37%
Mollusca	**2**	**1**	**0.07**	**0.18%**
Amphibian	**4**	**2**	**0.73**	**0.36%**
UD Amphibian	1	-	0.09	0.09%
Anura	3	2	0.64	0.27%
Reptiles	**33**	**3**	**12.91**	**3.02%**
Testudines	33	3	12.91	3.02%
Undefinable	**436**	**-**	**291.90**	**39.85%**
TOTAL	**1094**	**(1) 25**	**2133.76**	**100.00%**

Table 33. CH-240, *Canis familiaris*, *Conepatus leuconotus*, and *Bison bison* element NISP and Weight (g).

	Canis familiaris		***Conepatus leuconotus***		***Bison bison***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Calcaneum	1	0.99	-	-	-	-
Femur	3	2.53	1	0.59	-	-
Fibula	2	0.14	-	-	-	-
First Phalanx	5	0.19	-	-	-	-
Second Phalanx	2	0.05	-	-	-	-
Long Bone Epiphysis	9	0.54	-	-	-	-
Mandible	-	-	2	1.38	-	-
Metatarsal	6	0.28	-	-	-	-
Pelvis	1	0.35	-	-	-	-
Radius	3	4.35	-	-	-	-
Rib	43	3.02	1	0.11	-	-
Scapula	6	2.93	-	-	-	-
Skull	-	-	-	-	16	65.84
Tarsals	4	0.26	-	-	-	-
Teeth	15	1.62	-	-	-	-
Tibia	2	1.25	-	-	-	-
Ulna	2	0.99	-	-	-	-
UD Vertebra	22	1.33	-	-	-	-
Total	**161**	**29.70**	**4**	**2.08**	**16**	**65.84**

Table 34. CH-240, UD Artiodactyla, Cervidae, and *Odocoileus* element NISP and Weight (g).

	UD Artiodactyla		**Cervidae**		***Odocoileus***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	2	3.05	-	-	4	18.02
Atlas Vertebra	1	32.61	-	-	-	-
Calcaneum	-	-	-	-	3	44.28
Femur	-	-	-	-	3	39.25
First Phalanx	-	-	1	7.48	5	21.15
Second Phalanx	1	8.30	1	0.12	7	13.62
Third Phalanx	1	0.14	-	-	1	1.54
Humerus	-	-	1	16.81	8	127.83
Long Bone Fragment	21	81.53	22	75.71	7	25.38
Lumbar Vertebra	-	-	-	-	1	1.84
Mandible	-	-	-	-	4	23.54
Metacarpal	4	56.86	-	-	8	106.45
Metapodial	-	-	-	-	2	4.00
Metatarsal	1	7.00	-	-	2	5.58
Navicular	-	-	-	-	1	1.59
Pelvis	-	-	-	-	4	66.15
Radius	1	15.66	1	1.48	7	92.06
Rib	3	9.24	-	-	1	1.18
Scapula	2	18.64	-	-	4	22.83
Skull	-	-	2	3.13	2	13.24
Teeth	3	8.60	3	1.67	4	5.11
Tibia	5	85.59	1	6.23	18	269.12
Ulna	1	6.70	-	-	1	3.17
Total	**46**	**333.92**	**32**	**112.63**	**97**	**906.93**

Table 35. CH-240, UD Mammal, UD Large Mammal, and UD Small Mammal element NISP and Weight (g).

	UD Mammal		UD Large Mammal		UD Small Mammal	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Humerus	-	-	-	-	1	0.31
Femur	-	-	-	-	2	1.06
Long Bone Fragments	1	0.36	93	268.60	22	20.06
Pelvis	-	-	2	7.27	1	0.63
Phalanx	-	-	-	-	1	0.49
Ribs	-	-	2	15.92	5	1.02
Sacrum	-	-	-	-	1	1.18
Scapula	-	-	-	-	1	0.16
Skull	2	0.43	15	18.40	12	6.13
UD Fragments	433	291.11	-	-	-	-
Total	**436**	**291.90**	**112**	**310.19**	**46**	**31.04**

Table 36. Ch-240, Aves Am., Aves Med., and Anseriformes element NISP and Weight (g).

	Aves Sm.		Aves Med.		Anseriformes	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Coracoid	-	-	-	-	1	0.38
Humerus			5	0.44	1	0.61
Long Bone Fragment	1	0.12	-	-	-	-
Metapodial	-	-	-	-	1	0.24
Tibiotarsus	1	0.23	-	-	-	-
Ulna	-	-	-	-	1	0.45
Total	**2**	**0.35**	**5**	**0.44**	**4**	**1.68**

Table 37. CH-240, Amphibian, Anura, and Testudines element NISP and Weight (g).

	Amphibian		*Anura*		Testudines	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	-	-	3	0.64	-	-
Carapace	-	-	-	-	24	11.47
Femur	-	-	-	-	1	0.17
Humerus	1	0.09	-	-	4	0.49
Metapodial	-	-	-	-	1	0.13
Skull	-	-	-	-	3	0.65
Total	**1**	**0.09**	**3**	**0.64**	**33**	**12.91**

Table 38. CH-240, Cricetidae, *Spermophilius sp*., Rodentia element NISP and Weight (g).

	Cricetidae		*Spermophilius sp.*		Rodentia	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Cranium	1	1.11	-	-	-	-
Femur	-	-	2	0.50	-	-
Humerus	1	0.09	3	0.35	1	0.13
Mandible	3	1.18	3	1.22	1	0.13
Maxilla	1	0.19	-	-	2	2.75
Pelvis	-	-	3	0.50	4	1.41
Radius	-	-	2	0.57	-	-
Skull	-	-	2	0.11	2	0.34
Tibia	2	0.12	5	0.41	1	0.55
Teeth	-	-	1	0.09	2	0.04
Ulna	-	-	2	0.22	-	-
UD Vertebra	-	-	2	0.11	2	0.19
Total	**8**	**2.69**	**25**	**4.08**	**15**	**5.54**

Table 39. CH-240, *Lepus sp.*, *Sylvilagus sp*., and Mollusca element NISP and Weight (g).

	Lepus sp.		***Sylvilagus sp.***		**Mollusca**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	-	-	1	0.26	-	-
Calcaneum	-	-	2	1.70	-	-
Femur	1	1.46	1	0.41	-	-
Fibula	1	0.07	-	-	-	-
First Phalanx	1	0.10	6	0.83	-	-
Humerus	4	2.88	1	0.67	-	-
Mandible	1	0.63	1	0.44	-	-
Metacarpal	4	0.38	-	-	-	-
Metatarsal	1	0.25	-	-	-	-
Pelvis	-	-	1	0.19	-	-
Radius	3	1.27	-	-	-	-
Rib	3	0.29	-	-	-	-
Scapula	6	2.87	1	1.62	-	-
Skull	1	0.54	-	-	-	-
Tibia	2	1.57	2	1.18	-	-
Ulna	1	1.08	1	0.35	-	-
UD Fragments	-	-	-	-	2	0.07
Total	**29**	**13.39**	**17**	**7.65**	**2**	**0.07**

5.3.1. CH-240 Shovel Tests: 2000

In the initial shovel tests of the 2000 field season, a grid for the site was established with the site datum set at 200N 200E, seen in Figure 27 (Kelley and Garvin 2014, 21). Shovel testing was used to locate areas where sub-surface features might be present. These spread over 74 meters north-south (Kelley and Garvin 2014, 21). The shovel tests ranged from 0.5 x 0.5 m to 0.5 x 3.0 m in size. The first seven tests did not produce evidence of structures, but a shallow roasting pit was exposed in Test 6 and yielded a surprising number of artifacts as well as faunal ecofacts. This roasting pit expanded into Shovel Tests 10 and 10A and was such a prominent feature that excavations were expanded in the main excavation area to include Shovel Tests 8, 8A W, and 8A E. Elements were present in Levels 1 and 2, and most of the identified elements were present in Level 1 (n=73). The breakdown of element representation is presented in Figure 26.

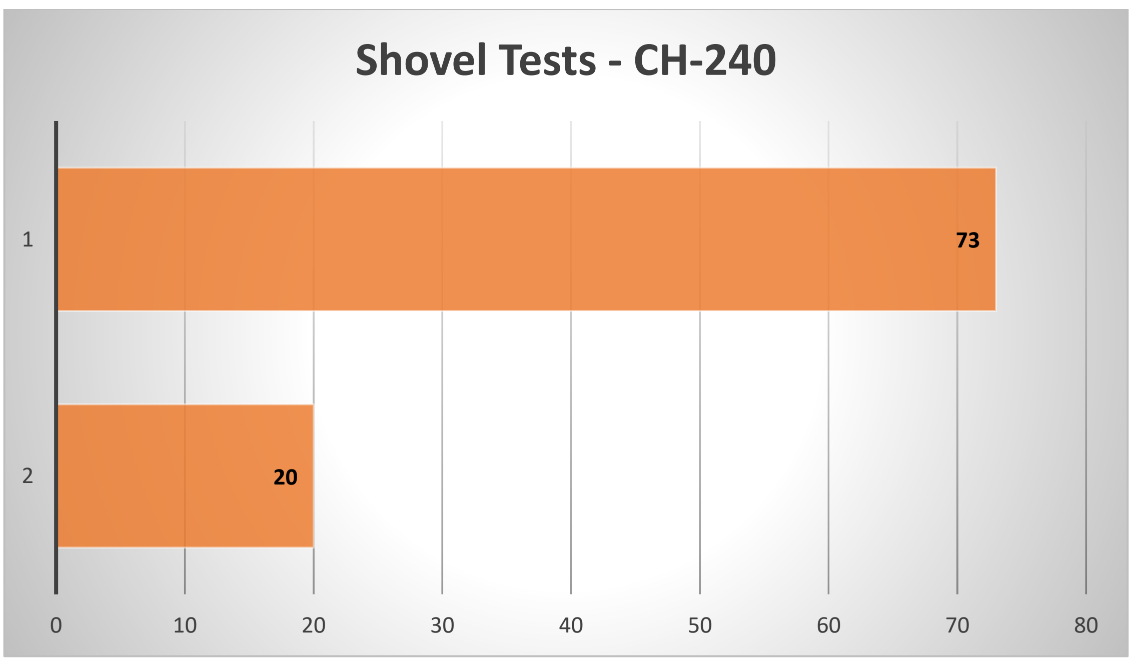

Figure 26. CH-240 number of faunal elements (NISP) per level of Shovel Tests.

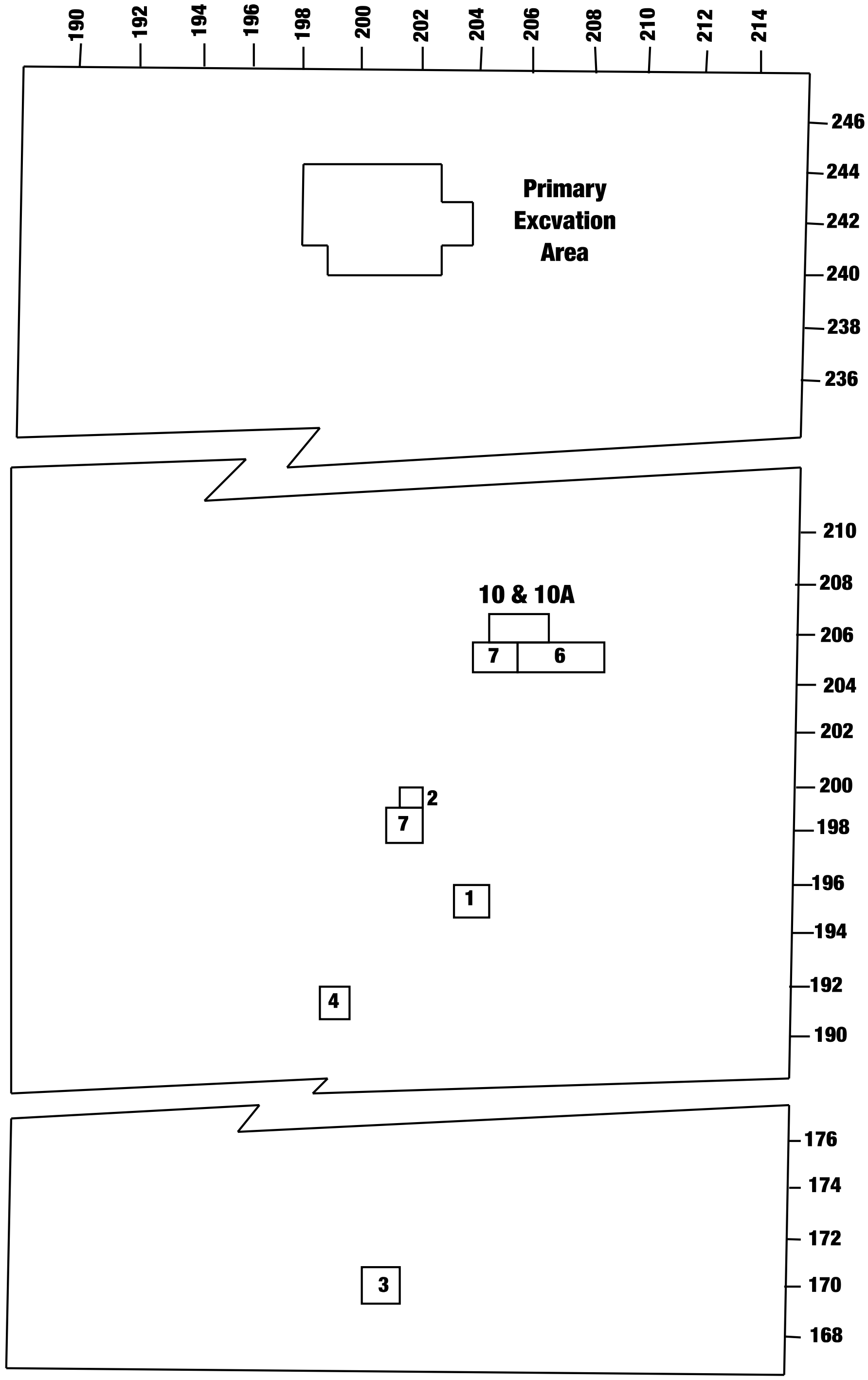

Figure 27. CH-240 Shovel Tests, north-south grid. Adapted from Kelley and Garvin (2014, 21).

