# THE USE OF FAUNAL REMAINS FOR IDENTIFYING SHIFTS IN PIT STRUCTURE FUNCTION IN THE MESA VERDE REGION: A CASE STUDY FROM GOODMAN POINT

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The archaeofaunal remains left by the Ancestral Puebloan people of Goodman Point Unit provides a valuable, yet underutilized resource into pit structure function. This thesis explores temporal changes in pit structure use and evaluates if a final feast occurred during a kiva decommissioning. The results from zooarchaeological analyses of a pithouse and two great kivas suggest that changes in pit structures at Goodman Point mimic the regional trend toward specialization until late Pueblo III. Cross-cultural studies on feasts, southwest ethnographies and previous zooarchaeological work established methods for identifying a feast. The analysis of differences in faunal remains from a great kiva and multiple room block middens imply that the remains in the kiva were from a final feast prior to a decommissioning ceremony and were not fill. Spatially and temporally the great kiva appears to be a unique, specialized structure in the cultural development of the Goodman Point community.

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# CHAPTER 1

## PITSTRUCTURE EVOLUTION, TYPOLOGY, FUNCTION AND FEASTING

The visualization of a ceremony with elaborate feasts and secret rituals conducted in a mysterious underground structure by Native Americans of the Southwest has intrigued archaeologists and members of the general public for nearly a century. These underground structures, or kivas, are features with a floor that has been dug below the ground's surface. It is widely held that the ceremonial great kiva evolved from the domestic pit house (Cordell and Plog 1979; Wilshusen 1989). Pit structures appear to have shifted from a domestic function to a ceremonial function over time, though smaller kivas retained various domestic functions. Although the historical trajectory from pithouses to kivas is fairly well established, less is known about the function of kivas and how much kiva use varied. This thesis evaluates functional variability of large pit structure via archaeofaunal assemblages.

Ceramic artifacts, architectural features, and ethnographies of Ancestral Pueblo people have been used as evidence to document how these circular structures were used (Blinman 1989). For example, utilitarian ceramics, such as brown and gray ware pottery, are often found in pithouses (Reed 2000), a combination of utilitarian wares and decorated ceramics are found in small kivas (Blinman 1989), while a majority of the ceramics found in great kivas are from highly decorated polychrome vessels. During the transition from pit houses to great kivas, it appears that function became more ceremonial. If true, then people might have used animals differently in early domestic settings than in Pueblo II (750-900 AD) ceremonial settings. Zooarchaeological data can be used to examine whether or not such a shift in function occurred. Such data provide an independent line of evidence for addressing hypotheses about kiva function.

Ethnographies describe Pueblo Indian religious ceremonies involving feasting within the kiva, to pay homage to ancestors and spirits (Hawley 1950; Parsons 1996). Puebloan descendants convey that these ceremonies have been handed down from their ancestors. Differences in meals eaten in a domestic setting as opposed to feasts eaten in a ceremonial setting would therefore be reflected by differences in preparation, presentation and consumption (Hayden and Villeneuve 2011).

Research on faunal data in association with Ancestral Puebloan architecture, particularly kivas, is warranted for three reasons. First, more information is needed to identify the types and functions of pit structures. Currently architectural features, ceramics and other artifacts are utilized (Blinman 1989). Second, little is known about differences between what people prepared between ceremonial and domestic contexts. A few published articles have used faunal remains and ceramics to interpret socio-political status of households within a Southwestern site or to examine communal feasting behavior (e.g. Potter 1997; Mills 2007) but there are no published reports that determine the utility of faunal data for discerning domestic and ceremonial contexts. Third, in the Mesa Verde region of the northern Southwest, little is known about changes in ceremonial kiva feasting that occurred in the late Pueblo III period. Minimal research has been conducted to identify changes that occurred in the Ancestral Puebloan religion during this period due to archaeologists' focus on motivations for abandonment of the Mesa Verde region (Glowacki 2011).

This thesis is a spatio-temporal assessment of faunal remains recovered from large pit structures in an Ancestral Puebloan community. The objective is to evaluate variability in function of large pit structures. It assesses faunal changes in large pit structures and faunal differences between a great kiva and contemporaneous structures. The spatio-temporal analyses of faunal assemblages reveal that in the context of feasting, large pit structure specialization peaked prior to late Pueblo III.

The following provides an introduction to Ancestral Puebloan culture to provide context for zooarchaeological research on kiva function in the following chapters. In the next section, I elaborate on architectural development and the evolution of the kiva. The pit structure typology and function section highlights what is known about these structures and emphasizes why more research needs to be conducted on their function. This is followed by how ethnography has been used to develop methods appropriate for identifying feasts from faunal assemblages. The chapter concludes with a description of how the sites from faunal assemblages used in this thesis were excavated, which is followed by a short summary of the goals of the thesis.

## Regional Culture History of the Ancestral Puebloan People

This section provides an introduction to the Ancestral Puebloan culture that developed in the Mesa Verde region (Figure 1.1). It summarizes settlement patterns, population, subsistence and significant cultural material. General trends in climate are included since rainfall and temperature are crucial to agrarian cultures. In terms of culture history, only the Basketmaker III through Pueblo III period is discussed. Although there were seasonal Basketmaker II (B.C. 500-A.D. 500) settlements and though a small population continued to live in the Mesa Verde region in Pueblo IV (A.D. 1300-1450) (Glowacki and Ortman 2012), settlement data for those periods are sparse. Further, much of the current research conducted on these topics, such as the Village Ecodymanics Project (Kohler and Varien 2012) do not consider these earliest and latest periods.

*Basketmaker III (AD 500-750)*

The initial immigrants primarily lived in single family households; they arrived to the region from migrations that occurred from the eastern and western outlying areas of Mesa Verde by around B.C. 600 (Ortman et al. 2012). Pollen data indicate an increase in temperature and winter precipitation making the region more favorable for maize farming (Wright 2012). The ubiquitous cultivation of a strain of corn better adapted to an arid climate, which flowers early (Upham et al. 1987), produced a larger yield and was easier to mill, a fact that is often credited for the propensity for sedentariness in the region during Basketmaker III and later periods (Martin and Plog 1973). The addition of bean cultivation, circa A.D. 600, to corn and squash crops provided necessary protein for human diet (Kaplan and Kaplan 1988). Isotopic analyses from human skeletal remains (Decker and Tieszen 1989) and human coprolite analyses (Minnis 1989) indicate that people were already highly dependent on maize by the time that beans were introduced to farming in the region. However, the recovery of seeds, plants, and pollen in human coprolites suggest that BMIII people supplemented their diet by foraging for wild plants and nuts, such as prickly pear cactus, goosefoot and piñon nuts (Minnis 1989). Though pottery existed in the area during earlier periods, it became prevalent and essentially replaced many of the functions of baskets during this time (Skibo and Blinman 1999). Pottery use is strongly correlated with sedentary cultures because of its weight and the need for regular and reliable access to paste raw materials (Arnold 1985). For agrarian cultures it offers efficient storage, and a better container for preparation and cooking of food (Skibo and Blinman 1999). The manufacturing of pottery was either independently invented (Morris 1927) or diffused (LeBlanc 1982; Blinman 1988) into the Mesa Verde region. Faunal assemblages from sites indicate animal protein portions of diets consisting of artiodactyls (deer and pronghorn), jackrabbit and cottontail

(Driver 2002; Badenhorst and Driver 2009). The recovery of atlatls, spears and clubs combined with ethnographic evidence suggest these were used for hunting wild game (Reed 1946), and by the end of this period bows and arrows had diffused into the region (Lipe 1978).

*Pueblo I (AD 750-900)*

Pueblo I is marked by substantial changes in Ancestral Pueblo culture in the Mesa Verde region, which include a shift to above-ground architecture and an increase in population size. Rainfall and precipitation consistently decreased until the end of Pueblo I (Wright 2012). Despite this, the population steadily increased until a dramatic decline began around AD 880 (Ortman et al. 2012). Evidence from dendrochronology (Douglas 1929) and settlement patterns has lead archaeologists to believe a drought occurred, leading to a mass migration (Petersen 1988; Ortman et al. 2012) south to the Chaco Canyon area (Lipe 2006). Due to its numerous sites with monumental architecture and abundance of non-local artifacts, Chaco Canyon is presumed to have been a ceremonial and trade center for the Puebloan people during the 11th and early 12th century (Lekson et al. 1988).

Pueblo I in the Mesa Verde region is often considered to be a transitional phase; living structures within hamlets are either pithouses, above ground pueblo structures or a combination of these two kinds of architectural features. Pueblo I sites are typically dispersed small hamlets that comprised several households (Glowacki and Ortman 2012). Farmers' dependence on corn (Decker and Tieszen 1989), squash, beans and supplemented foraged wild plants (Minnis 1989) remained similar to Basketmaker III times (Varien et al. 2007). Due to the proliferation of digging sticks and hoes recovered at PII sites, archaeologists assume that the Ancestral Puebloan people's dependence on agriculture increased after PI (Martin and Plog 1973). Faunal assemblages from sites indicate animal protein portions of diets similar to BMIII, consisting of artiodactyls, jackrabbits and cottontails but with the addition of turkey; initial signs of resource depression of artiodactyls—or a decline in the abundance of a resource caused by human predation—is observed in some areas (Badenhorst and Driver 2009).

*Pueblo II (AD 900-1150)*

The Pueblo II period in the Mesa Verde region is marked by a transition to larger, aggregated village centers, often referred to as community centers. Early Pueblo II exhibits a population decline (Ortman et al. 2012); winter rainfall and temperatures were at the lowest levels since Basketmaker III (Wright 2012). People began to immigrate back into the area during the middle of the 11th century and then the population dramatically increased (Ortman et al. 2012). This period is often termed the post-Chacoan era. Puebloan people erected larger unit pueblos and multi-story great houses, similar to the ones at Chaco (Lipe and Varien 1999). Many people aggregated into dispersed large communities, which were often on top of mesas, such as Big Juniper House (Swannack 1969), but a majority of the population lived in hamlets around community centers (Glowacki and Ortman 2012). McElmo black on white pottery, which was manufactured in Chaco and the Mesa Verde regions (Ellis and Dodge 1989) is one of the most prevalent forms of ceramics found in late Pueblo II (Bradley 1996). Faunal assemblages indicate a continued decrease in availability of artiodactyls and jackrabbits in relation to cottontail, while the proportion of turkey in diet dramatically increases (Badenhorst and Driver 2009). Pens, droppings, eggshells (Beacham and Durand 2007) and healed bones (Munro 1994) suggest that these turkeys had been domesticated and were intensively managed.

*Pueblo III (AD 1150-1300)*

The Pueblo III period in the Mesa Verde region is represented by continued population growth, aggregation into large villages in defensible locations, and eventual depopulation of the region. Climate conditions were favorable for agriculture (Burns 1983; Wright 2012), and the population reached its peak of approximately 20,000 people in the central Mesa Verde region by around A.D. 1240 (Ortman et al. 2012). Many people were living in or near large community centers, such as Yellow Jacket Pueblo, Sand Canyon Pueblo and Goodman Point Pueblo (Glowacki and Ortman 2012). Multi-story pueblo great houses and great kivas were prevalent during this time (Lipe and Hegemon 1989). PIII is often considered the Ancestral Puebloan Classic period when the Ancestral Puebloan culture most intensely demonstrated signs of its unique identity. Mesa Verde black-on-white is the most common pottery type found during this time, which is a style closely associated with the region (Oppelt 1989). Mesa Verde black-on-white mugs are often found in association with burials and in ritual contexts (Bradley 1996). People had become hyper-dependent on corn (Decker and Tieszen 1989; Hard et al.1996) and turkey (Munro 1994; Badenhorst and Driver 2009). Isotopic analysis of turkey bones suggests that residents of many sites fed their turkey corn (Rawlings and Driver 2010). This increase in dependency on domesticated resources may have resulted from increased specialization (Spielmann 2002), in response to depression of large prey, such as deer, and other wild resources (Badenhorst and Driver 2009), or a combination of both. Analyses of human coprolites indicate a significant decrease of piñon nuts and squash in the diet (Stiger 1979).

By late Pueblo III, migrations out of the region were initiated. The Great Drought (circa A.D. 1276-1299) was produced by a decrease in precipitation (Douglas 1929) and temperature (Benson et al. 2007; Wright 2012), which probably resulted in low crop yields over consecutive years (Burns 1983; Bellorado 2007). The people, who remained, shifted subsistence from hyper-dependency on domesticated resources to relying more heavily upon hunting and gathering strategies (Kuckleman 2010; Muir and Driver 2002). Reliance on turkey dramatically declined (Clinton et al. 2011). The composition of faunal assemblages suggest that severe depression of wild animal resources occurred and peoples' diets relied heavily on cottontail and rodents (Badenhorst and Driver 2009; Hoffman 2011). Many large community centers further aggregated and relocated to canyon heads, which were presumably more defensible locations on the landscape (Kuckleman 2010). Many archaeologists believe that a high incidence of violence occurred (e.g. Turner and Turner 1999; Billman et al. 2000; Kuckleman et al. 2002). Most of the region was abandoned before the beginning of Pueblo IV (AD 1300-1450). A consistent thread woven through Mesa Verde prehistory from BMIII to PIII is the presence of pit structures, many of which appear to have been large communal structures. The next section describes this thread in more detail, after which the precise research goals of this thesis are presented.

## Evolution of the Ancestral Puebloan Kiva

In order to study the faunal remains from kivas and pit structures, it is important to have an understanding of the kiva's evolutionary development and to comprehend diversity in pit structure architectural forms. Small kivas and great kivas evolved from domestic pithouses. However, due to the variability in individual village development across the Mesa Verde region prior to Pueblo II (Brew 1946), there is significant variation in contemporaneous pit structure types and function. Below is a generalized temporal history of Ancestral Puebloan architectural development or rather, kiva evolution.

Early Southwest archaeologists recognized that one of the earliest forms of habitation in the region was subterranean structures. Early pithouses can be discerned by at least 2100 B.C. (Herr and Young 2012). A typical Basketmaker III (500-750 A.D.) pithouse would have been oval or rectangular shaped (Toll and Wilson 2000) with adobe lined or earthen walls (Brew 1946). It would have had a main chamber and an antechamber for storage or one chamber with outside storage pits or both (Bullard 1962; Gilman 1983). Early earthen pithouses were likely semi-permanent (Cordell 1984) or winter habitations (Gilman 1987). Basketmaker III communities in the Mesa Verde region varied significantly in the number of pit structures and in floor area (Wilshusen 1989; Wilshusen et al. 2012). The wide range in floor area is attributed to a small number of oversized pit structures at only a handful of sites, leading many archaeologists to believe that these were the first great kivas (Morris 1939; Vivian and Reiter 1965; Adler and Wilshusen 1990; Wilshusen et al. 2012). In the greater Southwest region several pithouse villages with oversized pit structures interpreted as great kivas have been reported, such as Shabik'eschee in Chaco Canyon (Roberts 1929; Wills and Windes 1989), the SU site in western New Mexico (Martin 1943) and Broken Flute Cave in eastern Arizona (Morris 1980). However, some archaeologists have argued that many of the early large pit structures may have been the residences of large nuclear families (Birkedal 1976) and community leaders (Lightfoot and Feinman 1982). The Dillard site near Cortez, Colorado is the only site with a confirmed Basketmaker III great kiva in the Mesa Verde region (Diederichs and Copeland 2013), though other early oversized pit structures are found in the region and are presumed to be great kivas (McLellan 1969). The Dillard site is currently under excavation but initial reports indicate the presence of a cluster of approximately fourteen pithouses and a great kiva (Diederichs and

Copeland 2012). The great kiva is approximately 10 meters in diameter with a wet-laid, stacked masonry wall and is the earliest one found in the central Mesa Verde region.

Pueblo I (A.D. 750-900) marks the beginning of the pithouse to pueblo transition. Domestic and storage functions were shifted to surface architecture, while ceremonial functions remained below the ground (Lipe 1989). T. Mitchell Prudden (1903) observed that this new architecture followed a basic construction pattern, he termed as the "unit type" pueblo (Figure 1.2). It consists of a contiguous room block, a small circular kiva, and a midden. Each room block varies in the number of habitation and storage rooms. The Duckfoot site is a small Pueblo I hamlet in southwest Colorado and is a good example of a unit pueblo (Lightfoot et al. 1993). Its initial construction contained 18 contiguous double-rowed rooms with three small pit structures and a large midden. Its walls were of mud and stone (Lightfoot et al. 1993), unlike most early above ground structures that were of jacal construction—wood poles and sticks covered with clay (Lipe 2006). Great kivas in the Mesa Verde region are often circular, with a median floor area of approximately 12 to 15 meters (reported as 40 to 49 feet) but vary significantly on all attributes (McLellan 1969). Even diameter varies, for example, the great kiva at Badger House in Mesa Verde National Park is approximately 9.45 meters (Hayes and Lancaster 1975) but the great kiva at Grass Mesa is more than twice the size with a diameter of 22.5 meters (Lightfoot 1988).

