Title

Plotting, Planting and Prospering: Ancient Maya Agricultural Production and Water Management at Actuncan, Belize

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Publication Date

2019

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA
RIVERSIDE

Plotting, Planting and Prospering: Ancient Maya Agricultural Production and Water Management at Actuncan, Belize

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Anthropology

by

Theresa Heindel

December 2019

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ACKNOWLEDGMENTS

My research has been funded by the UCR Center for Ideas and Society, as well as general funding given to Dr. Lisa LeCount by the National Science Foundation. Thank you to Drs. Jaime Awe and John Morris, and everyone at the Belize Institute of Archaeology, for allowing be to work in the great country of Belize, and for providing permits to the Actuncan Archaeological Project under Dr. Lisa J. LeCount. Multiple institutions and scholars have aided in this research, including the University of Wisconsin – Madison, the University of Colorado – Boulder, Alabama University, and Binghamton University. Thank you especially to Payson Sheets, Art Joyce, and Gerardo Gutierrez at UC-Boulder for helping me begin my graduate work. All the students from the University of Alabama who have aided in my research, including Jane Millar, Taylor Lawhon, and Wade Tidwell, as well as the incorrigible Tucker Austin, have been instrumental in the collection and interpretation of my data. John Blitz in particular has provided me with a wealth of information and help. I also want to extend my immense gratitude to BriAnna Langlie, who provided the permit for soil exportation, and is continuing to store soil samples for my future research. You worked tirelessly to make sure my soil exports got through, and I am incredibly grateful to have you as a colleague and friend.

A huge thank you goes out to those who shaped me into the scholar I am today. Mark Kissel, my first, and only, Teaching Assistant, who I try to emulate every time I teach. Thank you also to Nicholas Hearth, who took the time to teach me lithic analysis methods and work with me while I started out. I also want to thank Rachel Horowitz, who is always up for talking lithics, even if everyone else thinks we're crazy. Bernadette Cap and Meaghan Peuramaki-Brown, I learned so much from you and I'd still be confused and digging at 10 cm a day without you. Jason Yaeger and Kat Brown in particular allowed me to flourish. Jason Yaeger, you are why I became interested in Maya archaeology. You took a chance on an unknowledgeable 18-year old by inviting me to be a part of your first field school, which provided me with the best experience and expertise possible. My love of lithics, and the Maya, only continued to increase through your guidance during my senior thesis research, and your faith in my abilities gave me the confidence to continue into graduate school. I also want to extend a thank you to my entire Mopan Valley Archaeological Project field school friends, and now, fellow colleagues, including Will Yeck (even if you did kill my plant), Lizzy Hare, and Susan Kooiman. Susan, I was so insanely lucky to have you as my first excavation partner and seeing you every year is one of my favorite parts of conferences.

None of my work would have been possible without the great people associated with the Actuncan Archaeological Project. Carolyn Freiwald, not only did you first guide me as an undergraduate, you introduced me to the amazing site of Actuncan and continue to be a cherished friend and mentor. Bobbie Simova has helped me so much along the way, both in my archaeological research and interpretation – particularly with her fantastic work on GIS hydrologic modeling in the *chich* cobble mound area that I heavily draw upon – and as a cheerleader and source of comfort. You are an amazing academic and person. Most importantly, I want to thank Drs. Lisa LeCount and David Mixter, the PI and field director for the Actuncan Archaeological Project. I am so lucky to be a part

of your project and work at such an amazing site. David provided invaluable assistance both in the field and in the lab, as well as serving as a mentor and friend when I needed it most. Your comments on my work cannot be topped, and I am always in awe of how much care you give to my research and writing – I couldn't be happier for you to kill my darlings. Nothing in this dissertation would be achievable without Lisa LeCount, who not only graciously provided me the opportunity to conduct to lithic analysis as well as this dissertation at Actuncan, and join the amazing Actuncan Archaeological Project, but also provided constant support and advice throughout my research. All ceramic analysis in this dissertation has been the result of Dr. LeCount's personal communication and doctoral research at Xunantunich. Her attention to detail in all aspects of the project's work in particular has given me the perfect template for academic rigor and professionalism, and I appreciate every piece of advice, constructive criticism, and assistance she has given me.

I would also like to extend my gratitude to the entire Galvez family, who allowed access to the site of Actuncan, and provided invaluable information on the environment and archaeology of the area. Azucena Galvez, not only do you provide a base for the Actuncan Archaeological Project at Clarissa Falls, you make it feel like not just a home away from home, but a real home with a real family. Linda, Gwen, Sandra, Henry – you are some of the most amazing and weird (Gwen) people I have ever met and I look forward to seeing you every year. I would also like to thank Kelvin Requena; you are my person. Somehow, I would be even crazier without you – you accept my lack of a filter, and I will beat you at any card game you throw at me. To the amazing men and women

from Succotz – you are at the heart of this research. In particular, I would like to thank Rene, Alvin and Romell Uck, Nelson Lemus, Santos Penados Jr., Marky Chaman, Oscar Chulin, Carlos Hernandez, and Eudy and Traylin Cocom. Elmer Cocom, you have been with me from the start, and can be a pain, but you (begrudgingly) stuck with me and I couldn't ask for a better partner in crime.

My friends and colleagues have been instrumental in keeping me going throughout this endeavor. To my cohort – Angel Gonzalez-Lopez**,** Karimah Richardson, and Shelley Guyton – we've been through so much (including Core), and still made it out alive. I also want to thank the many other great colleagues and friends I have made along the way: Mark Toussaint, Eric Heller, Erin Gould, Jared Katz, Kyle and Kristina Harp-Rushing, Leslie Perkins, Cat Santasilia, German Loffler, Ryo Takatsuchi, and so many more. I wouldn't have been able to stay (relatively) sane without teatime with Karimah Richardson and Shelley Guyton. Shelley – you've been my best friend and confidant and I am so lucky to have you in my life; I love you. Those that I have lived with have unfortunately been subject to my ups and down. Kendall Tallmadge and Ruth, you put be back together when I was at my darkest point. Thank you to Patrick Rohrer, Joshua Lieto, Jordan Koeppen, and Jeremy Colton – your feedback and advice, both professional and personal, has been invaluable and you have all made me (I think) a better person. I can't stand you most of the time, but Patrick Rohrer, I hope you see how good I know you can be. Kellam Throgmorton, thank you for providing this title; despite many rocky years, you have become my go-to for all things academic. Your support in everything I do and am has boosted my confidence in more ways you can imagine. Finally, I also want to thank Jacqueline Pozza, who made being stuck in a broom closet fun, and continues to put a smile on my face.

To my family: you are what keep me going. Uncle Lou and Aunt Carol, you are my surrogate parents, and Louie, Mike, and Courtney, you have never been anything but my siblings. Amelie, Helena, and Claire, I wish I could see you more often, but watching you grow up has been an absolute joy. To my granny, and the grandparents who have passed on, I was so lucky to have grown up with you always at my side, and your support of me means the world. Elena, thank you for grounding my dad and helping me in every way possible. Mama, you had a handful with me, and I know I never made it easy, but I love you unconditionally and that will never change. Pops, you're my best friend, and my heart – I can't express my complete love for you besides that. Lizzie, I write without any hesitation that you are the person I love most in this world. You have always been my inspiration and all I have ever wanted is to be half the person you are. You're my entire world and I would never have gotten through anything without you.

Finally, I want to thank the wonderful Wendy Ashmore. You have guided so many people over the years, but you always made me, and my research, feel unique. I can truly say I have never met anyone as supportive as you, and I can't express in words how important you have been to me. You are my mentor, friend, and family.

DEDICATION

I dedicate this dissertation to my grandfather, Ralph Lasecki. You have always been there for me, through (embarrassingly multiple) car crashes, horrible band and piano recitals, and every time I needed a kick to get out of my head and appreciate what I have. I love you, and I miss you.

ABSTRACT OF THE DISSERTATION

Plotting, Planting and Prosperity: Ancient May Agriculture Production and Water Management at Actuncan, Belize

by

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Doctor of Philosophy, Graduate Program in Anthropology
University of California, Riverside, December 2019
Dr. Travis Stanton, Chairperson

This dissertation will focus on several land use strategies utilized during the Late and Terminal Classic periods at the archaeological site of Actuncan, Belize (a Late Preclassic and Early Classic regional center), including terracing, water channeling, agricultural plots, and *chich* cobble mounds. Excavations in commoner settlement zone of the site exposed three terracing and water management system methods: 1) terraforming, in which earthen berms were created to facilitate water drainage, 2) low plastered walls utilized for water channeling, and 3) two small agricultural plot systems filled with a large amount of redeposited domestic trash. These features are representative of household-level land transformation, as well as localized land use based on microenvironments and specific social and political contexts. In addition, GIS flooding models indicate a number of linear cobble mounds to the east of the Actuncan site core, along the Mopan River floodplain, may have been used as a

cacao orchard, thus creating an economic opportunity or tribute system that could have benefitted the entire community. Together, these systems reflect how the ancient Maya at Actuncan managed water and agricultural production based on site-level environmental knowledge, and the scale at which these technologies were administered. In addition, while the Late and Terminal Classic period was a time of elite loss of power at the site of Actuncan, the agricultural plot systems and *chich* cobble mounds created and utilized during these periods denote commoner endurance in the face of political turbulence.

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Chapter 1. INTRODUCTION

1.1 Introduction

Recent archaeological work on ancient Maya agriculture has focused on the identification of the types of intensive techniques the Maya used to support themselves throughout their long history, with this work particularly focused on the use of terraces (e.g. Neff 2008; Wyatt 2008). Before the 1960s, the literature characterized ancient Maya agriculture as the long-fallow, slash-and-burn (swidden) cultivation of maize. Relying on the research of early soil scientists, Maya scholars viewed the tropical soils as being poor in quality due to the oxidation and leaching of nutrients, and therefore believed that the land could not be used for anything but swidden agriculture (Fedick 1996; Wiseman 1978). When it was subsequently determined that Maya sites held much higher populations than previously imagined, however, questions emerged regarding the ability of swidden agriculture to support these population levels (Bullard 1973; Culbert and Rice 1990; Haviland 1967; Willey et al. 1965). By the late 1970s and early 1980s, scholars began to focus on destroying the "myth of the *milpa*" (Hammond 1978) through the utilization of cultural ecology, as can be seen in the seminal volumes *Pre-Hispanic Maya Agriculture* (Harrison and Turner 1978) and *Maya Subsistence* (Flannery 1982). Soil science and geological and ecological studies were particularly important in demonstrating the possibility of a large array of agricultural techniques in the Maya area, and were used in conjunction with ethnographic work (Goméz-Pompa et al. 1982; Goméz-Pompa et al. 2003; Nimis 1982), comparative studies with other cultures (Bronson 1978), ethnohistory (Jones 1982; Marcus 1982), and excavations and surveys

(Denevan 1982; Harrison 1978; Puleston 1978). This new attempt to reconstruct an intensive (as opposed to swidden) Maya agricultural system, including the hypothesized use of terraces, raised fields, and modified *bajos*, was instrumental in moving Maya agricultural studies forward. However, these efforts also led to an over-generalization of strategies that were being applied to all areas of the Lowlands.

Today, it is now recognized that the Maya lowlands presented a wide array of microenvironments, including savannas, wetlands, flood plains, and hilly areas – all of which are suited to different agricultural strategies. Terracing, for instance, is better suited to hilly areas than wetlands, resulting in varied features in the archaeological record. It is important, therefore, that researchers analyze the environment on more localized terms which allow for a detailed exploration of how the ancient Maya adapted to different ecological niches (Dunning 1996; Fedick 1996; Fedick and Ford 1990; Graham 1987).

In addition to investigating the effect of localized environments on agricultural production strategies, researchers studying agricultural intensification have also examined the modes of agricultural intensification within this localized viewpoint. Hammond (1978) and McAnany (1992), for example, have examined agricultural intensification as a process that occurred on marginal land in the Maya lowlands. Terracing became a particular focus of study for lowland Maya research, since terracing is often associated with efforts to make marginal lands more suited for agricultural production. These studies also led to the acknowledgement that forces beyond the environment itself affect agricultural intensification, including the co-opting of “good” land that then forces commoners to utilize these marginal lands (McAnany 1995). As a result, social and political contexts have been infused into a previously ecological-focused perspective of agricultural production.

At the same time these advances in agricultural studies were occurring, an increasing focus on household archaeology in the Maya area helped to reconfigure how the field approaches household economies and subsistence. This was critical, as it provided a much needed focus on small-scale agricultural production. Studies viewing households as the primary locus of economic and subsistence activities in the Maya area (McAnany 1993; Wilk and Ashmore 1988) led to the further argument that households were also the primary institution for construction and maintenance of many agricultural technologies (Kunen 2004; Mathewson 1984; Murtha 2002; Ponette-González 2001; Pyburn 1998). The homegarden, in particular, represents a principal form of agricultural intensification given that it is the site of both constant cultivation and plant genetic modification. For example, the agricultural plot systems identified at Actuncan, which consist of a series of box terraces and associated features, provide evidence for the utilization of local topography and soils as well as intensive, pre-planned (as opposed to incremental) construction. These plots represent what Blaikie and Brookfied (1987) identify as landesque capital, in which agricultural strategies such as gardens are the result of initial agricultural intensification with the goal of increasing crop output and decreasing capital input in the future. A similar model can be used in reference to the *chich* cobble mounds (a series of linear cobble mounds I argue were used as cacao orchards), where initial construction that was based on moving a large amount of cobbles and lithic debitage would lead to eventual higher output and lower input.

The research for this current investigation of ancient Maya agricultural technologies was performed at the site of Actuncan, a site of early divine kinship whose political authority waxed and waned throughout the history of the upper Belize River valley. Located in close proximity to the Mopan River as well as to other important sites such as Xunantunich and Buenavista del Cayo, Actuncan was occupied for roughly 2000 years; during this time period and despite the actions of the site's elites, commoners continued to live in the Northern Settlement Zone (a domestic area situated on the northern periphery of the site) and possibly on the Mopan River floodplain to the east of the site core. However, little is known about the agricultural production and water channeling strategies utilized by the site's occupants. This study therefore examines the use of gardens and water channeling, as well as the possible use of cobble mounds for cacao orchards, by the commoners living in the Northern Settlement Zone during the Late (A.D. 600-780) and Terminal Classic (A.D. 780-1000) periods when divine kingship control at the site has waned.

1.4 Overview of the Study

This study set out to increase our understanding of possible agricultural features and water channeling systems at the site at Actuncan. More specifically, I look at the use of these technologies in reference to household models of agricultural intensification and the effect of microenvironments on the anthropogenic transformations at the site. In so doing, I contribute to larger ancient Maya agricultural research and residential studies by demonstrating how land use is directly related to the creation of unique and localized agricultural and water channeling technologies. Excavations and artifact analyses focused on five main features present at Actuncan: 1) Agricultural Plot System 1; 2) Agricultural Plot System 2; 3) Terraforming; 4) a Water Channeling System; and 5) *Chich* Cobble Mounds.

Agricultural Plot System 1 and Agricultural Plot System 2 represent two groups of bounded agricultural plots resembling box terraces, a series of small plots associated with residential groups that were most likely used as household gardens or seed beds. Box terraces are uncommon in the Maya area – or are easily hidden in or erased from the landscape – and have only been identified at a few sites in the region (Beach et al. 2002; Dunning and Beach 1994; Fedick 1994; Killion et al. 1991; Kunen 2001; Macrae and Iannone 2011), particularly when compared to the dearth of information provided on other forms of terracing. In contrast to the box terraces found at other sites (generally characterized by a collection of interconnecting one-course terraces), the agricultural plot systems uncovered at Actuncan contain distinct features associated with the "boxes."

Agricultural Plot System 1 has a particularly well-prepared series of structures that were most likely constructed at the same time as the box terraces, indicating an amount of planning for a singular construction event not usually associated with terraces. A platform sharing multiple walls with the larger plot system was most likely erected as a field house for the plots, to be used to hold agricultural tools and possibly utilized for shade. A thin layer of *yeso* was also found along the northern side of the system, connecting to a multi-course wall, which may have been utilized for channeling water. As discussed below, *yeso*, a soft, grayish, gypsum-laden clay, appears near the two agricultural plot systems and under the water channeling system walls, and was most likely used for hydrologic purposes. While Agricultural Plot System 2 sustained post-occupation damage and was not as well preserved, it too had unique features including a possible platform. Two pits were also located within the plot system, each encircled by cobbles but unlined. The pits were both around 90 cm in diameter and 70 cm deep, and also contained large broken pieces of pottery and charcoal at the bottom. The purpose of these pits, including whether there were directly related to agricultural functions, is unclear..