Out of the eight initial shovel tests, seven had faunal remains present. The prominence of faunal elements varied, but most were found in Shovel Tests 10 & 10 A (n=54). The lowest number of elements were found in Shovel Test 1 (n=1). Most elements were not able to be assigned to a taxon and were labelled as undefinable (n=23). UD large mammals (n=17), *Sylvilagus sp*. (n=13), and *Odocoileus virginianus* (n=12) were all found in abundance. Table 40 lists the elements according to taxa and content. Based on the identified features associated with the shovel tests, mainly thermal/roasting pits, potential conclusions can be drawn about certain species used for subsistence purposes, specifically based on the prominence of deer, mammals, and cottontail elements. Along with burnt and calcined bone, bones with evidence of possible cut marks seem to support evidence of subsistence activities. Most elements exhibiting these types of taphonomic processes (burning n=96 and cut marks n=35) came from CH-240. Specifically, the shovel tests associated with the roasting pit and Shovel Test 8.

Table 40. CH-240 taxa per Shovel Test Unit.

	Shovel Test Units						
TAXON	**1**	**2**	**4**	**5**	**6**	**9**	**10/ 10A**
UD Artiodactyla	-	-		1	-	-	8
Cervidae	-	-		-	-	-	6
Odocoileus virginianus	-	-	3	-	-	3	6
UD Large Mammal	-	-	-	-	6	5	6
UD Small Mammal	-	-	-	1	-	3	4
Canis familiaris	-	-	-	-	-	-	1
Sylvilagus sp.	1	-	-	-	-	2	10
Testudines	-	-	-	1	-	1	2
Undefinable	-	4	-	2	-	6	11
Total	**1**	**4**	**3**	**5**	**6**	**20**	**54**

5.3.2. CH-240 Structure 1: 2000

Evidence of Structure 1 was found in Shovel Test 8, and that shovel test was expanded into the principal excavation area (Tests 8A and Units 11-23). After expanding, multiple different floors and associated features emerged at a consistent pace (Kelley and Garvin

2014, 24). Structure 1 was in a shallow depression and was identified as a small pit house with a well-preserved floor (Kelley and Garvin 2014, 24). Following the abandonment of Structure 1, the area was used for trash disposal, like the structures at CH-254. Kelley and Garvin (2014, 25) found a complex array of pits in the intermediate levels of the excavation. Structure 1 was excavated entirely, but the floor and north side wall cut through another floor that presumably was older than Structure 1 (Kelley and Garvin 2014, 25). This possible structure was not excavated due to time constraints.

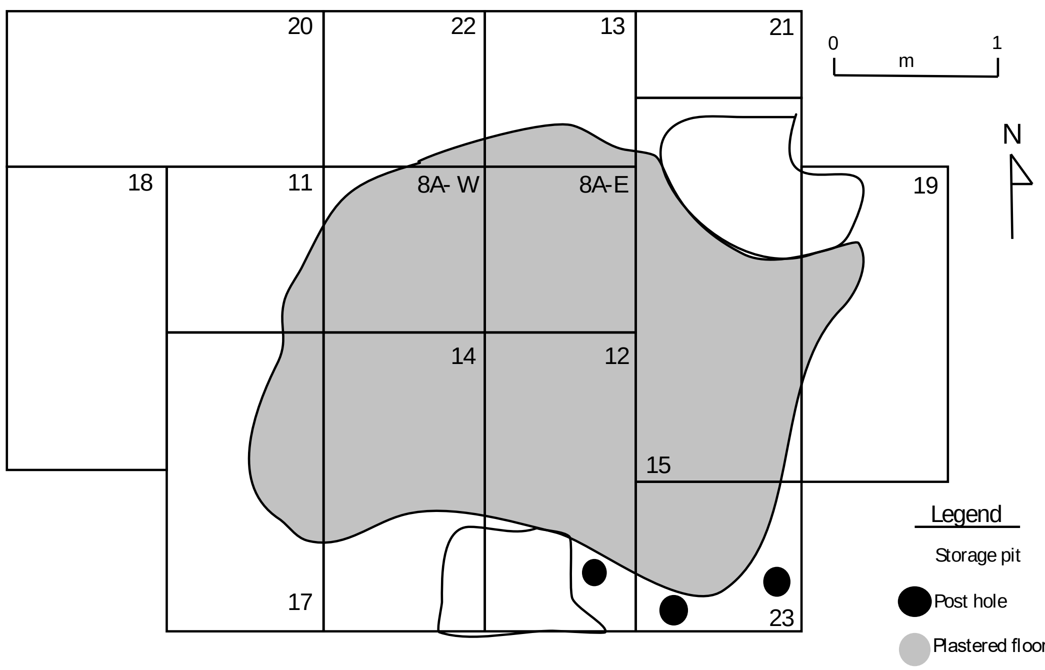

Figure 28. CH-240 Structure 1. Adapted from Kelley and Garvin (2014, 26).

Faunal elements were found in Levels 1 through 6, with the most elements (n=388) found in Level 3 because this is where a puppy burial was located. The level with the lowest number of elements was Level 6 (n=1). The total distribution of elements based on assigned stratigraphy and level designation can be seen in Figure 29.

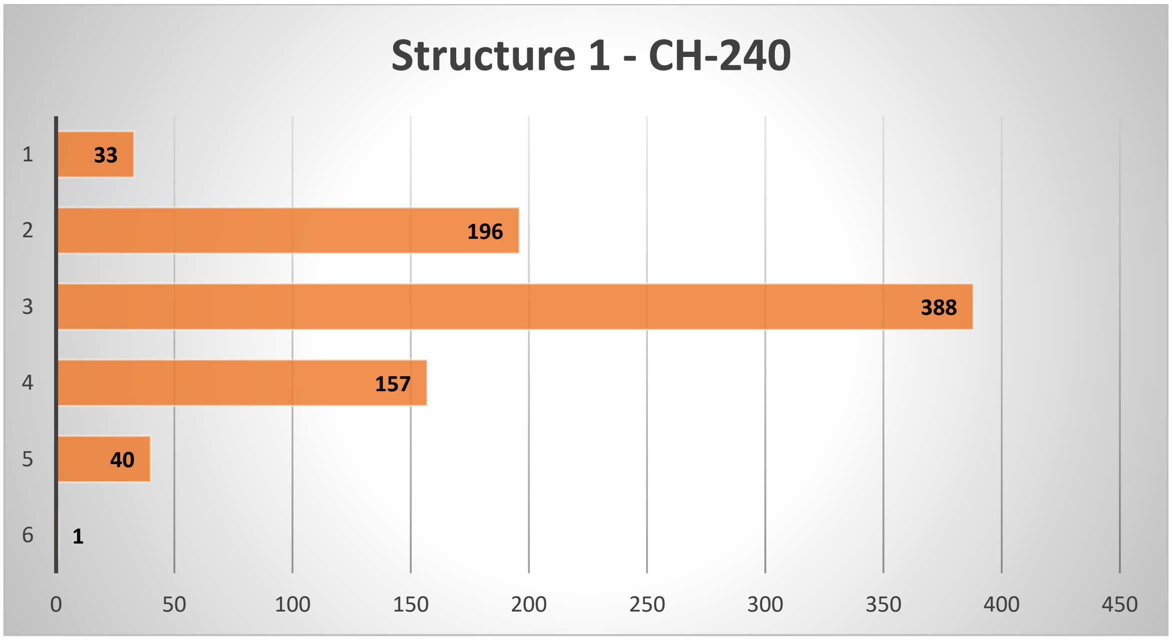

Figure 29. CH-240, number of faunal elements (NISP) per level of Structure 1.

The highest number of faunal elements within the CH-240 boundaries were recovered from Structure 1. The number of faunal elements varied but bone was present in 10 units. Table 41 lists the identified elements according to taxa and context. Most of the identified elements came from Unit 15 (n=339), and the least number of identified elements came from Unit 21 (n=6). Overall, elements classified as undefinable made up most of the fauna collected from Structure 1 (n=324). This is partly due to the fragmentary nature of the elements collected, most of which lack distinguishable attributes. The most prominent identified taxa are *Canis familiaris* (n=160). The taxa which are the least common are amphibians (n=1). Many *Odocoileus virginianus* elements are whole, non-fragmentary states from Structure 1 (n=61), which made identifying these elements to a species level easier than those from the other structures. The most plentiful taxa represented were UD large mammals (n=68), Testudines (n=27), *Spermophilius sp.* (n=25), and *Lepus sp.* (n=19).

Table 41. CH-240 taxa per unit of Structure 1.

	UNIT									
TAXON	**8**	**8E**	**12**	**13**	**15**	**16**	**19**	**21**	**22**	**23**
UD Artiodactyla	3	-	5	-	8	-	1	-	-	4
Cervidae	-	-	12	-	6	-	-	-	2	4
Odocoileus virginianus	4	4	13	8	13	3	5	2	1	8
Bison bison	-	-	-	-	-	-	-	-	16	-
UD Large Mammal	17	6	20	8	2	2	6	-	-	7
UD Small Mammal	1	1	8	-	6	5	2	-	1	4
Canis familiaris	-	2	2	-	155	-		-	-	1
Sylvilagus sp.	-	-	3	-	-	-	-	-	-	-
Lepus sp.	1	-	2	-	6	4	3	-	2	1
Conepatus leuconotus	-	-	-	-	4	-	-	-	-	-
UD Rodentia	1	1	4	1	4	-	2	-	1	1
Spermophilius sp.	-	1	1	-	1	-	22	-	-	-
Cricetidae	-	-	-	-	2	-	-	-	-	1
Aves, Medium	-	-	-	-	-	-	2	-	-	4
Aves, Small	-	-	1	-	-	-	-	1	-	-
Anseriformes	-	2	-	1	-	-	-	-	-	1
Mollusca	-	-	-	2	-	-	-	-	-	-
Amphibian	-	-	-	-	-	-	-	-	-	1
Anura	-	-	-	1	-	-	1	-	-	-
Testudines	6	-	5	-	7	2	4	-	1	2
Undefinable	3	-	66	12	125	3	41	3	18	53
Total	**36**	**17**	**142**	**33**	**339**	**19**	**89**	**6**	**42**	**92**

There is considerable evidence of roasting pits and associated faunal elements consistent with human-animal relations revolving primarily around subsistence. This is consistent with the shovel tests found in and around the identified roasting pit. Structure 1 had a juvenile dog burial within Unit 15. The puppy was placed in a small circular pit, its bones accounted for a large majority of the elements assigned to the species *Canis familiaris* (n=155). The lack of trauma on the bones in an ante or perimortem context indicates that the puppy could have died from natural causes and was purposely put into the burial by individuals residing in the area.

5.3.3. CH-240 Structure 2: 2000

Structure 2 was found high in the fill levels of CH-240 and was severely damaged by ploughing. Only a fire pit and bits of floor and charred beams were found, which was conclusive enough evidence that it was indeed a structure (Kelley and Garvin 2014, 26). Differing from the previously described evidence of pit houses in the region, Kelley and Garvin (2014, 28) characterized Structure 2 as a jacal surface structure. Unfortunately, because the structure was severely damaged by ploughing, this could not be confirmed. Structure 2 was entirely within the plough zone. The east side of the house extended over a trashy fill in the level above Structure 1, but most of the house was built on almost culturally sterile soil (Kelley and Garvin 2014, 28). Faunal elements were found in Levels 1 through 6, like that of Structure 1. Level 4 contained the most (n=66), while the level with the least was Level 1 (n=6). The total distribution of elements based on assigned stratigraphy and level designation can be seen in Figure 30.

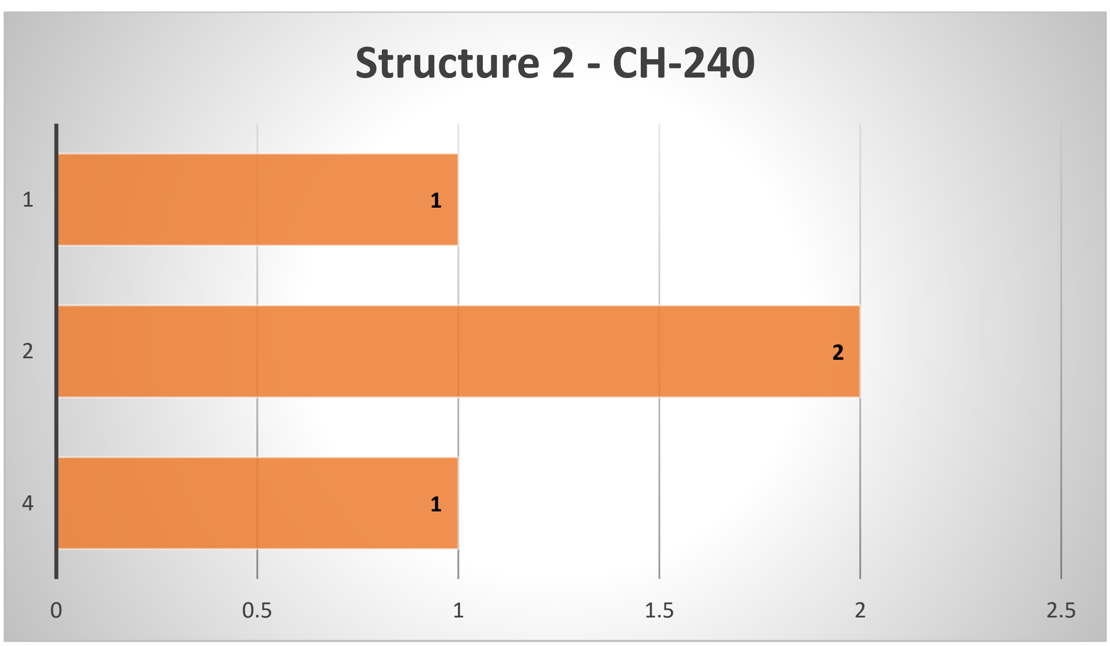

Figure 30. CH-240 number of faunal elements (NISP) per level of Structure 2.