Pueblo II (A.D. 900-1150) architecture is characterized by variability in construction styles but with a trajectory toward standardization. In the beginning of this period, construction was scarce in the Mesa Verde region (Wilshusen and Ortman 1999; Coffey 2007). A variety of building materials were used, such as jacal, stone and adobe brick. The keyhole kiva, which is a kiva named after its shape, due to a recess above the ventilator (Brew 1968 (1946)), became prevalent (Lipe 2010). This kiva type is thought to have originated in the Mesa Verde region (McLellan 1969) and is found at Pueblo II and Pueblo III sites, such as Spruce Tree in Mesa Verde National Park (Adler 2009). These kivas also appear in other areas, such as Pueblo Bonita in Chaco Canyon (Lekson 2007).

By Pueblo III (A.D. 1150-1300), there is greater standardization of architectural form (Brew 1968 (1946)) and there is an increase in community aggregation (Lipe 1989). The small-kiva to room ratio exhibits a trend toward a higher number of small kivas per each room block. Although fewer in number but with more standardization, the vast majority of great kivas built in Pueblo III have a south to southeast orientation, masonry lined walls and a complete bench (McLellan 1969). Lipe (1989) has suggested that some functions of the great kiva during preceding periods may have been translocated to plazas during Pueblo III. From mid to late Pueblo III, community aggregation rapidly increased. During Pueblo II, communities were located in relatively open mesa top settings on the landscape; some villages were relocated to cliff dwellings during Pueblo III, such as those in Mesa Verde National Park. In late Pueblo III, a massive migration began (Kohler and Varien 2012). Large communities that remained until late Pueblo III, such as Goodman Point and Sand Canyon pueblos, relocated to nearby canyon rims (Kuckleman 2010). The people from the aggregated villages built great houses, unit pueblos and towers within enclosing walls, presumably for defense.

Ancestral Puebloan architecture from Basketmaker III to Pueblo III supports a trend toward increased specialization over time. Initially, the pithouse incorporated domestic, storage and ritual functions, but through time these functions were diffused to multiple architectural structures (Lipe 1989). There is not a consensus in pit structure typology among archaeologists due to the temporal variation of architectural development throughout the Mesa Verde region until approximately Pueblo II (Brew 1968 (1946)). Archaeologists have not identified the variability in function of transitional structures. For example, pithouses and unit pueblos may often coexist within the same community. It is unclear if these pithouses would have retained domestic, storage and ritual functions or shifted to a primarily domestic function.

## Typology and Function of Pit Structures

From the beginning of Southwestern archaeology, there have been inaccuracies in nomenclature and typology of the kiva. Spanish explorers originally assumed that kivas were sweat baths and called them estufas (Wilshusen 1989). This term was often used until the first Pecos Conference in 1927. The attendees defined kiva as "…a chamber specially constructed for ceremonial purpose" (Kidder 1927:490); since then, the definition has been debated and modified. For example, small or pueblo unit kivas may not have been specifically constructed for ceremonial purposes, due to their domestic functions but are considered kivas. Watson Smith (1990) tried to redefine "kiva" types based on an exhaustive inter-site comparison of data from the entire Southwest in his book "When is a Kiva?" He found that not one particular feature was present or absent in the entire dataset and that kiva variability is driven more often by location within sites and uniqueness compared to other architecture within the community than by any standard set of criteria. Special types, such as square kivas, rectangular kivas, above ground kivas and tower kivas further complicate the issue.

Nonetheless, there does seem to be a consensus on several aspects of kivas and their function; the term kiva now implies that the structure had a ceremonial purpose. Unlike great kivas, small kivas are often thought to also have had a domestic function. Location within an Ancestral Puebloan community, size (Smith 1990), ethnographic data, architectural features

(Figure 1.3) and ceramics are used in combination to establish the typology and function of pithouses, small kivas, and great kivas (Brew 1968; Blinman 1989).

### *Pithouses*

Pithouses are assumed to be the first permanent or semi-permanent housing in the Southwest. They are found singularly or in clusters (Wilshusen et al. 2012). Pithouses are prevalent cross-culturally as habitations among hunter gatherers who rely slightly on agriculture and live in cold winter climates (Gilman 1987). A typical pithouse in the Mesa Verde region has four large posts and a bench underlying many smaller posts that are used to support the roof. These structures often have evidence of an indoor hearth and a deflector, thought to indicate a winter or year-round habitation (Powell 1980). In early small pithouse villages, the artifacts associated with pithouses exhibit domestic functions (Cordell 1984). Excavated ceramics are usually brown and gray utility wares (Reed 2000) with a high proportion of globular neckless jars called seed jars. Seed jars were used for cooking and storing and are thought to have been multi-functional, (Skibo and Blinman 1999). Pithouses, while primarily domestic in terms of function, may also have incorporated storage and ceremonial functions.

### *Small Kivas*

Early southwestern archaeologists, such as Morris (1939) assumed that small kivas were a transitional structure between the pithouse and the great kiva, and thus they are often referred to as protokivas. They are associated with unit pueblos and are generally located to the south of room block households (Smith 1990). Small kivas are semi-subterranean masonry structures that typically range from a diameter of five to seven meters (Conyers and Osburn 2006).

Ethnographically, the Hopi use small kivas that function ceremonially and domestically to serve matrilineal clans (Parsons 1923; Hawley 1950). Small kivas often exhibit architectural characteristics thought to relate to ritual functions based on ethnographic analogy, such as sipapus (Figure 1.3) (Lipe 1989). A sipapu is often a five to eight centimeter diameter hole in the floor of a kiva through which Pueblo people believe spirits leave and enter the underworld (Smith 1990). Excavated small kivas often contain a high frequency of decorated ceramics (Brown and Freeman 1964), serving bowls, wares manufactured in different regions, and lower frequencies of cooking jars compared to domestic areas (Blinman 1989). Blinman has argued that small kivas functioned in a communal capacity as places for hosting pot luck gatherings. It appears that Puebloan people used these kivas both domestically and ceremonially for small groups or extended families within a community.

*Great Kivas*

The traditional great kiva is a large subterranean masonry lined structure with the presence of ceremonial architectural features; however, some early great kivas were large earthen pit structures. Most often they are located away from a hamlet or village (Ferguson and Rohn 1987) and are oriented south to southeast (McLellan 1969). Archaeologists believe that the large size of great kivas, typically eight to twelve meters in diameter (Conyers and Osburn 2006), relates to a communal and ceremonial function by providing a meeting place for large groups of people (Lightfoot 1988). In early twentieth century Pueblo ethnographies, many Tanoan communities had one large kiva dedicated for ceremonial purposes (Hawley 1950). Each clan in the community referred to the great kiva by a different name. Architecturally, Ancestral Puebloan great kivas have similar characteristics to the ceremonial kivas used by Puebloan descendants (Fewkes 1922). Common characteristics (Figure 1.3) include hearths, deflectors, ventilation shafts, sipapus, benches, roof supports and floor vaults (Kantner 2004). Pueblo II and Pueblo III great kivas exhibit standardization of architectural features unlike ones from Basketmaker III and Pueblo I, which may only have a few commonly shared characteristics (McLellan 1969). Labor-intensive decorated pottery, such as polychrome vessels, is often found in association with great kivas (Freeman and Brown 1964; Longacre 1970; Upham et al. 1981); these types of ceramics are thought to have held communal and ritual functions (Hill 2000). Additionally, kiva jars are predominantly found in great kivas. They are jars with lids, typically of the Mesa Verde black on white style (Kidder 1924). Unfortunately, in much of the research that involves ceramics; great kivas are usually lumped with small kivas or plazas, thereby limiting the amount of empirical data available solely on great kivas. Problems are further compounded by the fact that much of the framework for understanding kivas in the Southwest has been based upon accumulated observations in the field and not on data from stratigraphic excavations with analyses (Brew 1968). Great kivas most accurately fit the Pecos Conference definition of having a predominantly ceremonial function.

## Ethnography to Establish Zooarchaeological Methods for Kiva Feasting

Ethnographic information can be used to develop expectations for identifying differences in faunal remains left from feasting in contrast to those left from daily meals. If great kivas functioned solely as ceremonial structures and pithouses functioned solely as domestic structures, then the animal remains left behind by the Ancestral Pueblo people should emulate those contextual functions. Fewkes (1922) and other early twentieth century ethnographers

(Hawley 1950; Parsons 1996) report that feasts did occur in communal areas within Pueblo societies and occurred in kivas, as well.

Cross culturally, ceremonial feasts have rules for preparation, presentation, and consumption of food (Dietler and Hayden 2001). Hayden and Villeneuve (2011) have argued that this would be expressed in the archaeological record by the types of animals people used, their quantity, and the method of preparation. Analysis of taxonomic composition and richness of faunal remains from different contexts as well as consideration of prey choice, carcass exploitation and taphonomic processes are topics that zooarchaeologists focus on to address types of animals people used, their quantity, and their method of preparation.

Presumed feasting events often result in faunal assemblages with a low number of species (richness) (Jackson and Scott 1995; VanDerwarker 1999). Richness is the number of different species, genera or families represented. However, it is possible that richness may be high if feasts were potluck because rare species may have been utilized in such settings. Ceramic evidence suggests that potluck ceremonial feasts may have occurred in small kivas at McPhee Village (Blinman 1989), resulting in high taxonomic richness in the archaeofaunal record. In addition, rare fauna may have been used simply because they were scarce and thus novel; as a result, rare taxa associated with kivas (Potter 1997) may influence richness.

Accounts of rabbit hunts in preparation for modern day Puebloan ceremonies have been published (Parsons 1923; Beaglehole 1970 (1936); Beaglehole and Beaglehole 1937). Large amounts of lagomorph and turkey remains have been associated with kivas (Potter 1997) and large amounts of cottontail remains found in association with Pueblo III kivas have been reported from sites within the Mesa Verde region (e.g. Badenhorst and Driver 2009; Hoffman 2011).

Ethnographers have also observed less intensive processing of animals for feasts (Rappaport 2000). Several aspects of carcass exploitation can be utilized to identify the intensity of processing, such as nutrient extraction from bones, mean utility, and butchery patterns related to skeletal part frequencies (e.g. Wolverton 2002; Jackson and Scott 2003; Munro and Bar-Oz 2005; Nagaoka 2005; Nagaoka et al. 2008; Wolverton et al. 2008). Roasting tends to be a prevalent form of cooking large animals for feasts (Rappaport 1984) and may be discerned during taphonomic analysis by coloration on the bone, acquired during exposure to heat (Shipman and Rose 1983), especially non-meaty portions of bone that would have been exposed to heat.

These types of analyses, coupled with expectations from ethnographic studies, can help identify potential differences between the faunal remains from domestic and ceremonial assemblages. The faunal assemblages from sites contained within Goodman Point were utilized for determining whether or not these types of differences exist in prehistoric pit structure and great kiva contexts.

## Site Descriptions

At Goodman Point, part of Hovenweep National Monument, in southwestern Colorado all three types of pit structures, as well as above ground Pueblo architecture exist spanning from approximately 1000 A.D. until 1280 A.D. (Coffey 2012); however faunal data are limited for small kivas. This subsection of Hovenweep is often referred to as the Goodman Point Unit (Figure 1.4); here I refer to the area, which protects several archaeological sites simply as Goodman Point, which should be distinguished from Goodman Point Pueblo, a large canyon head late Pueblo III site in the unit. Goodman Point is considered a community center of the Mesa Verde region (Glowacki and Ortman 2012).

The climate of the region is beneficial for bone preservation because microbial destruction of bone is less impactful in drier climates than in moister climates (Sillen 1989). The northern San Juan region encompasses the Four Corners region of the American Southwest, which is part of the Colorado Plateau, comprising a semiarid climate (Johnson 2002). The area receives between ten to fifteen inches of precipitation per year. In addition, extended protection by the U.S. government has provided excellent preservation of the sites at Goodman Point. The Goodman Point Archaeological Reserve was created in 1889 to exclude it from land available for homesteading (Connolly 1992). In 1952 the reserve was integrated into the Hovenweep National Monument, which has provided protection from looting and destruction. Altogether, Goodman Point has been under federal protection longer than any other site in the United States.

Faunal data were acquired from several sites; Harlan Great Kiva (5MT16805), Bluebird House (5MT), Pinyon Place (5MT), Windy Knob (5MT), Rain Ridge (5MT16777), Midway House (5MT16778) and Goodman Point Pueblo (5MT604), which are contained within the study area. The data from Harlan Great Kiva, Bluebird House and Pinyon Place are reported in the systematic paleontology. Bluebird House and Pinyon Place are not utilized for analytical assessment due to small sample sizes. Harlan Great Kiva is a site with a great kiva (Structure 101) superimposed on a Pueblo II pithouse (Structure 120). Windy Knob is a small hamlet with initial occupation dates of circa A.D. 1000-1150 (Coffey and Copeland 2011). Rain Ridge and Midway House are large hamlets constructed in Pueblo III. Goodman Point Pueblo is a late Pueblo III community center with a great kiva. Many residents of the earlier hamlet sites in the Goodman Point Unit are thought to have aggregated to Goodman Point Pueblo circa 1260

(Kuckelman et al. 2009). The faunal remains from these sites were excavated by a team from Crow Canyon Archaeological Center during Phase I and Phase II of the Goodman Point Community Testing Project. Amy Hoffman (see Hoffman 2011) identified the Goodman Point Pueblo faunal assemblage and Laura Ellyson (see Ellyson 2014) identified Windy Knob, Rain Ridge and Midway House. The Harlan Great Kiva dataset is presented within this thesis' systematic paleontology. Detailed site information is included within each chapter to explain the sampling method used to answer each question.

## Summary and Conclusion

Ethnography, architectural features and ceramics provide some information regarding pit structure function. The location and size allows designation of types of pit structure. Generally, small kivas integrate domestic and ceremonial activities of smaller groups within a community and are assessed by their smaller size and close proximity to residential units. Great kivas are assumed to have a predominantly ceremonial function for a community and are recognized by their larger size and by their distance from residential areas.

A culture that undergoes sedentarianism will typically increase specialization. Ceramics and architectural features have the potential to reflect technological variability rather than indicate function. Gray ceramics, brown ceramics and seed jars are considered early forms of pottery in the Mesa Verde region and are associated with domestic activities (Cordell 1984). It is likely that early ceramics were multi-purpose. Architectural features associated with ceremonial activities, such as central vaults which are thought to be foot drums (Mindeleff 1989), have rarely been found in a pit structures that predates Pueblo II (Bullard 1962). It is probable that ceramics and architectural features did not fully evolve from general purpose to special purpose form prior to Pueblo II. Additionally, due to the irregularity in the architectural development sequence throughout the Mesa Verde region, there appears to have been disparate levels of development. These issues support the need for further research into pit structure function using additional lines of evidence. Faunal remains can be used as another line of evidence to discern between domestic and ceremonial contexts. The Ancestral Puebloan people may have used variable types of animals, in variable amounts, prepared in diverse ways related to different contexts. Zooarchaeologists can utilize ethnographies to establish criteria for identifying feasts that may have occurred in a ceremonial functioning structure.

In this thesis, archaeofaunal remains are analyzed to answer questions regarding animal use in pit structures. The faunal data of Harlan Great Kiva, Pinyon Place and Bluebird House and the criteria used for identifications of bone specimens are presented within the systematic paleontology in Chapter Two. Chapter Three utilizes the zooarchaeological methods established from ethnographic criteria to answer the question, “Is there archaeofaunal evidence of a final feast at Harlan Great Kiva?” The purpose of this analysis was to identify if the mode of deposition was from a final feast at the time of abandonment or accumulated as a midden after abandonment. Chapter Four presents a temporal analysis of fauna associated with sequential pit structures at Goodman Point Unit. It answers the question, “Does fauna specialization occur in large pit structures at Goodman Point?” Chapter Five discusses the spatial and temporal significance of Harlan Great Kiva within the community and how this research contributes to the Ancestral Puebloan narrative of pit structure function.

Although elaborate feasts and secret rituals conducted in a mysterious underground structure by the Ancestral Puebloan people has intrigued archaeologists and members of the general public fornearly a century, we still know very little regarding the feasts that occurred inside the kiva. This thesis will shed some light inside the great kivas and other pit structures at Goodman Point.

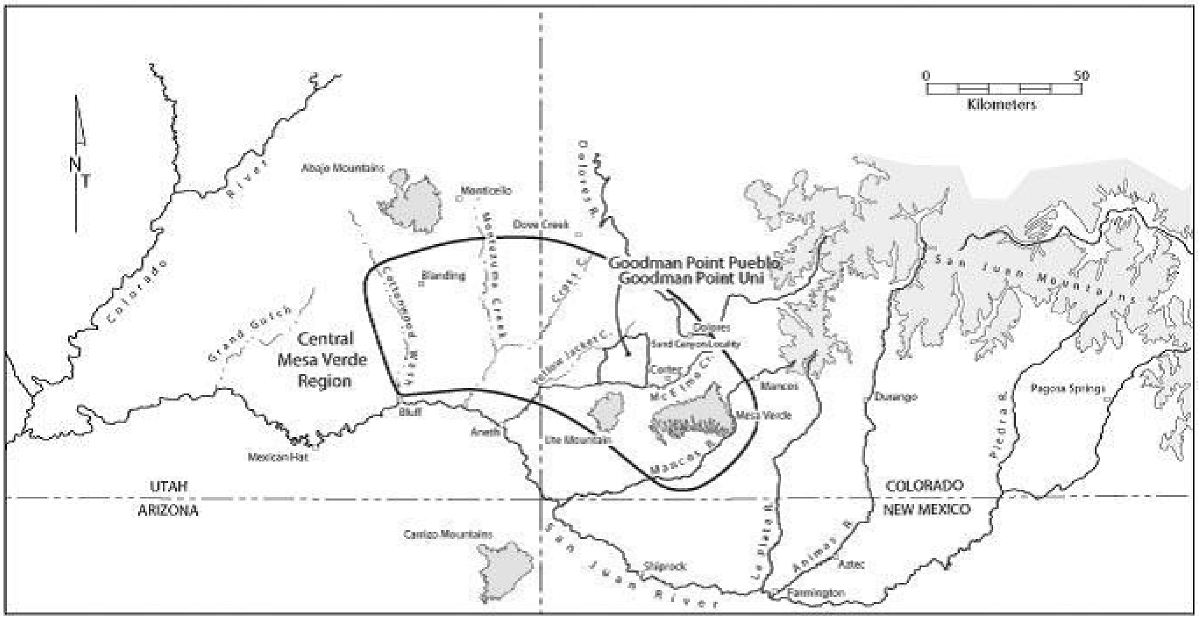


FIGURE 1.1. The location of Goodman Point Unit (Kuckleman et al. 2009).