Terraforming, a basic catch-all term for the manipulation of earth, was identified at Actuncan by a gradiometer survey targeting magnetic anomalies (Walker 2012). Test pits placed on two of these magnetic anomalies revealed berms made out of *yeso* clay, identified in the stratigraphy as slightly sloping ridges. One berm was located just to the south of Group 7, and one berm was located just to the north of Group 7, near Structure 90. Berms – utilized for channeling water – excavated in the Maya lowlands are generally made of stone, similar to terraces, such as those from the Rio Bec region described by Kunen (2001:329), which "were constructed of double alignments of limestone boulders separated by a rubble fill." Similar berms have also been identified in the Belize River Valley (Fedick 1994) and Petexbatun (Dunning and Beach 1994). The use of terraforming to create berms at Actuncan, then, is unique for two reasons: 1) berms at the site are earthen as opposed to being made of stone; and 2) the occupants at Actuncan utilized the local soil (i.e. *yeso*) to create these berms. It is possible there are other earthen berms in the Maya lowlands, and stone berms are more prevalent in the literature because they are easily identifiable in the archaeological record, but as of yet, earthen berms have not been discussed in the literature. The presence of *yeso* at Actuncan has only been identified in the northern settlement zone, at Agricultural Plot System 1, the Water Channel System, and berms. The exact stratigraphy throughout the settlement zone has not identified, but as evidenced by the thin layer of *yeso* associated with Agricultural Plot System 1 and the berms created out of *yeso*, it appears the occupants of the area dug up *yeso* to create these features. *Yeso* as a soil category is not itself unique to the site of Actuncan, and gypsum-ladened soil can be found throughout the Belize River valley. However, the use of a localized soil for these water channeling systems indicates a clear understanding of both topography and soil morphology of the area. The use of *yeso* in terraforming also demonstrates why the study of microenvironments is necessary for understanding ancient Maya land use, as it is clear that land use can vary even at a settlement level.

The Water Channel System is located in close association with Structure 90, to the north of Group 7, near one of the terraforming features. Excavations did not extend to the whole of the water channel system, but it is possible it connects to Structure 90. The water channel system consisted of a series of three low, diverging, plastered walls that angled up to the slope of the area. The remnants of a plaster floor were also found between two of the walls, and the floor and three walls were placed atop a layer of *yeso*. Evidence of occupation ended at the appearance of *yeso*, as did excavations, and thus it is unclear how deep the *yeso* goes. In addition, six deciduous teeth and nine shell beads were found just above the appearance of the low walls, suggesting a possible water shrine (Lisa LeCount, personal communication, 2016). Due to: 1) the use of plaster over the walls; 2) the presence of a plaster floor; 3) the presence of teeth and shell beads above the walls; and 4) the close association between Structure 90 and the water channel system, it is probable that this formal water channel system was utilized for a more ritual purpose than to simply drain water from the area (which would likely result in more informal construction). Again, however, we see *yeso* associated with water channeling, indicating the importance of utilizing local materials to transform the land.

Linear cobble mounds, labeled "*chich*" mounds by modern-day Maya, are found throughout the Maya area, stretching up to the northern Yucatán Peninsula. The modern Maya utilize these mounds in orchards in order to conserve moisture and provide support for trees (Kepecs and Boucher 1996), but the prevalence of *chich* cobble mounds in different archaeological contexts indicate they may have served a variety of uses. Other suggestions for their function include use for domestic structures (Sabloff and Tourtellot 1992:158) or as piles of stone resulting from the clearance of interresidential space for cultivation purposes (Killion et al. 1989:286). In the Mopan River valley, *chich* cobble mounds have been identified to the east (near San Lorenzo) and the west (near Actuncan) of the Mopan River, along the river floodplain (LeCount 2012; VandenBosch 1993). *Chich* cobble mounds in this area are shaped as 1) long linear mounds; 2) isolated mounds; and 3) mounds attached to linear features. In 2015, Borislava Simova of Tulane University used a Digital Elevation Model (DEM) of Actucan from a regional LiDAR survey (provided by Drs. Jason Yaeger and Bernadette Cap) in order to provide a flooding model for the *chich* cobble mound area/the Mopan River floodplain. Based on models of flooding and rain accumulation in the area, it was determined that the area would have collected a significant amount of water during rainfalls while remaining safely above flood levels, making the area well suited to agriculture. Excavations for this study focused primarily on understanding the stratigraphy of the *chich* mound region, with test pits placed on the edge of a cobble mound, between cobble mounds, and on top of a cobble mound. The test pit placed atop a cobble mound revealed how deep the cobbles go and the makeup of these cobble mounds, indicating 1) there was not an occupation layer directly below the cobble mounds – they were placed atop a sandy soil with few artifacts; and 2) the mounds were created with chert river cobbles and lithic debitage. Few artifacts were found in the test pit located along the side of a cobble mound, but excavations suggest there were two events of cobble construction, with a thin layer of soil between cobbles. In addition, excavations between the cobble mounds revealed evidence of Late and Terminal Classic period occupation, including a floor, a large density of diverse artifacts, and a large density of jute. Much of the jute contained holes and/or broken tips, indicative of jute consumption, suggesting a possible feasting event. Ceramics collected on the edge and atop cobble mounds also date to the Late and Terminal Classic periods, indicating at least a small number of settlers were living in the area at the time the mounds were constructed, around the same time as occupation and use of agricultural plot systems in the northern settlement zone. Excavations in the *chich* cobble mound area were also conducted to collect soil samples for macrobotanical and pollen analysis to determine the possible agricultural use of these mounds, though analyses are forthcoming. However, based on the amount of water flowing into the floodplain, the area has been determined to be a good place for agricultural production, and water-thirsty cacao trees in particular. Placement along the Mopan River would also provide proximity to a trade route towards Xunantunich, which would allow for fast transport of goods from a vassal kingdom, like that of Actuncan during the Late Classic period, to the more powerful site of Xunantunich.

1.5 Annotated Table of Contents

Chapter 2 focuses on the environment of the Belize River valley, including an overview of hydrology, geology, climate, soils, and vegetation. The Belize River valley is known for its three waterways – the Macal River, the Mopan River, and the Belize River. The Mopan River is particularly important to this study, as the site of Actuncan is placed on a ridge over-looking the river, with a series of *chich* cobble mounds and evidence of occupation along the Mopan River floodplain. The Belize River valley is also characterized by a karst landscape, which led to the creation of an *aguada* at the site of Actuncan – a depression fill with permeable clays that held water and created permanent and seasonal wetlands. Actuncan is located in a "Dry Tropical" environment, creating a warm and humid atmosphere with clear dry and wet seasons, producing a region reliant on seasonal-based agricultural production. The soils at Actuncan, and the Belize River valley in general, are limestone-derived and average in pH, which is very productive for agriculture, though the hills characteristic of the valley lead to some drainage issues, Vegetation is primarily made up of broad-leaf trees, though I also discuss the presence and characteristics of cacao in particular.

Chapter 3 provides the general culture history of the upper Belize River valley from the Archaic to Postclassic periods as well as a discussion of the specific history of the site of Actuncan. The first settlements in the Belize River valley appear during the Terminal Early Preclassic period, around 1100 B.C., and evidence suggests that Actuncan was settled around this time, with an increase in population in the Middle Preclassic. Large-scale architectural projects begin at Actuncan in the Late Preclassic period, associated with the emergence of divine kingship in the upper Belize River valley, and the site appears to have held political power in the region during the Early Classic period. The emergence of Buenavista del Cayo, and subsequently Xunantunich, during the Late Classic period led to a waning of Actuncan's power and the creation of a possible vassalage relationship with Xunantunich. During the Terminal Classic, Actuncan appears to have a brief resurgence, but occupation ends during the Postclassic period.

Chapter 4 presents a theoretical background for understanding agricultural intensification, both in terms of past perspectives and theories related specifically to the lowland Maya area. I first present the original ideas of Thomas Malthus (1798) and further points made by Ester Boserup (1965), as well as important improvements provided by Brookfield, Kirch, and Turner and Doolittle. Norman Hammond and Patricia McAnany helmed the application of agricultural intensification theory to the lowland Maya area specifically, and the appearance of household models of agricultural production (e.g. Killion 1992a, 1992b) in the area led to the argument that the highest amount of agricultural intensification occurred close to residential structures. This household model, coupled with the definition of landesque capital provided by Blaikie and Brookfield (1987), are used in my overall argument that technological inputs into household agricultural production such as gardens (i.e. the previously described agricultural plot systems) required a pre-planned, single event, initial agro-engineering for the purpose of increasing crop yields for later seasons.

Chapter 5 builds on chapter 4 by providing a history of theories and methodology related to ancient Maya agriculture, as well as descriptions of identified ancient Maya agricultural production technology. Mayanists studying agricultural production have come a long way from the assumption that the ancient Maya sustained themselves with swidden agriculture, and while the acknowledgment that there are other paths to agricultural production – the high performance milpa, raised fields, arboriculture, gardening, and terracing to name a few – there are still arguments to be made for the analysis of microenvironments. The utilization of *yeso* at Actuncan to create earthen berms, for instance, indicates that settlers modified their land based on the localized environment in which they live, and, thus, agricultural technologies could vary from site to site. This is important, because it proves a microenvironmental analysis is key to describing differences in agricultural technology.

Chapter 6 provides context and a description of excavations undertaken between the 2014 and 2017 Actuncan Archaeological Project field seasons, particularly in reference excavations in Northern Settlement Zone and Mopan River floodplain. The Northern Settlement Zone – previously referred to as the Northern Neighborhood – is a domestic area situated on the northern periphery of the Actuncan site core – made up of the residential areas of Group 1, Group 5, and Group 7. Group 7 is the residential group closest to the agricultural plot systems as well as the terraforming features and the water channeling system, and based on previous excavations, Group 7 appears to be the wealthiest residential area in the Northern Settlement Zone during at least the Late Classic period when elite power diminished, and four of the five features (Agricultural Plot System 1, Agricultural Plot System 2, Terraforming, and the Water Channel System) are located in close proximity to Group 7. The *chich* cobble mounds are located along the Mopan River floodplain, to the east of the Actuncan site core, but still in association with the site of Actuncan. Excavations indicate that some form of occupation was present in the *chich* cobble mound area at around the same time as the Northern Settlement Zone occupation (i.e. Late Classic and Terminal Classic), creating a connection between the two areas.

Chapter 7 presents artifact analyses, as well as chronological references, for the excavated areas. Lithic analysis focused on determining reduction stage, while ceramic analysis was conducted to determine a chronology. Other artifacts analyzed include groundstone, slate, obsidian, and jute. Obsidian was analyzed for typology and visual sourcing, while jute was examined for evidence of consumption. The larger goal of my artifact analysis is to demonstrate that the assemblages of Agricultural Plot System 1 and Agricultural Plot System 2 were the result of redeposited domestic trash, often associated with increasing the productivity of gardens.

Finally, in chapter 8, I return to the goals of this study and review my efforts at achieving them. I summarize the data presented, how they relate to larger studies, and the additional research that could elaborate on my conclusions.

1.6 Final Thoughts

Providing research on agricultural production and water channeling through the lens of localized environmental, political, and social contexts at Actuncan, and the upper Belize River valley, contributes greatly to the understanding of intensive agricultural practices and microenvironmental land use. Studies related to terracing have often been conducted in association with construction on marginal land and/or supposed inherent incremental construction. Arguments have also been made for both elite control over terrace construction (Chase and Chase 2004) and household-level control (Wyatt 2008), particularly in reference to extensive terracing. Most studies have focused on contour and dry-slope terraces, with only small attention paid to box terraces – possibly because they are not extensive, or because they are difficult to see in the archaeological record. When discussing agricultural intensification, however, these box terraces – used for gardens or seed beds – are indicative of household-level agricultural intensification. In addition, when discussed, box terraces are described as one-course interlocking terraces, creating plots, but there is no indication of any features associated with these plots. The agricultural plot systems uncovered at Actuncan are made up of box terraces, but with multi-course walls and a number of other features built into the plot systems, including a field house, earthen water drainage feature, and deep, encircled but unlined, pits. It is likely that these agricultural plot systems were not built incrementally like other terraces, but, rather, as a single (or at least over a small time span) construction event for the purpose of initial intensive input for the purpose of increased yields later on. As a result, the agricultural plot systems in the Northern Settlement Zone provide what is currently a unique form of agricultural intensification in reference to terracing.

Yeso terraforming and water channeling also demonstrate localized land use strategies. Berms in the Maya area are usually described as stone structures, but at Actuncan, there is evidence for earthen berms, and, in fact, berms made out of a specific type of soil as opposed to piling up easily available soil. In contrast to earthen berms, which would not require much work, another form of water channeling near Structure 90 provides evidence of more formalized construction. This indicates that we must also examine differential construction, and larger purpose, of water channeling systems. Both these features were found in the Northern Settlement Zone, indicating commoner control of both informal and formal strategies to control the hydrology of the residential area. Finally, while more research is required to understand the exact purpose of the *chich* cobble mounds, their possible utilization of the area as a cacao orchard provides answers to questions regarding the political economic context of the upper Belize River valley and the relationship between Actuncan and Xunantunich. While it has been theorized (Ashmore 2010) that Actuncan became a vassal to Xunantunich during the latter's height of political power in the region, the possibility of an orchard close to the Mopan River, and important trade route, may provide evidence for a specific type of tribute relationship based on cacao.

Chapter 2. THE ENVIRONMENT OF THE BELIZE RIVER VALLEY

2.1 Introduction

The general Maya area, which includes modern-day eastern Mexico, Belize, Guatemala, and the western portions of Honduras and El Salvador, can be divided into three basic geographic zones, each with its own agricultural needs. The Pacific coastal plain stretches along the Pacific coast from Chiapas in Mexico through the southern Guatemala and into El Salvador, and is known for its rich volcanic soils (Sharer 2006:31). The highlands, to the north of the coastal plain, include elevated terrain and high slopes, requiring more intensive agricultural strategies such as terracing (Demarest 2004:8; Sharer 2006:4). The Maya lowlands, where Actuncan is located, are characterized by a large range of resources within a varied environment, including the Maya Mountains in the southern lowlands, Petén of northern Guatemala, and Belize in the central lowlands, and the Yucatán peninsula in the northern lowlands (Sharer 2006:42, 45). More specifically, Actuncan is located in the upper Belize River Valley, within the Maya lowlands, in the district of Cayo, near the modern town of Succotz and the Guatemalan border. Utilizing the definition of the area provided by Yaeger (2000:69), the valley includes the Mopan, Macal and Belize River valleys along with the immediately adjacent uplands, which falls into the general area of the Central Maya Lowlands. To the north, west, and southwest, the upper Belize River valley is bounded by the Petén Basin, while the Maya Mountains and the Vaca Plateau border the region to the south and southeast (Figure 2.1). Actuncan itself is located in the lower Mopan River valley within the upper Belize River valley, which includes the valley bottom and margins of the Mopan River between the modern western Belizean border and the confluence of the Mopan and Macal Rivers (Mixter 2016:17) (Figure 2.2). In this chapter, I will discuss the hydrology, geology, climate, and soils of the Belize River valley to provide a greater understanding of the specific local environment in which Actuncan is located.

2.2. Hydrology

The Belize Valley is divided into sub-regions based on its waterways – the Macal River, the Mopan River, and the Belize River. The central portion of the Belize River valley, typified by flat alluvial terraces, is situated along the western bank of the Belize Valley, from the meeting of the Macal and Mopan Rivers eastward to the south of the modern city of Belmopan. The area along these rivers contains rich alluvial soil and relatively flat land, which easily supported settlement. The western part of the Belize River Valley, where the Macal and Mopan converge with the Belize River, contains an abundance of limestone foothills, allowing for multiple chert sources. Finally, the upper Belize River valley, the main geographic focus for this study, is located in western Belize just above the meeting of the Macal and Mopan Rivers, and is characterized by its hills and steep slopes (Chase and Garber 2004:1-3; VandenBosch et al. 2010).

The three waterways defining the Belize Valley, and the Belize River in particular, work as natural transportation routes between the resource-poor Maya heartland in Petén of Guatemala and the critical trade resources located along the Caribbean Coast and the Maya Mountains, which meant that the three rivers (Macal, Mopan, and Belize) would have been crucial for the transportation of long-distance trade goods (Chase and Chase 2004; Helmke and Awe 2012; Jones 1989; Laporte 2004; Laporte et al. 2008). Major trade resources produced or traded along these three routes included salt, Caribbean marine resources, granite stones used for grinding corn, cacao, obsidian, and greenstone (Laporte 2004; McKillop 2002, 2004; Muhs et al. 1985).

It is believed that Cahal Pech served as the gateway community for the Macal River, while Actuncan (Preclassic period), Buenavista (Classic period), and Xunantunich (Terminal Classic period) were sequential gateways for the Mopan River (Ashmore 2010; Chase and Garber 2004:4; LeCount and Yaeger 2010; Leventhal and Ashmore 2004). As will be discussed further below, these river trade routes were utilized heavily for transportation of goods such as pine and cacao.