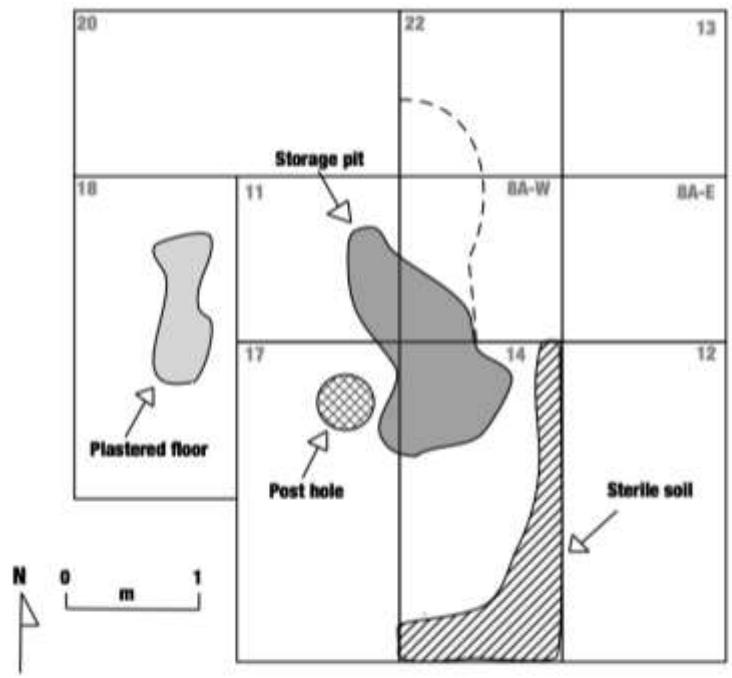

Figure 31. CH-240 Structure 2. Adapted from Kelley and Garvin (2014, 27).

Structure 2 had significantly fewer faunal elements recovered within the CH-240 boundaries, with elements found in six units. Table 42 lists the identified elements according to taxa and context. Most identified elements were present in Unit 14 (n=89), and the least number of identified elements came from Unit 20 (n=1). Overall, elements classified as undefinable make up most of the fauna collected from Structure 1 (n=84), damaged from plough action. Some bones were able to be classified as UD large mammals (n=27). The taxa which were the least common were the order Anura (n=1). It should be noted that, like CH-240 Structure 1, a considerable number of *Odocoileus virginianus* elements were recovered in the assemblage (n=23). The most plentiful taxa represented are artiodactyla (n=16), Cricetidae (n=5), and lagomorphs including *Sylvilagus sp.* (n=6) and *Lepus sp.* (n=6), as well as UD small mammals (n=8).

Table 42. CH-240 taxa per unit of Structure 2.

	Unit					
TAXON	**8W**	**11**	**14**	**17N**	**18**	**20**
UD Artiodactyla	6	5	2	3	-	-
Cervidae	2	-	-	-	1	-
Odocoileus virginianus	3	-	18	2	-	-
UD Large Mammal	1	6	12	8	-	-
UD Small Mammal	1	1	3	3	-	-
Sylvilagus sp.	-	1	4	-	1	-
Lepus sp.	1	-	5	-	-	-
Cricetidae	-	-	4	-	-	1
Anura	-		1	-	-	-
Testudines	-	-	1	1	-	-
Undefinable	9	6	39	30	-	-
Total	**23**	**19**	**89**	**47**	**2**	**1**

5.4. CH-218: The Quevedo Site

The elements making up the assemblage from the Quevedo site came from various field seasons, including 1998, 2007, and 2010. Four structures were identified in these field seasons and through the GPR and ground surveying done in 2005, 2007, and 2008. Excavations in 1998 focused on the excavation of Structure 1, in 2007 the team focused on Structure 2, and in 2010 they focused on Structures 3 and 4. All identified structures were relatively similar regarding the number of elements recovered. Individuals involved in the excavations pointed out that there were significantly fewer artifacts recovered for being one of the earliest Viejo period sites in the study region. Kelley and Garvin (2013, 5) commented that they have never understood why this site produced so few artifacts while the Calderón Site (CH-254) produced so many. I examined each of these identified structures individually to evaluate faunal element patterns, animal diversity, and the context in which elements were found. Information about excavation processes, site locality, and element context were compiled through site report published by Kelley and Garvin (2013).

CH-218 yielded a total NISP of n=64, weighing 180.95 g, putting it third among all four identified sites in this project for recovered faunal remains. All elements in this assemblage were assigned to a taxon, as there were no identified unidentified elements. The highest identified taxa element count belongs to the species *Lepus sp.* (jackrabbits), making up 23.44% of the identified bone in the CH-218 collection, with a total NISP of n=15. Other notable species within this collection include *Spermophilius sp.* (n=15), *Odocoileus virginianus* (n=8), *Canis familiaris* (n=8), UD small mammals (n=8), as well as bird taxa including Anseriformes (n=2), and *Meleagris gallopavo* (n=3). Three elements (n=3) were classified as Testudines. A breakdown of the total species identified, including NISP, MNI, and weight, can be seen in Table 43, and taxon-specific element breakdowns in Tables 44-47.

Table 43. CH-218, NISP, MNI, Weight (g), % of Bone.

TAXON	**NISP**	**MNI**	**TOTAL WEIGHT (g)**	**% OF IDENTIFIED BONE**
Artiodactyla	**9**	**2**	**147.20**	**14.06%**
UD Artiodactyla	1	-	10.49	1.56%
Odocoileus virginianus	8	2	136.71	12.50%
Mammalia	**47**	**7**	**26.56**	**73.44%**
UD Small Mammal	8	-	3.12	12.50%
Canis familiaris	8	1	5.24	12.50%
Sylvilagus sp.	1	1	0.35	1.56%
Lepus sp.	15	3	15.31	23.44%
UD Rodentia	1	-	0.05	1.56%
Spermophilius sp.	14	2	2.49	21.88%
Aves	**5**	**1**	**3.85**	**7.82%**
Anseriformes	2	-	0.69	3.13%
Meleagris gallopavo	3	1	3.16	4.69%
Reptiles	**3**	**1**	**3.34**	**4.69%**
Testudines	3	1	3.34	4.69%
Total	**64**	**11**	**180.95**	**100.00%**

Table 44. CH-218, *Canis familiaris*, *Sylvilagus sp*., and *Lepus sp*., element NISP and Weight (g).

	Canis familiaris		***Sylvilagus sp.***		***Lepus sp.***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Calcaneum	-	-	-	-	1	0.79
Femur	1	0.65	-	-	4	4.71
Lumbar Vertebra	-	-	-	-	1	0.86
First Phalanx	1	0.37	-	-	-	-
Mandible	-	-	1	0.35	1	2.91
Metacarpal	1	0.25	-	-	-	-
Metatarsal	3	1.40	-	-	-	-
Pelvis	-	-	-	-	1	0.69
Radius	-	-	-	-	1	0.37
Sacrum	-	-	-	-	1	1.57
Skull	1	2.29	-	-	-	-
Teeth	1	0.28	-	-	-	-
Tibia	-	-	-	-	4	2.79
Ulna	-	-	-	-	1	0.62
Total	**8**	**5.24**	**1**	**0.35**	**15**	**15.31**

Table 45. CH-218, UD Artiodactyla, *Odocoileus*, and UD Small Mammal element NISP and Weight (g).

	UD Artiodactyla		***Odocoileus***		**UD Small Mammal**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
First Phalanx	-	-	1	3.02	-	-
Second Phalanx	-	-	1	4.07	-	-
Humerus	-	-	2	83.32	-	-
Long Bone Fragment	1	10.49	-	-	4	1.81
Pelvis	-	-	-	-	2	0.50
Radius	-	-	2	13.73	-	-
Scapula	-	-	1	9.56	-	-
Skull	-	-	-	-	1	0.19
Tibia	-	-	1	23.01	-	-
UD Vertebra	-	-	-	-	1	0.62
Total	**1**	**10.49**	**8**	**136.71**	**8**	**3.12**

Table 46. CH-218, Anseriformes, *Meleagris gallopavo*, and Testudines element NISP and Weight (g).

	Anseriformes		***Meleagris gallopavo***		**Testudines**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Carapace	-	-	-	-	2	1.31
Carpometacarpus	-	-	1	0.69	-	-
Coracoid	-	-	2	2.47	-	-
Femur	1	0.21	-	-	1	2.03
Ulna	1	0.48	-	-	-	-
Total	**2**	**0.69**	**3**	**3.16**	**2**	**3.34**

Table 47. CH-218, Rodentia and *Spermophilius sp.*, element NISP and Weight (g).

	Rodentia		***Spermophilius sp.***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Cervical Vertebra	-	-	2	0.05
Femur	-	-	2	0.40
Humerus	-	-	1	0.15
Mandible	-	-	1	0.09
Rib	-	-	3	0.04
Scapula	-	-	1	0.23
Skull	-	-	1	0.72
Tibia	1	0.05	2	0.67
UD Vertebra	-	-	1	0.14
Total	**1**	**0.05**	**14**	**2.49**

5.4.1. CH-218 Structure 1: 1998

At CH-218, Structure 1 was the first identified Viejo period structure excavated by the PAC team (Kelley and Garvin 2013, 7). Structure 1 yielded essential information regarding the understanding of occupation and cultural practices of the Viejo Period. Structure 1 was a prehistoric house with a well-plastered floor encountered by crew members at around 40 cm below surface. The structure was circular and had a circular adobe wall around 10 cm below surface lining almost the entirety of the structure (Kelley and Garvin 2013, 7). The distribution of these faunal elements came in Levels 2 and 3, with most elements found in Level 3 (n=7). Though there were only two distinct species identified in Structure 1, there was no clear level separation as both were present in Level 2 and 3. An overall breakdown of elements per level is seen in Figure 32.

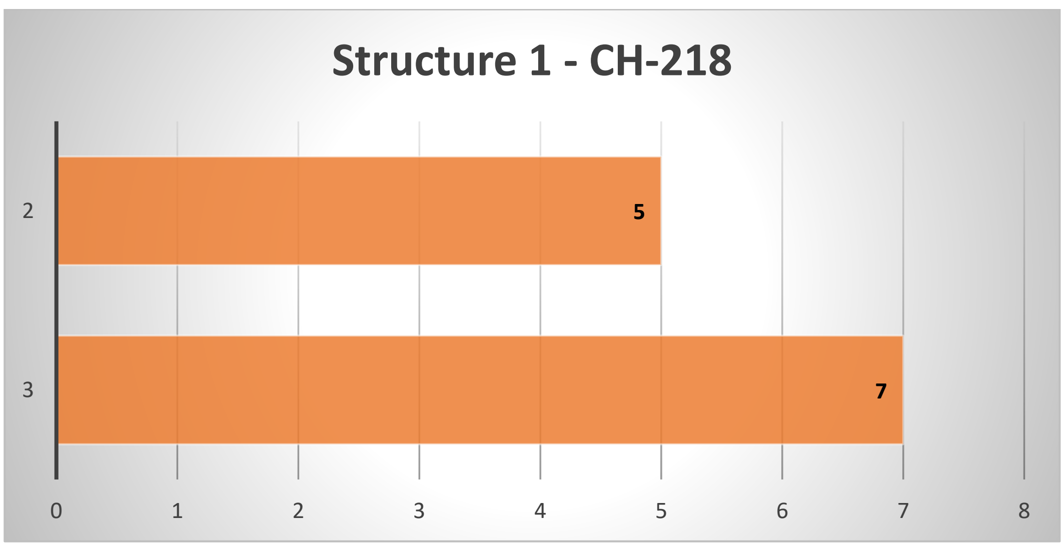

Figure 32. CH-218, number of faunal elements (NISP) per level of Structure 1.