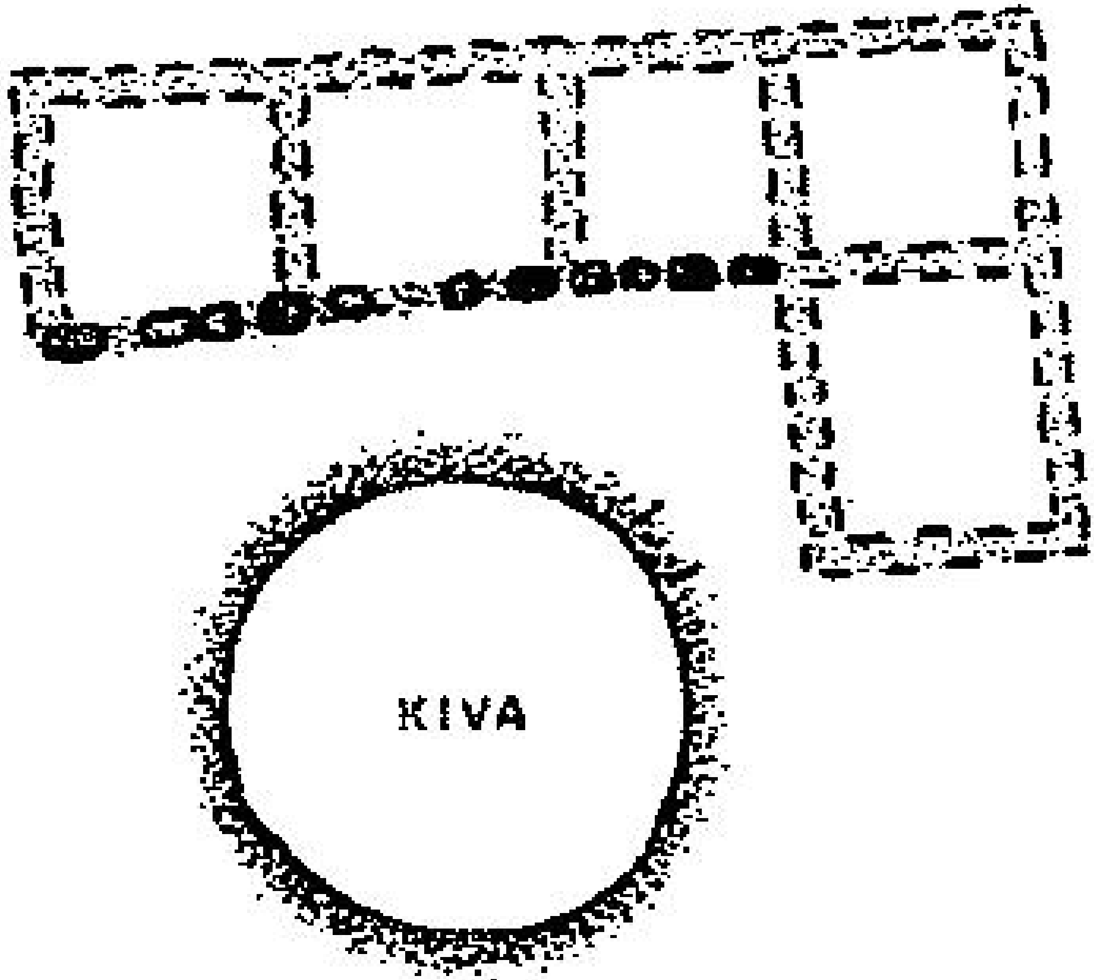


FIGURE 1.2. Prudden unit or unit type pueblo (nps.gov).

1. Ventilator shaft
2. Bench
3. Air deflector
4. Hearth (fire pit)
5. Central vaults (possible floor drums)
6. Sipapu

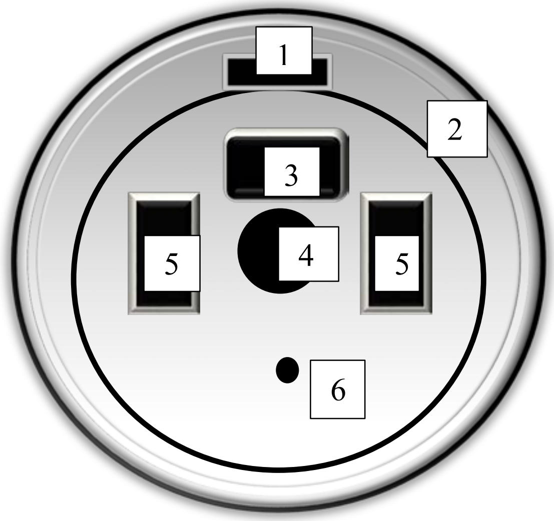


FIGURE 1.3. Diagram of common architectural features found in great kivas.

# CHAPTER 2

# SYSTEMATIC PALEONTOLOGY OF HARLAN GREAT KIVA, BLUEBIRD HOUSE AND PINYON PLACE

This chapter reports the data and the criteria used for identifications of Harlan Great Kiva (5MT16805), Pinyon Place (5MT16803) and Bluebird House (5MT16806) faunal assemblages. The inclusion of a systematic paleontology with zooarchaeological research offers availability of the data and addresses quality control concerns. Quality control is addressed by reporting the methodology used for identifications and allows for replicability (Lyman 2011; Wolverton 2013). This report describes the specimens that were identified and the data are reported in the appendix.

Harlan Great Kiva, Pinyon Place and Bluebird House were excavated by a team from Crow Canyon Archaeological Center during Phase II (2006-2011) of the Goodman Point Community Testing Project (Coffey and Copeland 2011). The data for each site obtained from identifications are reported in the appendix. In this thesis, I utilize other Goodman Point data from two other sources; however, I do not discuss them here because I did not identify those assemblages. For further information on the data from Goodman Point Pueblo, see Hoffman 2011 and for Rain Ridge and Midway House, see Ellyson 2014.

Faunal identifications were conducted using the procedures described in John Driver's Manual for Description of Vertebrate Remains, 8th edition (2006), developed for the Crow Canyon Archaeological Center. Modern comparative collections were used to categorize each specimen's element and taxon. Several comparative manuals (Olsen 2009; Gilbert 1990; Olsen 2004; Olsen 1983; Gilbert et al. 1996; Lawrence 1951; Elbroch 2006; Hillson 2009) were used to narrow down species or provided specific morphological details for identification of species.

Specimens were identified to species, genus, family, or body-size class and reported as the number of identified specimens (*NISP*). Except for the atlas, all vertebrae and ribs were identified to body-size class due to interspecies morphological similarities. Occasionally, specimens were accompanied by others that refit together. These refits were noted but were reported as independent specimens. Isolated teeth are included as independent specimens. An attempt was made to reinsert teeth if a maxilla or mandible was present in the same bag, in which case, the tooth was no longer reported independently. Unidentifiable specimens less than five millimeters were not measured and all identifiable specimens were measured by length and width.

## Systematic Paleontology

### Class Mammalia (mammal)

#### Small Mammal (jackrabbit size or smaller)

Remarks: A vast majority of remains in this category appear to be from lagomorph vertebrae or small mammal ribs. There are several incomplete elements that could not be distinguished between small lagomorphs and large rodents, such as incomplete innominates, which may have been cottontail or prairie dog.

#### Medium Mammal (deer size or smaller)

Remarks: A majority of specimens identified to this category are likely from artiodactyl vertebrae, ribs or shaft fragments.

#### Large Mammal (deer size or smaller)

Remarks: The only large mammal specimen was a machine cut cattle vertebrum, excavated from an area known to be disturbed.

Order Lagomorpha (hare, rabbit and pika)

Remarks: Specimens identified to this order were fragmented and of intermediate size, or these specimens were from juveniles. Lagomorph remains are easily identified from those of other small mammals due to their distinctive morphological features. However, genus identification between *Lepus* and *Sylvilagus* is made based primarily on size (Yang et al. 2005). The snowshoe hare (*Lepus americanus*) is an intermediate-sized species that may also have been identified to this category. Lagomorph specimens that were intermediate in size, those from juveniles or those without distinctive morphological features were placed in this category.

*Sylvilagus* sp. (cottontail rabbit)

Remarks: Desert cottontail (*Sylvilagus audubonii*) and mountain or nuttall's cottontail (*Sylvilagus nuttallii*) are two species that overlap in geographic range and occur together in the assemblages. The desert cottontail occupies semi-desert and montane shrublands below 2135 m in southwest Colorado and the mountain cottontail occupies mountainous areas between 1830 and 3500 m (Armstrong et al. 2011). All species of cottontail were identified to the genus level of *Sylvilagus*, through comparison to mountain cottontail and desert cottontail comparative specimens.

Family Leporidae (jackrabbit and cottontail)

*Lepus* sp. (jackrabbit or hare)

Remarks: Snowshoe hare (*Lepus americanus*) and black-tailed jackrabbit (*Lepus californicus*) have been identified in archaeofaunal assemblages from this region (Yang et al. 205). Typically, identification of *Lepus* is differentiated from *Sylvilagus* by its larger size, but there are some morphological differences, such as the absence of sutures between the inter-parietal and the parietal in adult hares (Elbroch 2006; Armstrong et al. 2011). The two *Lepus* species occupy different habitats. Snowshoe hare is found in coniferous mountain forest at higher elevations and black-tailed jackrabbit are found at lower elevations in semi-desert shrublands and grasslands (Zahratka and Shenk 2008). Identifications were conducted using modern comparative specimens.

Order Rodentia (rodent)

Small Rodent (wood rat or smaller)

Remarks: Almost all small rodent post-cranial elements or incomplete cranium elements that did not have teeth present were given this designation. However, due to differential preservation and differential recovery (Lyman 1994; Nagaoka 2005), few specimens were identified.

Large Rodent (larger than wood rat)

Remarks: Incomplete post-cranial mammalian elements were given this designation if lagomorph could be ruled out.

Family Sciuridae (squirrel)

Remarks: Tree squirrels and ground squirrels are two subfamilies of squirrel that occupy Colorado (Armstrong et al. 2011). Most specimens of the sciurid family were identified to the family level unless they were whole diagnostic elements, cranium or teeth.

*Spermophilus variegatus* (rock squirrel)

Remarks: Rock squirrels belong to the ground squirrel subfamily, though they resemble tree squirrels (Oaks et al. 1987). Rock squirrels live within rock pilings in foothills, valleys and rough lands below 2530 m (Armstrong et al. 2011). Tree squirrels, large ground squirrel species, such as the rock squirrel, and prairie dog have many morphological similarities and overlap in size (Hoogland 1995). Though there has not been a morphometric study comparing rock squirrel and prairie dog, many of their skeletal remains overlap. Therefore, only cranial specimens containing teeth were identified to this species level via a comparative specimen.

*Cynomy's* sp. (prairie dog)

Remarks: Gunnison's prairie dog (*Cynomys gunnisoni*) is the only prairie dog with a modern distribution in southwest Colorado but white-tailed prairie dog (*Cynomys leucurus*) and black-tailed prairie dog (*Cynomys ludovicianus*) exist in other parts of the state (Armstrong et al. 2011). They occupy a diverse range of habitats; grasslands, semi-deserts and montane scrublands. Due to morphological similarities and overlap in size (Hoogland 1995) with large ground squirrel species and rock squirrel, only cranium and diagnostic whole elements were identified via a comparative collection.

Family Geomyidae (pocket gopher)

Remarks: The Botta's pocket gopher (*Thomomys bottae*) and northern pocket gopher (*Thomomys talpoides*) have modern day distributions in southwestern Colorado but the plains pocket gopher (*Geomys bursarius*) and yellow-faced pocket gopher (*Cratogeomys castanops*) have distributions in other regions of Colorado (Armstrong et al. 2011). The northern pocket gopher lives in elevations above 1525 m and botta's pocket gopher lives at lower elevations. There is overlap in skeletal morphology of these species, thus identifications are made at the family level. However, due to the skeletal similarities between this species and other rodents, only humeri and crania were identified to this level by means of a comparative collection.

Thomomy's sp. (pocket gopher)

Remarks: Due to morphological overlap within the Geomyidae family, only a mandible was identified to this genus using a comparative collection and with aid from Elbroch (2006).

Family Muridae (deer mice, voles, etc.)

*Peromyscus* sp. (mice)

Remarks: Canyon mouse (*Peromyscus crinitus*), deer mouse (*Peromyscus maniculatus*), brush mouse (*Peromyscus boylii*), pinyon mouse (*Peromyscus trueii*), rock mouse (*Peromyscus difficilis*) live in varying habitats within this region (Armstrong et al. 2011). Only specimens with teeth were identified using a comparative collection with aid from Hillson (2009).

*Neotoma* sp. (wood rat)

Remarks: Woodrats are often referred to as pack rats for their collecting behavior (Finley 1958). Western white- throated woodrat (*Neotoma albigula*), bushy tailed woodrat (*Neotoma cinera*) and Mexican woodrat (*Neotoma mexicana*) are three species of *Neotoma* with range distributions in southwestern Colorado. All of these species prefer rocks, rockshelters or caves for dens but they can also utilize trees and other microhabitats. Rodents that den in rocks are usually considered intrusive but there are many historical accounts that witness Pueblo people utilizing various methods to capture wood rats, such as smoking them out of nests and setting dead fall traps (Hill 1982; Beaglehole 1970 (1936)). Cranium and complete post-cranial diagnostic elements were identified by comparative specimens.

*Microtus* sp. (vole)

Remarks: Three species in the area are the montane vole (*Microtus montanus*), long tailed vole (*Microtus longicaudus*), Mexican vole (*Microtus mexicanus*) and meadow vole (*Microtus pennsylvanicus*) (Armstrong et al. 2011). Only cranium and teeth were identified to this level by comparison to modern day skeletons.

*Erethizon dorsatum* (porcupine)

Remarks: Porcupine is one of the largest rodents in Colorado and is found in almost every ecosystem in the state (Armstrong et al. 2011). Typically, Hopi used dead fall traps or snares to capture porcupines (Beaglehole 1970 (1936)). One complete humerus was identified through comparison to reference skeletal material.

Order Carnivora (carnivore)

Family Canidae

*Canis* sp. (dog, wolf, coyote)

Remarks: Coyote (*Canis latrans*), gray wolf (*Canis lupus*) and domestic dog (*Canis familiaris*) lived in a variety of habitats in this region. Hybrids from a combination of two of the three species are common (Pilgrim et al. 1988; Boyd et al. 2001). The gray wolf is an ancestor of the domestic dog (Wayne et al. 1997) and many consider (*Canis familiaris*) a subspecies of *C. lupus*. Domesticated dog is commonly found in archaeofaunal assemblages at Ancestral Puebloan people sites (Olsen and Olsen 1977). Early twentieth century Hopi believed that canine species had souls, therefore may not have eaten the meat but would have used their skins (Beaglehole 1970 (1936)). Only a maxilla and an atlas vertebra were identified to this genus level through comparison to skeletal materials of other carnivores in reference collections.

Order Artiodactyla (artiodactyls)

Medium Artiodactyl (deer size artiodactyl)

Remarks: This non-standard description category is used for deer-sized fragmented specimens that do not have any morphologically distinguishable features. Species from the *Odocoileus*, *Ovis*, and *Antilocapra* received this designation. Many of these specimens were compared to material at the University of Texas' Vertebrate Paleontology Laboratory for finer identification; however, in when further separation was not warranted, this designation was retained.

Family Cervidae (deer)

*Odocoileus* sp. (deer)

Remarks: Mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) are species with modern day distributions throughout Colorado (Armstrong et al. 2011. Identifications were conducted with the use of a modern comparative collection and following the criteria of several comparative manuals (Lawrence 1968; Lyman personal notes). The majority of specimens assigned to *Odocoileus* are innominates and long bones with diagnostic features.

Class Aves (bird)

Medium bird (mallard size and smaller)

Remarks: The few specimens that were identified to this group were fibula or small fragments. It is possible these may be from a small or juvenile turkey.

Large bird (larger than mallard)

Remarks: The majority of remains in this category is assumed to be turkey but did not have diagnostic features. Other possible alternatives to turkey are sandhill crane (*Grus canadensis*) or large bird species not common in the region (Driver 2002).

Order Anseriformes (water fowl)

Family Anatidae (surface feeding ducks)

Remarks: Surface feeding ducks live in or near ponds, lakes and rivers but most species migrate, such as the mallard (Robins et al. 2009). Identification of cranium specimens was conducted using a comparative collection with assistance from Miles et al. (1996).