The Mopan River is an important part of the Actuncan landscape, and its periodic flooding and seasonal rains would have maintained the productivity of the fertile soils located in the valley bottom (Fedick 1995). Agricultural production in the alluvial plain was further augmented by terrace agriculture in the uplands along the valley margin (Neff 2010; Wyatt 2012). In contrast to much of the Maya Lowlands, which suffer from unpredictable rainfall and limited permanent water sources, food production in the Mopan River valley was likely a source of local stability and an export commodity during years of abundance.

2.3 Geology

The Belize River, which spans the entire width of Belize from the Guatemalan border to the Caribbean, divides the country into two fairly distinct regions with unique geological histories and climate patterns (Graham 1987). To the south of the Belize River are the Maya Mountains, an ancient range running southeast to northwest. Formed primarily from Paleozoic sedimentation and volcanic activity, the Maya Mountains are made up of quartz-rich rocks that contain very few minerals suitable for addition to plant foods. A previously thick limestone cap formed on top of the mountains during the Cretaceous era has largely been stripped off due to weathering and erosion, revealing both the underlying quartzite and slate as well as the granite that was formed from volcanic intrusions below that. As a result, much of the soil in the Maya Mountains is not well-suited for agriculture. The Vaca Plateau within the Maya Mountains is the setting for a number of Maya sites with high levels of agricultural terracing, such as Caracol and Minanha. Much of the cap of Cretaceous limestone remains in this area, and the soils here are better suited for agriculture than much of the rest of the Maya Mountains due to the relatively higher soil fertility resulting from the limestone bedrock (Balick et al. 2000).

The Belize River valley is characterized by a karst landscape, which was formed by the interactions of the underlying limestone and water. Limestone is highly soluble and porous, and as water percolates through the limestone, it erodes away from below, creating underground streams, caverns, and *cenotes*. *Aguadas* and *bajos*, the results of depressions that have been filled with impermeable clays, are found above ground, holding water and creating permanent and seasonal wetlands. The problems typically associated with a karst landscape, such as lack of permanent water, are mitigated in the Belize River valley by the presence of the Belize River and its tributaries, the Mopan and the Macal Rivers. In addition, and in contrast to the shallow soils in the northern parts of the Yucatán, soil in the area is sufficiently deep for agriculture.

2.4 Climate and Rainfall

Like much of the world at the beginning of Holocene period, the glaciation of the previous Ice Age began to melt in the area, with the earliest warming period occurring around 16,000 BP. Oxygen isotope data found in sediment cores from 10,500 to 8,000 BP indicate that the climate began to shift from an arid environment to a moisture rich environment from 8,500 BP (Ford and Nigh 2015; Hodell et al. 2000). Pollen evidence indicates that a tropical forest appeared in northern Guatemala around 8,500 BP (Hodell et al. 2000), and the composition of the forest changed from pine-oak forests, normally found in temperate regions, to a forest dominated by the broadleaf vegetation characteristic of tropical environments (Ford and Nigh 2015). The moisture rich environment prevailed in the lowlands for approximately 4,000 years, before a period of more unpredictable weather began with alternating wet and dry cycles (Ford and Nigh 2015). From 3,000 BP on, paleoclimate data suggests an increase in unpredictable weather marked by much dryer and increasingly turbulent weather with long drought events (Hodell et al. 2000).

Today, the Belize River valley is categorized as Dry Tropical (Wright et al. 1959), which means that temperatures never fall below 18 degrees Celsius. There are, however, distinct wet and dry seasons, with hotter or cooler temperatures at different times of the year. A higher amount of rainfall is found in the southern portion of Belize, enhanced by the northward movement of the Inter-Tropical Convergence Zone, an equatorial low pressure zone that influences the wet and dry seasons of much of the tropics. Although the Belize River valley is situated at the midpoint of the country, its weather patterns are more similar to those of the north. The wet season normally spans from June to January, with rainfall averaging about 250 mm per month (Fedick 1995). The dry seasons spans February to April, and normally receives less than 25 mm of rainfall per month (Balick and Arvigo 2015; Fedick 1995). The month of May, however, varies and can be either wet or dry depending on the year (Balick and Arvigo 2015; Fedick 1995).

Temperature minima and maxima correspond roughly to the dry and rainy seasons, with a mean temperature of 23 degrees Celsius in January and 29 degrees Celsius in May. However, sporadic but regular weather phenomena such as hurricanes and ENSO (El Niño-Southern Oscillation) events also affect Belize's climate. Hurricane season begins in June and lasts until November, with peak months of activity in September and October. Belize has not had many hurricanes that have hit the country head on (in the past 25 years, only three hurricanes have made direct landfall in Belize), and the effects of those hurricanes that have hit are felt most dramatically in the coastal regions. Hurricanes can bring large amounts of rain inland, but their effect is generally only felt for several days and do not have a great impact on yearly rainfall averages.

Events associated with ENSO, in contrast, do create problems with forest ecology (Frappier et al. 2002). ENSO events are the warming of normally cold water in the eastern Pacific caused by a rising air pressure, bringing warm water to the western Coast of South America and preventing the normal upwelling of cold water from the depths of the Pacific. While these events do not appear to impact rainfall patterns in Belize today, studies of carbon isotopes in stalagmites in the Actuncan Tunichil Muknal cave in Belize have detected fluctuations in ^{13}C ratios that correlate with ENSO events (Frappier et al. 2002). Although the impacts to agriculture are uncertain, the fluctuations in the uptake of carbon isotopes may have as yet unforeseen effects.

2.5 Soils

The parent material of the soils in the Belize River valley is primarily limestone-derived, a result of the weathering and erosion of the Maya Mountains. In the Late Pleistocene, the current Belize River and much of present-day northern Belize was a shallow bay to the north of the Maya Mountains (Fedick 1994, 1995). Over time, the erosion of the Cretaceous limestone cap on the uplands filled the bay with limestone rubble and sand. The parent material of the soils in the Belize River valley, then, is this Cretaceous limestone brought down from the erosion of the uplands of the Maya Mountains. Although the Belize River valley was once part of the ancient coastline and held a great deal of sand and quartz-rich coastal sediments, these have since eroded away. However, the silica-rich sediments brought down from the Maya Mountains may have created many chert beds throughout the area (Fedick 1994).

Much of the soils in the Belize River valley are therefore primarily created from a limestone substrate (although the soils along the river terraces are more clay-rich soil created from alluvial sediments), and limestone-derived soils can be very productive for agriculture (Wright et al. 1959). However, as the topography is karstic, with rolling hills, towers, cliffs, and sinkholes, the soils on hilltops, hillslopes, and low-lying areas can be quite different from each other. In the low-lying areas as well as on the river terraces along the Belize River, clays tend to accumulate, presenting drainage problems and making maize cultivation difficult (Wright et al. 1959). This finding prompted Willey (1965) to suggest that the river terraces were utilized primarily for settlement and the cultivation of root crops and cacao, with maize agriculture practiced on the nearby hillslopes. Fedick (1989), however, questioned this characterization of river terrace soils, pointing out that subsequent research has identified them as some of the most fertile in the area.

The Belize River valley contains both highly acidic and alkaline soils, with an average pH in the region of 6.4, indicating the soils are neutral to slightly acidic (Kellman 1973). Soil pH greatly impacts the types of plants that can be grown as well as the soil fertility. Some plants will not thrive in soils that are too acidic or alkaline and require human intervention to remain productive. Domesticates such as manioc will tolerate nutrient poor acidic soils as long as the soils are well-drained, while maize thrives in environments with neutral pH and requires soils rich in nutrients (Roosevelt 1980).

The rugged upland terrain of the Belize River valley includes enclosed depressions and residual hills, with gray and brown soils of the Toledo Beds that are predominantly calcareous mollisols and vertisols (Beach et al. 2002; Day 1993:122; King et al. 1992). Underlying the area is a karst belt that runs through central Belize. The Cretaceous to Early Tertiary period limestone substrate is composed primarily of calcium, barium, and strontium (Day 1993). The soils are mostly acidic with a range of 5.5-6.5 on the pH scale and are often less than 50 cm thick. Probes at Actuncan have reached depths of more than 3 m, however, indicating that limestone bedrock was not readily available as a source for construction material. This is particularly important to this study as: 1) the box terraces of the agricultural plot systems are not placed on bedrock like most terraces, but, rather, a clayey soil matrix; and 2) berms at Actuncan take the form of earthen berms created out of *yeso* instead of chert and limestone cobbles that are traditionally used to create berms (Kunen 2001:339).

Soils at Actuncan fall under the Yaxa Suite (and the Yalbac Subsuite more specifically), made up of mollisols and vertisols. Vertisols are clay-rich soils (50-70% clay), found in river terraces in the Belize River valley, that form deep cracks during the dry season and become sticky and swell in the wet season (USDA 1999). Grasslands, savannah, open forest, and desert scrub typically grow in vertisols. Irrigation of vertisols is problematic because the soils are slow to drain and become waterlogged easily. They can, however, be brought into use through the channelization and creation of raised fields (Adams et al. 1981; Siemens 1996; Siemens and Puleston 1972). Mollisols have high organic content and are highly productive, and likely contributed to the high capacity for agricultural production throughout the Maya Lowlands (Brady 1990:67). Locally, this type of soil is called “chachakluum” and is considered optimal for maize agriculture (Wyatt 2008:71).

The main soils of the Yaxa Suite are dark colored blocky clays that are neutral or alkaline and well supplied with calcium, magnesium and aluminum, but that have only moderate contents of other nutrients such as iron. In anthropogenic soils in the Northern Settlement Zone, excavations have shown that the soil often exhibited small specks of dark red to black mottling embedded in the dense blocky clay, which may be associated with magnetite, maghemite, or magnesium (LeCount 2012:15). These clay rich soils are low in potassium and phosphates, essential nutrients for plant growth, but are satisfactory for growing grain crops, including maize (Birchall and Jenkin 1979:35-36). The nearby Melinda suite soils are more nutrient rich due to their location on the Mopan River floodplain, and are ideal locations for agriculture (Cap 2015; Birchall and Jenkin 1979). Within the Yalbac Subsuite, the Piedregal series (on which Actuncan is situated) is one of the most productive soil series in terms of potential productivity using prehispanic agricultural techniques. A revision by Fedick (2010) of Baillie and colleagues (1992) vague description of the soil capability led to a numbering system that represented the Piedregal series in terms of five main limitations: 1) fertility; 2) erosion; 3) root zone; 4) workability; and 5) drainage. With the number 1 representing the fewest limitations, the Yalbec Subsuite is graded 1 for fertility, 2 for erosion, 2 for root zone, 1 for workability, and 1 for drainage, leading Fedick (2010:57) to categorize the soil as "Capability Class 2," suggesting a high capability for agricultural production. Despite the general belief that tropical soils are thin and bereft of nutrients, the soils in the Belize River valley, as well as in much of the southern Maya Lowlands in general, are fertile and productive. The limestone substrate and the extensive presence of mollisols make this a prime area for agricultural settlement both in the present day and in the past.

2.6 Vegetation

Centuries of postcolonial settlement and modern agriculture have drastically altered the vegetation of the Belize River valley. Much of the Belize River valley today has been given over to agriculture, including small fields of individual farmers practicing slash-and-burn as well as industrial farming operations, mechanized farming, and extensive cattle ranching. Much of the larger farming and ranching operations are located along the river on the floodplain and upper terraces (and have been there for many decades), whereas more slash-and-burn farming is found in the surrounding uplands. As a result, the uplands today are in various stages of regrowth, and are a mosaic of different stages of forest succession.

The vegetation surrounding Actuncan is a neotropical deciduous forest dominated by broadleaf hardwood species of trees. While much anthropogenic change has occurred since ancient Maya occupation, the Belize River valley still contains many of the tree species that were present and economically important for the Maya, including ramón, chicozapote, mahogany, pine, and cacao trees. Other economically important tree species found throughout the Belize River valley include: logwood (*Haematoxylum campechianum L.*), nargusta (*Terminalia obovata*), Santa Maria (*Calophyllum brasiliense Camb.*), cedro (*Cedrela odorata*), and allspice (*Pimenta dioica*) (Lentz et al. 2005).

Ramón trees prefer shallow limestone soils, which accounts for their prevalence at ancient Maya sites, and Lundell (1937) hypothesized that the ancient Maya may have utilized the seeds from their abundant fruits as a primary source. Puleston (1968) further expanded on this hypothesis when it first became clear that swidden agriculture could not have supported the high populations of the ancient Maya, at least in and around the site of Tikal. Contemporary Maya use the seeds for tortillas and the leaves for animal fodder, although their use by humans is often only during times of famine (Mikisicek et al.

1981). Subsequent studies revealed that the cause for the many ramón trees surrounding Maya sites was ecological rather than anthropogenic (Peters 1982).

Chicozapote, a valuable economic tree, is prized for its lumber, fruit, and resin, and was used extensively by the ancient Maya as well as by current Central American inhabitants. Because of its resistance to rot and insect damage, the Maya used the wood for lintels in their temples and for other works of fine art. The fruit was eaten in the past as well as today, and the resin was used to make chewing gum, one of the most fundamentally important economic goods in the history of the Maya Lowlands. Because of its importance, its wide-ranging presence in modern forests is likely due to its cultivation in the past (Lundell 1937).

Mahogany trees generally became established in tropical forests due to circumstances that caused large clearings such as hurricanes, fires, or agriculture (Steinberg 2005:128). In order for mahogany seedlings to gain competitive advantage they need a great deal of sunlight (an amount not provided by a single tree fall or other small-scale clearing), so large-scale clearing would be needed. Clearings made by human settlements, such as those made for agricultural practices and swidden agriculture, provide the ideal conditions for the creation of these types of forests. The southern Maya Lowlands had substantial amounts of mahogany that were used for commercial purposes, and particularly intensive logging in western Belize served as one of the main sources of revenue for the British colony (Waddell 1961). It is therefore likely that the formerly extensive forests were the result of ancient Maya land-use practices, including both swidden and more intensive forms of agriculture (Steinberg 2005:131).

The Mountain Pine Ridge is a distinct upland environment dominated by stands of pine (*Pinus oocarpa*) that was never extensively occupied, perhaps due to the presence of poor, acidic soils that negatively affect agricultural potential (Dubbin et al. 2006). The soils, however, do support extensive open-canopied pine forests that were utilized by the Maya in a variety of ways. Modern Maya, such as the Tzotzil and Tzeltal of highland Chiapas, use pine to make furniture, domestic utensils, fences and houses (Berlin et al. 1974). The Mopan and Kekchi of southern Belize also use the wood for house construction (Thompson 1930). In addition to these more mundane applications, modern Maya also employ pine in rituals such as the burning of pine resin as incense and the use of pine boughs and needles to adorn crosses and altars (Atran et al. 1993; Tedlock 1982). Paleoethnobotanical data demonstrate the long history of utilitarian and ritual uses of pine in the Maya area. Pine occurs in diverse domestic contexts within Maya sites, and particularly in middens and platform fill (Dickau and Lentz 2001; Lentz et al. 1996; Miksicek 1983). Archaeologists have also reported finding pine in caves, which served as points of communication with the underworld (Morehart 2001), as well as in caches at Caracol (Chase and Chase 1998), tombs at Copán (Lentz 1991), and offerings at La Milpa (Hammond et al. 2000). Studies by Lentz and colleagues (2005) at the site of Xunantunich, located just 2 km from Actuncan, indicate that pine was traded from the Mountain Pine Ridge to the Belize River valley via the Macal River.

2.6.1 Cacao

Given that one of the arguments put forth in this dissertation is that cacao orchards were being grown by Actuncan inhabitants along the Mopan River floodplain, it is important to provide a broad description of the tree here. The Karstic Piedmont includes deeply dissected limestone uplands, alluvial valleys and steep tributary streams, and major sites such as Lubaantun appear to have been strategically situated in order to control both upland ridges and intervening valleys by supplying them with a range of resources including cacao orchards (Hammond 1975). Only three cacao tree species are known to have been grown in the Maya region: *Theobroma cacao* L., *T. angustifolium*, and *T. bicolor*, with the most commonly cultivated species today being *Theobroma cacao* L (Cuatrescasas 1964). This species is the one that was exploited in Prehispanic times, and is the one whose seeds have formed the basis of the worldwide chocolate industry since that time. Cacao in Mexico and Central America is usually found either in hot and humid climates with rainfall in the summer and autumn, or in areas with less rainfall but with soils in favorable humidity (Erneholm 1948). Cacao grows well in deep, well-drained, fertile soils with an abundant organic matter. The wild species usually grow in the shady intermediate tree strata of high evergreen tropical forests, making it a shade-tolerant species that is traditionally grown under the shade of other trees (Goméz-Pompa et al. 2009:249). The plant has no natural mechanism by which the pods can open, so the plant therefore relies on humans and other animals to open pods and disseminate the seeds (Coe and Coe 2007:22). Cacao seeds are naturally dispersed by rodents, bats, and monkeys, who eat through the thick pod surface to reach the sweet pulp surrounding the bitter seeds (Young 2007). As a result, there are numerous examples of ancient Mesoamerican artworks depicting monkeys, squirrels, and bats holding cacao pods (Ogata et al. 2006). GIS-based flooding models indicate that, at the site of Actuncan, cacao could have thrived along the Mopan River floodplain to the east of the Actuncan site core (Simova 2015) (Figure 2.3, Figure 2.4). As will be discussed in later chapters, *chich* cobble mounds, used by modern Maya to promote tree growth in orchards, are present in this area and may indicate the presence of an ancient orchard.