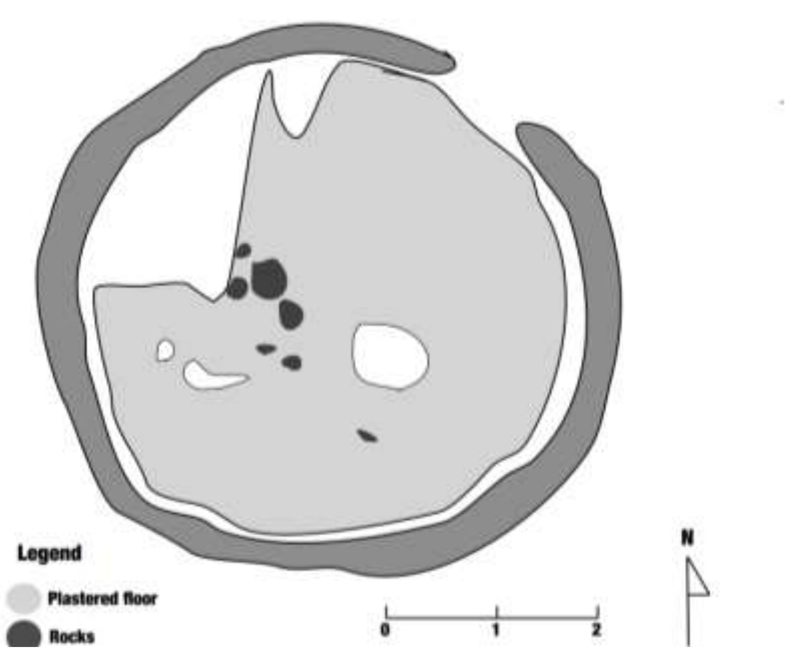

Figure 33. CH-218 Structure 1. Adapted from Kelley and Garvin (2013, 9).

The lowest number of faunal elements within the CH-218 boundaries were recovered from Structure 1 (n=12). Elements were found in three different localities within Structure 1, Table 48 lists them according to taxa and context. Most identified elements were present in 100N 49W (n=7), and the least number of identified elements came from 103N 48W (n=1). Overall, faunal elements were classified into two species, *Lepus sp*. (n=2) and *Spermophilius sp*. (n=10). It is unclear why this structure had so few remains, but this matches the overall trend of low artifact/ecofact counts seen throughout the site.

Table 48. CH-218 taxa per unit of Structure 1.

	UNIT		
TAXON	**100N 48W**	**103N 48W**	**103N 49W**
Lepus sp.	2	-	-
Spermophilius sp.	2	1	7
Total	**4**	**1**	**7**

5.4.2. CH-218 Structure 2: 2007

Structure 2 was found through systematic testing at the beginning of the 2007 field season aimed at finding site anomalies, brought to the crew's attention in the GPR survey done in 2005 (Kelley and Garvin 2013, 11). Structure 2 is described as larger than Structure 1, but a similar round shape, with an estimated diameter of 6 m (Kelley and Garvin 2013, 12). Like Structure 1, there was a curved adobe wall which would have extended around the entirety of the structure. The stratigraphic profile of Structure 2 revealed three levels of strata: Level 1 - compact/hard soil with little moisture representing an old plough zone; Level 2 - like Level 1 with slightly less compact and damper soil, and Level 3 - compact clay underlying the cultural deposits. The level distribution of faunal elements came in Levels 2, 3, and the back dirt. Some elements could not be assigned to a level based on a lack of available information in site reports and level records. Most elements were found in Level 2 (n=9), while the lowest amount was found in an unidentified context (n=2). An overall breakdown of elements per level can be seen in Figure 34.

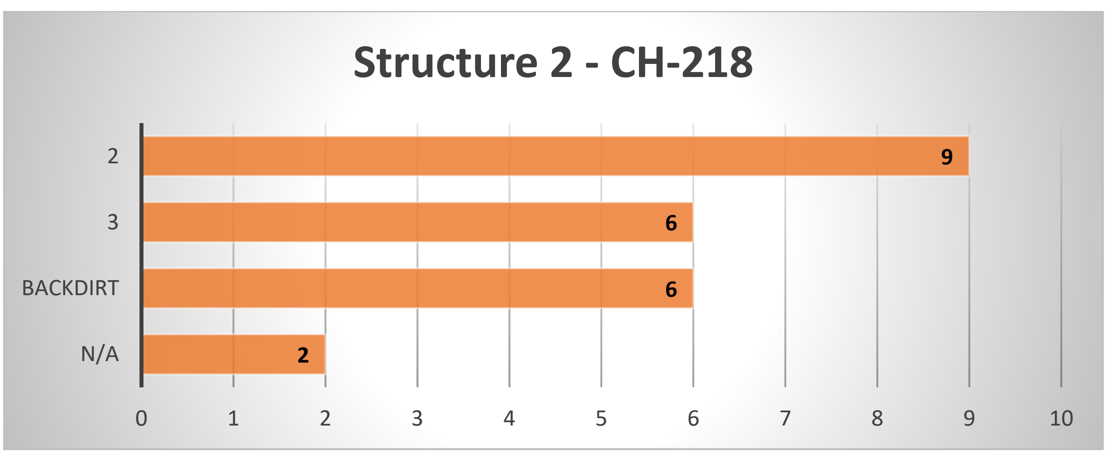

Figure 34. CH-218 number of faunal elements (NISP) per level of Structure 2.

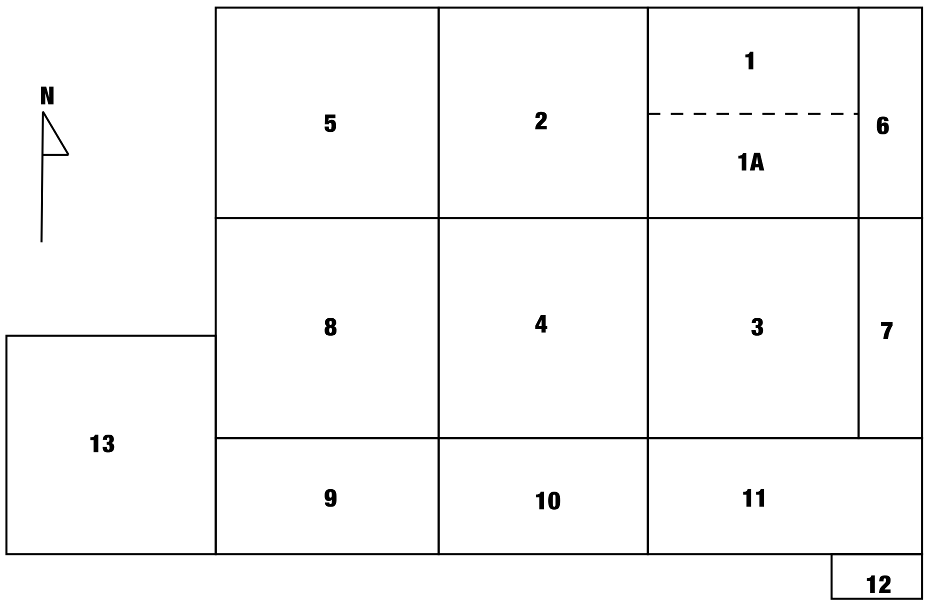

Figure 35. CH-218 Structure 2. Adapted from Kelley and Garvin (2013, 16).

Faunal elements found in Structure 2 totaled (n=23) and were present in four of the fourteen units excavated. These elements varied, listed in Table 49 according to taxa and context. Most identified elements were present in Unit 2 (n=17), and the least number of identified elements came from Unit 12 and Unit 16, both having NISP values of n=1.

Table 49. CH-218 taxa per unit of Structure 2.

	UNIT			
TAXON	**U2**	**U3**	**U12**	**U16**
Odocoileus virginianus	2	3	-	-
UD Small Mammal	6	-	-	-
Canis familiaris	-	1	1	-
Lepus sp.	7	-	-	1
Spermophilius sp.	1	-	-	-
Testudines	1	-	-	-
Total	**17**	**4**	**1**	**1**

Overall, elements classified as *Lepus sp.* Make up most of the fauna collected from Structure 2 (n=8). The taxa that were the least common were Testudines and *Spermophilius sp*., both having a NISP of n=1. The presence of *Odocoileus virginianus* (n=5) and *Lepus sp.* (n=8), though in relatively small amounts compared to other sites in the study area, support the idea that individuals during this time potentially incorporated garden hunting as part of their subsistence practices. This hypothesis is expanded upon in later discussions of animal use within the study region in the subsequent chapter.

5.2.3. CH-218 Structures 3 and 4: 2010

Structures 3 and 4 were identified through the 2005 and 2008 GPR surveys and were excavated during the 2010 field season. Kelley and Garvin (2013, 10, 12, 17) explained that the circular outline of Structure 4, detected on the 2005 GPR images, was initially thought to represent a similar adobe wall base surrounding a floor, as had been the case in all the previously excavated structures at CH-218. The makeup of these floors proved to be different from the structures previously excavated, as they were made up of locally sourced soil and water (Kelley and Garvin 2013, 20). Structure 3, the smaller of the two, was not initially identified as a structure but was later identified as such, though no suggestion of the nature of the structure could be presented (Kelley and Garvin 2013, 20). The crew who excavated Structures 3 and 4 pointed out that Structure 3 appears to have been a storehouse next to Structure 4. There was evidence that Structure 4 was burnt down and, based on the context of the artifacts found, was in use at that time (Kelley and Garvin 2013, 21).

The distribution of faunal elements came from Levels 1, 2, and 3. Most elements were found in Levels 2 and 3 with a NISP value of n=12. The lowest amount was found in Level 1 (n=5). An overall breakdown of elements per level can be seen in Figure 36.

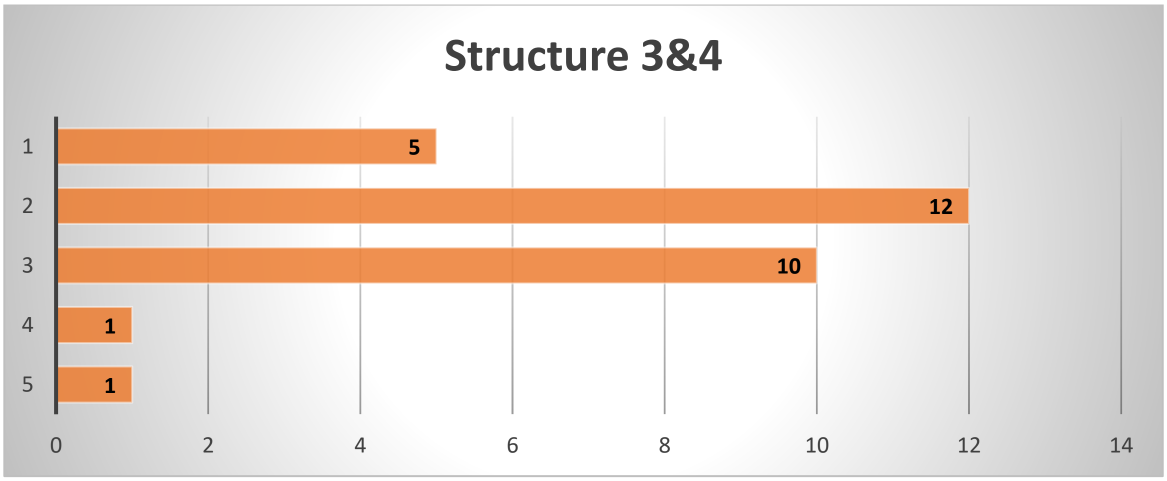

Figure 36. CH-218 number of faunal elements (NISP) per level of Structure 3 and 4.

Faunal elements found in Structures 3 and 4 (n=29), are the highest out of all identified structures at CH-218. Elements were present in thirteen of the forty-one units excavated. The prominence of these elements varied, and most units with faunal elements had relatively low counts. Table 50 lists the identified elements according to taxa and context. Most identified elements were present in Unit 13 (n=7). Units 1, 4, 19, 32, 33, 38, and 41 all had NISP values of n=1. Overall, elements classified as *Canis familiaris* make up most of the fauna collected from Structures 3 and 4 (n=6). The taxa which were the least common were UD Artiodactyla and UD Rodentia, both having a NISP of n=1. The most abundant taxa represented were *Lepus sp*. (n=5), Aves, including *Meleagris gallopavo* (n=3), Anseriformes (n=2), *Spermophilius sp.* (n=3), and *Odocoileus virginianus* (n=19).

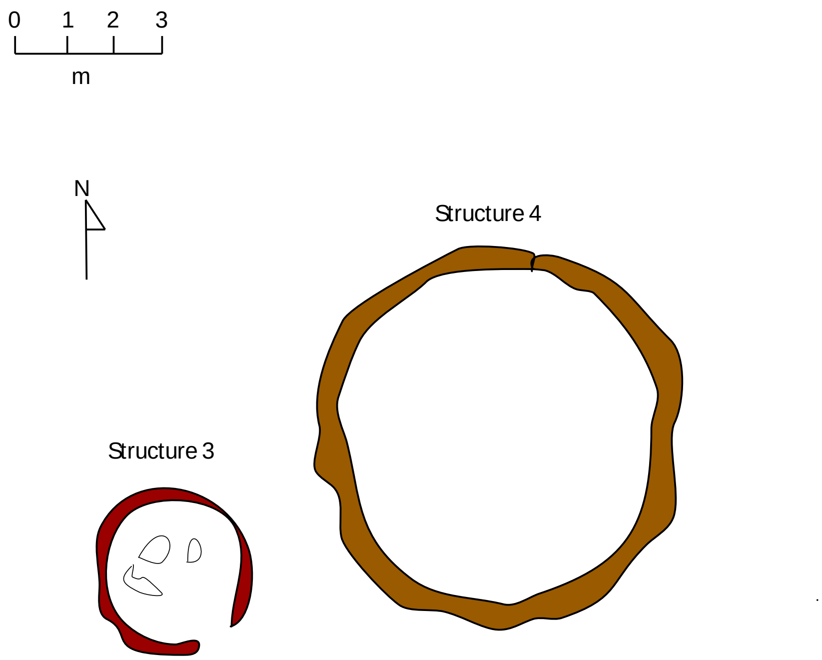

Figure 37. CH-218 Structure 3 and 4, taxa per Unit.