Order Galliformes

*Meleagris gallopavo* (turkey)

Remarks: Turkey remains found at Pueblo II and Pueblo III Ancestral Puebloan sites are assumed to be domesticates due to ample indication of husbandry (Munro 2006). Researchers have obtained inconclusive *m*DNA results in the quest to identify the sub-species of the wild progenitor of the southwestern domestic turkey (Speller et al. 2010). Therefore, it is unknown if these particular turkeys ever had wild indigenous populations in the region or if they were introduced into the region as domesticates. It has been suggested that wild turkeys were introduced due to the lack of turkey specimens from sites pre-dating Basketmaker II (Munro 2006). However, recently several early Holocene sites have produced turkey remains during excavation (Newbold et al. 2012). Identifications of turkey were conducted using a modern comparative collections, comparative manuals (Miles et al. 1996; Olsen 1983; McKusick 1986) and with additional aide from a journal article to prevent misidentification with sandhill crane (Hargrave and Emslie 1979).

Class Amphibia

Order Anura (frog and toad)

Remarks: The only specimens identified to this order were found within the same provenance of elements identified to Pelobatidae (see below). It appeared to be a fragmented cranium of spadefoot toad; however, due to the degree of fragmentation, refitting was not an option and order was the finest level of identification for a few specimens that were identifiable.

Pelobatidae (spadefoot toad)

Remarks: The Great Basin spadefoot (*Scaphiopus intermontanus*), plains spadefoot (*Scaphiopus bombifrons*) and western spadefoot (*Scaphiopus hammondi*) are species found in various habitats across Colorado (Whitaker 1977). Only cranial elements with teeth present were identified using a modern comparative skeleton.

Class Reptilia (reptile)

Order Squamata (lizard and snake)

Suborder Serpentes (snake)

Remarks: Species of vipers (Viperidae) and typical snakes (Colubridae) are found in Colorado (Hammerson 1999). Snakes are commonly considered intrusive since they are not eaten by modern Puebloans (Gnabasik 1981); however they are used in various kiva ceremonies and rituals by Hopi (Waters 1963). Only vertebrae were identified via a comparative collection and with assistance from Olsen (1996).

# CHAPTER 3

## FEAST OR FILL: SPATIAL ANALYSIS OF FAUNAL ASSEMBLAGES FROM MIXED AND COMMUNAL CONTEXTS

The mode of deposition of faunal remains on great kiva floors has been debated. Were the faunal remains initially deposited as a final feast or were the remains accumulated as a midden after the kiva was no longer in use? The answer to this question would enhance our knowledge of pit structure function and great kiva abandonment. I explore this question by analyzing differences in zooarchaeological variables of faunal data from an Ancestral Puebloan great kiva and contemporaneous middens.

Ethnographies can be a useful source for establishing criteria to identify feasts. In *A Century of Feasting*, Dietler and Villenueve (2011) surveyed cross-cultural ethnographic feasting research and solicited zooarchaeologists to identify feasts within the archaeological record. They argued that cross-culturally feasts would be expressed in the archaeological record by the types of animals people used, their quantity, and the method of preparation. In chapter one, zooarchaeological methods were discussed that should distinguish daily meals from communal feasts in the Ancestral Puebloan Southwest. These methods follow Dietler's and Villeneueve's (2011) criteria, as well as incorporate Pueblo ethnographic and southwest archaeological research.

Southwestern anthropologists of the late nineteenth and early twentieth century reported numerous incidences of communal Puebloan feasting (Fewkes 1922; Hawley 1950; Parsons 1996; Hill 1982). Men in the village, men from the surrounding area, or men from a particular clan attended feasts conducted within great kivas for various ceremonies throughout the year. The meat used for feasts varied from mutton to rabbit. Communal rabbit hunts often marked the beginning of particular annual multi-day religious festivals. Communities, such as Santa Clara Pueblo, marked the beginning of the summer katchina initiations with a communal rabbit hunt (Hill 1982).

Archaeologists in the Southwest encounter inconsistent findings on species used for feasts. Potter (1997) has argued that large numbers of rabbits in areas of some southwestern sites can be attributed to communal feasting. However, Pueblo de los Muertos, a Pueblo IV site in Arizona, was found to have higher turkey abundance in communal plaza areas (Potter 2000). These findings suggest that species utilized for feasts varied by site but were animals that could be expediently collected in large numbers.

Domestic stocks and garden game are two animal resources that Ancestral Puebloan people could utilize to expediently procure animals in large numbers. Numerous Pueblo II and Pueblo III sites have generated turkey pens, excrement, skeletal pathologies (Munro 1994) and egg shells (Beacham & Durand 2007), which suggest that turkey husbandry was prevalent by the Pueblo III period. High rabbit abundance is observed in most southwestern archaeofaunal assemblages. Ancestral Puebloan farming practices would have produced a favorable habitat for high populations of *Sylvilagus* species (Chapman and Morgan 1973). The adoption of garden hunting (Linares 1976; Jones 2006) would help control pests but provide a dependable source of protein due to the rabbit's high proliferation rate (Schollmeyer and Driver 2012). Both of these resources, if managed correctly, could be used for feasting events.

Harlan Great Kiva (HGK, 5MT16805) was identified as a probable feasting location. The site was occupied from circa late A.D. 900's to A.D. 1250's (late Pueblo II to mid Pueblo III). The study area is from sites within the Goodman Point Unit in southwestern Colorado. A relatively large sample of faunal remains was obtained from the floor of the great kiva. The kiva appears to have been intentionally decommissioned with its roof having been collapsed or dismantled and the structure having been burned (Coffey and Copeland 2011). Wilshusen (1986) found a strong association between Pueblo I great kivas with central vaults and the intentional burning of the structure.  HGK exhibits a central vault and may be a late example of this pattern. If the great kiva was intentionally decommissioned by the community, it seems logical that the faunal remains on the floor would be the result of a final feasting event. However, I have not located any reference to a decommissioning kiva feast within the ethnographic record.

Given, cross-cultural ethnography, Pueblo ethnography and southwestern archaeology, several patterns in faunal data are expected when identifying feasts. If the assemblage from HGK is from a feast and not fill, one would expect to observe differences in several variables between the great kiva and middens. First, taxonomic composition should have a larger percentage of rabbit, turkey and possibly artiodactyl in the kiva. I would expect these species to be rank high in terms of dietary importance and, thus, also in terms of cultural significance. Due to the large size of artiodactyls, fewer animals may have been obtained (thus, fewer zooarchaeological specimens would be represented) but would have fed more people. However, in the event that the feast was potluck, which ceramic evidence suggest occurred in small kivas at McPhee village (Blinman 1989), the faunal assemblage from HGK may not be discernable from assemblages from middens. Second, the predominant fauna in the HGK assemblage would probably be obtained from species that occurred in the immediate area or that were procured from domestic stocks that could be collected in an expedient manner. This can be measured using an index that measures the expediently collected type animals and compares it to other animal resources. Third, a feasting event should be characterized by low species richness, dominated by a few species unless there were rare species transported in from long distances. The *NTAXA* (number of species) of the great kiva assemblage should be much lower than for midden assemblages. Fourth, the manner of preparation would be different, such as more indications of roasting on bone specimens. Ethnographically, cultures tend to roast meat for feasts due to expediency (Rappaport 1984). It is assumed that all or a higher proportion of meat from a feast would be roasted if compared to a daily meals. Given, that HGK was intentionally burned, this method was omitted from the analysis. Analysis of differences in taxonomic composition, richness, and indicators of use of expedient prey should establish if a feast occurred during the great kiva decommissioning or if the remains resemble rubbish, similar in composition and abundance of remains found in middens.

## Methods and Materials

The Harlan Great Kiva (5MT16805, Figure 3.1) (Structure 101) was constructed in late Pueblo II and decommissioned at the end of mid-Pueblo III (circa A.D. 1250's). Since HGK's faunal assemblage was obtained from the floor of the great kiva immediately under the decommissioned roof rubble, the contemporaneous midden faunal assemblages to be used for comparison were chosen from surrounding Pueblo III room block sites of Rain Ridge (5MT16778) and Midway House (5MT16777). Midden assemblages were used to characterize day-to-day rubbish. Ideally, room structure assemblages that are suspected of being fill should be used to compare differences with the great kiva floor and middens but none of structures produced large enough assemblages. Dates of sites within the unit were established via a combination of strategies; architecture, dendrochronology, carbon isotopes and ceramics (Coffey and Copeland 2011). The abbreviated names, site names, site number and context designation are listed in Table 3.1. These faunal assemblages were used in order to determine if a final feast at the great kiva could be identified.

*Are Particular Prey Taxa More Common in HGK?*

Taxonomic composition was evaluated for each assemblage to determine differences in the types and quantity of animals used by context. Animal remains left from a feast may be expressed by the predominance of one animal (Dietler and Villenueve 2011). Relative frequency provides an indication of taxonomic abundance of all represented fauna, regardless of sample size (Lyman 2008). The total $\sum NISP$ for each assemblage and the $NISPi$ for each taxon were tallied to acquire an absolute frequency in order to establish the relative composition of taxa in each assemblage using the following equation:

$$\text{Relative Frequency} = ((NISPi) / (\sum NISP)) \times 100$$

After obtaining the relative frequency of taxa for each assemblage, some data were excluded or aggregated. Data from taxa suspected of being intrusive were excluded from further analysis and the $\sum NISP$ was adjusted. The suspected intrusive taxa consisted of small rodents and large burrowing rodents, unless there were indications, such as burning or cutmarks, that a particular taxon was used for eating. The large bird category was aggregated with turkey (*Meleagris gallopavo*) and the lagomorph order category was aggregated with cottontail (*Sylvilagus* sp.). The majority of the specimens in large bird are assumed to be turkey, however it may include sandhill crane (*Grus canadensis*) or another large bird species not common in the region (Driver 2002). The majority of specimens within the lagomorph category is thought to be cottontail but may include individuals of relatively small-bodied hares, such as snowshoe hares (*Lepus americanus*) (Driver and Woiderski 2008). Deer (*Odocoileus* sp.), pronghorn

(*Antilocapra americana*) and big horn sheep (*Ovis canadensis*) were aggregated into the medium artiodactyl category. Most of the identifiable artiodactyl remains are *Odocoileus*. For all subsequent tests, these turkey (*Meleagris gallopavo* + large bird) and cottontail (*Sylvilagus* sp. + Lagomorph) groupings remain aggregated.

Next, the taxa from each assemblage were rank-ordered by their relative frequency. Rank order was used to assess differences on an ordinal scale for taxonomic composition of the contexts. Multiple chi-square tests of independence were run to determine if there is a significant difference in taxonomic abundance between HGK and Pueblo III midden assemblages.

*Results*: Taxonomic relative frequencies (Table 3.2) are used to assess differences between faunal assemblages from mixed and communal contexts. In both of the Midway House midden assemblages (Table 3.3), cottontail is ranked as the most abundant taxon but turkey is ranked first for the Rain Ridge assemblages and HGK. However, "small mammal" is ranked third for all assemblages except HGK, which may be due to a high abundance of lagomorph vertebrae that were conservatively identified as small mammal. If this is the case, then lagomorph would be ranked first for all assemblages except HGK and RR1. MH2, MH3, RR1 and RR2 have rodents or jackrabbit ranked as fourth. For HGK, medium mammal and medium artiodactyl are ranked third and fourth. A majority of the *NISP* in the medium mammal grouping come from artiodactyl vertebra.

A chi-square test of independence was run to see if there was a significant difference between cottontail (cottontail + lagomorph) and turkey (turkey + large bird) abundance among faunal assemblages (Table 3.4). A significant difference was found with moderate effect size ($X^2$ (4) = 46.026, p <.05, Ø = .258). However, there is no significant difference between MH2, MH3 and RR2 for these two taxonomic categories ($X^2$ (2) = .297, p>.05, Ø = .042). All other combinations that contain HGK and RR1 exhibit significant differences in the abundance cottontails and turkeys. These results suggest that the amount of turkey and cottontail for the 100 roomblock midden at Rain Ridge and the floor of Harlan's great kiva are different from all the other middens for the first and second ranked taxa. However, HGK exhibits a high abundance of turkey, followed by cottontail then large game, which is different from RR1. At RR1 prairie dog is ranked third, which is similar to the other middens. Turkey, cottontail and artiodactyls are animals that have previously been associated with feasting in the Southwest (Potter 1997; Potter 2000).

*Is There a Difference in the Use of Animals that can be Collected Expediently?*

Lagomorphs and domesticated turkey can be expediently collected throughout the year. The use of these types of animals would offer a distinct advantage for feasting if large amounts of meat were required. An expedient collection index was calculated, where cottontail and turkey were considered easily obtained local animals related as managed flocks or garden game and are contrasted to other game.

Expedient Collection Index= (cottontail + lagomorph + large bird) / $\sum$ (*NISP*)

A value of 0 = no exploitation of local animals and 1 = exploitation of only locally available animals that were easily collected.

*Results*: Figure 3.2 demonstrates that HGK (ECI=.80) is not within the ECI domestic assemblage range (.60 to .75), but it exceeds the maximum for roomblock midden assemblages by only .05. These results suggest that there is slightly higher use of locally collected animals in the great kiva than in these midden contexts.

*Is There a Difference in the Richness of Species Used?*

Cross-cultural ethnographic research suggests that ceremonial feasts should have a lower amount of animal species compared to daily meals in domestic settings (Jackson and Scott 1995; VanDerwarker 1999). To test this hypothesis, the quantity of animal species (*NTAXA*) recovered from each assemblage was tallied. The animal types were based on individual species represented. However, genus or a higher taxonomic level may have been used where only the genus was designated or one species within a genus occurred (Lyman 2008).The *NTAXA* and *NISP* for each site were graphed on a scatter plot. Previous research suggests that *NTAXA* has a direct relationship with *NISP* (Grayson 1984; Lyman 2008) because larger assemblages have a higher probability of sampling rare taxa. A scatterplot of *NISP* to *NTAXA* is used to identify the presence of samples that exhibit relatively low or high richness given sample size.

Remains of rare taxa are often excavated from communal areas, such as kivas (Potter 1997). Residents may have traded or traveled to exploit other ecological regions for rare taxa used in feasts or religious ceremonies. A nestedness temperature analysis was done to determine if the communal faunal assemblage was exploited from the same metacommunity or if the faunal assemblage contained unique or rare animals. A matrix for taxa of RR1, RR2, MW2, MH3 and HGK was created. In several cases, the genus was identified rather than the species; therefore, in several cases I used the genus level. All species were included for this analysis. The binary matrix notes the presence of a taxon and is designated as a 1 and the absence with a 0 (Atmar and Patterson 1993; Ulrich et al. 2009). The software then computes the temperature of its nestedness from 0 to 100 degrees, with 0 being completely nested and 100 not nested.

*Results*: The results indicate that significantly fewer taxa were used in the communal context of HGK. The bivariate scatterplot (Figure 3.4) illustrates that HGK is at the lower 95%

confidence interval of the relationship between *NTAXA* and *NISP* for these assemblages. MH1 and HGK are two outliers at the opposite ends of the spectrum. The midden assemblages appear to represent a broader diet breadth and HGK demonstrates comparatively specialized use of animal species.

The assemblages were moderately nested (T= 36.302) (Figure 3.2). Domesticate turkey, small game, such as cottontail, squirrel and a variety of small rodents were present in all of the assemblages. Jack rabbit is absent from the HGK, but was present in all other assemblages. There is much more variability between the assemblages with carnivores and artiodactyls. Exotic animals were absent from all assemblages but there is the presence of a couple of unique taxa. Remains of snakes were present in RR1 and HGK. Snakes may have been intrusive but there is ethnographic literature that the Antelope Snake clan often used snakes in their ceremonies (Hill 1982). Rare taxa found in communal areas in the Southwest (Potter 1997) may be from animal burials, which were not encountered during excavations of kivas at Goodman Point.

## Discussion

The great kiva, according to southwestern ethnographers, is a communal area which would have been used for some feasts (Fewkes 1922; Hawley 1950; Parsons 1996) but archaeologists are unsure if a final kiva feast event occurred at abandonment of HGK. Potter (2000:485) has argued that turkeys were raised as a “predictable and sustainable feasting resource.” Hayden (2003 & 2009) found a correlation between domestication and feasting and postulates that the origins of domestication can be attributed to feasting. If Potter’s and Hayden’s assumptions are correct, then turkey would be expected to be the most abundant animal on the great kiva floor.

The results from the faunal analyses of the Harlan Great Kiva assemblage exhibits patterns expected from a feasting event. The three top ranked taxa for HGK in terms of faunal abundance were turkey, cottontail and artiodactyl, which are animals that have been associated with feasting (Potter 1997; Potter 2000). In addition, HGK had the highest ECI values, supporting that a feast occurred, and HGK exhibited that lowest taxonomic richness compared to other assemblages. These results align with several of the ethnographic criteria for identifying feasts.

Ethnographic evidence suggests that an essential component of feasting is accessibility of large amounts of an animal that is easily accessible at various times throughout the year. Turkey and cottontail are animals that can be expediently collected in large numbers throughout the year from local contexts. The high *expedient collection index* results demonstrate that a majority of the HGK faunal assemblage consisted of species that were probably obtained from domestic stocks or garden hunting.