It is generally accepted that the genus *Theobroma* evolved in South America. From the upper Amazon basin, T. cacao spread out and up through Central America and into Mexico either naturally or through human agency (Bletter and Daly 2006). The earliest *Theobroma* macroremains found in Mesoamerica are charred wood fragments excavated from the site of Cuello, Belize, dating to between 1000-900 B.C. (Mikisicek et al. 1991). In addition, *Theobroma* cacao seeds have been recovered from a number of sites in Central America, including: Uaxactun; Guatemala (Late Classic period) (Kidder 1947); Ceren, El Salvador (early Late Classic) (Lentz et al. 1996); and Ayala, Granada, Nicaragua (A.D. 750-850) (Salgado González 1996:171). In addition, macroremains identified as possible cacao bean fragments have been found throughout Belize at sites such as Cuello, Cerros, and Pulltrouser Swamp (Crane 1996). The most common use of cacao throughout Mesoamerica was a chocolate drink consisting of cacao powder and water, and was often mixed with other additives such as chili powder, vanilla, and ground maize (Christopher 2013:50).

Chemical analyses of organic residues found on the interior of vases from an elite tomb at Rio Azul (Stuart 1988) lend support for the proposal that vases were containers for chocolate drinking. Vases, proposed as drinking containers for chocolate, are found in the highest frequency on El Castillo, the most prominent architectural feature at

Xunantunich, while fewer vases are found in the service area of the royal residence. Household assemblages also contain very low relative frequencies of vases, indicating that chocolate drinking was customary at Maya rituals, but more commonly associated with elite events. Based on evidence from Xunantunich, LeCount (2001:947) suggests that chocolate drinking was a highly charged political ritual among the Late Classic Maya, a critical act that consolidated political allegiance and cemented civic agreements between individuals, both elite and common. She further argues that drinking was a relatively private, possibly one-on-one activity between men in power (LeCount 2001:947). Houston and colleagues (1989) have long hypothesized that the Primary Series Sequence found along the rim of pottery vessels makes propriety statements that not only identify the owner of the vessel, but his or her social status as well.

Cacao played a central role in the complex elite culinary traditions and practices of Mesoamerican cultures, and also served as an important item of trade and economic wealth (Bergmann 1969; Coe and Coe 2007; Millon 1955; Thompson 1956). Chocolate is unlike maize in the ways it is raised and processed (Coe and Coe 2007:42). Cacao tress are difficult to grow and require year-round moisture and specific soil conditions, such as those found in the Soconusco area of the Pacific coast or the Gulf Coast plain. Therefore, unlike beer, *chicha*, or other beverages made from high-yielding crops, ancient people could not have been fed chocolate at entrepreneurial feasts, work parties, or patron-role festivals. Presumably, the restricted nature of cacao farming allowed Maya elites at some point in the distant past to seize control of its means of production and/or significance (LeCount 2001:948). Trading cacao within a community requires a very organized agricultural system, and a ruler could have extended his power to the periphery borders by demanding tribute of items such as cacao. Cacao would be grown in the rural areas and taken back to the urban center in various amounts (Millon 1955:139-149). As a binding force within social and political interactions, cacao served as a mode of exchange (Christopher 2013:51). Classic commoners had access to cacao products since they were the people cultivating it, but much of this cacao may have been paid as tribute to elites and consumed in feasts sponsored at the royal courts in the large urban centers (Millon 1955:139-149). The *chich* cobble mound area to the east of Actuncan dates to the Late and Terminal Classic periods, a time of Xunantunich political dominance. It is my assertion that, if the *chich* cobble mounds were utilized as cacao orchards, then Actuncan and Xunantunich may have solidified their vassal-overlord relationship through a tribute of cacao. The Mopan River provides a direct trade route between the two sites, and in addition to being a good growing environment for cacao, the presence of the *chich* cobble mounds along the Mopan River floodplain would allow for easy transportation of cacao seeds from the orchard to the elites at Xunantunich.

2.7 Summary

The Maya region contains a diverse set of ecological communities that must be considered when examining Maya agricultural practices. The hydrology of specific regions, for example, impacts where agricultural activity as well as other economic endeavors, as is seen with the use of the Belize, Macal, and Mopan Rivers for transportation of goods. The geology of the region also influences water drainage, and variation in rainfall influences species diversity since the Belize River valley had limited accessibility during the dry season. Soil fertility has high impact as well, since it determines the types of species that can grow in certain environments. Although the Belize River valley has in the past been characterized as a homogenous region of tropical forest (Meggers 1954) and a poor location for agricultural production (Willey et al. 1959), the area is actually a quite heterogeneous region of diverse resource extraction and agricultural potential that contains a wide array of agricultural production strategies (Fedick 1996).

Chapter 3. CULTURE HISTORY OF THE BELIZE RIVER VALLEY

3.1 Introduction

The general history of permanent Maya settlements begins with the establishment of early permanent villages in the Maya Area by 1000 B.C., along with the emergence of imposing, monumental sites like El Mirador in the Preclassic period in the 6th century B.C. The Lowland Maya civilization grew to its peak during the Classic period, ranging from A.D. 250 to A.D. 800/900. Social stratification between elites and non-elites also arose at this time, with the Late Classic period (A.D. 600-900) showing an explosive population growth in the Maya lowlands. This rapid increase in the size, complexity, and number of polities throughout the lowlands, however, eventually led to more intense competition for land, water, food, and other resources. The Terminal Classic period (A.D. 800/900-1150) began with a disappearance of the large polities in the lowlands, and those individuals who chose not to compete for these resources migrated to the coasts, to the southern highlands, and to the north in the Yucatán Peninsula. This northern migration, in particular, resulted in the Postclassic period (A.D. 900/1100-1500), which focused more on an oligarchy-based system. By 1500, however, Spanish conquistadors had taken over Mesoamerica, including an attempt to eliminate native practices.

As stated in the previous chapter, the upper Belize River valley traditionally refers to a geographic area bounded by the edge of the Vaca Plateau to the south and the modern Belizean border to the west (Chase 2004). Actuncan is located in the subsection of the upper Belize River valley referred to as the lower Mopan River valley, and while the trajectory of the upper Belize River valley generally mirrors the larger history of the

Maya, it is also important to examine the localized unfolding of events. While the above provides a general chronology of the Maya lowlands, Table 3.1 indicates the more specific chronology associated with the Belize River valley. The following is a description of the political and cultural history of the Belize River valley (Figure 3.1), the upper Belize River valley (Figure 3.2) and the area around Actuncan more specifically (see Figure 3.3 below).

3.2 Archaic Period

The initial semi-occupation in and around the Belize River valley arose during the Archaic period, with particularly rapid population growth occurring during the Late Archaic. Early inhabitants congregated in the river valleys and wetlands of the region, allowing for the exploitation of multiple ecological zones as well as the possible adoption of agriculture (Lohse et al. 2006; Piperno and Pearsall 1998). Pohl and colleagues (1996) and John Lose (1994) have found evidence for the use of maize and manioc by 3400 B.C., with more widespread cultivation by 2400 B.C. in the wetland regions of northern Belize. Despite its later importance in Mesoamerica, maize was not heavily relied upon until late in the Preclassic, when it became a significant aspect of culinary and ritual traditions.

3.3 Terminal Early Preclassic Period (1100-900 B.C.)

The earliest settlements in the upper Belize River valley date to approximately 1100 B.C. with the emergence of the sites of Cahal Pech and Blackman Eddy (Awe 1992; Cheetham 2005; Healy et al. 2004; Sullivan and Awe 2013; Sullivan et al. 2009). Cahal Pech, a medium-sized center located near the convergence of the Mopan and Macal rivers, along with several settlements located on ridges surrounding the site center, represent one of the earliest occupations in the valley (Awe 1992; Awe et al. 1990). Downstream of Cahal Pech is Blackman Eddy, another medium-sized center in the Belize River valley which appears to have been settled around the same time as Cahal Pech, as evidenced by a series of post-holes cut into bedrock (Garber et al. 2004:33-36).

There is also evidence, based on the presence of a small assemblage of ceramics with Olmec-style motifs (Strelow and LeCount 2001), that Xunantunich, located east of the Mopan River, 2 km north of Actuncan, was a site of early settlers. Similar artifacts have also been found at Pacbitun, a larger site in the far upper Belize valley situated at the foothills of the Maya Mountains, as well as at Floral Park in the central valley. Architectural and artifactual assemblages suggest an egalitarian society, but the presence of marine resources in the area also suggests some sort of interaction with the coast (Awe 1992).

3.4 Middle Preclassic Period (900-400 B.C.)

The Middle Preclassic period is associated with an increase in population, with most sites in the Belize River valley also containing evidence of occupation at this time, and with the earliest identified construction taking the form of perishable buildings anchored into leveled sections of bedrock (Garber et al. 2004). Dwellings of early occupants at Barton Ramie, for example, are found on the upper alluvial terraces of the Belize River and are spread out rather uniformly across the landscape as individual houses, although there are also several locations with groupings of two or three structures. As with earlier sites, Barton Ramie does not show a great deal of social differentation at this time, but there is evidence of long distance trade in the form of *Spondylus* shells and obsidian from the Guatemalan highlands. Willey and colleagues (1965) conducted the first surveys in the region, and argued that these early inhabitants were simple farmers, clearing the virgin forest and cultivating a variety of crops. According to Willey et al. (1965:574), the alluvial land along the Belize River was not well-suited to maize agriculture, so maize was planted in the surrounding uplands while roots crops, and possibly cacao, were planted among the housemounds at Barton Ramie. Late Middle Preclassic occupation is also evident at other sites in the Belize River valley, such as Baking Pot and Buenavista del Cayo. Buenavista del Cayo, located upstream from Barton Ramie along the Mopan River, is argued to be a center for the entire Belize River valley at this time (Ball and Taschek 2004).

Cahal Pech and Blackman Eddy also expanded in complexity during the late Middle Preclassic period, with the introduction of large, circular structures at both sites. It is argued that these types of circular structures, and particularly those without superstructures, were sites for ritual performance given their decoration and the greater investment in construction (Aimers et al. 2000; Hendon 1999). The earliest use of mask facades on public architecture appears at Blackman Eddy and it is argued that this mask, as well as the presence of circular structures, suggests an emerging Maya religious and iconographic symbolism that would fully develop in the later Preclassic (Brown et al. 1998). Although the public architecture and iconography at Cahal Pech and Blackman Eddy do not necessarily indicate social stratification, it is possible that the beginnings of a system associated with elite culture occurred at this time. Middle Preclassic monumental construction has also been identified at Xunantunich, Chan, and Pacbitun (Brown 2013; Brown et al. 2011; Brown et al. 2013; Garber et al. 2004; Healy et al. 2004; Robin et al. 2012)

Clear evidence of agricultural production by the Middle Preclassic has been documented at Cahal Pech, with paleoethnobotanical studies indicating the use of maize, beans, and squash as well as the use of ramón nuts, nance, calabash, and cotton (Wisen and Lentz 1999). Faunal analysis also indicates the use of white-tailed deer, brocket deer, armadillo, agouti, tapir, turtles, marine freshwater fish and shellfish, and a variety of birds (Powis et al. 1999). It can be surmised that although agriculture was being practiced (as evident with the cultivation of maize, beans, and squash), the Maya were nonetheless utilizing wild resources as well.

Monumental construction and formal site planning also become widespread throughout the Belize River valley during this time period (Doyle 2012; Estrada-Belli 2011; Hansen 1998; Inomata et al. 2013; Joyce 2004). In particular, E-Group complexes, composed of a single western pyramid paired with a long linear eastern mound, are frequently identified as the earliest manifestation of public architecture (Clark and Hansen 2001; Doyle 2012; Estrada-Belli 2011; Inomata et al. 2013). It has been argued that E-Groups were used to track the solar year and celebrate agricultural cycles (Aimers and Rice 2006; Chase and Chase 1995), and at the least were likely early gathering places, centers of public ritual, and possibly early centers of exchange (Doyle 2012; Inomata et al. 2015; Stanton and Freidel 2003). The Middle Preclassic is considered to be the first time period in which one sees clear cultural unity across the Maya Lowlands, particularly in reference to the spread of specific architectural styles such as E-Groups.

3.5 Late Preclassic Period (400-150 B.C.)

Many of the centers in the Belize Valley became established with the beginning of the Late Preclassic, and ceramic traditions went from being highly varied within the valley to incorporating those traditions found throughout the rest of the southern lowlands. This integration with the larger southern lowland area persisted to the early Late Classic period (Chase and Garber 2004:7). While relatively little is known regarding the Late Preclassic Belize River valley, both Blackman Eddy and Cahal Pech appear to have displayed continued expansion during this time period, with architecture transitioning from purely residential to being more elaborate and ceremonial in purpose. At Blackman Eddy for instance, Structure B-1 went from a simple pole and thatch structure in the terminal Early Preclassic period, to a two-tiered pyramidal group with stucco masks flanking the staircases like that found at Uaxactun (Ricketson and Ricketson 1937). This structure was likely utilized for public ritual and performance (Schele and Freidel 1990:72), and created a link for the emerging elite between the local population and the Maya deities. Structures at Cahal Pech also show a similar pattern of simpler, domestic architecture being replaced by larger and more elaborate architecture in the Late Preclassic (Cheetham 1995; Garber and Awe 2006). Exotic material such as marine shell, jadeite, and obsidian have been found there, providing further evidence for social stratification based on variable access to goods (Healy et al. 2004:123).

Xunantunich (Leventhal and Ashmore 2004), Nohoch Ek (Taschek and Ball 2003), and Las Ruinas de Arenal (Taschek and Ball 1999), all show more complex and elaborate construction during the Late Preclassic. At Xunatunich in the lower Mopan River valley, evidence suggests that Group D and Group E were both occupied during the Late Preclassic period (Brown 2013; Brown et al. 2013; Brown et al. 2016; McCurdy et al. 2014). Some residents at Cahal Pech, Chan, and Xunantunich also began to be placed in positions of privilege, such as being buried under the floors of public temples (Awe 2013; Brown 2013; Novotny 2012). The presence of these burials points to clear special treatment of community leaders, if not the marking of early royal rulers (Awe 2013; Brown 2013).

Actuncan, which will be discussed further below, also began a program of large-scale architecture during the Late Preclassic. Located on a low ridge overlooking the Mopan River, Actuncan appears to have been a primary force in the area, with nearly one-half of the northern civic architecture being constructed at this time. According to LeCount (2004), Actuncan was a likely early location for the rise of kingship in the Maya Lowlands.

The trend toward social stratification and the establishment of political power that began in the Middle Preclassic becomes more solidified during the Late Preclassic period, with major construction programs at Blackman Eddy and Actuncan demonstrating a move toward public architecture, increasingly exclusive residential space, and the establishment of public ritual and performance (Clark and Hansen 2001; Inomata et al. 2015). Within city centers, monumental architecture grew in size and was elaborated by monumental art programs, while E-Groups at major centers were renovated and continued to grow (Doyle 2012; Estrada-Belli 2011; Laporte and Fialko 1995; Ricketson and Ricketson 1937). This elaboration of architecture further suggests an attempt at cementing both the roles of rulers and the formation of the institution of kingship (and particularly divine kingship). In addition, the pressure on land resources (due to both an increase in population and the need to feed other segments of the population) may have initiated a turn to more intensive agricultural methods, although the specifics of these methods is not yet known.

3.6 Early Classic Period (A.D. 250-600)

The Early Preclassic Period in the Maya area has generally been associated with the introduction, in the second half of the third century A.D., of carved stone monuments with hieroglyphic text. These hieroglyphics focus primarily on the histories of the royal dynasties that have ruled Maya centers (Martin and Grube 2008; Proskouriakoff 1960; Schele and Freidel 1990), and provide evidence that Maya divine kings ruled semi-autonomous polities scattered across the Maya Lowlands. These kings became embroiled in wars and complex alliance networks that resulted in certain divine kings serving as overlords (Martin and Grube 2008:20-21) who were owed allegiance by a network of client kings. The rivalry between the sites of Tikal and Calakmul, in particular, dominated the politics of the Maya Lowlands.