Table 50. CH-218 Structure 3 and 4, taxa per Unit.

	UNIT												
TAXON	**U1**	**U4**	**U8**	**U 13**	**U19**	**U32**	**U33**	**U37**	**U38**	**U39**	**U40**	**U41**	**U42**
Artiodactyla	-	-	-	-	-	1	-	-	-	-	-	-	-
Odocoileus virginianus	-	1	-	-	-	-	1	-	-	1	-	-	-
Small Mammal	-	-	-	2	-	-	-	-	-	-	-	-	-
Canis familiaris	1	-	-	4	-	-	-	-	-	-	1	-	-
Sylvilagus sp.	-	-	1	-	-	-	-	-	-	-	-	-	-
Lepus sp.	-	-	2	1	-	-	-	1	-	-	1	-	-
Rodentia	-	-	1	-	-	-	-	-	-	-	-	-	-
Spermophilius sp.	-	-	-	-	-	-	-	-	-	1	1	1	-
Anseriformes	-	-	-	-	-	-	-	-	-	-	1	-	1
Meleagris gallopavo	-	-	-	-	1	-	-	2	-	-	-	-	-
Testudines	-	-	-	-	-	-	-	-	1	1	-	-	-
Total	**1**	**1**	**4**	**7**	**1**	**1**	**1**	**3**	**1**	**3**	**4**	**1**	**1**

Though one of the smaller faunal collections, this assemblage contains a diverse array of taxa with varying proposed uses. As previously discussed with the Calderón site, *Canis* *familiaris* may indicate a companionship human-animal relation. Animals associated with ritual, such as Testudines, were also identified in Structures 3 and 4. The presence of *Lepus sp.* (n=5) supports the incorporation of garden hunting as part of their subsistence practices. Additionally, one of the more significant finds is a scapula rasp seen in Figure 38. As mentioned previously, bone artifacts were quite rare throughout the study area. These artifacts contribute to our understanding of the human-animal relations and resource management predicated by past groups that lived there.

Figure 38. CH-218, scapula rasp found in Unit 39 (Test Unit N) located north of Structures 3 and 4.

5.5 CH-272: The Santa Rosa Site

The elements that make up the assemblage from the Santa Rosa site (CH-272) came from the 1999 and 2000 field seasons. Little was known about this site, and the overall goal was to conduct both shovel tests and test unit excavations to determine what features were present at the site. Shovel tests were conducted in 1999, and in 2000 the crew returned to the site to conduct further surface collections and excavate test units (Kelley and Garvin 2014, 2-3). Kelley and Garvin (2014, 2) did not encounter any architectural remains in the shovel tests and test units during the 1999 and 2000 field seasons. Both the shovel tests and test units were evaluated individually to examine faunal element patterns, animal diversity, and the context in which elements were found. Information regarding excavation processes, site locality, and element context were compiled through site reports published by Kelley and Garvin (2014).

CH-272 ranked last among all four identified sites for this project regarding the number of recovered faunal elements, having a total NISP of n=31, weighing 134.23 g. Most are UD large mammals making up 22.58% of the identified bone in the CH-272 collection, with a total NISP of n=7. All elements in this assemblage were assigned a taxon, as there were no unidentified elements. Notable species within this collection include *Lepus sp.* (n=6), *Odocoileus virginianus* (n=5), and *Sylvilagus sp.* (n=4). A breakdown of the total taxa identified, including NISP, MNI, and weight, can be seen in Tables 51-54.

5.5.1 CH-272 Shovel Tests and Test Units: 1999-2000

In the 1999 field season, thirty-one shovel tests were dug at CH-272. Kelley and Garvin (2014, 2) split these shovel tests into two primary concentrations, those to the east and those to the west. This separation was based on the what the crew believed were promising chances of finding cultural material, where the east showed the most promise and the west the least (Kelley and Garvin 2014, 2)

Table 51. CH-272, NISP, MNI, Weight (g), % of Bone.

TAXON	**NISP**	**MNI**	**TOTAL WEIGHT (g)**	**% OF IDENTIFIED BONE**
Artiodactyla	**5**	**2**	**100.24**	**16.13%**
Odocoileus virginianus	5	2	100.24	16.13%
Mammalia	**23**	**4**	**32.84**	**74.19%**
UD Large Mammal	7	-	26.19	22.58%
UD Small Mammal	3	-	1.26	9.68%
Canis Familiaris	2	1	0.56	6.45%
Sylvilagus sp.	4	1	1.83	12.90%
Lepus sp.	6	2	2.57	19.35%
UD Rodentia	1	-	0.43	3.23%
Aves	**1**	**-**	**0.30**	**3.23%**
Aves, Medium	1	-	0.30	3.23%
Reptiles	**2**	**1**	**0.85**	**6.45%**
Testudines	2	1	0.85	6.45%
Total	**31**	**7**	**134.23**	**100.00%**

Table 52. CH-272, *Canis familiaris*, *Sylvilagus sp.*, and *Lepus sp.*, element NISP and Weight (g).

	Canis familiaris		***Sylvilagus sp.***		***Lepus sp.***	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Astragalus	-	-	-	-	2	0.64
Calcaneum	-	-	1	0.32	-	-
Femur	-	-	1	0.21	-	-
First Phalanx	1	0.26	-	-	-	-
Mandible	-	-	1	1.13	-	-
Pelvis	-	-	-	-	1	0.46
Ribs	1	0.30	-	-	-	-
Tibia	-	-	1	0.17	1	0.69
Ulna	-	-	-	-	1	0.29
UD Vertebra	-	-	-	-	1	0.49
Total	**2**	**0.56**	**4**	**1.83**	**6**	**2.57**

Table 53. CH-272, *Odocoileus*, UD Large Mammal, and UD Small Mammal element NISP and Weight (g).

	Odocoileus		**UD Large Mammal**		**UD Small Mammal**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Second Phalanx	1	1.50	-	-	-	-
Humerus	2	89.28	-	-	-	-
Long Bone Fragment	-	-	5	22.18	-	-
Metacarpal	1	2.95	-	-	-	-
Navicular	1	6.51	-	-	-	-
Skull	-	-	2	4.01	1	0.55
Total	**5**	**100.24**	**7**	**26.19**	**1**	**0.55**

Table 54. CH-272, Aves Med., Testudines, and Rodentia element NISP and Weight (g).

	Aves Med.		**Testudines**		**Rodentia**	
ELEMENT	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**	**NISP**	**WEIGHT (g)**
Carapace	-	-	2	0.85	-	-
Femur	1	0.30	-	-	-	-
Mandible	-	-	-	-	1	0.43
Total	**1**	**0.30**	**2**	**0.85**	**1**	**0.43**

Faunal elements found in shovel tests have a total NISP of n=17, the highest out of the two field seasons. Elements were present in seven of the thirty-one shovel tests dug. The prominence of these elements varied, and most units with faunal elements had relatively low numbers, resulting in low counts per unit. Table 55 lists the elements according to taxa and context. Most identified elements came from Unit 2 and Unit 24, both having NISP values of n=5. Units 1, 7, and 9 all had NISP values of n=1. Overall, elements classified as UD mammals, both large and small, made up most of the fauna collected from the shovel tests having a NISP of n=4. The taxa which were the least common were Aves (medium), *Canis familiaris*, and UD Rodentia, all having NISP of n=1. Faunal elements came from Levels 1 and 2. Most elements were found in Level 1 with a NISP value of n=12, and the lowest from Level 2 (n=5). An overall breakdown of elements per level can be seen in Figure 39.

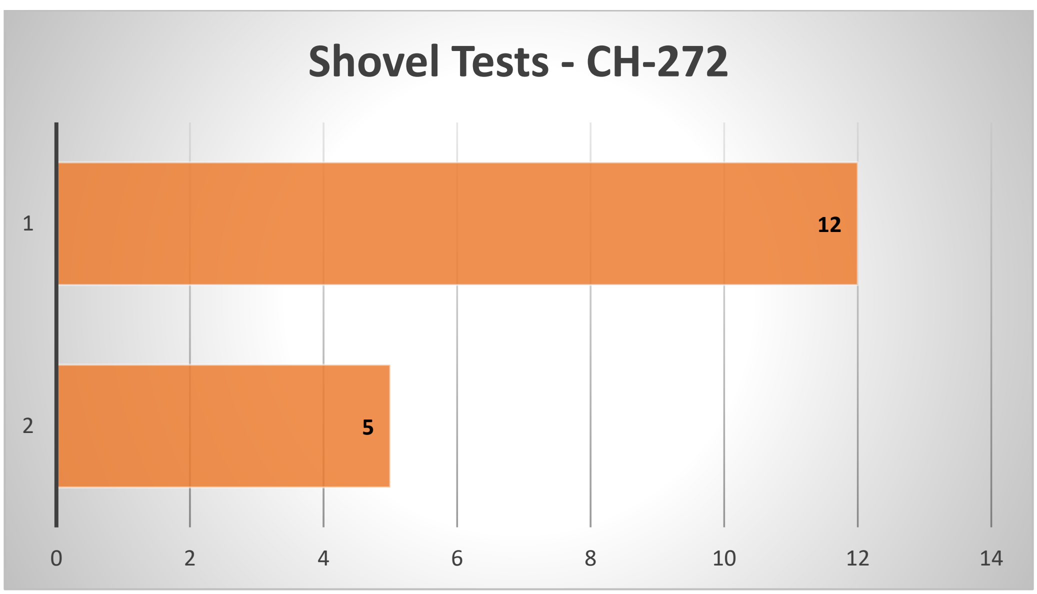

Figure 39. CH-272 number of faunal elements (NISP) per level of Shovel Tests.

Table 55. CH-272 taxa per level of Shovel Tests.

	SHOVEL TEST						
TAXON	**1**	**2**	**7**	**9**	**12**	**20**	**24**
Odocoileus virginianus	-	2	-	-	-	-	-
UD Large Mammal	-	-	-	-	-	-	4
UD Small Mammal	-	-	-	1	2	-	1
Canis familiaris	-	-	-	-	-	1	-
Lepus sp.	1	-	-	-	-	1	-
UD Rodentia	-	1	-	-	-	-	-
Aves, Medium	-	1	-	-	-	-	-
Testudines	-	1	1	-	-	-	-
Total	**1**	**5**	**1**	**1**	**2**	**2**	**5**

In the 2000 field season, six test units were placed and excavated in areas which yielded the most cultural materials during shovel testing in the 1999 field season (Kelley and Garvin 2014, 3-6). A total NISP of n=14 faunal remains, the lowest of the two field seasons, were found in all the test units excavated. As with the shovel tests dug the previous year, the prominence of these elements varied, and most units with faunal elements had relatively low amounts. Compared to the elements recovered in the shovel tests, the test units produced a lower diversity of taxa. Table 56 lists the identified elements according to taxa and context. Most identified elements came from Units 1 and 2, both having NISP values of n=3. Unit 6 had the lowest NISP values of n=1. Overall, elements classified as *Sylvilagus sp.* make up most of the fauna collected from the test units with a NISP of n=4. The least commonly found taxa was *Canis familiaris*, having a NISP of n=1. Faunal elements came from Levels 1, 2, 3, and 4. Most elements were found in Level 1 with a NISP value of n=9, and the lowest amount was found in Levels 2 and 3 (n=1). An overall breakdown of elements per level is presented in Figure 40. The limited number of faunal elements, as well as the lack of identifiable structures and features at CH-272 makes it difficult to assess the form of human-animal relations that were practiced at the site. Future excavations would prove beneficial to better understand these relationships.

Table 56. CH-272 taxa per unit of Test Units.

	TEST UNIT						
TAXON	**1**	**2**	**3**	**4**	**5**	**6**	**N/A**
Odocoileus virginianus	-	-	2	-	-	1	-
UD Large Mammal	-	-	-	1	2	-	-
Canis familiaris	-	1	-	-	-	-	-
Sylvilagus sp.	1	1	-	1	-	-	1
Lepus sp.	2	1	-	-	-	-	-
Total	**3**	**3**	**2**	**2**	**2**	**1**	**1**

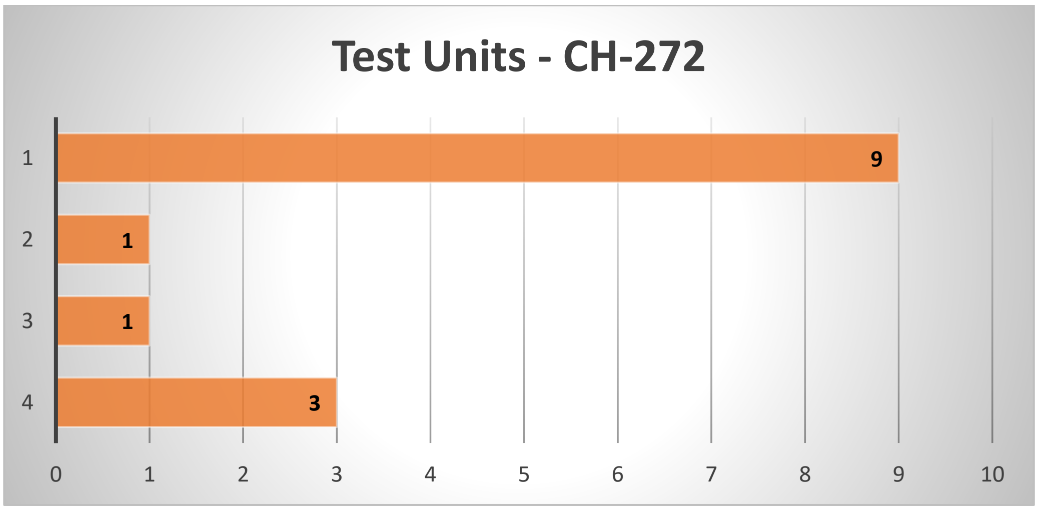

Figure 40. CH-272 number of faunal elements (NISP) per unit of Test Units.