The great kiva had lower species richness than the middens. Feasting events in other areas besides the Southwest often exhibit faunal assemblages with a low number of species (Jackson and Scott 1995; VanDerwarker 1999). In the Southwest some great kivas have higher species richness due to the presence of remains from rare animals (Potter 1997); however this was not the case at HGK.

There appears to have been a final feast at HGK prior or during the decommissioning as the fauna assemblage differs in taxonomic frequencies and composition from assemblages from roomblock midden contexts. These results demonstrate that there are faunal differences between the great kiva's floor and contemporary typical rubbish. Additionally, this chapter demonstrates that faunal remains can contribute to researching a structure's function. In the future, I would like to include the faunal assemblages from the floor of room units in this analysis.

TABLE 3.1. Sampling method for PIII assemblages.

| **Name** | **Study Area** | **Site #** | **SU#** | **Context** | **Function** | **Time** |
|---|---|---|---|---|---|---|
| MH2 | Midway House | 5MT16778 | NS203 | Room block unit midden | Mixed | PIII |
| MH3 | Midway House | 5MT16778 | NS304 | Room block unit midden | Mixed | PIII |
| RR1 | Rain Ridge | 5MT16777 | NS102 | Room block unit midden | Mixed | PIII |
| RR2 | Rain Ridge | 5MT16777 | NS203 | Room block unit midden | Mixed | PIII |
| HGK | Harlan Great Kiva | 5MT16805 | SU101 | Great kiva floor | Communal | PIII |

TABLE 3.2. Relative frequency of PIII assemblages in percent.

| | | | **MH2** | **MH3** | **RR1** | **RR2** | **HGK** |
|---|---|---|---|---|---|---|---|
| Lagomorpha | | Rabbits & hares | 6.96 | 9.86 | 2.27 | 1.33 | 7.73 |
| | Sylvilagus sp. | cottontail | 28.70 | 26.76 | 26.39 | 25.33 | 7.25 |
| | Lepus sp. | Jackrabbit or hare | 1.74 | 1.41 | 1.24 | 9.33 | |
| Rodentia | Sciuridae | Squirrels | | | 2.06 | 4.00 | .48 |
| | Spermophilus sp. | Ground squirrels | 1.74 | 2.82 | 1.44 | | |
| | Spermophilus variegatus | Rock squirrel | | 2.82 | .62 | 1.33 | |
| | Cynomys sp. | Prairie dog | 2.61 | | 1.86 | | 1.45 |
| | Geomyidae | Pocket gophers | 2.61 | | 2.27 | 5.33 | .48 |
| | Muridae | Deer mice & voles | | | | | .97 |
| | Neotoma sp. | Wood rat | 4.35 | 1.41 | 1.03 | | 1.45 |
| Carnivora | Carnivore | | | | .21 | | |
| | Canidae | Dogs, wolves | | 2.82 | | | |
| | Canis sp. | Dog, wolf, coyote | | 2.82 | .21 | | |
| | Lynx sp. | Lynx, bobcat | | | .21 | 1.33 | |
| | Urocyon or Vulpes | Fox | | | | 1.33 | |
| Artiodactyla | Odocoileus sp. | Deer | | | | 1.33 | 1.93 |
| | Antilocapra americana | pronghorn | .87 | 1.41 | | | |
| | Ovis canadensis | Bighorn sheep | | | .21 | | |
| Non-standard | | Small mammal | 15.65 | 7.04 | 10.93 | 12.00 | 2.42 |
| | | Medium mammal | .87 | | 1.03 | 1.33 | 8.21 |
| | | Small rodent | .87 | 2.82 | .62 | | |
| | | Large rodent | .87 | | | | |
| | | Medium artiodactyl | | 1.41 | | | 1.45 |
| Galliformes | Meleagris gallopavo | turkey | 13.91 | 15.49 | 26.39 | 21.33 | 24.64 |
| | Phasianidae | Quail | | 1.41 | | | |
| Passeriformes | Passeriformes | Perching birds | 1.74 | | | | |
| Strigiformes | Strigiformes | owls | | | .21 | | |
| | | Large bird | 13.04 | 18.31 | 19.59 | 12.00 | 39.13 |
| | | Medium bird | | 1.41 | .82 | | .97 |
| | | Small bird | | | .21 | 2.67 | |
| Reptilia | Squamata | Snakes | | | .21 | | 1.45 |

TABLE 3.3. Rank order of taxa.

| | | | | MH2 | MH3 | RR1 | RR2 | HGK |
|---|---|---|---|---|---|---|---|---|
| Mammalia | Lagomorpha | Sylvilagus sp. | Cottontail, lagomorpha | 1 | 1 | 2 | 2 | 2 |
| | | Lepus sp. | Jackrabbit or hare | 5 | 7 | 6 | 4 | |
| | Rodentia | Sciuridae | Squirrels | 5 | 4 | 4 | 5 | 10 |
| | | Cynomys sp. | Prairie dog | 4 | | 5 | | 6 |
| | Carnivora | | | | | 9 | | |
| | | Canidae | Dogs, wolves | | 4 | | | |
| | | Lynx sp. | Lynx & bobcat | | | 9 | 7 | |
| | | Urocyon or Vulpes | Fox | | | 9 | 7 | |
| | Non-standard | | Small mammal | 3 | 3 | 3 | 3 | 5 |
| | | | Medium mammal | 8 | | 7 | 7 | 3 |
| | | | Medium artiodactyl | 8 | 6 | 9 | 7 | 4 |
| Aves | Columbiformes | Columbiformes | Pigeons and doves | | | | | |
| | Falconiformes | Buteo sp. | hawks | | | | | |
| | Galliformes | Meleagris gallopavo | Turkey & large bird | 2 | 2 | 1 | 1 | 1 |
| | | Phasianidae | Quail | | 7 | | | |
| | Passeriformes | Passeriformes | Perching birds | 5 | | | | |
| | | | Owl | | | 9 | | |
| | Non-standard | | Medium bird | | 7 | 8 | | 8 |
| | | | Small bird | | | 9 | 6 | |
| Reptilia | | Squamata | Snakes | | | 9 | | 6 |

TABLE 3.4. Chi-square results of PIII assemblages for turkey and cottontail.

| | Observed | | Residual | |
|---|---|---|---|---|
| | Cottontail | Turkey | Cottontail | Turkey |
| HGK | 31 | 132 | -30.7 | 30.7 |
| MH2 | 41 | 31 | 13.7 | -13.7 |
| MH3 | 26 | 24 | 7.1 | -7.1 |
| RR1 | 139 | 223 | 1.9 | -1.9 |
| RR2 | 25 | 20 | 8.0 | -8.0 |

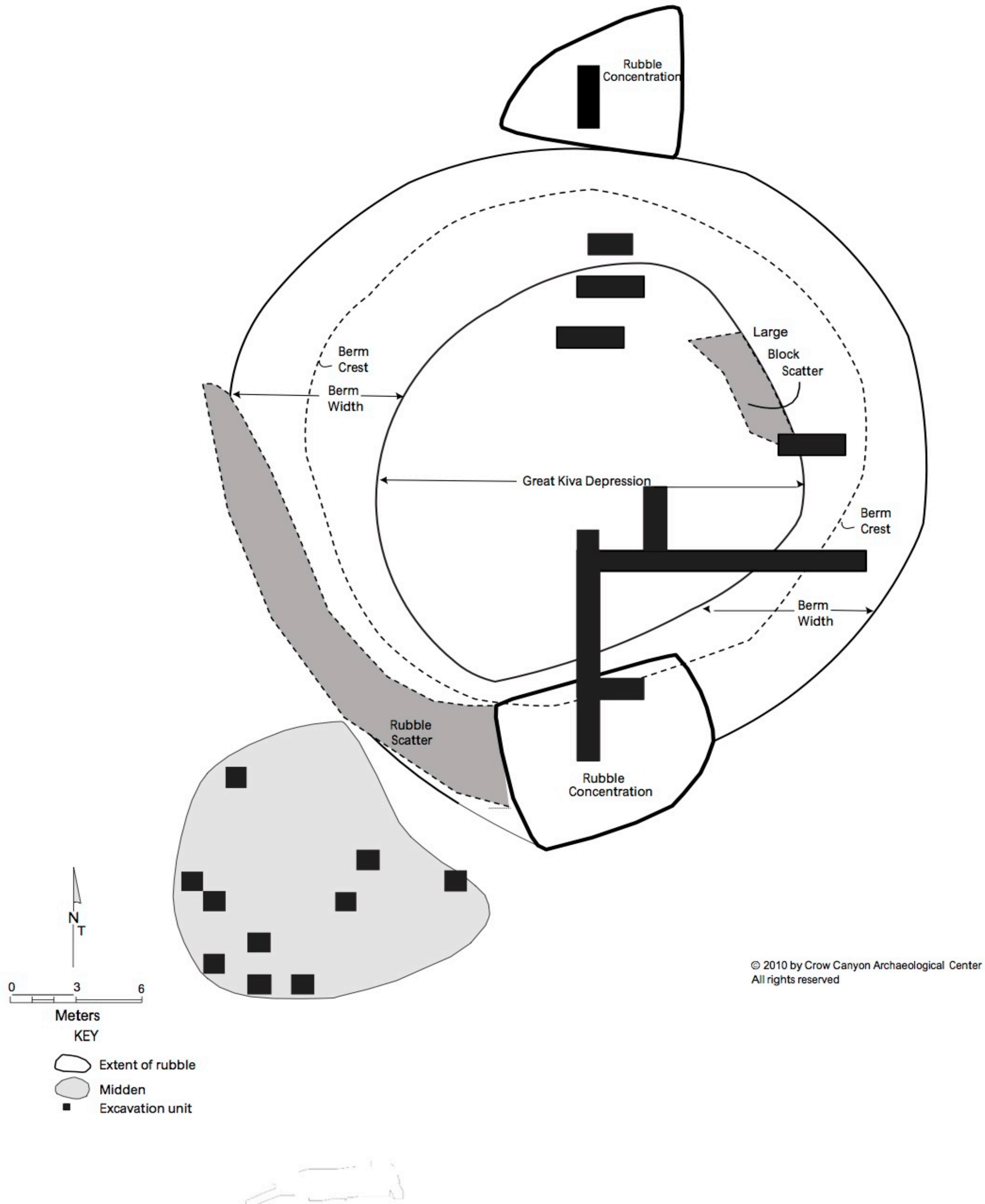


FIGURE 3.1. Site plan of Harlan Great Kiva (5MT16805) with cultural components and excavation units (Crow Canyon Archaeological Center 2010).

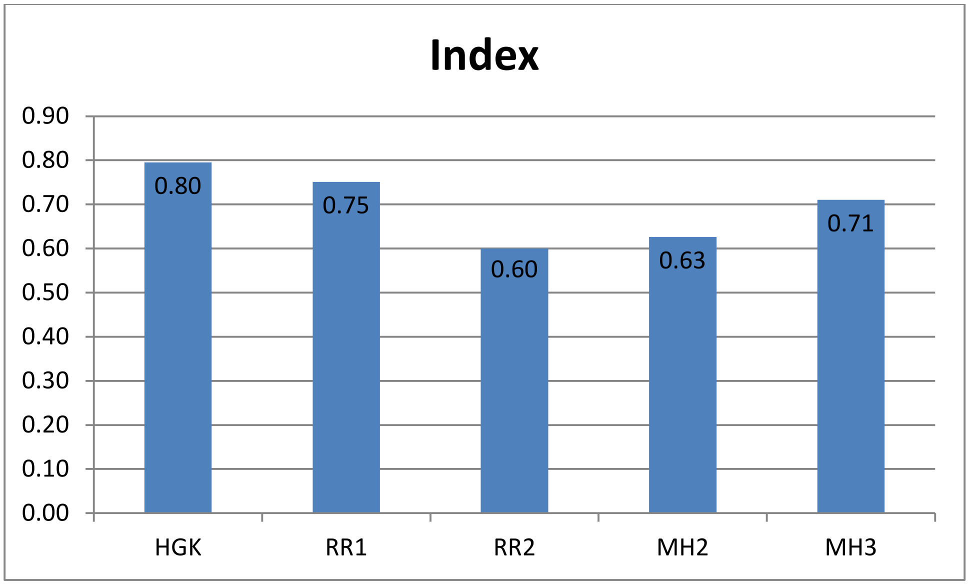


FIGURE 3.2. The expedient collection index for PIII assemblages.

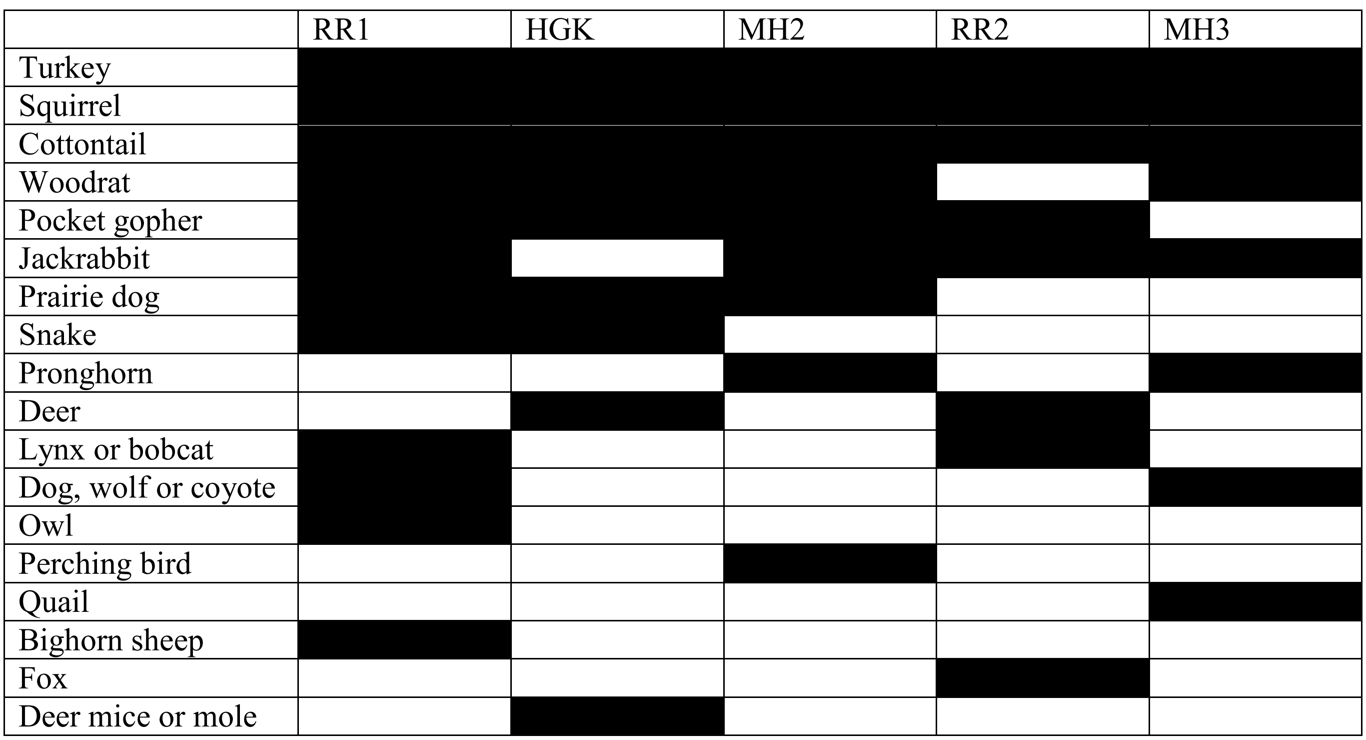


FIGURE 3.3. Nestedness packed matrix (T= 36.302) for assemblages and taxa with common names.