It is hypothesized that the shift from the Late Preclassic to Early Classic period is marked by increasing economic complexity, especially in the establishment of markets and in attempts by royal families to more tightly manage wealth and stable goods

(Blanton et al. 1996; Earle 2001; Hirth 1996; Masson 2002). Reciprocal exchanges of valuables such as jade, obsidian, and labor-intensive local craft items parallel the growth of social hierarchies. Maya leaders were particularly interested in administering trade items (e.g., high-quality chert, greenstone, decorated pottery, forest products, and marine fish) and local labor-intensive craft goods (e.g., mirrors, decorated pottery, and slate items). Market exchange may also have been an elite strategy to increase polity prosperity by stimulating household production and rewarding noble families with access to influence and wealth. In market systems, households – regardless of status – had the potential to obtain certain kinds of craft goods, since markets operate through nonhierarchical provisioning networks (LeCount 2012:3).

Although research on the ancient Maya in the Maya Lowlands during the Early Classic period has focused largely on the site of Tikal and its relationship with the site of Teotihuacan, there is little evidence of the presence of Teotihuacan in the Belize River Valley at the time of its height of power. The coastal site of Altun Ha is the only site with identified Teotihuacan artifacts, consisting of a typical Teotihuacan-style cache comprising of Pachuca obsidian eccentrics (White et al. 2001). The Belize River valley reflects some of the effects of the hiatus and depopulation that occurred in the central Petén following the demise of Teotihuacan, including the realignment of power. For example, there is little Early Classic construction in the area, though excavations of commoner households at Actuncan indicate occupation in the Late Preclassic through the Late Classic periods. Although there are some Early Classic materials as well as significant civic building projects at this time, LeCount (2004) suggests that the lack of commoner household architecture may represent a population decline in the Early Classic period.

Other sites in the Belize River valley, however, show a clear increase in construction activity in both site centers and residential areas. At Buenavista del Cayo, for example, an increase in the size and distribution of residential populations and large-scale, formal architectural activities involving both public monumental and private residential areas suggest the site's rise in importance in the area. Baking Pot also experiences an increase in architectural construction in both the site core and outlying areas at this time period (Audet 2004; Awe and Helmke 2005; Conlon and Powis 2004), and vessels found at the site make reference to royal owners or patrons (Colas et al. 2002). These vessels provide some of the earliest direct evidence of Late Classic ritual and political relationships, and the likely manufacture of these vessels at Baking Pot suggests that it was an important part of a royal realm (Awe and Helmke 2005:50).

3.7 Late Classic Period (A.D. 600-780)

All sites in the Belize River valley continued to be occupied by the Late Classic period, but some sites (such as Actuncan, which saw its apogee during the Late Preclassic and the Early Classic) diminished somewhat in population and influence, later becoming subordinate to the site of Xunantunich. Following the trends exhibited in other areas of the Maya Lowlands, however, most sites in the region expanded in population and monumental construction. At the beginning of the Late Classic period, Buenavista del Cayo expanded significantly in conjunction with the much larger lowland center of Naranjo. It has been suggested (Leventhal and Ashmore 2004) that this expansion of one of Naranjo's subordinate centers was due to that polity's attempt to control the valley. Buenavista del Cayo's expansion peaked during the reign of Smoking Squirrel at Naranjo, but both cities then declined shortly after his death in the mid 8th century (Leventhal and Ashmore 2004:170). Construction at Cahal Pech also increased during the early part of the Late Classic, with an expansion of numerous structures in the site core. Both Buenavista del Cayo and Cahal Pecg, however, diminish in architectural activity and prominence by the latter part of the Late Classic.

Early Late Classic construction begins at Xunantunich at approximately A.D. 600/670, and the emerging Late Classic period was associated with more regionalized ceramics in the Belize River valley (LeCount et al. 2002). Both Xunantunich's architecture, (along with an inscription on Altar 1) and Buenavista's ceramics show an association with the northern lowlands during this time period, which has been suggested to be evidence of possible "foreign" populations (Chase and Garber 2004:8; Helmke et al. 2010:121; Yaeger 2010:155). As Buenavista's power waned in the Terminal Classic, Xunantunich grew to be the dominating center of the area as the major power of sacred and secular activity. The local settlements during this period remained as rural communities, with small secondary centers as the main focal points for the surrounding population (LeCount and Yaeger 2010; Leventhal and Ashmore 2004:178). As the Late Classic progressed, previously open plazas and courtyards in Xunatunich became restricted, and the site contracted further by the Terminal Classic with the abandonment of the courtyards, indicating instability during this period (Leventhal and Ashmore 2004:173).

Questions have been raised regarding the nature of the political history of the Belize River valley at this time. Taschek and Ball (2004) have argued that the three sites of Xunantunich, Cahal Pech, and Buenavista del Cayo were particularly important during this time period, but rather than functioning as three independent sites, Buenavista del Cayo was the primary seat of power in the Belize River valley while Cahal Pech and Xunantunich served somewhat subsidiary roles. According to Taschek and Ball (2004:203), Xunatunich was a temporary residence for royal visitors who came for short, periodic visits to the site for ancestral rituals, funerary rites, pilgrimages, and other ceremonial purposes. This interpretation, however, is particularly problematic as it is based primarily on the contrast between the architectural style of the Castillo, described as "striking in its sparseness and simplicity" (2004:203), and the more complex structures of Cahal Pech and Buenavista del Cayo. This interpretation led to the assumption that Cahal Pech served as the "Summer Palace" to Buenavista del Cayo's "Winter Palace" due to unsubstantiated claims of microclimatic differences between the two locations (Ball and Taschek 2001). This model saw Buenavista del Cayo as the location of more public activities as well as administrative economic services, with Cahal Pech acting as a royal residential location and a site for private ritual (Taschek and Ball 2004). The authors cite differences in layout as evidence to support their claims of different purposes at these sites, but a more likely scenario is that these layout differences are the result of different geographical locations and the restrictions of construction on hilltop sites (Audet and Awe 2005:363).

While Ball and Taschek's construction of the political history of the Belize River valley contains major gaps, their identification of the site of Naranjo as a primary polity that controlled all the sites in the Belize valley is still a valid interpretation (Ball and Taschek 1991). The "Buenavista Vase" found in an elite burial contains an inscription referring to the owner/patron of the vessel as Lord K'ak-Til, a powerful ruler of Naranjo (Taschek and Ball 1992). Other portable objects have also been found during this time containing text referring to Buenavista del Cayo (Houston et al. 1992:507-508; Yaeger et al. 2015:185-188). Baking Pot provides further evidence of Naranjo's influence in the valley in the form of several pots suggesting a foreign origin, with an inscription on one of the pots indicating that it was made in Naranjo. Given these findings, Audet and Awe (2005:363) argue that Baking Pot was an extension of the antagonistic interactions between Naranjo and a number of sites throughout the latter part of the Late and Terminal Classic periods.

A similar model of Naranjo influence has been proposed by Leventhal and Ashmore (2004), but with amendments regarding how the control of Naranjo was manifested in the Belize River valley and the nature of the relationship between Buenavista del Cayo, Cahal Pech, and Xunantunich. Leventhal and Ashmore agree with Ball and Taschek that Buenavista del Cayo was a polity capital in the early part of the Late Classic, but also argue that Xunatunich rose in power in the latter part of the same period. In this more plausible model, Buenavista del Cayo peaks as a valley center during the reign of Smoking Squirrel of Naranjo during the eighth century, as monumental construction and hieroglyphic inscriptions cease at the site with his death. Naranjo then enters a hiatus until A.D. 780, with the erection of four stelae and increased construction likely related to the decline of nearby Caracol and Tikal (Martin and Grube 2000:80). This date corresponds with the change from the Late Classic period to the Terminal Classic period in the Belize River valley.

The recently discovered stela panel at Xunantunich contains two glyphs commemorating the death of Lady Bat Ek (December 638 AD), the wife of the ruler of Caracol. Caracol was the military stronghold of the lowland Maya area during this time, having defeated major sites like Tikal and Naranjo. However, evidence also suggests that Caracol was later defeated by Naranjo, and the panel was then taken from Caracol to Naranjo. It is believed that at Naranjo, the panel was cut into pieces and a part given to Xunantunich for the purpose of thanking them for assistance. Although this interpretation suggests that a connection between Xunantunich and Naranjo may have led to the prominence of Xunantunich towards the end of the Late Classic period, the actual nature of this connection is still debated (Awe and Helmke 2019). Ashmore (1998, 2010) has noted that layout of Xunantunich's reorganized monumental core in the Late Classic echoes that of Naranjo, suggesting that this was an intentional emulation that signaled a political connection between these two sites. The Xunantunich palace also seems to imitate, albeit in much smaller scale, the layout of Naranjo's Central Acropolis, interpreted by Fialko (2006) as the site's royal palace during the Late Classic period. The erection of the Xunantunich palace corresponds particularly to the Hats' Chaak phase (A.D. 660-780), a time of Xunantunich expansion (LeCount et al. 2002). This early phase is broadly coeval with efforts by Naranjo's rulers to establish their authority over the eastern central lowlands beginning in AD 682 (Martin and Grube 2008; Taschek and Ball 1992). According to Yaeger (2010:149), because Xunantunich's architectural expansion, the remodeling in the image of Naranjo, and the establishment of the new palace complex all occur within a context of an expanding, assertive Naranjo polity, it is likely that the two sets of phenomena were interrelated.

Ashmore (2010:57) has also suggested that it is possible that other local allies, such as the ruling house at Actuncan, became vassals to Xunantunich. Current excavations have revealed only limited evidence of Late Classic period monumental construction or ritual activity within Actuncan's public spaces, although such activities had not been abandoned in the Early Classic period. Mixter and colleagues (2014) note that most households within the Actuncan core continued to be occupied throughout the Classic period. It is suggested that instead of a capital, the site likely functioned during the Late Classic period as a secondary center within the Buenavista del Cayo, and (later) Xunantunich polities (Mixter et al. 2013). As will be discussed in greater detail below, the households at Actuncan do not follow the same trajectory as the elite residences after the Early Classic period.

It should be noted that with the increased population and settlement in the Late Classic, there appears to be an intensification of land use and agricultural production. Studies of land productivity and settlement indicate that farmers tended to occupy land with the greatest agricultural potential in earlier periods (Fedick 1989, 1995). During the Late Classic period, however, the Belize River valley exhibits a trend towards settling less productive land, although it is argued that cultivation during this time period is of low intensity (Fedick 1989:244). The construction of agricultural terraces also increases during this time (Fedick 1994; Robin 1999), however, which indicates a conscious change in agricultural production rather than reflecting a simple model of lack of intensity. At Actuncan, small agricultural plots resembling box terraces were found next to one of the households (Group 7) referenced above (Heindel 2017, 2018). The presence of these features, utilized during the Late and Terminal Classic period, may suggest a change in agricultural production strategies during this time period.

3.8 Terminal Classic Period (A.D. 780-1000)

The Classic Maya political system, particularly in the Maya Lowlands, collapsed during the Terminal Classic Period. As a result, warfare increased, trade routes were disrupted, and people migrated from existing centers in the area (Demarest et al. 2004; Freidel and Shaw 2000). The power and authority of divine rulers at Xunantunich began to wane by the beginning of the Terminal Classic period (Ashmore et al. 2004; LeCount et al. 2002). While residences were ritually buried during the Late Classic period (Yaeger 2010), the erection of three carved stelae between A.D. 820 and 849 suggests a change from preeminence to foreign rule (Helmke et al. 2010). At the same time, other local centers, such as Buenavista del Cayo and Cahal Pech, began to bury individuals in the manner of kings, possibly contesting Xunantunich's claim to a wide-reaching regional authority (Awe 2013; Helmke et al. 2008).

As stated earlier, references to Naranjo have been found on vessels at Baking Pot dating to the Late Classic and Terminal Classic, with the most notable vase coming from the beginning of the Terminal Classic period (roughly AD 812) and called the "Komkom

Vase." The Komkom Vase was produced during the precarious final decades of centralized rule of "godly kings," suggesting its creation occurred at a time of social upheaval leading to the eventual abandonment of the royal courts and entire settlements (Helmke et al. 2017). The text on the vase is one of the longest glyphic texts on any ceramic object discovered, and distinguishes itself from the more common format of Classic Maya narratives that focus on the life, times and deeds of a principal individual or royal actor. Instead, am array of different agents are introduced, and none distinguish themselves as primary in any way. Instead, the text reveals a calendrical record, a lengthy historical narrative, and a pedigree of the original owner. This pedigree is important, as, based on the dynasty names, the mother of the owner is a native of Naranjo, while the father (known as the "Kokom King") is possibly a reference to the locality of Kokom mentioned in texts of Naranjo as a place that suffered multiple attacks from Naranjo (Martin and Grube 2000:137-139; Helmke and Kettunen 2011:63). Similar references to Kokom have also been found at Buenavista del Cayo (Houston et al. 1992:507-508; Yaeger et al. 2015:185-188). While the connection between Kokom and Buenavista del Cayo is still unclear, the Kokom Vase suggests a singular moment in time when the kings of Baking Pot and Kokom were united in a common cause, possibly related to Naranjo, at a time when the rule of divine kings was rapidly eroding.

Evidence at Actuncan points towards the waning authority of Xunantunich by the end of the Late Classic, as seen in the destruction of a household interpreted as the Late Classic residence of a noble vassal from Xunantunich (Mixter et al. 2013). In addition, according to Helmke and colleagues (2010:109; 115), iconography at Xunatnunich, such as the glyphic "flint and shield" expression on Panel 2 and portrayal of a captive and shield on Stela 1, reflects a trend toward the increasingly military iconography of the Terminal Classic (Grube and Schele 1995). With the exception of construction on the Castillo during the Terminal Classic, major construction projects also decreased immensely (Leventhal 2010). Sometime after the erection of a final carved monument in A.D. 849, the divine kings at Xunantunich were removed from power, and the civic core was abandoned (LeCount et al. 2002).

3.9 Postclassic Period (A.D. 1000-1567)

The abandonment of sites throughout the Southern Lowlands appears to be mirrored throughout the Belize River valley (Demarest et al. 2004). The disturbances and upheavals of the Terminal Classic led to depopulation in the area, with the end of architectural construction and stela erection. Regional centers such as Xunantunich and Cahal Pech as well as smaller commoner settlements like San Lorenzo (Yaeger 2000) and Chan (Kosakowsky 2008) diminished, although small populations continued to live at these sites. The inhabitants that stayed at these sites during the Postclassic are portrayed as squatters or less-complex village level societies, reoccupying sites abandoned by elites (Andrews and Sabloff 1973). Evidence of Postclassic domestic occupation has been recorded at Baking Pot and Barton Ramie (Aimers 2004; Hoggarth and Awe 2014, 2016) as well as at sites such as Chan and Xunantunich Group E, indicating that these sites continued to be visited even if they were not occupied full time (Brown 2011; Robin et al. 2012). A small quantity of Postclassic ceramics have also been found across Actuncan that provide evidence for Actuncan occupation at the time, although the scarcity of Postclassic ceramics suggests a smaller population (Mixter 2016:38).

3.10 History of Actuncan

Actuncan has a long history of occupation that spans 2000 years. The first settlement at the site began during the terminal Early Preclassic period, but large-scale architectural construction did not begin until the Late Preclassic period when an earlier village was completely covered by a new, formalized site plan. This large-scale construction indicated the introduction of the site in the Belize River valley as an influential capital. During the Late Preclassic period, Actuncan was divided into two formal civic-ceremonial groups (Actuncan North and South) located on adjoining hilltops. Actuncan South is isolated from the much larger Actuncan North by a deep ravine, with one *sacbe* (a formal limestone-plastered causeway) stretching across the ravine to connect the two parts of the site (Figure 3.3). While Actuncan South contains a single plaza (Plaza A), Actuncan North is organized into five plazas bounded by monumental structures. Mixter (2016) argues that these different plazas likely served a variety of ceremonial, administrative, economic, and residential purposes. A large (28 m tall) triadic pyramid focused on Structure 1 located to the south of Plaza A, cemented Actuncan South as the site's ritual center. Actuncan South also contained several stone monuments, including one (Stela 1) that was carved in a style diagnostic to the Late Preclassic period (Fahsen and Grube 2005:79).

Plaza C appears to be the largest public gathering place at Actuncan, with administrative structures, a ball court, and what has been hypothesized as a funerary period (Mixter 2016:41). Plaza D is much more restricted, and may have shifted functions over time, being repurposed during the Terminal Classic period (discussed below) as the primary civic zone (Mixter 2016:41). Plaza E, which similarly exhibits restricted access, is located to the east of the E-Group and may be related to those structures. Plaza H is a large, poorly understood plaza bounded by Structure 12 and Group 8 to the east; Structure 73 and a large elute house to the south; a civic group that may be associated with the *aguada* to the west; and Group 1's household plot to the north. Excavations indicate that this space contained a number of discrete activity areas and several buried buildings (Chambers-Koenig 2013; Craiker 2013; Keller and Craiker 2012).