5.6 Summary

A total of n=3655 bone elements were identified in the complete collection, with the majority classified as being the taxon Mammalia (n=2247). Taxa and species found in abundance throughout the region include Anseriformes, *Canis familiaris*, *Lepus sp.*, *Sylvilagus sp.*, *Odocoileus virginianus* UD small and large mammals, and Testudines. The data from the four sites denote variations and similarities when compared in an overall perspective, as well as on an individual site level. Most elements came from CH-

254, with 66% of the collection excavated from structures within the site boundaries. The Calderón site has noticeably higher amounts of faunal material than the other sites in the region. This difference is the because of the size and number of structures excavated, as CH-254 has the highest number of excavated structures in PAC. The CH-240 site has the second most abundant collection of faunal elements, with 31% of the total collection being from excavations within the site's boundaries. CH-218 and CH-272 had the two lowest number of total collected elements, with 2% and 0.005% of the total collection excavated within their boundaries.

Structures and features within all four sites of study show patterns consistent with domestic activity. There is no evidence to suggest that the sites within the study region would have been areas of aggregation used for larger ceremonial and communal activities. Compared to the larger sites to the north in the Casas Grandes region, such as Paquimé and El Zurdo, there are differences in the abundance of faunal material as well as the type of taxa and species identified. Material from my four study sites show clear evidence of subsistence practices, but there are also contextual patterns that do not fall under typical subsistence related explanations. The now recognized anomalies can be explored using alternate theories. In the following chapter, I discuss other uses of animal resources to explain the patterns and variances in the datasets.

Chapter 6: Discussion

Applying several theoretical frameworks can frequently be the greatest strategy to portray the complexity of ancient lives, since theoretical approaches have a considerable impact on archaeological interpretation and conclusions. In this chapter, I explore conventional approaches focused on subsistence, environmental, production, trade and social models used to explore these elements of the Viejo period of Chihuahua culture. Additionally, I introduce alternative ontological perspectives to understand the faunal material in the region, focusing on, animism, and analogism. This strategy shows how multiple theoretical approaches may be used to understand different facets of ancient lifeways.

6.1 Traditional Models of Faunal Analysis

From a straightforward reading of the results presented in Chapter 5, it is possible to interpret the faunal material from the sites of study through traditional naturalistic models of human-animal relations. The dominant theoretical frameworks used faunal analysis, as described in Chapter 3, tend to shape archaeological research in the Casas Grandes region. These models emphasize naturalistic approaches to human-animal relations, such as subsistence, environmental, production and trade, as well as social aspects of prehistoric lifeway patterns.

6.1.1 Subsistence and Environmental Models

The data collected from the faunal assemblages shows that animals were often used for subsistence. Di Peso (1974, 744) initially concluded that the trash at Paquimé pointed towards the diet in the region being representative of individuals having a "virtually vegetarian diet" until the Medio Period. Di Peso's conclusions of this vegetarian-based diet resulted from the lack of faunal elements recovered from JCGE excavations. Those faunal elements that indicate subsistence-related activities were from larger mammals, primarily bison (Whalen and Minnis 2009, 236). Di Peso's interpretations regarding the subsistence practices of Casas Grandes could be the result of excavation processes which were not adapted to the collection of small animal bones, and they may have been missed due to the lack of screening standards during the early years of excavations (Minnis and Whalen 2015, 12; Whalen and Minnis 2009, 229-230).

In contrast, the faunal assemblage collected from the sites of study show evidence of subsistence practices for the southern regions of Casas Grandes during the Viejo period that echo other findings (see Minnis and Whalen 2015, 12; Whalen and Minnis 2009, 229-230). Specifically, this faunal assemblage shows patterns of large and small animals used for subsistence purposes. As described in Chapter 5, excavations at all four sites of study recovered animal bones from various animal types, suggesting a large diversity of species would have been locally available to the occupants of the region during the Viejo periods (Martinez et al. 2011, 38-39; Merrill and López Gónzalez 2007, 44-45). Contrary to the diverse range of species available throughout the Casas Grandes region, only a few seem to be exploited for subsistence-related purposes, and animal diversity is restricted to three fundamental taxa: artiodactyls, lagomorphs, and mammals, both large and small. Animals including cervids, white-tail deer species, jackrabbits, cottontails, and UD small and UD large mammals were consumed (Kelley et al. 2012, 96; Manin and Lefèvre 2016, 135; Whalen and Minnis 2009, 231-232).

As Chapter 5 shows, people at each site seem to have exploited animals in slightly different ways. These slight differences are most evident in relation to the different proportions of the total identified bone. The CH-254 assemblage has an overall greater representation of large and small mammals. Faunal material from CH-240 has a more significant overall representation of artiodactyls, and CH-218 show a significantly greater representation of lagomorphs. Lastly, the CH-272 assemblage has fewer variable values, namely species diversity and total NISP, overall than the assemblage size. These slight variations were also presented in the earlier isotope evidence collected by Webster (2001, 104) and McConnan (2021, 143), which note differences in nitrogen isotope values across different sites, suggesting differences in the exploitation of animal resources.

The taxa present show that hunting practices revolved around "garden hunting." Manin and Lefèvre (2016:136) define the garden hunting model as "a practice taking place in cultivated fields and other culturally modified environments and focusing on animals privileged by human activities." In archaeological contexts, garden hunting is represented by the type of taxa that result from techniques tailored to capture small to medium-sized animals (Hodgetts 1996, 154; Potter 2004, 326; Whalen and Minnis 2009, 232-234). Garden hunting is a foraging technique expected by behavioural ecology, in which underlying decision-making focuses on caloric returns. A few taxa exploited primarily for subsistence shows that individuals may have deemed certain species more optimal and reliable than others.

Lagomorphs, represented by jackrabbits and cottontails (both *Leporidae* family), are one of the predominant mammalian orders throughout the region. Lagomorphs represent 6.39% of the total assemblage (n=228). Lagomorphs hunted and consumed were likely found near fields, in addition to mammals and artiodactyls, specifically deer, that subsisted on lusher resources (McConnan 2021, 143-144). Additionally, deer species can be sustainably exploited with garden hunting strategies (Jackson 2014, 111). The family Cervidae had a total NISP of n=213, within which, white-tail deer (*Odocoileus virginianus)* have a total NISP of n=165. Faunal elements of this species often exhibit evidence of burning, less-intensive breakage, and greater representation of meat-bearing elements (Jackson 2014, 111). These patterns are seen at the site of CH-240, where roasting pits were found and associated faunal elements generally reflected a pattern consistent with subsistence. The importance of these two taxa, lagomorphs and cervids, may reflect their easy availability.

Species abundance in faunal assemblages can also be a good indicator of environmental changes in populated regions. As outlined in Chapter 2, significant climatic change is not hypothesized to have occurred during the Viejo and Medio periods, although highly variable seasonal fluctuations define the region. In relation to faunal material, lagomorph species can be used to determine if shifts occur in the availability of certain species over time as a result of changes to the environment. Though the environments of these two species overlap, jackrabbits are found more in open terrain. In contrast, cottontails are found in denser vegetation, so higher frequencies of jackrabbits may suggest either dry periods or greater deforestation, while higher frequencies of cottontails represent wetter periods or higher vegetation levels (Whalen and Minnis 2009, 235).

The calculation of a "lagomorph index" is especially helpful in this situation in determining the ratio of *Lepus sp*., and *Sylvilagus sp*. For this project, the lagomorph index was calculated by dividing the cottontails' NISP by the total number of cottontail and jackrabbit NISPs added together (cottontail NISP/ (cottontail NISP + jackrabbit NISP)). A lagomorph index of 1.00 indicates all lagomorphs are cottontails (*Sylvilagus sp*.), while a value of 0.00 shows all lagomorphs are jackrabbits (*Lepus sp*.) (Badenhorst and Driver 2009, 1835; Driver and Woiderski 2008, 5; Whalen and Minnis 2009, 235-236). Within the PAC faunal assemblage, jackrabbits had a total NISP of n=163, while cottontails had a NISP of n=65. The overall assemblage generates a lagomorph index value of 0.28, suggesting jackrabbits dominated the assemblage.

These results suggest that the Viejo period sites throughout the PAC would have experienced a relatively dryer, less vegetative environmental setting during the time of occupancy. This could be due in part to either seasonal fluctuation of precipitation levels which influences the availability of denser vegetation, or changes in the environment due to increased permanent settlement of individuals in the area, leading to the prominence of species which thrive in dryer, less vegetive environments (Driver and Woiderski 2008, 6; Whalen and Minnis 235). On a site-specific level, the lagomorph index values calculated are consistent with the overall values indicating that jackrabbits dominate the two species shown throughout the region. Lagomorph index values varied slightly but are calculated as: 0.28 for CH-254, 0.37 for CH-240, 0.06 for CH-218, and 0.40 for CH-272, respectively. As with many standard quantification methods, the total number of lagomorph elements identified affects the calculated values, as the variance in these values at a site-specific level are influenced by the higher or lower total NISP of lagomorphs identified. We see that sites with a lower number of lagomorphs present values which are either extremely close to 1.00 or extremely close to 0.00, indicating a total dominance of one species over the other. Therefore, the calculation of a lagomorph index may prove more valuable at sites with a higher sample size, such as CH-254 and CH-240. Though this is something that needs to be kept in mind, the abundance of lagomorphs found throughout the sites of the PAC overall allow for the lagomorph index to be a great quantitative tool to be able to identify evidence of environmental change, whether that be due to seasonal climatic fluctuations, or changing settlement patterns affecting environmental diversity.

6.1.2 Production and Trade

Archaeologists have assumed that prehistoric regions in the Greater Southwest and Northern Mesoamerica, including Casas Grandes, present evidence of the production and trade of local and exotic goods, including faunal material (Cunningham 2017, 193; Rakita and Cruz 2015, 58). As previously outlined in Chapter 3, two specific forms of exotic faunal goods were brought into the Casas Grandes region in large numbers during the Medio Period: shell and scarlet macaws. Based on the analysis of the faunal assemblage collected, no bone elements are classified as belonging to macaws. Therefore, contentions that specialized trade of macaw species within the region's boundaries during the Viejo period cannot be supported with the available faunal material. Though no macaw fauna is present, interestingly, a single macaw stone was found at the Viejo period Calderón site (CH-254) (Kelley et al. 2014, 17). The absence of macaws in the assemblage may relate to networks of exchange for macaws bypassing the study area in the Viejo period.

There is evidence of several types of shell fragments and shell ornaments. Marine shells came from two primary sources, the Gulf of California, and local mussels. Small numbers of shell ornaments and beads were identified in structures and burials throughout the project boundaries, including an incredible human burial in Structure 5B-I at the Calderón site, where an infant was interred with a total of n=940 shell beads (Kelley et al. 2014, 121). These ornamental shells were not available for my thesis project, but some shell was present in the faunal assemblage. The cultural activities tied to these shell fragments is difficult to determine. They may be tied to subsistence but could also have been used as raw material for artifact projection. The fishhook and unworked shell found in midden contexts at the Calderón site (CH-254) support the contention that the shell would have been an aquatic resource used at least partially for food. Shell likely acted as a prestige commodity and a local foodstuff, but the extent of shell trade is impossible to assess from the available evidence. However, it is worth remembering that Whalen and Minnis (2009, 237-246) argued that "one should note that economic specialization and trade have the potential to extend beyond artifacts deemed as eye-catching." Kelley et al. (2012, 97) also stated that there is little doubt that trade occurred with people in the regions surrounding the project boundaries. However, the faunal elements considered in this study do not support widespread trade for macaws or shells like in the later Medio period.

6.1.3 Social Models

Animal resources might also be central to social activities such as feasting. Minnis and Whalen (2015, 54) note that communal feasting activities at Paquimé focused on agave and bison roasted in large earthen ovens. The Viejo period sites studied for this thesis reflect domestic structures in small agricultural communities. Instead of feasting activities, daily food preparation and consumption defines site activities at CH-254 (Structures 2, 4, 5A, 5BII, 5C, and 6) and CH-240 (Test Unit 6), which possessed cooking hearths, utilitarian cooking vessels, and manos and metates. Faunal materials from the study area are dominated by lagomorphs (n=228) and small and medium-sized mammals (n=398 and n=287) that reflect a garden-hunting strategy for domestic consumption.

Interestingly, a small number of bison elements (n=16) were recovered from Unit 22 at CH-240. However, all bison materials belong to the skeleton's cranial section. Cranial portions of animals in a zooarchaeological context generally have an exceedingly low meat-utility index. Therefore, it is safe to assume that these portions were not utilized for subsistence-related purposes.

The faunal evidence outlined in the previous sections supports an interpretation of different Viejo and Medio period social consumption patterns. These interpretations may relate partly to different settlement sizes because larger aggregates of people generally create more diversity in the faunal assemblage. However, it also reflects social and economic developments in the Casas Grandes region during the Medio period. New inequalities are reflected in agricultural and craft production changes associated with ritual activities and feasting events (Cunningham 2017, 193). These changes introduced new consumption practices that depart from the Viejo period consumption trends identified by this thesis.