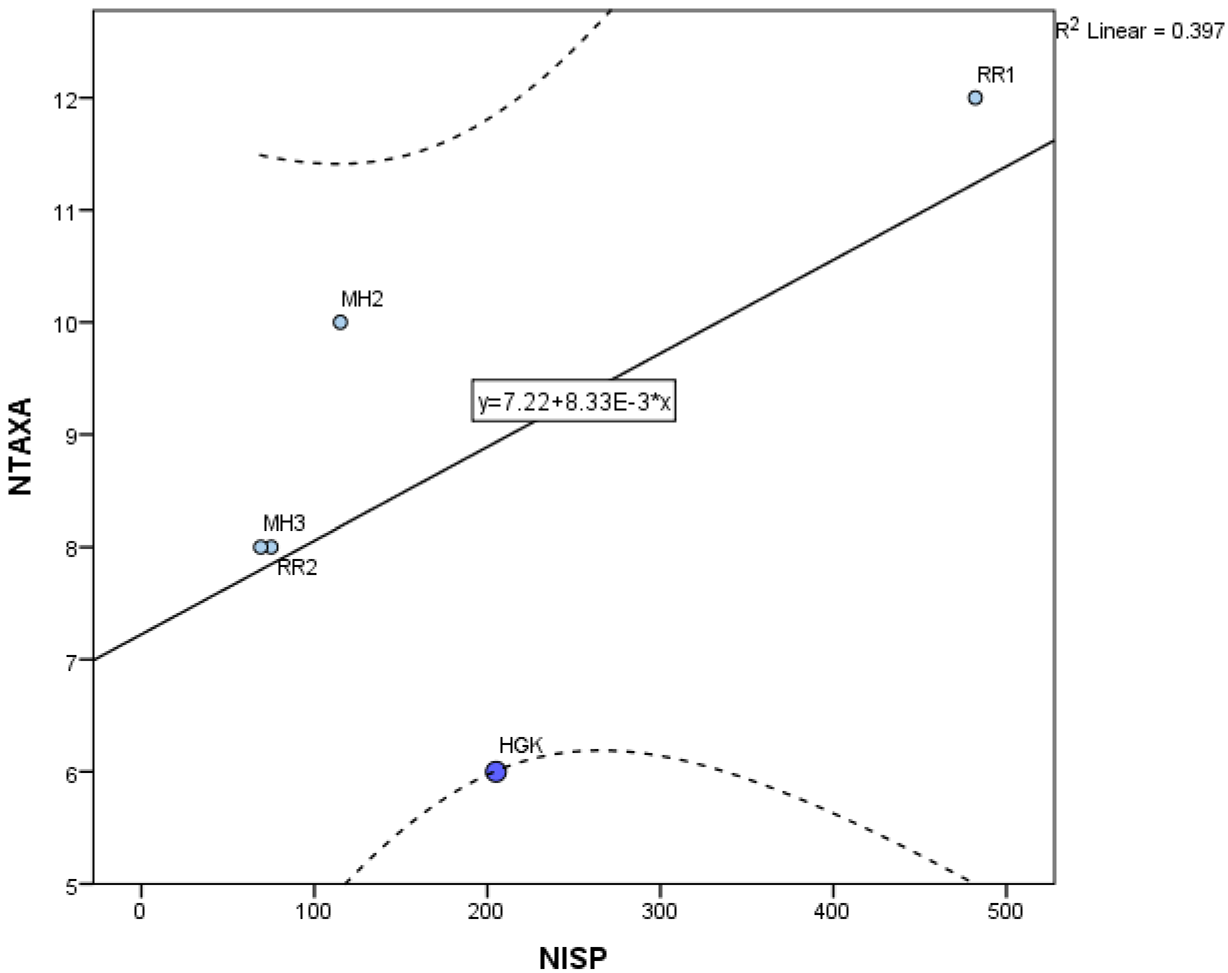


FIGURE 3.4. Bivariate scatterplot of *NTAXA* and *NISP*.

# CHAPTER 4

# TEMPORAL CHANGES IN FAUNAL EXPLOITATION WITHIN LARGE PIT STRUCTURES AT GOODMAN POINT

This chapter explores the temporal changes in the faunal assemblages of the Goodman Point community's large pit structures. Typology and the evolution of large pit structure function has been examined via architectural features and ceramics. Early large pit structures, such as pithouses combined domestic, religious and storage functions (Lipe 1989). In Pueblo I during the pithouse to pueblo transition, domestic and storage functions moved above the ground, while religious functions stayed subterranean within kivas. Archaeologists have observed trends toward specialized and standardized architectural features from Pueblo I to Pueblo III (Brew 1946; McLellan 1969). Additionally, multi-purpose ceramics are found in association with pithouses (Reed 2000) while specialized, highly decorated vessels are found within great kivas (Freeman and Brown 1964; Longacre 1970; Upham et al. 1981). The trajectory of pit structure evolution is toward specialization but does the fauna found in association with large pit structures exhibit a similar trend toward specialization?

Research was conducted on faunal assemblages from three large pit structures in the Goodman Point Unit, consisting of a pithouse and two great kivas. The assemblages date from late Pueblo II, mid Pueblo III and late Pueblo III. If animal use in pit structures displays a similar trend toward specialization, one would expect to observe a trend toward lower species diversity. Typically, species diversity is a measured as evenness and richness. What is meant by diversity here is the types of taxa represented, their abundance and the number of taxa represented (Lyman 2008). I measure these components of taxonomic diversity separately. The three pit structures are evaluated for differences in taxonomic composition, species richness and cultural and environmental factors. By cultural and environmental factors, I mean circumstances such as, the introduction of domesticates, resource depression, deforestation and climate change, which could have resulted in a change in the types of animals the residents used.

I make two assumptions related to this research. First, I assume that the faunal remains within the great kivas were last used for a final feast. Results from chapter three suggest that the Harlan Great Kiva's remains were from a feast. Though, I do recognize the possibility that HGK and GPK may have been fill, left after a majority of the residents abandoned the site. In that case, the results would be evaluating differences in daily diets after abandonment of the structures from the two areas. Even if these great kivas do not represent individual feasts, as a record of community use of these great kivas, the presence of these animal remains and data from this context has value for archaeologists. Second, in communal contexts, such as in association with a great kiva, particular animal species may have been purposely used for ritual or customs, may also be a reflection of the animals used for daily subsistence, or may simply reflect which taxa were available on the surrounding landscape. Daily subsistence for the time periods in the region is described below.

*Late Pueblo II (A.D. 1050-1100) Subsistence*

Climate models indicate that precipitation and temperature were increasing from their previous lows earlier in Pueblo II (Wright 2012), which may be a motive for why people immigrated back into the Mesa Verde region from Chaco Canyon during this time (Ortman et al. 2012). Corn, squash and beans were grown for sustenance and were supplemented with foraged wild plants and animals (Minnis 1989). Faunal assemblages indicate a decrease in availability of artiodactyls and jackrabbits in relation to cottontail, while the proportion of turkey in the diet increases (Badenhorst and Driver 2009). Pens, droppings, eggshells (Beacham and Durand 2007) and healed bones (Munro 1994) found in faunas from this period suggest that turkeys had been domesticated and were intensively managed.

*Mid Pueblo III (A.D. 1200-1250) Subsistence*

Southwestern archaeologists believe that by mid-Pueblo III, weather conditions were favorable for agriculture (Burns 1983). The Ancestral Puebloan civilization appears to have been hyper-dependent upon cultivated resources for subsistence, such as maize (Decker and Tieszen 1989; Hard et al.1996) and turkey (Munro 1994; Badenhorst and Driver 2009). Maize surplus was stored for sustenance throughout the year, to supplement possible low crop yields during the forthcoming harvest (Spielman et al. 1990) and to feed their turkey flocks (McCafferty et al. 2014, Rawlings and Driver 2010; Adams and Bowyer 2002). This increase in dependency on domesticated resources compared to previous Pueblo periods may have resulted from increased specialization (Spielman 2002) or in response to depression of large prey and other wild resources (Badenhorst and Driver 2009).

*Late Pueblo III (A.D. 1250-1300) Subsistence*

By Late Pueblo III, migrations out of the region initiated. The Great Drought (A.D. 1276-1299) produced a decrease in precipitation (Douglas 1929) and temperature (Benson et al. 2007; Wright 2012) which may have resulted in low crop yields (Burns 1983; Bellorado 2007). Subsistence shifted from hyper-dependency on domesticated resources to incorporating hunting and gathering a greater proportion of wild resources (Kuckleman 2010; Muir and Driver 2002).

In the context of these changes, people continued to build and use large pit structures at Goodman Point. Like the architecture of pit structures, can a trend toward specialization be observed in the faunal assemblages of large pit structures at Goodman Point and are they even more specialized than the contemporaneous diet? If there is a trend toward specialization, you would expect a decrease in species diversity. This analysis evaluates species composition, species richness and cultural and ecological factors to determine if there is a trend of specialization in the animals used in large pit structures.

## Methods and Materials

### *Site Description and Sampling Methods*

Faunal assemblages from Harlan Great Kiva (5MT16805) and Goodman Point Pueblo (5MT604), both within Goodman Point Pueblo Unit were utilized to determine if there were changes in use of animal resources in large pit structures over time. The faunal samples are from a large domestic Pueblo II pithouse (HPH) (structure 152 and associated middens) underlying Harlan Great Kiva (HGK), the Pueblo III communal HGK (structure 101), and the late Pueblo III ceremonial Goodman Point Pueblo's great kiva (GPK) (structure GK1213 and room GK1215). HPH was an earthen pithouse, believed to be one of the first settlements of Goodman Point (Coffey 2011). A small sample was obtained from the floor; therefore, several contemporaneous middens that appear to be domestic in context and are spatially and temporally associated with HPH, were grouped with the HPH floor assemblage.

HGK was constructed on top of the pithouse as a masonry subterranean, roofed structure and has undergone multiple episodes of reconstruction (Figure 4.1). A badger's den was located within the structure's berm (structure 120); therefore all data associated with the disturbance are not utilized, which left a mid-Pueblo III (*circa* A.D. 1250) final deposit. The Goodman Point Pueblo's great kiva was constructed above ground on bedrock *circa* A.D. 1260 and abandoned *circa* A.D. 1280 (Kuckelman et al. 2009). A peripheral associated room structure (room 1215) was included in the GPK's assemblage to increase sample size. Peripheral rooms are thought to provide an ancillary function to great kivas, such as a storage room, waiting room or dressing room (Cameron 2009).

In comparison to the pithouse and great kiva assemblages, the faunal assemblages from contemporaneous room block middens were used as a control group to determine if the pit structures differed from the "typical" residential context. No exclusively PII room block middens were excavated; therefore, I used room block middens that had a late Pueblo II to early Pueblo III as a control for HPH. Pueblo II-III middens were obtained from Windy Knob (5MT16784) and Midway House (5MT16778), PIII middens were from Rain Ridge (5MT16777) and Midway House (5MT16778) and the LPIII were from Goodman Point Pueblo (5MT604). Middens were chosen if their sample size exceeded 70 *NISP* and had verifiable dates. Only two middens in PII-PIII met that criteria, therefore, two from PIII and two from LPIII were chosen based on similar sample sizes to the PII/PIII middens. The assigned names, site names, site number and context designation are listed in Table 4.1.

*Methods*

These following methods are used to evaluate if there is a trend of specialization in the animals used in the Goodman Point large pit structures. Taxonomic composition and taxonomic richness were utilized to evaluate trends in the pit structures' species diversity. Additionally, an index was utilized to determine if cultural and environmental factors affected the diet in the typical residential context and in the pit structures.

In order to address whether or not taxonomic composition changed over time in these three pit structures I used several measures, beginning with the calculation of relative frequency. The relative frequency obtained from the HPH, HGK and GPK faunal assemblages can demonstrate changes in the types and quantity of animals used within the pit structures (Lyman 2008). The *NISPi* for each taxon and the ∑*NISP* of the assemblages was tallied. The following equation was used for each taxon group:

$$\text{Relative Frequency} = ((\text{NISPi}) / (\sum\text{NISP})) \times 100$$

After the relative frequency was calculated, the rank order for the taxa was determined for each assemblage. All data from taxa suspected to have been biointrusive are excluded from further analysis. These taxa consisted of small borrowing rodent groups that did not have any indications of human modifications, such as mice species and wood rats. Specimens in the identified as large bird are included with the turkey (*Meleagris gallopavo*) remains due to the fact that nearly all large bird specimens that could be identified to taxon morphologically are from turkey (Driver 2002). It is possible that some of the large bird remains could be sandhill crane (*Grus canadensis*) or another large bird species not common in the region but those specimens should be rare. In addition, specimens identified to lagomorph and cottontail (*Sylvilagus* sp.) are aggregated for similar reasons. The lagomorph group is predominantly cottontail but may include remains snowshoe hares (*Lepus americanus*) (Driver and Woiderski 2008). Additionally, all medium artiodactyls were grouped into the same category since many of the artiodactyl specimens are not complete elements and categorized to that level due to similarities in size between mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), pronghorn (*Antilocapra americana*), and bighorn sheep (*Ovis canadensis*). Most identifiable artiodactyl remains from the region are from *Odocoileus*, and pronghorn and bighorn are uncommon. The rank order for each taxon was determined for each assemblage without the intrusive species and with aggregated taxa. After grouping, the results were graphed for turkey, cottontail and all other taxa.

The types of animals (*NTAXA*) were tallied from HPH, HGK and GPK to determine if there was a change in taxonomic richness. The richness was determined from the presence of a species in the assemblage, however if a genus was present and no species from that genus was present, the genus was counted as a species. Jaccard Indices were calculated to determine if there are differences in taxonomic composition:

$$\text{Jaccard Index} = (100C) / (A + B + C)$$

Where A= ∑ HPH *NTAXA*, B = the total number of HGK *NTAXA* and C= shared from HPH and HGK; and where A= ∑ HGK *NTAXA*, B = the total number of GPK *NTAXA* and C = shared from HGK and GPK; and where A= ∑ HPH *NTAXA*, B = the total number of GPK *NTAXA* and C= shared from HPH and GPK. An index of 1 = different in taxonomic composition and 100 = similar in composition (Lyman 2008).

A bivariate scatterplot was produced from graphing *NTAXA* HPH, *NTAXA* HGK and *NTAXA* GPK and the *NTAXA* for each of the midden assemblages in relation to *NISP*. Sample size and *NTAXA* are highly correlated and often times, as sample size increases, the *NTAXA* increases until you reach a point of redundancy (Lyman 2008). The midden data acted as a control for sample size and what the people typically ate.

Abundance indices (en sensu Szuter and Bayham 1986) are useful for evaluating changes in faunal resources over time. There is evidence of turkey husbandry by the Ancestral Puebloan people in the Mesa Verde region (Munro 1994; Rawlings and Driver 2010), and the use of domesticated animals may have been a response to resource depression or a cultural decision. Typically, indices, such as the artiodactyl index, are utilized to determine resource depression of a high ranked or large bodied wild game animal compared to low ranked or small bodied prey (Broughton 1994; Nagaoka 2001) but prey rank can also be evaluated by variables such as pursuit costs (Stiner et al. 1999; Wolverton 2005). For this study, a 'turkey-cottontail index' (TCI) was created to examine changes in the community's use of domestic and wild animal resources inside large pit structures and compare it to contemporaneous middens.

$$TCI = (\sum(\text{turkey} + \text{large bird})) / (\sum(\text{turkey} + \text{large bird}) + (\text{cottontail} + \text{lagomorph}))$$

Where 1 = domesticated animals only are represented and 0 = wild prey only. The assumption is that a domesticated turkey does not have search and pursuit costs compared to wild prey. Therefore, a turkey would be considered high ranked prey, whether it was to be used as a food resource, a ceremonial resource, or both. Chi-square test of independence is used to determine if there is a significant difference between turkey and cottontail *NISP* for the HPH, HGK and GPK assemblages using these index values.

## Results

The results from the relative frequency and rank order for the HPH, HGK and GPK assemblages are reported in Table 4.2 and Table 4.3. The HPH assemblage is dominated by cottontail, followed by small mammal, prairie dog and jackrabbit. Many of the specimens in the small mammal grouping are from the vertebra of cottontail and other small mammals similar in size. For the HGK and GPK assemblages, the first through fourth rank order included cottontail, turkey and non-standard groups believed to be dominated by turkey and cottontail taxa. The

HGK assemblage is dominated by turkey, followed by cottontail, then medium artiodactyl. Medium mammal is ranked third and medium artiodactyl fourth. Many of the specimens in the medium mammal grouping are vertebrae, presumed to be from artiodactyl. The GPK assemblage is dominated by cottontail, followed by turkey. Though turkey was still being used, its predominance was replaced by cottontail. In summary, HPH can be described as dominated by wild taxa (Figure 4.2), HGK shows a dramatic shift toward high abundance of turkey remains, and GPK shows a shift away from turkey dominance to exploitation of a diverse array of wild taxa. In terms of taxonomic composition, the three contexts are distinctive.

Table 4.4 reports *NTAXA* by assemblage. In Chapter 3, it was demonstrated that HGK indicated a very high reliance on turkey usage when compared to contemporaneous middens. A Jaccard Index of 50 was obtained for each comparison between HPH and HGK, HPH and GPK, as well as HGK and GPK. This moderate to low Jaccard Index values in these comparisons indicates that the assemblages differ in terms of taxonomic richness.

A bivariate scatterplot (Figure 4.2) between *NTAXA* and *NISP* (Table 4.5) across assemblage shows there is a relationship between sample size and richness ($r^2 = .386$). However, these results also show that these assemblages differ in terms of richness, mirroring the Jaccard Index values. HGK is below the lower confidence levels indicating that given expected richness for its sample size *NTAXA* is low. Indeed HGK exhibits lower *NTAXA* than the other assemblages and is lower in richness than contemporaneous middens. HPH's and GPK's *NTAXA* is similar to those from contemporaneous midden assemblages. These results suggest that HPH and GPK are less specialized and closely resembled the average daily meal. This result may also indicate that the GPK assemblage is domestic fill related to other contexts and not necessarily remains related to the communal function of the GPK. However, another explanation would be that in late Pueblo III, the turkey may have been culled (Ellyson 2014) and therefore less available for communal feasting.

Figure 4.3 illustrates that  turkey use in large pit structures is similar to use found within contemporaneous middens at ordinal scale between periods; turkey use is low in PII/PIII, high in mid PIII, and moderate in late PIII. However the index values for HPH, HGK, and GPK differ in how they compare to contemporary middens. Each pit structure has the highest or lowest index in their time period. HPH exhibits no turkey use (TCI=.01) and shows the least reliance compared to contemporaneous midden assemblages from. LPII at .21 to .46. It is probable that turkey husbandry did not occur until early PIII when the pithouse was no longer used. The HGK assemblage indicates a high use of domesticated turkey (TCI= .81) and has the highest reliance on turkey compared to all other assemblages. HGK is well above contemporaneous midden values of .48 to .61. This may indicate specialized use of turkey in HGK (see discussion below). GPK (TCI= .27) is below .45 and .52 values of the contemporaneous middens. HPH has practically no reliance (TCI=.01) and has the least reliance of all other assemblages and was well below LPIII's TCI range of .45 to .52. A significant difference with a strong effect size was found for TCI by period ($X^2$ (2) = 228.280, p <.05, Phi = .753). These results suggest that domesticates were not utilized during LPII but that their use changed during PIII. In LPIII the use of domesticates decreased and that of wild game increased.