Radiocarbon data indicate that villager occupation began during the terminal Early Preclassic period, around 1000 B.C. (LeCount 2015), which also corresponds with terminal Early Preclassic deposits at Cahal Pech (Awe 1992). Cunil ceramics found on the eastern range of Actuncan's E-Group reveal that this site was a likely center of aggregation during this time period (Simova and Mixter 2016), similar to the contemporaneous E-Group construction at Ceibal, which Inomata and colleagues (2013) argue was a gathering point for mobile populations. Actuncan's E-Group continued to be used during the Middle Preclassic period, but possibly as a ritual zone with limited residential space given that Middle Preclassic ceramic primary deposits are only found at the E-Group (Mixter and Craiker 2013). While it is likely that Xunatunich (which is first occupied at this time), dominated local politics during the Middle Preclassic (Brown 2010, 2013; Brown et al. 2011; Brown et al. 2013), it appears that early divine kingship began at Actuncan given the presence architectural and artistic programs associated with Preclassic dissemination of divine kinship. In particular, a large triadic temple group, the E-Group and an early ball court provide evidence for ritual activity (Hansen 1998), and Actuncan's early carved stela (Fahsen and Grube 2005:79) contain stylistic similarities to the portraiture seen on the murals from the West Wall of the Pinturas Building at San Bartolo (Taube et al. 2010) dating to the 1st or 2nd century B.C.

A boom in architecture construction at Actuncan during the Late Preclassic coincides with the introduction of hierarchical rule at the site. In particular, Mixter (2016) argues that the burial of a poorly understood Late Preclassic village in Actuncan North and its replacement with a new planned site built on a monumental scale, indicates a change in elite control. Similar reorganizations of site plans have been identified at the sites of Pacbitun, Cahal Pech, and Cerros, where early, nucleated villages were buried under reassembled centers during the adoption of divine kingship (Cliff 1982, 1988; Healy et al. 2004; Peniche May 2014; Powis et al. 2009). Radiocarbon dates from one buried Late Preclassic structure and redeposited Late Preclassic midden place the occupation of Actuncan's Late Preclassic village between 450 and 200 B.C. (LeCount 2015; Mixter and LeCount 2013).

This broad remodeling of Actuncan's site core likely corresponds to the establishment of divine leadership at Actuncan, which sparked the construction of much of the site's ceremonial core (Mixter 2016:46). While nearly all civic structures that have been investigated were originally laid out during the Late Preclassic period, the site's E-Group in Plaza F shows evidence of continuity of construction from prior to the construction of the planned center. Excavations under Plaza F have encountered the only known Preclassic deposits at the site, and the discovery of two sub-structures under Structure 26 (Simova and Mixter 2016) indicate that this location was an important ritual area prior to the construction of the planned center. In addition, the buildings around Plaza F maintained a different orientation than the rest of the site, which may indicate that the E-Group had an earlier ceremonial importance that was worth preserving (Mixter (2016). According to McGovern (2004:147), roughly 52% of the site's monumental architecture was constructed during the Late and Terminal Preclassic periods, and radiocarbon dates place these site-wide transformations to around 200 B.C., near the end of the Late Preclassic period (Mixter 2016:47). The proposed date of 200 B.C. also aligns with a stylistically appropriate date for Actuncan's Stela 1.

Three large single houses, Structures 29, 41, and 73, were built during the Terminal Classic period, and Mixter (2016) argues that these houses were the homes of the heads of Actuncan's most eminent households. While Actuncan's Late Preclassic monumental architecture and carved monuments clearly point to the presence of Preclassic divine kingship at the site, the specifics of who became king may have been negotiated by local elite lineages. Excavations by the Actuncan Archaeological Project indicate that there is no royal household of the kind that one might expect if a single house dominated the local political hierarchy, and it is likely that these three elite households collaborated (or competed) to rule the Actuncan polity (Mixter 2016:54). Although the process for selecting Preclassic divine rulers is not clear, the rulers could have come from different lineages at different times.

Structures 29 and 41 are in the eastern section of the site core, while Structure 73 is located just west of the site's *sacbe* that connects Actuncan's northern and southern groups (see Figure 2.4 for time scale). These house mounds are large terraced structures with the foundations of a single dwelling remaining on top, and based on ceramics below associated plaza floors, it is likely that initial construction on these structures dates to the Terminal Classic period (LeCount 2015; Mixter 2012; Nordine 2014; Simova et al. 2014). While these three households all appear to have benefited from several centuries of stability during Actuncan's Preclassic and Early Classic apogee, all three structures were abandoned in the Early Classic period and then came back into use during the Late and Terminal Classic periods (Nordine 2014). According to Mixter (57), the massive single houses of Structures 29, 41, and 73 were established in association with the rise of divine rule at the site and remained stable until the Early Classic end of Actuncan's political apogee, when the polity fell and the elites left.

Based on the end of construction at Xunantunich's E-Group and the increase in construction at Actuncan, it is likely that the apogee of Actuncan's power corresponds with the end of Early Xunantunich's period of primacy in the area. Although several other sites in the region constructed E-Group complexes by the end of the Late Preclassic period (Brown et al. 2016; Robin et al. 2012), Actuncan is distinguished by: 1) the comparatively large areal extent of its Preclassic civic center; 2) its triadic temple group decorated with polychrome plaster masks, and 3) its carved stela. During this time, the rulers located at Actuncan likely held sway over the lower Mopan River valley.

While McGovern (2004:154-156) viewed the Early Classic period as Actuncan's apogee, the Actuncan Archaeological Project has found that construction slowed during this time, with construction on the E-Group ending in the Terminal Preclassic period. Destruction events associated with Structure 41 and Group 4, as well as a deposit of broken sculpted stucco at Structure 41, indicate intentional desecration of the area. Radiocarbon results from Structure 41 and Group 4 indicate dates between A.D. 425 and 530, situating this change in the Early Classic period. Mixter (2016:49) suggests that Actuncan's period as a royal seat ended around A.D. 400 and it is possible that these radiocarbon dates mark the latest possible date for the collapse of royal leadership at Actuncan. This timing coincides with the general trajectory of seats of power in the area, with Buenavista del Cayo becoming the primary locus of the authority in the valley in the Early Classic by the 5th century A.D. (Yaeger et al. 2015). Broadly speaking, the small quantities of Early Classic ceramics recovered from most civic contexts at Actuncan speaks to the limited use of these spaces after Actuncan's rulers were eclipsed.

The final two phases in the site's history can be dated based on the well-defined regional ceramic chronology for the Late Classic period (see chapter 7 for a detailed description of ceramic traditions). It is likely that after Actuncan's decrease in influence during the Early Classic period, the remaining population of the site fell under the power of other local political centers. According to the model of region political succession proposed by members of the Xunantunich Archaeological Project (Ashmore 2010; LeCount and Yaeger 2010; Leventhal and Ashmore 2004), power along the Mopan River valley moved from Actuncan to Buenavista del Cayo by the end of the Early Classic period, and then to Xunantunich during the second half of the Late Classic period. During Actuncan's period under subordinate rule, there is limited evidence for construction efforts within the site's monumental architecture. Even if some construction was undertaken to renovate structures during the Late Classic period, it is unlikely that these actions were locally derived, and any construction at Actuncan during this time period pales in comparison the construction boom at Xunantunich (LeCount et al. 2002). However, while Actuncan was likely integrated into the Xunantunich polity during this time, the full extent of this relationship is not completely clear. As will be discussed further in other chapters, it is my assertion that a type of trade or tribute system was created between Actuncan and Xunantunich, possibly resulting in the growing of cacao along the Mopan River floodplain near Actuncan and the transport of cacao along the river to Xunantunich.

Although large-scale architectural construction in Actuncan fell during this time period, the construction of a ruler's residence, Group 8, may have marked the shift in regional power from Buenavista del Cayo to Xunantunich, with the multi-patio residence serving as a home of a vassal noble of Xunantunich (Mixter et al. 2013). In this scenario, the vassal noble would operate as an administrator at Actuncan for Xunantunich, and the construction of the ruler's residence may indicate that the kings of Xunantunich viewed Actuncan as important to the administration and legitimacy of their polity (Mixter et al. 2013). Structures 29, 41, and 73 (the three massive houses established in association with the rise of divine rule in the Terminal Preclassic) were abandoned in the Early Classic period, but then reoccupied in the Late Classic period. While Mixter (2016:56) argues that the Actuncan population turned these houses into ritual or special function structures, it is also possible they were reoccupied as houses during the Late Classic period when Xunantunich was expanding its power and the valley reached its apex of population.

Three commoner households, located in the Northern Settlement Zone (Group 1, Group 5, and Group 7) (see Figure 3.4), did not all share the same fate as that of the elite residences following the failure of the Actuncan polity (Mixter et al. 2014). Group 1, the largest patio-focused group in the urban core, does provide evidence of the failure of the polity, as largely seen through the slowing of renovation during the first half of the Late Classic period. Although this household was not entirely abandoned, it is likely that the residents of this group lost wealth and status during Actuncan's period of subordination to Xunantunich. Mixter (2016:59) suggests that its large size resulted from the household's early attachment to polity rulers, but when the Actuncan king was overthrown, this household suffered the greatest and fell into poverty. In contrast, Group 5 residents continued to renovate at a rate similar to that during the site's apogee, suggesting the members of this household remained stable, while Group 7 (located in the furthest northeast corner of the Northern Settlement Zone) actually increased in prosperity after the fall of the Actuncan polity (Simova 2012).

Actuncan enjoyed a brief renaissance as a center of authority during the Terminal Classic period, as evidenced by the construction of a new civic complex at Group 4 and the resurgence of Plaza A as a ritual space. Group 8, the home of the noble vassal of Xunantunich, is also destroyed and abandoned during this time, indicating that the members of the Actuncan community attempted to dissociate themselves from the residence of their Late Classic ruler during the Terminal Classic period, (Mixter et al. 2013; Simova et al. 2014). Mixter (2016) argues that Group 4 became a new structure meant to be used as a council house, and the Terminal Classic deposits in Plaza A are related to the ritual underpinnings of the site's Terminal Classic revitalization. Renovation also resumes at all three domestic groups (Group 1, Group 5, and Group 7) during the Terminal Classic period, indicating that Actuncan's return to prominence led to prosperity for the remaining community.

It should be noted, however, that of the four structures tested in Group 7, the expansive patio-focused group with Structure 58 serving as the principal mound is the only one that dates to the Terminal Classic apogee, while the other structures date exclusively to the Late and Terminal Classic periods (LeCount 2012:11). As discussed above, this household may have experienced a boost in fortune between Actuncan's fall and resurgence. These dates also coincide with the agricultural plots found near Group 7, indicating the necessity for innovative agricultural technologies to support the members of Group 7. In addition, a series of *chich* cobble mounds dating to the Late and Terminal Classic periods have been identified to the east of the Actuncan site core (see chapter 7 for ceramic analysis). Excavations conducted by myself at Actuncan (Heindel 2018, 2019), as well as by VandenBosch (1993) near the site of San Lorenzo (north of Actuncan and across the Mopan River), determined that in addition to these cobble mounds, there was also small Late and Terminal Classic settlements in the open areas between these mounds. Ethnohistoric research by Kepecs and Boucher (1996) indicate that similar cobble mounds were erected in tree orchards, and the authors suggest that ancient *chich* cobble mounds found at Maya sites may have functioned to conserve moisture and provide support for trees. As discussed in the previous chapter, cacao is best grown in areas of high water content, and the presence of these mounds associated with orchards may suggest the presence of a cacao orchard along the floodplain, with small households focused on the maintenance of these orchards.

It is unclear when final abandonment occurred at Actuncan, but the presence of Postclassic ceramics in Group 4 and elsewhere in the site core suggests continued occupation up to the beginning of the Postclassic period. Group 4 underwent at least one major renovation at this time, which also indicates that the Terminal Classic community continued until the Postclassic ceramic transition. Analysis by Tibbits (2016:75) also indicates the presence of ground stone tools from this time period, suggesting that settlers were still present in the early Postclassic period. However, as with much of the upper Belize River valley and the Maya lowlands in general, the Postclassic period was a time of depopulation and abandonment in the region.

Actuncan's 2000-year trajectory was marked by a number of distinct periods of occupation. The earliest occupants of the site created a village during the terminal Early Preclassic period, which then transformed into an area of spatially restricted use during the Middle Classic period and continued village life during the Late Preclassic period. A royal ceremonial center was then founded near the beginning of the Terminal Preclassic period, indicating the rise of divine rulership at Actuncan and the site's prominence through the Belize River valley. After reaching its apogee in the Early Classic period, Actuncan then fell in importance and became a political subordinate of Xunantunich during the Late Classic period (Mixter et al. 2013). Finally, Actuncan experienced a period of revitalization during the Terminal Classic period that lasted to the Postclassic period (LeCount et al. 2011; Mixter et al. 2014). In contrast to elite members of the Actuncan community, Maya commoners experienced a diversity of outcomes during the periods of political transition, with Group 7 in the Northern Settlement Zone of the site (the main area of this study) prospering throughout the Late and Terminal Classic periods. Late and Terminal Classic occupation (or at least land use) is also present in the *Chich* Cobble Mound region along the Mopan River floodplain, which may have been utilized for growing cacao possibly for trade with, or as tribute to, Xunantunich. This long history of both elite political prominence and instability, combined with a general commoner household endurance, provides evidence of the complexity of the site throughout its rise and fall.

Chapter 4: AGRICULTURAL INTENSIFICATION

4.1 Introduction

This chapter provides an overview of past and present views on agricultural intensification, particularly in reference to terracing and the general lowland Maya region. Before beginning, however, it is important to note that I will utilize the generic definition of agricultural intensification as laid out by Neff (2008:31), with agricultural intensification "constituting or relating to an increase in agricultural productivity by the expenditure of more capital and/or labor rather than by an increase in farmland." The use of "rather than by an increase in farmland" is necessary, as it differentiates between intensive and extensive agricultural production strategies, with extensive production necessitating an increase in farmland. As articulated by Neff (2008), agricultural intensification is inherently a process, occurring relative to some point in the past when agricultural expenditure was less intensive. The general "trajectory" of agricultural intensification usually occurs when a cultivator is confronted with the necessity to increase production, and must decide whether to put more land into production – the process of agricultural expansion – or to utilize methods to increase yields in land currently in use – the process of agricultural intensification. Agricultural intensification is accomplished through increases in labor and skills, through the creation of agro-engineering features, or through a combination of the two approaches.

An addition of labor and/or skills to agricultural production, one of the two pathways to intensification, may initially include the shortening of fallow time for cultivated fields (Boserup 1965). In extensive slash-and-burn agriculture, farmers will clear a section of the forest, burn the fallen vegetation, and then farm for several years before allowing vegetation to regrow and replenish the soil. Ideally, fields in Mesoamerica are considered best from high forests (Atran 1993; Vlcek et al. 1978), but as production intensifies, farmers return to fallowed fields after less time, clearing and cultivating bush fallow initially, followed by grass fallow. Increases or changes in labor investments may also include the diversification of agricultural fields in different microenvironments (Cowgill 1962), the introduction of new cultigens, increased weeding and mulching (Johnston 2003), or the reorganization of labor (Brookfield 2001; Netting 1993; Stone 2001). However, this type of intensification (i.e. simply increasing labor or skills) will only serve to increase production for that season.

While there are a multitude of theories and terms used to describe the difference between the addition of labor and/or skills and the creation of agro-engineering features, I prefer the terms "laboresque" and "landesque" capital (Sen 1959:279-285). Landesque capital represents an "investment in land with an anticipated life well beyond that of the present crop, or crop cycle." (Blaikie and Brookfield 1987:9). Although landesque capital investments create increased labor at the outset, they ultimately save labor in the future cropping cycles, thereby creating less work for future generations. Laboresque capital investments in diversification of fields, greater attention to weeding, and shortening of fallow cycles, all raise the initial labor inputs of the cultivation process without "banking" any of this work for the future. Terraces, irrigation systems, and other forms of landesque capital, however, may decrease labor in the future and produce higher yields in subsequent years with no additional labor apart from maintenance of the systems.

Brookfield (1972:32) argued that landesque capital investments are different from increased inputs, as the physical evidence of a major site transformation (which is often all that remains to be seen of former intensive practices) represents only one end of a continuum of former intensification. As will be discussed further below, I argue that the theory of landesque capital is the best fit for agricultural intensification identified in the residential area of Actuncan.