6.1.4 Anomalies Within Traditional Models of Faunal analysis

Most of the patterning outlined in Chapter 5 can be explained through traditional subsistence-based approaches to faunal materials. These traditional models supply the basic building blocks for understanding human-animal relations. Faunal analysis in both a past and present context, emphasize a naturalistic viewpoint with regard to Descola's framework for various ontologies. Naturalism highlights the observed continuities of physicalities based upon assigned biological categories and a discontinuity of interiorities or inner essence. An animal's core value to society under this perspective thus is its caloric and nutritional value. Such approaches therefore assume ancient societies were structured, regardless of their specific belief systems, by focusing on economic returns.

Naturalistic approaches cannot explain some of the patterns observed in the assemblage. For example, the turtle bones show an abundance of carapace and complete long bone elements, primarily at CH-254 (n=92) sites and CH-240 (n=33). Dog bones are often found in an articulated context, as seen in Structure 6 (Feature 7) at CH-254 and Structure 1 (Unit 15, Level 3) at CH-240. Patterns representing whole animals instead of scattered elements indicate interactions between humans and animals that depart from traditional neoclassical economic models. It is thus necessary to tease apart the evidence in the project's faunal assemblage to seek out different explanations for these anomalies.

6.2 The Ontological Turn in Zooarchaeology

In recent years, archaeologists have started to explore alternative approaches to shed light on anomalous patterns that deviate from traditional models of faunal analysis (Boyd 2017, 302). As described in Chapter 3, the "ontological turn" has caused a rethinking of the nature of animal-human relations, and Descola's *Beyond Nature and Culture* proposes some interpretive options. Specifically, the questions are whether the anomalies in the faunal assemblage can be explained because of the operation of an animistic or analogical ontology. These findings might shed light on the ontology that governed Casas Grandes culture.

6.2.1 Animism

Animals are visible in Medio period Casas Grandes culture through multiple lines of evidence, including ceramic iconography, rock art, effigy figurines, and faunal materials. Up to this point in time, animistic perspectives are the conventional alternative to naturalistic perspectives concerning human-animal relations within the study of prehistoric Casas Grandes. As discussed in Chapter 3, animism considers all beings to be persons, and many non-human entities enjoy inner lives replete with humanized attributes (Scott 2014, 8). Animism has been introduced as a hypothesis for understanding ritually significant features at sites such as Paquimé (VanPool and VanPool 2016, 320). The VanPool's analysis of Medio period iconography and architecture indicated that Paquimé reflected an animistic cosmology and a shaman-focused ritual system (VanPool 2003, 2009; VanPool and VanPool 2015, 2016, 2021; VanPool et al. 2005).

The question is whether one can see evidence of an animistic cosmology in the faunal assemblage collected from the four sites of study. We can expect to see patterns of faunal elements traditionally associated with shamanic activities because of the iconographic depictions of human-animal relations previously outlined by VanPool (2003) and VanPool and VanPool (2015, 2016, 2021). In this regard, some patterns are in accordance with animism, particularly given the abundance of turtle elements (n=133). The turtle carapace is traditionally associated with ritual activities such as offerings to the underworld and musical drums during ritual activities. Carapace elements were identified at all four sites of study, CH-254, CH-240, CH-218, and CH-272, and do not show taphonomic evidence of subsistence. In turn, this could suggest turtle remains reflect shamanic ritual activities, perhaps rattles, associated with the spirit travel and transformations typical of animistic perspectives.

However, other faunal materials do not show patterns of species engagement expected by the Medio period ritual system described by the VanPool's (VanPool 2003, 2009; VanPool and VanPool 2015, 2016, 2021). Metamorphic transformations are described as a classic feature of many animist ontologies. However, turkey and macaw sacrifices associated with those metamorphic transformations in the Medio period are absent in Viejo period sites found in the study region for this thesis. The small number of turkey elements (n=5) identified are all parts of the appendicular skeleton, and no elements were identified from macaws. One explanation is that this component of animal use in the ritual system did not appear until the Medio period florescence of Paquimé. However, ontology is considered a particularly durable components of a society's belief system. We would expect Medio period ritual systems to be an intensification of human-animal relations in the Viejo period, and thus they should show an underlying similarity. One possible added problem is that much of our understanding of animals in Medio period ritualism is based on iconographic depictions and some rather spectacular internments at Paquimé rather than a consideration of the overall faunal assemblage.

Beyond these issues with the faunal evidence, others have raised concerns about how archaeologists use animism and shamanism to explain ancient religious practices. As Willerslev (2013, 54) pointed out, animist perspectives of prehistoric culture are problematic. Klein et al. (2002, 384) similarly argued that shamanism, as employed in the studies of ancient Mesoamerica, is a romanticized category of behaviour that originated in hostility towards overtly materialist explanations. Shamanism is thus a vague and catchall western category that romanticizes the influence of spiritual “others” in ways that risk oversimplifying the complex dynamics of human belief systems in prehistory (Klein et al. 2002, 383-384). The trend in recent work has thus been to avoid using shamanism and animism as a basis for interpretation (Harrison-Buck and Freidel 2021, 4).

An alternative hypothesis was suggested by Descola (2013a). He outlines a number of possible ontological frameworks and makes the explicit claim that the Mesoamerican belief system is defined by an analogical ontology rather than an alternative to naturalism being a generalized form of animism (Descola 2013a, 207-209). The fact that many researchers see a Mesoamerican origin for the Casas Grandes ritual system suggests a need to consider analogism as a possibility. As I outlined in Chapter 3, analogism frames the world as a complex web of parallel substances present in multiple beings that creates a network of continuities and discontinuities in both the interiorities and physicalities of beings (Chamel 2019, 12-13; Descola 2013b, 41). The great diversity of these modes and types of being makes each entity of the world, viewed as human or non-human, connected but also quasi-unique (Corona 2020, 325).

6.2.2 Analogism

Throughout his work in the mid-twentieth century, Charles Di Peso (1974) proposed that the cultural patterns seen between sites classified as Medio versus Viejo period should be radically different. Mathiowetz (2018, 374) points out that Di Peso was criticized for relying heavily upon Southern Mesoamerican data to interpret Casas Grandes religion. Despite these criticisms, Di Peso's view of Mesoamerican deities presents a source to build upon, specifically in understanding the Casas Grandes region as structured by an analogical ontology.

The anomalies outlined in the earlier sections were viewed through naturalistic and animistic lenses, but they also fit an analogical ontology. With analogism, however, we can examine human-animal social relations with greater precision. With faunal material, there is always a reason behind the inclusion of animal resources, and the exploitation of certain species over others can be inferred as being distinct categories of interaction. Emery (2004, 105) describes factors which might reveal the complexity of human-animal relations beyond traditional Neo-classical approaches. Unique relations are found in three categories: 1) species considered sacred, 2) species identified as exotic in origin, and 3) faunal regalia utilized in ritual practices. Many of the anomalies found within the PAC faunal material have the potential to be explained through these categories, namely bird species, deer species, turtle species, shell, domestic dog, and bison. Anomalies are present on a site-specific level, such as the Calderón site, where we see an abundance of articulated dog elements (n=449), but more broadly across the region in the presence of unique species such as waterfowl and small birds (n=48 and n=48), turtle species (n=130), the domestic dog (n=620), as well as shell elements (n=44). Many of these elements were excavated from the Calderón site and the CH-240 site.

Two specific examples show how an analogical framework might explain the collected faunal assemblage. Feature 8 from Structure 6 at the Calderón site is identified as a cluster of artifacts, bones, and pieces of broken bajareque, interpreted as once being a basket. The faunal material from this context included a turtle carapace, the femur of a waterfowl, the axis vertebra of a mule deer, and a fragment of shell likely from the phylum Mollusca well as two elements identified as the domestic dog. The question arises of what these elements within a site structure have to do with human-animal relations.

Through an analogical understanding of human-animal relations, the basket creates an assemblage of different skeletal components which might articulate similarly powerful components of being. Animistic perspectives focus on the sacrifice and metamorphic transformation of holistic beings represented by a single species. However, here we see the encompassing of a diverse range of faunal elements that might assemble parts of being that are analogically related to communicating with gods or deities.

Notably, these species have been interpreted as strongly associated with water (VanPool and VanPool 2015, 96-97). The annual precipitation within Casas Grandes region is high variable, so ritually significant species may be those with ties to water. These associations could have persisted across the Viejo and Medio periods as core metaphors in an analogical ontology. In Mesoamerican belief systems, water was central to creating and maintaining the three world realms. The entrance into the underworld was often represented in a feature of a site associated with water, such as the Walk-In Well at Paquimé (VanPool and VanPool 2015, 96). Birds can be viewed as critical components of these activities based on our understanding of the cosmological structure of Mesoamerican rituals and religion. In elements collected from Ch-218, 240, 254, and 272, the majority classified as bird (n=128) were identified as waterfowl (n=48). While this has been interpreted as subsistence, smaller birds were also connected to practices of cultivation and agriculture, where they winnowed grain and acted as guardians of water and canals (Muir and Driver 2004, 130; Van Pool and Van Pool, 2015, 97). These species are often seen as offerings at the entrances into the underworld. Anthropomorphic figures are present in iconographic depictions of ritualistic activities, signifying the offering of animals as gifts to the deities which control the world realms. The raising and sacrifice of bird species, including turkeys, macaws, and waterfowl, allow for an established continuity between recognized differences in interiority and the physicality of existing beings, evident through the dawning of faunal regalia to tap into the shared sacred powers between these beings (Lucero 2018, 334).

Deer are also seen in rituals as having relations to water deities controlling the rain (Muir and Driver 2004, 131). Deer are described as treated with care after death. In the collected faunal assemblage, deer elements are notable for their lack of fragmentation. Muir and Driver (2004, 130-131) explain that a deer was returned home after being killed on a hunt, where specialized rituals were practised on the deer carcass. Emery (2004, 105) explains that fertility and life-renewal ceremonies, which involved deer, were often carried out in caves throughout the southern Maya regions, where deer elements, including crania, antlers, and teeth, were often left where the sacrifice took place (Emery 2004, 105). Elements represented throughout the faunal collection include scattered remains from many-body portions, including cranial fragments, teeth, pelvic, vertebrae and long bones, with a majority present in Structure 1 of CH-240. While these elements did not constitute complete individuals, they were consistent with highly intermingled animal offerings, possibly made at separate times. Deer are associated with rain in the American Southwest and symbolize fertility and rebirth in Mesoamerica (Emery 2004, 103; Muir and Driver 2004, 130-131). The faunal evidence points towards deer hunting being a prominent practice throughout the region. Though hunting is related to subsistence, its practicality for nutrition does not preclude its deeply ritual associations and the way those associations might impact faunal patterns (Emery 2004, 104-105; Muir and Driver 2004, 131-132; Paris et al. 2020, 44; Potter 1997, 358).

Many remains were recovered from the order Testudines, known as turtles, and this species is not local to the Casas Grandes region. The turtle elements found throughout the study area were relatively high in abundance compared with other species identified within the assemblages, with a total NISP of n=130. Turtle species were found in Structures 1-6 at the Calderón site (CH-254), as well as structures at CH-240 (Structure 1) and the Quevedo site (Structure 2). None of the elements identified as turtle have evidence of being utilized for subsistence-related purposes. Turtles have previously been identified as symbolizing water throughout the Americas. An abundance of turtle shells and regalia found at the site of Paquimé were kept in ritual waterways with other items associated with water, such as turquoise (VanPool and VanPool 2015, 97). Mesoamerican cosmologies view the earth as floating on a sea, represented as either a crocodile or a turtle carapace (Duff and Harrison-Buck 2015, 43; Lucero 2018, 333).

Terrestrial and marine turtles were often identified with water due to their aquatic habitats (Duff and Harrison-Buck 2015, 43). The turtle carapace was a guideline for cardinal directions identified through Mesoamerican cosmologies. The legs of the turtle support the cosmos in the corners of the world, while the carapace symbolizes the centre of the world (Rappenglück 2006, 227-228). Turtle shells were also widely used as drums in ancient Mesoamerica. These are seen as being associated with ritual practices relating to these drums as a reference to thunder, storms, and rain (Duff and Harrison-Buck, 44; Manin and Lefèvre 2016, 139). The skeletal representation in the PAC faunal assemblage is made up of those elements identified as representing the structure of the Mesoamerican cosmological world realms, including the carapace, hind and front limbs, and the pelvis.

Bone elements from the domestic dog make up a sizable part of the faunal material found throughout the study region. One anomaly within the faunal material collected, particularly seen in the CH-254 and CH-240 material, is the presence of dog burials. Literature on Casas Grandes dog burials is sparse, but studies to the south in the central and southern regions of Mesoamerica indicate ritual and mortuary factors. Specifically, two dog species seem significant in Aztec contexts, the tlalchichi (ancient short-legged dog), and the xoloitzcuintli (ancient hairless dog or xolo) (Wilkosz 2019, 8). While there is no straightforward evidence of how often dogs would have been utilized for subsistence purposes, there is available information regarding dogs' cosmological importance to the Aztec societies (Semanko 2020, 73-74; Wilkosz 2019, 6). The xoloitzcuintli was not regarded as a part of occupants' daily diet but was considered an important contributing factor to maintaining cosmological realms with the deity Quetzalcoatl. Dogs are described in these southern regions of Mesoamerica as being buried with elite individuals to guide the departed individual's journey to the afterlife (Emery 2004, 105). In short, the presence of dogs in funerary contexts indicated a connection between the mythological figure of xoloitzcuintli and the Aztec vision of the underworld (Wilkosz 2019, 13-14).