## Discussion

The results suggest that specialization of animal use in large pit structures at Goodman Point unit peaked before or during late Pueblo III. Spatial and temporal analyses suggest that Harlan Great Kiva was a unique and specialized structure. The most abundant taxon in the LPII pithouse is cottontail and with virtually no turkey. The few remains found in the pithouse middens may have been from wild turkeys or marks the initial domesticates at the site. However, turkey dominates the assemblage in MPIII but is replaced to some degree in the LPIII with cottontail rabbit. Both are animals that can be acquired locally. In addition to these shifts in turkey use, a broad diversity of animals changed to a more specialized selection of animals, then back to a broader diversity. However, the portion of other types of animals used did not significantly change from PIII to LPIII, regardless of the increase in richness. Cultural and environmental factors appeared to influence the pit structures' assemblages but only in Harlan were the use of domesticates above contemporaneous use and not below like the others.

Results indicate general use of animals in early pit structures followed by specialized and a shift back to general use in LPIII. Changes occurring from mid Pueblo III to late Pueblo III may have been due to an overall village trend, a regional trend or in anticipation of abandonment. The Great Drought may have produced low crop yields (Bellorado 2007) prompting a decreased reliance on turkey. This would have increased the necessity for garden hunting of rabbits (Schollmeyer & Driver 2012), an economic decision to use turkey eggs (Beacham & Durand 2007), or killing of turkeys at Goodman Point Pueblo in anticipation of abandonment. Stable isotopic analysis of turkey bones suggest that turkeys in the San Juan region were fed primarily corn (Rawlings & Driver 2010; McCaffery et al. 2014). It is plausible that residents gradually killed off their turkey in order to conserve a more important asset, corn. Any of these factors or a combination of them would explain the reduction in turkey use in the great kivas and middens between PIII and LPIII.

It must be acknowledged that GPK's assemblage or both great kiva assemblages may have been fill left after the site was abandoned. I think it is less likely that HGK is fill due to the results in Chapter 3. The abandonment context with the roof deliberately torn down, which was then burned, suggests an intentional decommissioning by the residents (Wilshusen 1986). However GPK did not have a roof and little if any research has been conducted on decommissioning kivas without a roof. If GPK is the result of fill, one would expect to see less turkey in the assemblage and this was not the case.

The shift from turkey to rabbit apparently did have an impact upon the Ancestral Puebloan religion. Ethnographers, such as Beaglehole (1936; 1937), Hawley (1950) and Waters (1963) have reported that rabbit hunts are an integral part of some Pueblo kiva ceremonial feasts, and turkeys are not discussed except for the use of their feathers. I believe that this trend toward cottontail rabbit use in ceremonial areas has been maintained with some Pueblo groups until historical times and the turkey's significance is still acknowledged with its feathers. One kiva ceremony exchanges corn for a turkey feather (Waters 1963). This begs the question, "Were turkey killed off in an effort to conserve the corn for the site's residents?"

Spatially and temporally the faunal assemblage of Harlan Great Kiva appears to be a unique specialized structure in the cultural development of the Goodman Point community. Its fauna displays less diversity than all other structures and is dominated by domesticated turkey. If factors leading to abandonment had not occurred, I believe an increase in specialization would have been observed in the Goodman Point great kiva. Harlan may represent the climax of specialized communal function for this community.

TABLE 4.1. Sampling methods for middens and pit structures.

| **Name** | **Study Area** | **Site #** | **SU#** | **Description** | **Context** | **Temporal Designation** |
|---|---|---|---|---|---|---|
| WK1 | Windy Knob | 5MT16784 | NS104 | Roomblock middens | Mixed | PII-PIII |
| MH1 | Midway House | 5MT16778 | NS103 | Roomblock middens | Mixed | PII-PIII |
| HPH | Harlan Great Kiva (pithouse) | 5MT16805 | SU152, NST108, NST109, NST110, NST 111, NST 133, NST136 | Pithouse floor and pithouse middens | Domestic/ Mixed | PII |
| RR1 | Rain Ridge | 5MT16777 | NS102 | Roomblock middens | Mixed | PIII |
| RR2 | Rain Ridge | 5MT16777 | NS203 | Roomblock middens | Mixed | PIII |
| HGK | Harlan Great Kiva (great kiva) | 5MT16805 | SU101 | Great Kiva floor | Communal | PIII |
| GP8 | Goodman Point Pueblo | 5MT1604 | NS802 | Roomblock middens | Mixed | LPIII |
| GP9 | Goodman Point Pueblo | 5MT1604 | NS910 | Roomblock middens | Mixed | LPIII |
| GPK | Goodman Point Pueblo | 5MT1604 | SU1213, SU1215 | Great Kiva floor | Communal | LPIII |

TABLE 4.2. Relative abundance for HPH, HGK and GPK taxa.

| Taxon- Common Name | HPH | HGK | GPK |
|---|---|---|---|
| | **Percent** | **Percent** | **Percent** |
| Rabbits & hares | 9.52% | 7.73% | |
| Cottontail | 46.35% | 7.25% | 47.56% |
| Jackrabbit or hare | 4.13% | | 2.44% |
| Rodent | .32% | .48% | 2.44% |
| Squirrel | 2.22% | | |
| Rock squirrel | .32% | | 2.44% |
| Prairie dog | 4.44% | 1.45% | 1.22% |
| Pocket gopher | .32% | .48% | 1.01% |
| Wood rat | 1.90% | 1.45% | 1.22% |
| Deer mice and voles | .32% | .97% | |
| Mice | | | 1.22% |
| Vole | .63% | | 1.22% |
| Porcupine | .32% | | |
| Dog, wolf and coyote | .32% | | |
| Deer family | | | 1.01% |
| Deer | | 1.93% | |
| Small mammal | 19.68% | 2.42% | 6.10% |
| Medium mammal | 4.13% | 8.21% | |
| Large rodent | .32% | | |
| Medium artiodactyl | 2.22% | 1.45% | |
| Grouse | | | 1.22% |
| Turkey | .32% | 24.64% | 18.29% |
| Quail | | | 1.22% |
| Large bird | .32% | 39.13% | 9.76% |
| Medium bird | | .97% | |
| Amphibian | .95% | | |
| Spadefoot toad | .32% | | |
| Reptile | .63% | | |
| Snake | .63% | 1.45% | 1.22% |

TABLE 4.3. Rank order for HPH, HGK and GPK taxa.

| Taxon- Common Name | HPH | HGK | GPK |
|---|---|---|---|
| | Rank | Rank | Rank |
| Lagomorph & Cottontail | 1 | 2 | 1 |
| Jackrabbit or hare | 4 | | 4 |
| Squirrel | 6 | | 4 |
| Prairie dog | 3 | 6 | 6 |
| Porcupine | 10 | | |
| Dog, wolf and coyote | 10 | | |
| Small mammal | 2 | 5 | 3 |
| Medium mammal | 4 | 3 | |
| Medium artiodactyl | 7 | 4 | 10 |
| Grouse | | | 6 |
| Turkey & large bird | 8 | 1 | 2 |
| Quail | | | 6 |
| Snake | 8 | 6 | 6 |

TABLE 4.4. *NTAXA* for all faunal assemblages.

| Temporal Designation | Name | *NTAXA* |
|---|---|---|
| PII-PIII | WK1 | 9 |
| PII-PIII | MH1 | 11 |
| PII-PIII | HPH | 9 |
| PIII | RR1 | 12 |
| PIII | RR2 | 8 |
| PIII | HGK | 6 |
| LPIII | GP8 | 6 |
| LPIII | GP9 | 12 |
| LPIII | GPK | 9 |

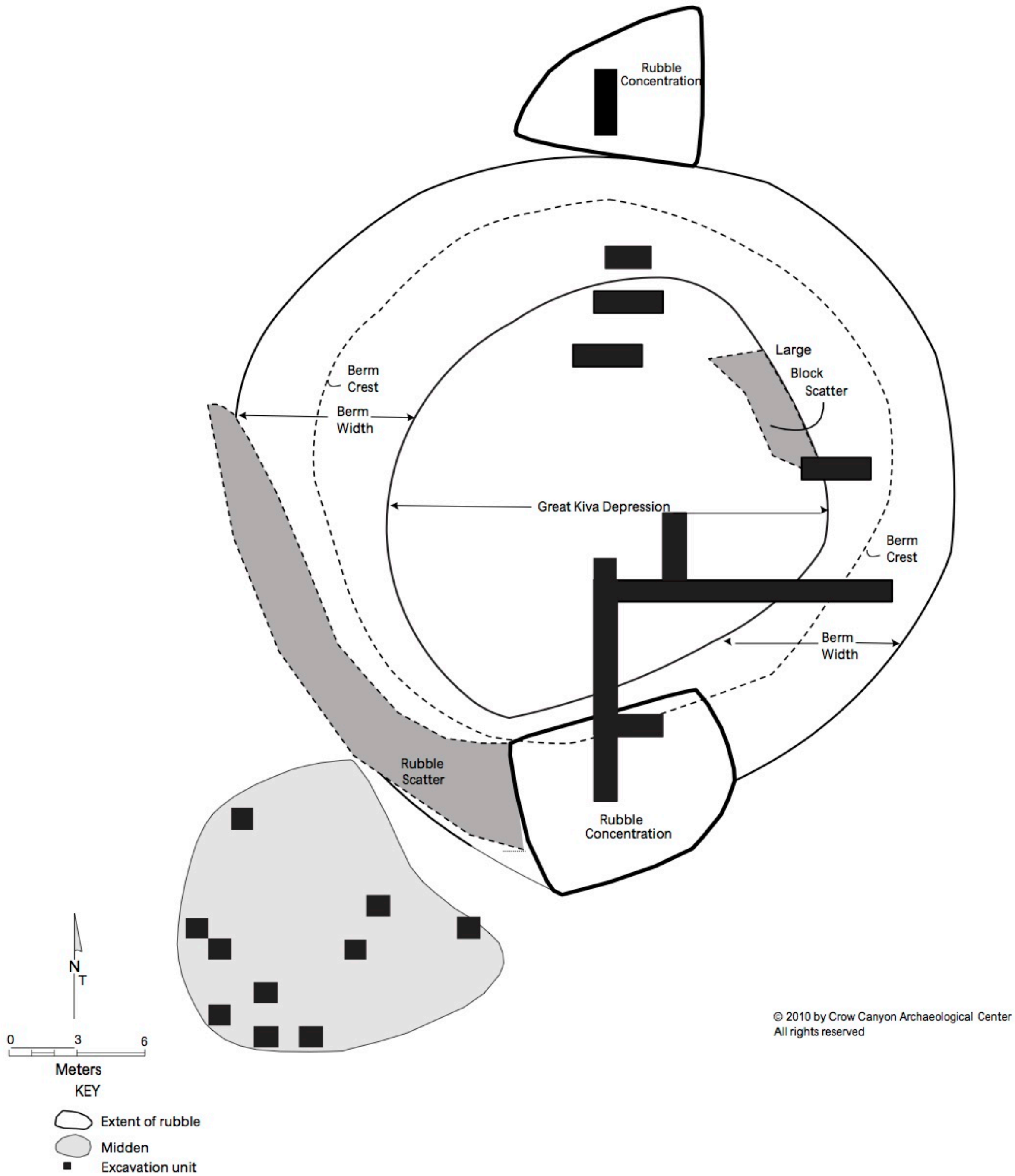


FIGURE 4.1. Site plan of Harlan Great Kiva (5MT16805) (Crow Canyon Archaeological Center 2010).

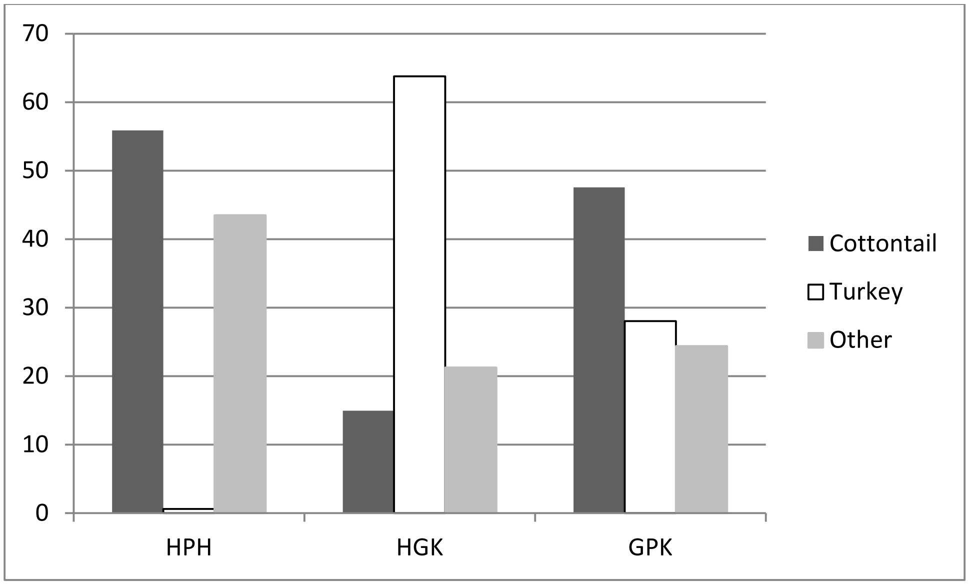


FIGURE 4.2. HPH, HGK and GPK relative percentage of turkey, cottontail and other taxa.

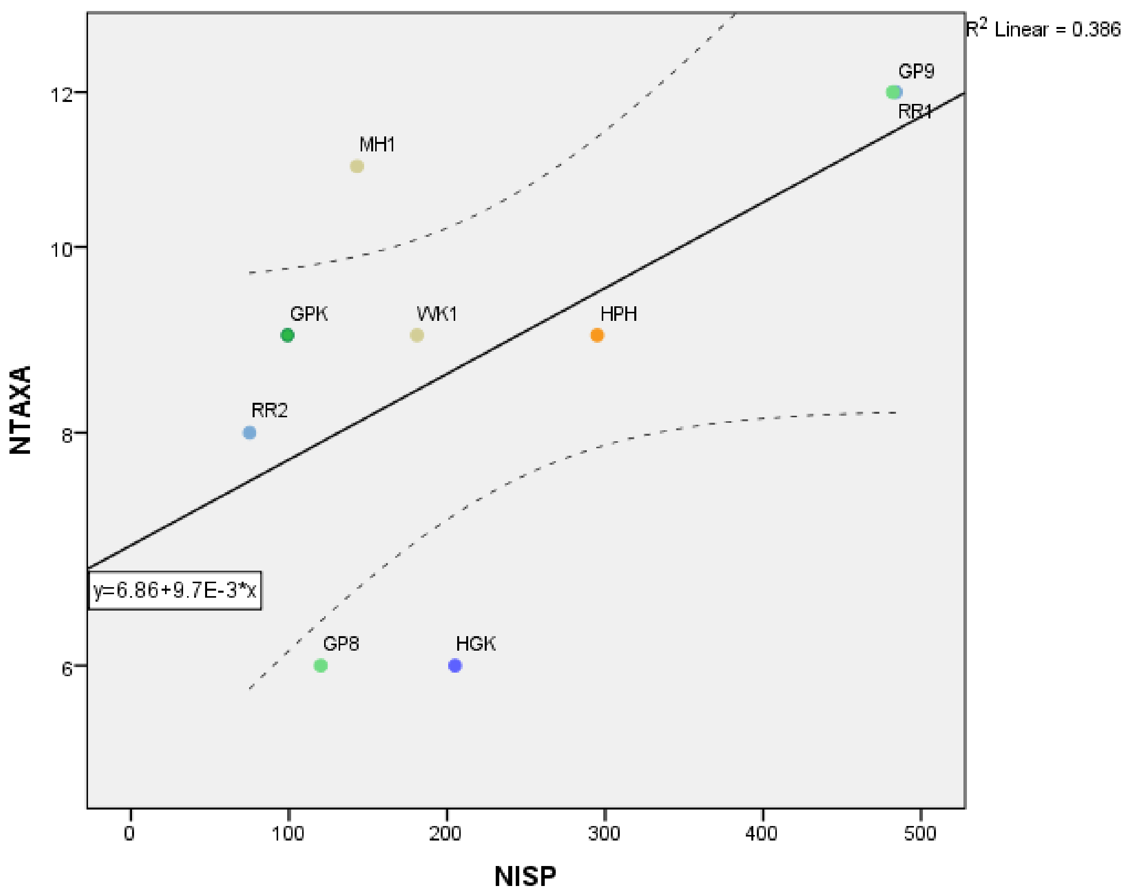


FIGURE 4.3. Bivariate scatterplot of *NTAXA* and *NISP* for HPH, HGK, GPK and roomblock middens.