4.2 History of Theoretical Views on Agricultural Intensification

4.2.1 Malthus

The first extensive theoretical perspective on agricultural intensification begins with Thomas Malthus (1878), who argued that technological innovation and the subsequent increase in production led to an increase in population, which was then kept in line by famine, disease, warfare, and other population calamities. More specifically, Malthus believed that the population will eventually expand beyond the productive capacity of a particular agricultural technology. Preventative checks forestall the inevitability of population growth only temporarily, and increasing food demand will then outstrip agricultural productive capacity. When this occurs, population levels are reduced to sustainable levels, or are brought back into equilibrium with the productive capacities of the agricultural system, by positive checks such as famine, disease, and warfare. As with later archaeologists (e.g. Hammond 1978), Malthus saw population growth as the prime mover in the creation of agricultural intensification, and envisioned a world of eventual inability to sustain population levels with agricultural intensification. As a result, Malthus saw human populations as locked in a constant struggle of population increases vs. agricultural increases, ending in dramatic population checks and environmental degradation.

4.2.2 Boserup

Ester Boserup (1965) also argued that population is the prime mover that creates intensification. Forgoing the calamitous positive checks proposed by Malthus, Boserup stated that as populations rise, pressures on natural resources increase, and societies respond by intensifying agricultural production to meet the rising demand for food. For Boserup (1965:43), agricultural intensification is defined simply as the process of increasing labor inputs to land, without a distinction between labor and technological changes. This increased labor input would have begun with the shortening of fallow periods and with the construction of agricultural features such as terraces and irrigation systems. In particular, Boserup raised five main points regarding agriculture production. First, she (1965:15-16) proposed a land use classification system consisting of forest-fallow, bush-fallow, short-fallow, annual cropping, and multi-cropping stages that are primarily distinguished from one another by fallow length. She then argued that: 1) this land use classification system is a *de facto* historical sequence and that cultivator fallow length is indicative of progression or digression along the sequence (1965:62); 2) land use stage is generally not limited by the environment (1965:21); 3) land use stage dictates the type of tools being used, not the other way around (1965:23); and 4) land tenure is dependent on land use type (1965:77). In all, Boserup created a theory of causal trajectory in which population growth leads to land scarcity, which leads to agricultural intensification.

The ideas of: a) “the law of least effort” (i.e., the assumption that people will not work beyond what they immediately need); and b) “the law of diminishing returns” (i.e., the assumption that as agriculture intensifies, production decreases in relation to inputs of labor) are also important concepts in Boserup’s work (1965:28, 31). As a result, she argues that farmers will adopt intensive agricultural practices and technologies only under duress, such as caused by an increase in population. However, in opposition to Mathus’ “constant struggle” hypothesis, Boserup viewed farmers as actively engaging in adapting to population pressures (Borjeson 2007). As such, she envisioned a future when farmers would “develop better technologies, invest in the land, work harder, and survive” (Wilk 1996:602). Boserup also differs from Malthus in that she saw no limit on population growth, because agriculture can be continuously intensified to keep pace with food demand.

Much of the anti-Boserup literature has attacked her evolutionary and deterministic view that is based on a theoretical progression from forest fallow slash-and-burn to intensive agro-technologies, along with a coincident evolution in tool types from simple to more complex (Erickson 2006; Leach 1999; Morrison 1996). From the ethnographic data, however, we can see that farmers actually pursue multiple agricultural strategies, both in response to environmental conditions as well as a mitigation of risk factors associated with any one particular strategy (Adams 1981; Kirch 1994; Leach 1999; Morrison 1996; Wilk 1985). More specifically, researchers critiquing Boserup’s model have noted that: 1) agricultural intensification does not follow one unilinear course, but rather multiple courses (Erickson 2006:342-343; Morrison 1994); 2) there are other ways, in addition to fallow reduction, to intensify agriculture (Morrison 1994, 1996; Stone 1996); 3) environmental variables do affect intensification (Stone and Downum 1999); and 4) particular technologies are not always adopted in conjunction with a particular stage of agricultural intensification (Morrison 1994).

4.2.3 Brookfield

Harold Brookfield (1972) defined agricultural intensification as increased inputs of capital, labor, and skill, with capital including materials such as rocks for constructing terraces or pipes for drainage or irrigation. Skill refers to the knowledge and ability to carry out agricultural endeavors such as terracing, irrigation, or raised field construction, which thereby added more complexity to the previous generic ideas of "labor." Like Boserup, his definition is specifically concerned with inputs, but he also argues that factors other than labor are a part of the equation. For example, new skill can result in an increase of crop production per unit area and time without necessarily increasing cropping frequency/fallow reduction. While Brookfield's labor and skill definitions would later be combined as laboresque capital (Blaikie and Brookfield 1987), he originally viewed skill as relating to the creation of new agricultural technologies. This idea is particularly important for archaeologists studying agricultural intensification.

Demonstrating increases in cropping frequency/fallow reduction as described by Boserup is difficult to do from the archaeological record. In contrast, the appearance in the archaeological record of features such as agricultural terraces, allow us to determine an increase in the inputs of capital, labor, and skill. Archaeologists have a much easier time documenting and quantifying features such as agricultural terraces than documenting increased cropping frequency/fallow reduction. Thus, an operative definition of agricultural intensification that includes Brookfield's increases in capital and skill factors as well as labor increases, is more pertinent for archaeological study. Brookfield also argued (in contrast to Boserup) that although population pressure may have been a factor in creating the conditions for the development of agro-engineering features, their adoption and ultimate use must be understood within the particular social contexts in which individuals also "seek to gain advantage by the exercise of power in society." (1984:35). Agro-engineering features are not created in a vacuum or in response to one causal event such as population increase, and it is important to identify the social and political context in which they are created.

4.2.4 Kirch

While writing much later than Brookfield, I include Patrick Kirch (1994), as he built on the work of Brookfield by providing a taxonomy of sorts for the routes (e.g. innovations) to agricultural change. For Kirch (1994:19), innovations in agricultural strategies include both agro-engineering technologies and genetic innovation. These innovations create many of the benefits associated with intensification, but generally without the labor costs (or at least with a low level of labor costs). A distinction, then, is made between intensification and innovation. But the dichotomy of intensification vs. innovation created implicitly by Brookfield and explicitly by Kirch creates a gray area of agricultural intensification that may fit both categories. Kirch (1994:18) defines innovations as labor intensive, but also stresses the importance of separating increases in productivity from increases in labor.

In this framework, the distinction between intensification and innovation is reflected in the amount of labor input compared to increases in productivity, but it could be argued that the agro-engineering features revealed at Actucnan (i.e. small-scale irrigation and terracing systems and gardens) represent evidence of both intensification and innovation. Donkin (1979) stated that most terrace systems in the world are constructed in a piecemeal process over long periods of time rather than in one labor-intensive project, and many water control systems are small-scale, subject only to local control, and built up over long periods of time (Fleuret 1985; Guillet 1992). It has been noted (Guillet 1987; Mountjoy and Gilesman 1988), however, that it is difficult to determine from the archaeological record whether irrigation and terrace systems were constructed as a labor intensive project (i.e. Kirch's intensification) or over time with low labor inputs (i.e. innovation). Gardens, too, are subjected to a great deal of labor inputs, but they are often overlooked in discussions of intensification since they are conceived of as a different type of cultivation and not subject to the normal rules of agriculture (Leach 1997; van der Veen 2005). Even in systems of extensive agriculture, people will keep gardens near their households, which are sites of intensive labor inputs as well as experimentation with different cultivars. It has been argued (Coomes and Ban 2004; Gleason 1994) that gardens are the primary site of genetic innovation in terms of manipulating cultivars and experimenting with new plants. Thus, the intensification vs, innovation dichotomy first generically envisioned by Brookfield and solidified by Kirch does not take into account the cross-over between intensification and innovation, particularly in reference to residential-based agricultural production.

4.2.5 Turner and Doolittle

While Boserup and Brookfield (and by extension, Kirch) focused on inputs as an indicator of agricultural intensification, B.L. Turner II and William Doolittle (1978:298) argued that a definition of agricultural intensification should focus on crop yield output. The authors (1978:299) chose to combine Boserup's increase in frequency of cultivation/fallow reduction and Brookfield's increase in capital, skill and labor, but now in the context of output. As a result, Turner and Doolittle viewed agricultural intensification as increases in labor signified by increasing cropping frequency/fallow reduction and increases in capital and skill. More specifically, they argued that the best way to identify agricultural intensification is through an increase in crop yield as opposed to the labor invested to increase those crop yields. They did, however, recognize that specific crop production data against constant land and time is difficult to obtain even in present-day situations. Given that it is difficult to obtain such data in present-day situations, it would be next to impossible to infer in the past. To alleviate this problem, Turner and Doolittle identified three interconnected variables that are important to the measure of agricultural intensification: 1) land (the amount and type); 2) agricultural activity (including tools used and the capital, labor and skilled invested); and 3) time span (e.g. production per land unit per year, or the frequency of cultivation per land unit over a specified time). The use of marginal land, the introduction of new tools, an increase in invested capital, labor and skill, and a short time span would all be indicative of agricultural intensification.

In should be noted that Doolittle (1984) later created yet another dichotomy based on the distinction between a systemic and incremental view of agro-ecosystem change, similar to Brookfield and Kirch's intensification vs. innovation. A systemic view of agricultural change occurs when "structural transformation is completed before a new field is used for cultivation. As such, construction normally is thought to involve inputs applied over short, discrete periods of time, and often include planning, engineering expertise, and socially coordinated effort." (Doolittle 1984:124). In the construction of terraces, water systems, or other features, systemic agricultural change occurs at once over the course of one season involving the high labor inputs associated with intensification. Incremental agricultural change, however, occurs when "individual fields and associated features, and ultimately the entire agroecosystems, are created by gradual upgrading through small units of input over long periods of time while cultivation is taking place," (Doolittle 1984:125). Incremental change makes the additional labor inputs needed to construct small-scale terrace or irrigation systems less critical. Since they systems are constructed over long periods of time and are incorporated into daily maintenance tasks, they do not appreciably raise the amount of labor invested in an agricultural system. Significantly, according to Doolittle (1984), since incremental change is not planned or organized beyond the level of the individual household or farmstead, it is outside the control of elites.

While the distinction between systemic versus incremental change provides a way to delineate the gray area created between intensive and innovative agriculture, there is still an inherent distinction between well-planned systems created at one time (systemic) and systems associated with daily maintenance and incremental change over time. As noted above, gardens, for example, can be well-planned and created in one labor-intensive event while still changing over time in reference to cultivars or the creation of more agricultural plots in a small time frame. As will be discussed in the summary and conclusion section, theories related to laboresque and landesque capital combine the intensification vs. innovation difference provided by Kirch (1994) with the time scale proposed by Doolittle (1984).

4.3 Lowland Maya-Specific Definitions of Agricultural Intensification

After the realization that swidden agriculture alone could not support lowland Maya population size, Mayanists began to focus on the growing evidence for a variety of strategies of agricultural intensification in the area, as well as on the specific types of land used in the region (Siemens and Puleston 1972; Turner 1983a; Turner and Harrison 1983). Wetland agriculture was the first to be examined, but eventually the descriptions of terracing in the area led to discussions of terracing as an important feature for understanding ancient Maya agricultural intensification (Donkin 1979; Pueston 1978; Turner 1983a). Descriptions of terracing in the lowland Maya area provide a particularly unique reference to questions related to top-down vs. bottom-up perspectives. Sites like Caracol (Chase and Chase 1998) and Chan (Robin 2003), for example, provide a stark distinction between elite controlled terracing programs and incremental terrace construction related to specific households (see also Wyatt 2008). Social and political contexts provide further extrapolation of elite vs. commoner: What are considered simple, commoner households can become political players in the absence of an “elite” class, and can exemplify a pre-planned construction event that is also associated with a specific household or combination of two or three households that would not be characterized as "elite."

It should be noted that the definitions of agricultural intensification discussed above do not provide a description or differentiation of "land," or land types, an important distinction when discussing localized agricultural strategies. The ancient inhabitants of the lowland Maya utilized their resource diversity by adopting a suite of subsistence practices tailored to their local environment, and as a result, it is important to turn to archaeologists working in localized regions to provide a specific definition of units and types of agricultural land utilized for agricultural intensification. Norman Hammond (1978), for example, argued that the unit of agricultural land was not a constant, as evidenced by how he defined agricultural expansion as a type of agricultural intensification (rather than intensive vs. extensive agricultural production). For Hammond (1978:24), agricultural expansion refers to "agricultural activities that absorbed a larger proportion of the total labor-time available in a society." In this conceptualization, agricultural expansion is a form of intensification, with agricultural activity (including agricultural terracing on marginal lands) being a form of agricultural expansion.

In the context of the lowland Maya area, marginal land refers to steep soils or soils in seasonally or permanently waterlogged valley bottoms (Hammond 1978:24). The concept of "marginal land" has become integral to the understanding of how and why lowland Maya agricultural intensification occurred. Hill soils in the region are problematic for agriculture because of their thinness and their susceptibility to erosion: Because agricultural terracing in particular can be used to counter both problems, agricultural terracing in this context would be a form of agricultural expansion. This differentiation of marginal land from other lands is an important distinction, as previous discussions of agricultural land were vague and generic in this regard. In order to understand agricultural intensification of a specific region such as the Maya lowlands, Hammond argues that a definition of agricultural intensification that includes agro-engineering (such as agricultural terracing) needs to highlight marginal land as opposed to incorporating basic references to just "land."

Patricia McAnany (1992:186-187) similarly focused on agricultural intensification as a process that occurred on marginal land, or in areas such as swamps and steeper slopes that are less suitable to agriculture than are well-drained flatter lands. She updated this idea, however, by providing a "biotic continuum model" derived from a larger landscape perspective. This acknowledgment of multiple types of land in the Maya lowlands led McAnany to identify four theoretical points along a continuum of land types ranging from the surrounding landscape to the household area: 1) located at the greatest distance from the household is pristine rainforest that has not been impacted by human activity; 2) agricultural lands with varying rates of fallow; 3) lands currently in cultivation but that are intermittently fallowed; and 4) areas located closest to households that are places of permanently cultivated fields, gardens, and orchards. In addition, she (1992:187) considered the construction of features like agricultural terraces and raised fields as indicative of agricultural intensification, because they represented increased inputs (i.e. investments that improve the cultivation potential on marginal land) of capital, labor, and skill. This conceptualization is crucial for archaeological investigations, because it provides a combination of pedology and easily identified agricultural features to be used to determine ancient agricultural intensification. McAnany's conceptualization of agricultural intensification as it relates to agricultural terracing draws on both Boserup's focus on increased frequency of cultivation as well as Brookfield's emphasis on inputs of capital, labor and skill. Like Hammond, however, she also conflates agricultural intensification with agricultural expansion (Erickson 2006:337).

Both McAnany and Hammond also incorporate the sociopolitical and socioeconomic characteristics of the ancient lowland Maya landscape in which the agricultural intensification was taking place. For example, when discussing the role of lineages in Maya socioeconomic dynamics, McAnany (1995) suggests that factors such as the right of first occupancy, competition, and inequality were also important as they probably led to the control of optimal land by certain lineages to the exclusion of others. With this land unavailable, there would naturally be consequences for agricultural production on other lands, including hilly areas where agricultural terracing occurred. If food demand increased, or if agricultural production needed to be sustained, this production would have to be accomplished via the use of marginal lands.

The acknowledgement that households are the primary locus of economic and subsistence activities in the Maya area (McAnany 1993; Wilk and Ashmore 1988) led to the further argument that households were the primary institution for the construction and maintenance of many agricultural technologies (Kunen 2004; Mathewson 1984; Murtha

2002; Ponette-González 2001; Pyburn 1998). Distance from houselots, which is based on a more localized scale of analysis (Killion 1992a), became a particular concern for Mesoamerican researchers. This distance to field variable was first utilized by von Thunen (1842) as a part of his pioneering research on pre-industrial, small-scale agrarian landscapes. Von Thunen created a "model of crop choice," in which he argued that transport costs for harvested crops will vary based on the bulk or perishability of produce. More specifically, he argued that bulky or perishable crops will be grown close to town. This point also leads into his idea of cultivation intensity, stating that a given crop can be grown under different levels of intensity, where intensity is based on factors such as the amount of time spent weeding, the adding of fertilizer to soil, and irrigation system construction to provide water. Put simply, the intensifying cultivation of a crop will increase the amount of products per unit of land area, and farmers must compare the costs of intensification in a field located close to town vs. greater distances (Fedick 2010:62). This idea echoes the law of diminishing return utilized by Boserup, where the cost of a crop from more distant fields will be higher. Von Thunen created an idealized landscape of concentric use patterns around isolated towns, and argued that intensive cultivation occurs close to town, as those crops represented perishable or bulky crops or those that require constant attention.