The two human-like burials found at CH-254 and CH-240 provide evidence to suggest that some dogs were not used for subsistence, thus an alternate hypothesis is needed to understand these patterns. Some of the region's most obvious evidence of subsistence practices came from CH-240, where roasting pits containing white-tail deer and smaller mammals and birds were unearthed. The dog burial found at CH-240 is unique in the proximity to these roasting pits but presents a clear difference in taphonomic processes and skeleton placement. The dog was placed in a shallow pit (Structure 1, Unit 14, level 3) on its right side, with no evidence of burning, cut marks, or clear disarticulation of the bone elements. The context of the dog in this burial suggests that it was a companion rather than a meal.

The dog burial identified at CH-254 (Structure 6, Unit 11 level 2) presents similar contextual evidence to CH-240, as the bones were found fully articulated and the animal was placed on its right side. Kelley et al. (2014, 171) noted that the burial was found underneath the outside floor, suggesting that the burial did not post-date the occupation of the structure. The careful placement of this dog and the un-fragmentary nature of the skeleton, though some of the smaller elements (sesamoids, phalanxes and teeth, were lost through the excavation process of the middens, suggests a companion or domestic relationship over subsistence. Furthermore, the burial was placed in one of the more ritually defined features found at the Calderón site (Structure 6, Feature 8), suggesting an overarching ritual significance to water and deities associated with rainfall through the type of species present. If one looks at the connection of the dog burial to the other faunal elements identified, we can infer the placement of the dog as having a deeper meaning to occupants of the site. The abundance of dog remains found in the faunal material at CH-254 (n=449) and CH-240 (n=161) indicates that this animal was common throughout the region. However, the special treatment of specific animals suggests they were close companions.

The placement and differential treatment of the dog burials alone can be argued as insufficient evidence to support an analogical human-animal relationship. Dog remains and dog burials are nearly ubiquitous cross-culturally in archaeology. However, the dog burials at these sites are associated with a unique mortuary item: scapula rasps. Scapula rasps, likely from white-tailed deer or pronghorns, were found within the identified structures of both dog burials (CH-254 and CH-240). Rasps are one of the earliest forms of musical instruments, and they served to underscore rhythmic patterns, often within a ritual context (Turpin 1996, 267). According to early accounts by the Spanish in the 16th century, the music produced by these rasps was very sombre sounding and generally only performed during the funerals of rulers or the ceremonies commemorating the death of warriors (Turpin 1996, 266-267). Rasps found at Paquimé were interpreted to have been used by Ehecatl in the performing of death ceremonies of fallen warriors (Di Peso 1974, 272). At the Calderon site (CH-254) and CH-240, both structures in which the rasps were found are not associated with any human burials but did have dog internments.

Moreover, very few examples (n=8) of modified bone were found across the entire assemblage. These rasps are thus particularly significant as they are both rare and associated with human burials in the Medio period. As described in Chapter 3, analogism is predicated on parts of being that are related to one another, which frame the world as a complex web of analogous substances. The specific relations that linked a human and a dog in a mortuary context with a rasp could be linked to a belief that specific dogs uniquely shared important substances with their human companions and were mourned as such.

In naturalistic explanations of human-animal relations, dogs are a species in which individual animals are considered largely interchangeable. From an analogical perspective, beings of the world, including dogs, differ in their make-up both physically and interiorly from all other beings, including other dogs. Dogs present in the burial contexts identified at CH-254 and CH-240 could indicate these animals were chosen for companionship rather than a meal due to their perceived unique physicality and interior essence. The special treatment of certain individuals, rather than "species", in a mortuary context presents a way of exploring human-animal relations through an analogical lens in Casas Grandes.

6.3 Summary

Faunal analysts use a range of interpretive approaches to understand the patterning in their assemblages. Early approaches highlight the practical use of animal resources for subsistence. Patterns in the faunal material support the conclusion that animals played a key role in the diet of the people that lived at these sites in the Viejo period likely acquired by garden hunting. Seasonal environmental fluctuations can cause species variability and abundance, and the quantities of lagomorph species reflect the existence of a hot/dry climate across the study region. Besides the ornamental shell, the faunal record lacks evidence of widespread exchange in faunal materials, especially for macaws. Moreover, the faunal assemblages from the sites investigated do not show a pattern of feasting on high-status foods like what is seen at some Medio period sites.

Naturalistic explanations of material culture, such as subsistence practices, environmental change, production and trade of resources, and social consumption patterns, provide definite explanations for many identified patterns. Though these traditional models of understanding faunal material provide us with the basic building blocks for generating an understanding of human-animal relations, there are patterns which cannot be fully explained using these ontologies. In recent years, archaeologists have started to explore alternative approaches which shed light on anomalous patterns that do not fit the expectations of traditional models of faunal analysis. Phillipe Descola's proposed ontological categories of the world, specifically animism and analogism, present a promising approach to address anomalies in the faunal record. Animistic perspectives have led previous work concerning human-animal relations within Casas Grandes culture, seen largely through research published primarily by Todd and Christine VanPool surrounding the site of Paquimé. The VanPool's work examines forms of animistic relationships within the Casas Grandes region by identifying the practice and importance of shamanism and shaman-priests throughout the Medio period ideology (VanPool 2003, 697; VanPool and VanPool 2016, 312; 2021, 1).

Though an animistic approach offers some interpretive insights, critiques of how archaeologists have used "animism" suggest a need for greater interpretive precision. Descola's description of analogism as the ontology of Mesoamerica makes it a viable alternative. Indeed, analogism may explain the anomalies detected in the faunal patterns from the four study sites. More generally, this study showcases the need for multiple approaches to faunal analysis to generate a better understanding of the human-animal relationships that were present.

Chapter 7: Conclusion

7.1 Research Outcomes and Significance

Analyzing faunal materials within site assemblages offers several unique perspectives on human-animal relations. Specimens from all four study sites (CH-254, CH-240, CH-218, and CH-272) evidence subsistence practices but the assemblages also have patterns that cannot be explained easily from an economic perspective. Consequently, the study of faunal material from the study area presented the opportunity to consider alternate avenues of interpretation that expand the understanding of human-animal relations., One of the main goals this research was to use a range of theoretical approaches to interpret the data generated from analysis of the faunal material collected.

To carry out this task, information from published site reports, original level records, and data from previous small-scale analyses had to be linked to the faunal remains excavated from the Casas Grandes region. For this thesis, faunal material from CH-254, CH-240, CH-218, and CH-272, dated to the Viejo period, was analyzed. Until this research, little work on faunal material recovered from these Viejo period sites had been done. My research provides the first full-scale multisite comparison of faunal material from the study area. By examining material from almost 25 years of ongoing research and excavations in the region, I was able to produce a data set from the fauna collected from the Calderón Site (CH-254), the CH-240 site, the Quevedo Site (CH-218), as well as the Santa Rosa Site (CH-272). I created a dataset that can be compared with the previously analyzed faunal material elsewhere in the Casas Grandes region. A total of n=3566 specimens were recovered and catalogued. Most bone elements came from CH-254 and CH-240, but a significant enough portion of faunal material from CH-218 and CH-272 allowed for a robust comparative analysis. The data from the four sites present both variabilities and similarities when compared overall and on an individual site level.

The analysis of the faunal material collected from the study area revealed interesting patterns, especially concerning animal type, as well as the contextual insight into human-animal relationships. Although elements from similar species are identified at each of the four sites, there are site-specific patterns that are potentially of greater significance. Most elements came from CH-254, with 66% of the collection excavated from structures within the site boundaries, largely made up of small mammals such as the domestic dog and lagomorph species, as well as bird species, including waterfowl. CH-240 had the second highest number of faunal elements, with 31% of the total collection from excavations within the site's boundaries made up of medium size mammals and artiodactyls, including white-tailed deer. CH-218 and CH-272 had the two lowest number of total collected elements, with 2% and 0.005% coming from their boundaries, both represented by a variety of animal types, including mammals, artiodactyls, and birds.

Though there is variation in the amount of faunal material present at each site, there are consistent patterns of identified taxa throughout the region. Mammalia and Artiodactyla constitute the two taxa most represented overall within the PAC faunal assemblage. There was n=2247 elements classified as mammals, making up 63.02% of the overall assemblage, and n=351 artiodactyl elements identified making up 9.84% of the overall assemblage. Beyond these two dominant taxa, species consistently identified throughout the study region include Anseriformes, *Canis familiaris*, *Lepus sp.*, *Sylvilagus sp*., and Testudines. Although the overall state of preservation of the materials collected ranged from whole to incredibly fragmented elements, the majority of the faunal material gathered from the PAC boundaries exhibited some degree of fragmentation.

The majority of the previous studies on the faunal remains in the Casas Grandes region of northwest Chihuahua, Mexico, concentrated on the more significant Medio period occupations, including the site of Paquimé. Previous research of human-animal relations that concentrated on faunal material in the PAC also focused on Medio period occupants, most notably the site of El Zurdo (CH-159). Thus, the results from the analysis of faunal material from the sites dating to the Viejo period, allowed differences in predominant and unique taxa to be noted, compared to the previously published reports of sites such as Paquimé and El Zurdo. Overall, I was able to develop an understanding of these differences. Notably, there is variation in the faunal material collected in both the dominant taxa tied to household contexts rather than in larger communal contexts.

My third research objective was an application and evaluation of past and present theoretical models to interpret the faunal material found within the study area. The focus of zooarchaeological studies has primarily revolved around theories correlated with the use of animals in association with human economic activities. This is often achieved by looking at lines of evidence tied to subsistence, social and economic importance, environmental influences, and ritualistic importance. Patterns present within the faunal assemblages were examined in multiple ways. The first approach related to subsistence-based approaches to faunal studies. Looking at faunal material through a subsistence approach creates an understanding of the hunting strategies utilized during occupational periods. What I found was that garden-hunting techniques of smaller and medium-sized animals was the dominant subsistence strategy used at that time. Social patterns associated with consumption activities in Casas Grandes have tended to focus on feasting. The sites studied, however, are residential sites dating to the Viejo period; feasting activities would be unexpected. This is consistent with the faunal material presented. The consumption patterns identified, specifically CH-240, point toward practices at a household scale.

My final research objective was to devise an understanding of human-animal relations by incorporating theoretical perspectives established within the ontological turn in anthropology and archaeology. Although many patterns that have been observed can be understood through naturalistic explanations of material culture, abnormalities in the faunal assemblage cannot be entirely addressed by these conventional models. These anomalies are found in the calculated MNI values of the bone elements, the presence of particular animals, and the context from which these taxa are identified. The complete dog burials and the abundance of turtle and dog elements indicate relationships between humans and animals that are inconsistent with neoclassical economic models. It is for these cases that the work of Phillipe Descola and his proposed typology for human ontologies can be applied to detect the inherent human-animal relations. Animism and analogism both offer alternative perspectives to evaluate the amassed faunal material from the four sites of study.

Previous work concerning human-animal relations within Casas Grandes culture has used animism, seen largely through research published by Todd and Christine VanPool. The VanPools examined animistic relations in the Casas Grandes region through shamanism in Medio period ideology (VanPool 2003, 697; VanPool and VanPool 2016, 312; 2021, 1). Their work has allowed archaeologists to formulate insights about the ideological structure of Casas Grandes culture in a way that previous functional analysis could not. The question is whether these later Medio period ritual activities are supported by the faunal assemblage that was collected. Many understandings of human-animal relations during the Medio period are based on depicting animals in iconography rather than faunal evidence. While consideration of animism reveals some new interpretive insights in the faunal assemblage I examined, it still left several anomalies unexplained. I thus considered an analogical perspective as an alternate explanation for these patterns in the faunal assemblage. The presence of certain animal species in the faunal collection suggests connections with Mesoamerican analogism and connections with specific deities. These contentions are found in the presence of animals such as Anseriformes, Mollusca, *Odocoileus virginianus, and* Testudines. These taxa play symbolic roles in the transformative abilities of the individuals in the region to connect with deities.

A key line of evidence is the context and abundance of *Canis familiaris* (domestic dog) bone elements. The human-like burials found at CH-254 and CH-240 suggest that dogs and humans maintained relations beyond subsistence. Both dogs were found in similar contexts (bones fully articulated and placed on their right side) and exhibited no evidence of taphonomic processes consistent with subsistence practices. Expanding beyond the context of the articulated skeletons, both burials were found in proximity to scapula rasps, likely from white-tailed deer or pronghorns. Rasps are one of the earliest forms of musical instruments, and they served to underscore rhythmic patterns, often within a ritual context (Turpin 1996, 267). Modified bone was extremely rare within the sites in the study area, as only eight elements were found from all four of the sites studied. The potential importance dogs had could reflect their cosmological importance for occupants of the site, like what is seen in Mesoamerica's southern and central regions.

7.2 Future Directions of Research

As demonstrated in Chapter 5, the data generated from these sites contribute to a small pool of published faunal data about the context, abundance, and type of taxa and species identified within the Casas Grandes region. The analysis of human-animal relations is hampered by this lack of data, which makes it difficult to provide more conclusive interpretations of animistic and analogical ontologies. Work regarding analogism in zooarchaeology is absent in the literature. In contrast, much of the work on Casas Grandes faunal assemblages has been dominated by naturalistic perspectives and some considerations of animism. Though these perspectives provide tangible explanations for some of the material patterns, analogism offers an alternative approach that should be considered because of the association of Casas Grandes with Mesoamerican cosmologies. From this perspective, analogism is worth exploring more fully to determine whether it is the dominant ontology in the Casas Grandes region. The conclusions reached in this thesis are consistent with the presence of an analogical framework, but additional work is required. Faunal analysts looking to explore this issue should consider collaborative approaches or the use of multiple lines of evidence that might combine faunal analysis with a study of the iconographic representations of animals to assess whether the expectations of analogism are present.

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