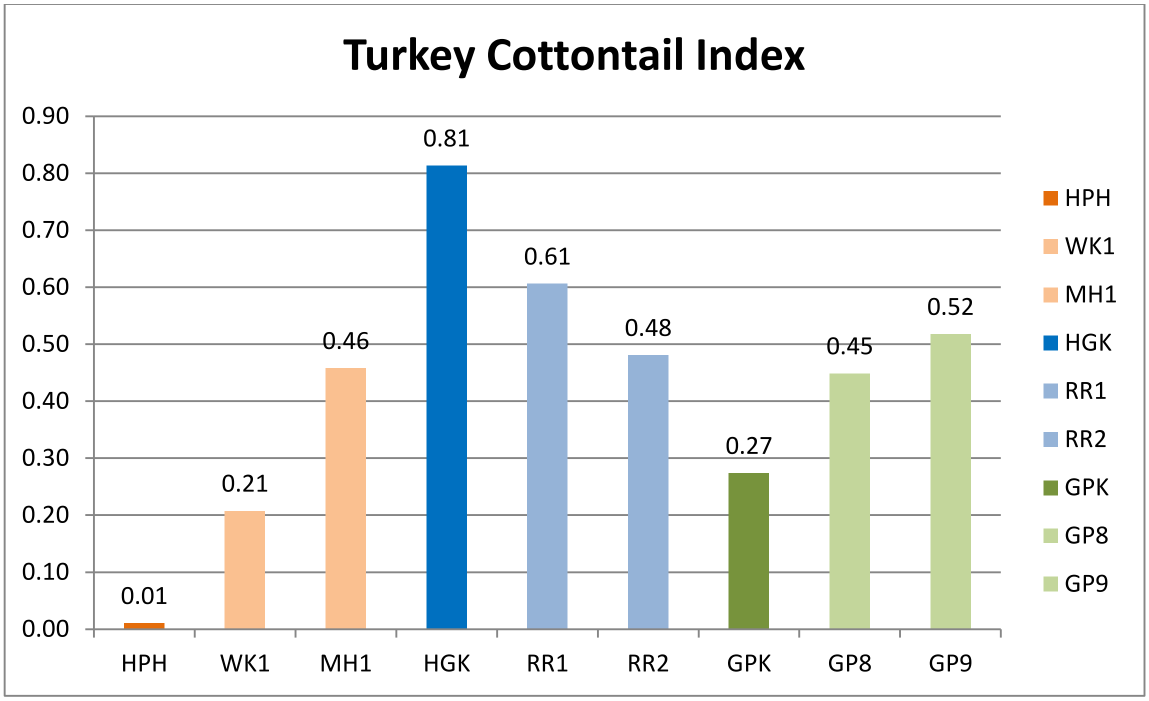


FIGURE 4.4. Turkey-Cottontail Index displaying degree of domesticated animal use for all faunal assemblages.

# CHAPTER 5

## SUMMARY AND CONCLUSION

Several aspects of this research contribute to field of archaeology. First, the faunal data from Harlan Great Kiva, Bluebird House and Pinyon Place are available for other researches conducting analyses in the region. Second, Chapter 3 results suggest that the faunal remains excavated from Harlan Great Kiva were remnants of a final feast during the kiva's decommissioning. Third, the HGK assemblage represents a period of faunal specialization in pit structures at Goodman Point. Finally, this thesis demonstrates that zooarchaeology can be utilized for an additional line of evidence to evaluate pit structure evolution and function.

The inclusion of a systematic paleontology not only reports data but provides details on how the identifications were conducted (Driver 1992; Lyman 2002; Lyman 2011; Wolverton 2013). This allows researchers to adapt these or other data identified by other zooarchaeological analysts for comparison. For example, I chose to use a conservative approach to identifications and identified all vertebrae to a size class. Other data that may identify vertebrae to a finer scale can be adapted by transferring vertebrae to size class for standardization of different data sets.

I am unaware of any publications that mention a kiva decommissioning feast; however, I have heard archaeologists expressing this impression during excavations. The results from Chapter 3 suggest that a final kiva feast did occur. This enhances our understanding of how kivas functioned and opens the door to a broader regional analysis to determine under which circumstances final kiva feasts occurred.

In Chapter 4, the Harlan Great Kiva faunal assemblage exhibited lower species richness, which represents a type of specialization. The occupants of Goodman Point during mid-Pueblo III chose to utilize larger amounts of fewer species in association with this communal structure.

A trend toward specialization in pit structures in the Mesa Verde region has been documented with architectural features, ceramics and now faunal remains. This thesis supports prior evidence (e.g. Brew 1946; McLellan 1969; Lipe 1989) of pit structure specialization.

Zooarchaeological data remain an underutilized resource with a narrow range of current uses (Lyman 2012). I believe this thesis demonstrates the potential of zooarchaeological data for use as another line of evidence in broader archaeological research. The results from this thesis suggest that a final feast occurred in the decommissioning process of Harlan Great Kiva and that there was a trend toward faunal specialization in the evolution of pit structures. Zooarchaeological evidence can be valuable when evaluating a structure's function.

# APPENDIX A

# SYSTEMATIC PALEONTOLOGY OF BLUEBIRD HOUSE (5MT16806)

Class Mammalia (mammal)

Small Mammal (jackrabbit size or smaller)

Identified Specimens: 1 cranium, 2 sternums, 1 vertebra (total NISP = 4)

Medium Mammal (deer size or smaller)

Identified Specimens: 3 ribs (total NISP = 3)

Order Lagomorpha (hare, rabbit and pika)

Identified Specimens: 2 mandibles, 1 ulna, 2 femora, 1 permanent tooth (total NISP = 6)

*Sylvilagus* sp. (cottontail rabbit)

Identified Specimens: 1 frontal, 1 maxilla, 2 mandibles, 1 atlas vertebra, 4 scapulae, 2 humeri, 1 ulna, 1 radius, 1 innominate, 1 femur, 1 calcaneus, 1 metatarsal (total NISP = 17)

Family Leporidae (jackrabbit and cottontail)

*Lepus* sp. (jackrabbit or hare)

Identified Specimens: 4 auditory bullae, 1 femur

(total NISP = 5)

Order Carnivora (carnivore)

Family Canidae

*Canis* sp. (dog, wolf, coyote)

Identified Specimens: 1 atlas vertebra (total NISP = 1)

Order Artiodactyla (artiodactyls)

Family Cervidae (deer family)

*Odocoileus* sp. (deer)

Identified Specimens: 1 metacarpal, 2 metapodials (total NISP = 3)

Class Aves (bird)

Large bird (larger than mallard)

Identified Specimens: 2 phalanges (total NISP = 2)

Order Galliformes

*Meleagris gallopavo* (turkey)

Identified Specimens: 1 ulna (total NISP = 1)

*Summary*: Bluebird House is a modest Pueblo II-Pueblo III habitation site within the Goodman Point Unit with a small faunal assemblage. A stratified random sampling strategy was used with 24 randomly selected units and one judgmental (Coffey and Copeland 2010). Compared to other excavated sites at Goodman Point, a small amount of faunal remains was recovered. The Bluebird House faunal assemblage had an NSP of 68, of which 26 were unidentifiable. Seven bone artifacts were identified, which appeared to be all tools. Taphonomically, 18 specimens were burnt and one had indications of carnivore gnawing.

# APPENDIX B

# SYSTEMATIC PALEONTOLOGY OF PINYON PLACE (5MT16803)

Class Mammalia (mammal)

Small Mammal (jackrabbit size or smaller)

Identified Specimens: 2 premaxillae, 1 cervical vertebra, 2 thoracic vertebrae, 1 rib, 1 metapodial, 1 calcaneus, 2 phalanges, 4 permanent incisors, 1 permanent unknown tooth fragment (total NISP = 14)

Medium Mammal (deer size or smaller)

Identified Specimens: 1 metapodial, 1 metacarpal (total NISP = 2)

Order Lagomorpha (hare, rabbit and pika)

Identified Specimens: 1 parietal, 1 ulna, 1 innominate, 1 tibia, 1 astragalus, 1 tarsal (total NISP = 6)

Sylvilagus sp. (cottontail rabbit)

Identified Specimens:  1 innominate, 1 tibia, 1 calcaneus (total NISP = 3)

Family Leporidae (jackrabbit and cottontail)

Lepus sp. (jackrabbit or hare)

Identified Specimens: 1 auditory bulla, 1 tibia (total NISP = 2)

Order Artiodactyla (artiodactyls)

Medium Artiodactyl

Identified Specimens: 1 cervical vertebra, 1 metacarpal (total NISP = 2)

Family Cervidae (deer family)

Odocoileus sp. (deer)

Identified Specimens: 1 metapodial (total NISP = 1)

Class Aves (bird)

Large bird (larger than mallard)

Identified Specimens: 1 auditory bulla, 1 vertebra, 4 cervical vertebrae, 6 phalanges (total NISP = 11)

*Summary*: Pinyon Place is a modest Pueblo II-Pueblo III habitation site within the Goodman Point Unit (Coffey and Copeland 2010). Crow Canyon excavated 17 units from this site. The faunal assemblage had an NSP of 185, of which 145 were unidentifiable and 76 of them were less than 5mm in length. Four were worked bone artifacts. Taphonomically, 133 were burnt and 4 had cut marks. Many of the bones appear to be damaged and broken from burning which resulted in a small number of identifiable specimens (total NISP = 41).

# APPENDIX C

## SYSTEMATIC PALEONTOLOGY OF HARLAN GREAT KIVA (5MT16805)

Class Mammalia (mammals)

Small Mammal (jackrabbit size or smaller)

Identified Specimens: 5 skull fragments, 3 bulae, 1 maxilla, 1 nasal, 3 premaxillae, 1 mandible, 16 vertebrae, 5 atlas vertebrae, 1 axis vertebra, 11 cervical vertebrae, 21 thoracic vertebrae, 21 ribs, 2 sternabrae, 37 lumbar, 3 sacral vertebra, 1 caudal vertebra, 6 scapulae, 1 humerus, 1 metacarpus, 5 innominates, 3 femora, 1 tibia, 1 calcaneus, 5 metapodials, 4 phalanges, 5 permanent incisor teeth, 3 permanent unknown tooth fragments, 1 unknown tooth fragment (total NISP = 170)

Medium Mammal (deer size or smaller)

Identified Specimens: 13 vertebrae, 1cervical vertebra, 5 thoracic vertebrae, 19 ribs, 2 lumbar vertebrae, 1 sacral vertebra, 3 scapulae, 1 metapodial, 1 phalanx (total NISP = 46)

Large Mammal (deer size or larger)

Identified Specimens: 1 vertebra (total NISP = 1)

Order Lagomorpha (hare, rabbit and pika)

Identified Specimens: 4 skull fragments, 4 frontals, 2 maxillae, 1 nasal, 5 parietals, 2 zygomatics, 13 mandibles, 2 caudal vertebra, 2 scapulae, 4 humeri, 1 radius, 2 ulnae, 1 metacarpus, 7 innominates, 9 femora, 9 tibia, 1 astragalus, 1 calcaneus, 1 tarsal, 1 metatarsus, 2 permanent incisor teeth, 8 permanent premolar teeth, 8 permanent molar teeth, 2 molar teeth 9 permanent unknown teeth fragments, 7 unknown teeth fragments (total NISP = 110)

*Sylvilagus* sp. (cottontail rabbit)

Identified Specimens: 5 skull fragments, 4 bulae, 13 frontal, 19 maxillae, 2 mandibles, 3 nasal, 3 occipital condyles, 4 occipitals, 4 petrosas, 3 parietals, 2 premaxillae, 1 sphenoid, 6 squamosal, 12 zygomatics, 27 mandibles, 1 atlas vertebra, 1 sacra vertebra, 20 scapulae, 14 humeri, 9 ulnae, 9 radii, 32 innominates, 1 fibula, 28 tibia, 26 femora, 15 calcanei, 3 tarsals, 21 metatarsals, 4 phalanges, 5 permanent incisor teeth, 14 permanent premolar teeth, 11 permanent molar teeth, 5 permanent unknown tooth fragments (total NISP = 326)

Family Leporidae (jackrabbit and cottontail)

*Lepus* sp. (jackrabbit or hare)

Identified Specimens: 6 bulae, 1 maxilla, 3 humeri, 3 ulnae, 3 innominates, 7 femora, 2 scapulae, 5 tibia, 2 astragal, 5 metatarsals, 1 metapodial

(total NISP = 38)

Order Rodentia (rodent)

Identified Specimens: 1 maxilla, 1 mandible, 1 atlas vertebra, 1 radius, 3 scapulae, 2 tibia, 1 metapodial, 2 permanent incisor teeth (total NISP = 12)

Small Rodent (wood rat or smaller)

Identified Specimens: 2 phalanges (total NISP =2)

Large Rodent (larger than wood rat)

Identified Specimens: 1 femur, 1 tibia (total NISP =2)

Family Sciuridae (squirrel)

Identified Specimens: 2 skull fragments, 1 bulla, 2 frontals, 1 maxilla, 2 parietals, 1 premaxilla, 2 mandibles, 2 humeri, 1 femur, 1 permanent premolar tooth (total NISP = 15)

*Spermophilus sp.* (ground squirrels)

Identified Specimens: 2 parietals, 1 mandible (total NISP =3)

*Spermophilus variegatus* (rock squirrel)

Identified Specimens: 2 mandibles (total NISP = 2)

*Cynomy's* sp. (prairie dog)

Identified Specimens: 1 skull fragment, 1 parietal, 1 nasal, 2 maxillae, 1 premaxilla, 2 mandibles, 1 scapula, 4 humeri, 2 radii, 2 ulnae, 2 innominates, 3 femora, 3 tibia, 1 permanent molar (total NISP = 26 )

Family Geomyidae (pocket gopher)

Identified Specimens: 1 skull fragment, 1 maxilla, 3 mandibles, 5 humeri, 1 tibia (total NISP = 11)

Thomomy's sp. (pocket gopher)

Identified Specimens: 2 mandibles (total NISP = 2)

Family Muridae (deer mice, voles, etc.)

Identified Specimens: 2 skull fragments, 1 premaxilla, 2 lacrimals (total NISP = 5)

*Peromyscus* sp. (mice)

Identified Specimens: 2 maxillae, 1 premaxilla, 1 mandible (total NISP = 4)

*Neotoma* sp. (wood rat)

Identified Specimens: 1 skull fragment, 2 parietals, 1 squamosal, 2 mandibles, 1 humerus, 1 radius, 1 ulna, 1 femur (total NISP = 10)

*Microtus* sp. (vole)

Identified Specimens: 1 mandible, 1 molar tooth (total NISP = 2)

*Erethizon dorsatum* (porcupine)

Identified Specimens: 1 humerus (total NISP = 1)

Order Carnivora (carnivore)

Family Canidae

*Canis* sp. (dog, wolf, coyote)

Identified Specimens: 1 axis vertebra, 1 maxilla, 1 femur, 1 phalanx (total NISP = 4)

Order Artiodactyla (artiodactyls)

Medium Artiodactyl (deer size)

Family Cervidae (deer)

*Odocoileus* sp. (deer)

Identified Specimens: 2 metacarpals, 2 innominates, 1 femur, 1 tibia, 1 phalanx, 5 third phalanges, 3 metapodials (total NISP = 15)

Class Aves (bird)

Medium Bird

Identified Specimens: 2 sternal ribs, 1 scapula, 1 ulna, 1 fibula (total NISP = 5)

Large bird (larger than mallard)

Identified Specimens: 6 vertebrae, 4 cervical vertebrae, 16 ribs, 4 sternal ribs, 4 scapulae, 5 furculum, 23 sterna, 2 humeri, 8 radii, 1 carpometacarpus, 1 ulna, 2 wing phalanges, 3 innominates, 14 tibiotarsi, 4 femora, 2 tarsometatarsi, 3 medial phalanges, 12 phalanges (total NISP = 115)

Order Anseriformes (water fowl)

Family Anatidae (surface feeding ducks)

Identified Specimens: 1 occipital, 1 femur (total NISP = 2)

Order Galliformes

*Meleagris gallopavo* (turkey)

Identified Specimens: 4 coracoids, 16 scapulae, 4 furcula, 7 sterna, 4 humeri, 2 radii, 10 ulnae, 7 carpometacarpi, 4 wing phalanges, 2 innominates, 3 tibiotarsi, 2 tarsometatarsi, 4 proximal phalanges (total NISP = 69)

Class Amphibia

Identified Specimens: 2 mandibles, 1 vertebra (total NISP = 3)

Order Anura (frog and toad)

Pelobatidae (spadefoot toad)

Identified Specimens: 1 vertebrum (total NISP = 1)

Class Reptilia (reptile)

Order Squamata (lizard and snake)

Suborder Serpentes (snake)

Identified Specimens: 4 vertebrae (total NISP = 4)

*Summary*: The initial structure at Harlan Great Kiva was a Pueblo II pithouse, then later repurposed into a great kiva with several episodes of remodeling (Coffey and Copeland 2010). The faunal assemblage had an NSP of 1982, of which 940 were unidentifiable. Bone artifacts totaled 25. Taphonomically, 393 were burnt, 14 had signs of rodent gnawing, one had carnivore damage and six had humanly produced cut marks. One turkey ulna had a pathological condition caused from the bone breaking then re-healing.  There were several areas of biodisturbance, such as an identified badger den, of which one machine cut large mammal vertebra specimen and several juvenile lagomorph specimens were excavated. A large percentage of the assemblage was broken or burnt but over half was identifiable (total NISP = 1042).

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