Following the distance to fields premise, researchers (e.g. Killion 1992a; McAnany 1995) have formulated models that characterize agrarian land use from both a top-down landscape perspective and a bottom-up household view. These models conceptualize agricultural areas that are adjacent to (or interspersed among) households that frequently contain agricultural terraces, as zones of permanent or semi-permanent cultivation. Top-down theories of agricultural intensification focus on the centralized power of the state as the role of primary planner, organizer, and custodian of complex agricultural technologies. More specifically, some archaeologists assume that large-scale intensive agricultural systems require some form of elite involvement in planning, construction, and management (Abrams 1995; Chase and Chase 1998; Earle 1997; Johnson and Earle 1987; Kolata 1991; Sherbondy 1987; Stanish 1994; Turner 1983b). In the Maya area, some researchers have posited elite involvement in the management and control of water resources (Lucero 2006; Scarborough 1998), wetland agriculture (Turner and Harrison 1983), and terracing (Chase and Chase 1998; Turner 1983b). This view translates to the belief that elites assume control of intensive agricultural systems in order to ensure a reliable supply of staples and wealth finance (D'Altroy and Earle 1983). Farmers would normally be resistant to increasing production as required by the state, so they would have to be coerced either through force, the manipulation of ideology, or rewards of elite goods (Erickson 2006).

In contrast, the household model of agricultural production and intensification, such as that provided by Killion (1992b), assumes that the household is the basic unit of subsistence production, and predicts decisions made about the location of farming households and the pattern of cultivation surrounding a farmstead within the context of available land resources. In particular, Killion (1992b:124) (emphasis added by me) describes the ideal Mesoamerican houselot as consisting of "the structural core, a clear area of debris-free space surrounding the core, an intermediate area of fairly concentrated refuse enclosing, and *a peripheral garden of mixed vegetation and debris*." This description is particularly pertinent to this study, as it provides predictions regarding the type of archaeological material that would be found in association with gardens. Killion (1992a:4-7) notes that the exterior household space would be used for both cultivation and habitation, and therefore would yield material traces of both types of activities (i.e. ethnobotanical remains and domestic trash). In addition, he (1992a:6) argues that as the population reached progressively higher levels, more uniformly intensive systems of production would replace the infield-outfield structure related to extensive agricultural production. Thus, as noted by others (e.g. McAnany 1993; Wilk and Ashmore 1988), the fundamental form of agricultural intensification in the Maya lowlands was (and still is) homegardens (Drennan 1988; Fedick 1995:29, García de Miguel 2000). As first proposed by von Thunen (1842), crops with high predictability or high transport costs, or crops that require frequent attention will be cultivated closest to the residence. Stemming from this view, it is argued (e.g. Fedick 1995; 2010:64) that cultivation intensity will decrease with increasing distance from the household.

However, more extensive terracing and raised and drained field systems in the Maya area do provide evidence for intensification of cultivation practices beyond the homegardens. The intensification of the best land resources may not require engineering modification, but might involve permanent, mixed crop cultivation with soil quality maintained by fertilization or composting. The establishment of large orchards and forest gardens, for example, necessitates the use of land further from the residential unit, and may represent increased agricultural intensity without large-scale input given the natural resources (Goméz-Pompa 1987; Goméz-Pompa et al. 1987; McAnany 1995:64-79). The *chich* cobble mound area at Actuncan is located along the Mopan River floodplain where soils were regularly inundated with water, which creates the perfect environment for growing cacao. After the initial planting of trees and the creation of *chich* mounds, laboresque and landscapesque capital investment would decrease to the point of basic maintenance.

4.3.1 Terracing

Resource management features such as terraces and berms can provide archaeological evidence for both the intensification of agricultural production and a heightened importance to social groups of the management and control of critical agricultural resources. Certainly, agricultural features such as terraces represent the expenditure of time, energy and skill. However, the association between these agricultural features and social groups is particularly important given that agricultural intensification does not occur in a vacuum of simple environmental restriction. Thus, to determine the presence and concentration of agricultural intensification, we must examine: 1) social and political context; 2) spatial patterning; and 3) the methods and chronology of construction. For example, while a system of terraces collectively represents a large investment in intensification, each individual terrace construction may have been organized without the cooperative labor or the coordination of a supra-family group (Donkin 1979:33). According to Fedick (1994:124), intensification of agriculture can also result from small-scale responses of individual farmers or smallholder families to the demands of production within their localized base. While not directly related to terracing, the excavation of five small *milpas* at the site of Ceren in El Salvador have revealed the choices individual farmers made regarding the intensification and planting of maize (Lamb and Heindel 2011). The different *milpas*, all located in close proximity to each other, provide evidence for differential maintenance patterns. Three of the *milpas* contained well-maintained ridges, all roughly the same width and height, while the other two *milpas* had distinctly informal construction. Different stages of maize maturation were also present, with the two less-maintained *milpas* remaining uncultivated. This finding indicates that certain farmers or households, each with their own *milpa*, implemented individual choice in relation to *milpa* construction and intensification. It can therefore be surmised that a similar pattern of small-scale responses may also be applied to gardens.

It has often been argued that irregular, discontinuous patterns of terraces suggesting incremental or piecemeal intensification of agriculture, are indicative of individual household production (Kunen 2001). In contrast, an orderly, uniform appearance would indicate a well-coordinated program of planning and labor investment, resulting from the implementation and control of agricultural intensification by a centralized entity (Chase and Chase 1998). These assumptions reflect the top-down models of agricultural intensification. It is my argument that at Actuncan, we see evidence of orderly and uniform terracing at the level of a household (i.e. Group 7) or a small collection of households (i.e. Groups 1, 5, and 7). As stated in chapter three, the end of the Late Classic period and most of the Terminal Classic period at Actuncan were times of political upheaval regarding elites at the site, but the residential areas at Group 1, Group 5, and Group 7 appear to have survived this political turmoil. In fact, Group 7 seems to have thrived in the absence of divine kingship, with the box terraces and associated features making up Agricultural Plot Systems 1 and 2 indicating pre-planned and well-organized construction, that was implemented either by the residents of Group 7 or through coordinated efforts by the residents of Group 5 and Group 7 (and possibly Group 1). Thus, the political context in which these agricultural plot systems are situated is incredibly important in understanding the creation of terraces in the Northern Settlement Zone, as commoner households continued to persevere despite the waning of elite power at Actuncan. In addition, while the spatial patterning of the agricultural plot systems is comparable to that of other box terraces associated with small-scale and localized intensification (i.e. close to residential areas), the uniformity of the systems as well the lack of evidence for incremental construction indicates a more labor-intensive endeavor with a clear indication of pre-planning. The presence of a fieldhouse and a *yeso* feature likely used for water channeling at Agricultural Plot System 1, and the cobble encircled pits in Agricultural Plot System 1, provide evidence for a clear and singular planning program not usually associated with simple box terraces or household-level terrace features.

While the period of construction is not clear, the *yeso* berms located in the Northern Settlement Zone are located in close proximity to the agricultural plot systems, and to Group 7 in particular, indicating an association with these features and the Group 7 household. Berms found in the Maya lowlands are typically identified as linear rubble features, created by a mass of chert and limestone cobbles in clayey soil matrices (Kunen

2001:339). In contrast, the berms created at Actuncan are earthen structures, and even more uniquely, are made up of *yeso* natural soil that was dug up and purposefully placed as berms. To my knowledge, neither the presence of earthen berms nor the use of *yeso* for terraforming has previously been identified in the lowland Maya area. While *yeso* was clearly utilized in water channeling at the site, as evidenced by the (again) undated water channel system found near Group 7 and the *yeso* feature associated with Agricultural Plot System 1, the role that *yeso* played in the natural stratigraphy of the Northern Settlement Zone remains unresolved. What is known is that, in a likely labor-intensive project, the ancient Maya residents in the area dug up or transported the grayish gypsum-laden soft clay in a terraforming event meant to create berms around the agricultural plot systems, indicating a combined effort to create a pre-planned water channeling system. Earthen works are not usually discussed in the Maya literature (and particularly not in reference to agricultural intensification due most likely to poor preservation), but if these berms were built at the same time as the agricultural plot systems (a likely possibility), then this finding adds to the evidence for the intensive planning involved in the creation of the plot system. However, even if they were created at an earlier time than the agricultural plot systems, the use of *yeso* for water channeling in the area (particularly in reference to the *yeso* feature at Agricultural Plot System 1 would indicate a collective memory of the use of *yeso* for water channeling systems by the residents of the Northern Settlement Zone.

4.4 Summary and Conclusions

Past discussions of agricultural intensification (Boserup 1965; Brookfield 1972; Malthus 1878) have focused on labor input, with an increase in labor input being an inevitable reaction to population increase. Malthus (1878) made a simple prediction that human populations will continue struggling between population increases and agricultural production increases, until dramatic population checks and environmental degradation affect both. Boserup (1965) suggested a similar trajectory in which, as populations rise, pressures on the natural resources increase and societies respond by intensifying agricultural production to meet the rising demand for food. Unlike Malthus, however, Boserup believed agricultural intensification could be sustained, and also provided a specific scenario for the beginnings of agricultural intensification. Brookfield (1972) and Kirch (1994) went further and argued that population increase was not the only motivating force for agricultural intensification, but that social contexts must be acknowledged as well. Kirch further described a distinction between intensification and innovation, stating that intensification is the amount of labor input while innovation refers to the actual agro-engineering features created to aid in increasing agricultural production. While arguing that researchers should focus on crop yield output as opposed inputs, Turner and Doolittle (1978), and Doolittle in particular (1984), created a distinction between a systemic view and an incremental view of agroecosystem change, similar to Kirch's intensification vs. innovation. This theory thus focused on time scales, with construction and labor input occurring either during a specific time period or through gradual input. In an effort to create a more localized view of agricultural intensification, Mayanists began to recognize that specific environmental, social, and political contexts affected agricultural intensification in the Maya lowlands (Hammond 1978; McAnany 1992). In addition, Mesoamerican archaeologists incorporated spatial patterning in their reconstructions of agricultural intensification such that distance to households was used as a measure of intensification (Killion 1992a; McAnany 1995). Household models (e.g. Killion 1992a) in particular argued that agricultural intensification occurred closer to residential units. This argument is especially pertinent to this study, as the agricultural plot systems revealed in the Northern Settlement Zone are located in close proximity to households, which along with the multiple features added to basic box terrace gardens, indicates a high level of agricultural intensification.

The differentiation between laboresque and landesque capital (first laid out by Blaikie and Brookfield 1987) updates Kirch's distinction between intensification and innovation by discussing how both labor and agro-engineering affect the goals and time scale in which agricultural intensification occurs. In particular, although landesque capital investments (like the construction of terraces and irrigation systems) create increased labor at the outset, they save labor in future cropping cycles, creating less work for future generations. I believe that the idea of landesque capital is the best way to explain the creation of agricultural plots at Actuncan. For example, theories regarding agricultural intensification are often focused on the amount of input in reference to time, which pits a singular planned event vs. incremental change as a way to determine intensification. In contrast, and based on the number of features involved in the creation of Agricultural Plot System 1 and 2, the agricultural plot systems at Actuncan represent a highly planned, single construction event that most likely led to general maintenance later on. In particular, while top-down perspectives would suggest that this type of construction was associated with elite involvement, the social and political context of Actuncan at this time actually indicates a decrease in elite power. Instead of just identifying input to labor vs. agro-engineering systems (intensification vs. innovation) or the amount of construction over time (systemic vs. incremental), discussions of landesque capital identify the specific choices farmers make along with their long-term goals. Household models of agricultural intensification provided by researchers in the lowland Maya area (Killion 1992a; McAnany 1995) are also particularly useful in describing the agricultural plot systems found at Actuncan. These models indicate that household agricultural features (such as gardens) signify the height of agricultural intensification, which I believe is evident in the residential agricultural plot systems and the associated features at the site. Thus, through the investment of landesque capital in the Northern Settlement Zone, the agricultural plot systems represent a high level of agricultural intensification by either one or a small number of household(s).

Chapter 5. MAYA AGRICULTURE

5.1 History of Research on Maya Agriculture

In the initial years of Maya studies, the tropical lowlands were seen as a bad environment for agriculture, with scholars relying on research by early soil scientists who categorized the tropical soils as poor with low nutrient status with a shallow depth covering limestone bedrock. As a result of the soil being poorly suited to plow cultivation, the first Europeans saw the tropical soils as bad for commercial production, leading to the assumption that the ancient Maya would encounter similar problems (Fedick 2003:144-147; Hammond 1978; Turner 1978). As a result, early archaeologists believed swidden agriculture, or the use of long-fallow, slash-and-burn cultivation of maize, beans and squash, was the only way the ancient Maya could utilized the land for food production (Fedick 1996; Wiseman 1978). Surveys and demographic studies conducted in the late 1960s and 1970s, however, led to the conclusion that population levels were beyond the subsistence capability of simple swidden cultivation (Bullard 1973; Culbert and Rice 1990; Haviland 1967; Willey et al. 1965). This revelation led to 1) the re-examination of crops suitable for the region (Pohl et al. 1996; Rice 1978), and 2) an attempt to dismantle the "myth of the *milpa*" (Hammond 1978).

Scholars offered up alternative crops such as ramón nuts (Puleston 1977) and root crops, including manioc and *malanga* (Bronson 1966) as other possibilities for Maya subsistence. In addition, by the late 1970s and early 1980s, researchers turned their focus to the utilization of cultural ecology, as seen in the seminal volumes *Pre-Hispanic Maya Agriculture* (Harrison and Turner 1978) and *Maya Subsistence* (Flannery 1982), to discuss the possibility of terracing on hill slopes and the conversion of wetlands for raised and drained field cultivation. New soil science and geological and ecological studies were particularly instrumental in demonstrating that the land was not dominated by highly weathered, nutrient leached poor soils as previously thought. In addition, through new work in ethnography (Goméz-Pompa et al. 1982; Goméz-Pompa et al. 2003; Nimis 1982), comparative studies with other cultures (Bronson 1978), ethnohistory (Jones 1982; Marcus 1982), and excavations and surveys (Denevan 1982; Harrison 1978; Puleston 1978), scholars began to focus more on different technological possibilities. This new attempt to reconstruct an intensive (as opposed to swidden) Maya agricultural system, which hypothesized the use of terraces, raised fields, and modified *bajos*, was instrumental in moving Maya agricultural studies forward, but it also led to an over-generalization of strategies being applied in all areas of the Lowlands.

Throughout the 1990s, researchers began to recognize that the Maya Lowlands presented a wide array of microenvironments, including savannas, wetlands, flood plains, and hilly areas – all of which are suited to different agricultural strategies. These researchers began to analyze the Maya environment on more localized terms, allowing for a detailed exploration of how the ancient Maya adapted to different ecological niches (Dunning 1996; Fedick and Ford 1990; Graham 1987). Fedick's 1996 *The Managed Mosaic* in particular shed light on the diversity of the Maya Lowlands, utilizing regional ecology to argue that the different regions of the Maya Lowlands (as opposed to the Maya Lowlands as a whole) should be the unit of analysis. Arguments were made that well-drained uplands were the single most important resource in the Maya region, and within the central Maya Lowlands more specifically. According to Ford (1996:299), for instance, settlement and population in the region are distributed in proportion to available uplands, and in order to understand the history of the Maya Lowlands, archaeologists must first understand differential resource use. Scholars today now acknowledge that there is a great deal of local and regional variability in land resources in the Lowlands (Fedick 1996; Goméz-Pompa et al. 2003), which provides a starting point for utilizing pedological and geological research to further understand ancient Maya agricultural techniques.

5.2 Current Considerations

With this information, scholarly debates have turned to the social organization of agricultural production (Demarest 2004:148-174; Dunning 2004; Kunen 2004; Scarborough et al. 2003). Questions that are still unanswered include: did agricultural specialists produce food for elite or craft specialists? Did urbanization at large sites (e.g. Tikal and Calakmul) necessitated reorganization of agricultural production in surrounding rural villages? Did smaller settlements specialize in certain forms of agricultural production, with goods being exchanged through a regional marketing system? (Fedick 2010:48). These questions can be aided by the use of modeling and analysis of spatial relationships between farmers and the land resources they utilize, as well as the relationship between agricultural producers and consumers. Demographic and political change generally result in the necessity to reorganize agricultural production, and diachronic studies of agricultural techniques in conjunction with longitudinal research related to changing social and political structures in the Maya Lowlands could be particularly fruitful. In addition, natural climate cycles or environmental changes induced by human impact require reorganization, including alterations in agricultural techniques (Beach et al. 2003; Dunning and Beach 2000; Gill 2000). It is also important to consider how well-suited a particular area of land is for production crops as well as where crops are grown in relation to the consumers of food production - are they being grown in larger fields outside of the site core? To what extent are crops (and which crops) are grown in proximity to households (see below; Robin 2012, 2013). Are decisions concerning agricultural land made by independent farming households seeking to fulfill their own subsistence needs (i.e. are there any social or economic forces beyond the needs of household subsistence that shape the relationship between farmers and the landscape in which they live and work? (LeCount, upcoming paper)

Other considerations include larger anthropological issues such as gender division and household and community diversity (Kunen 2004; Neff 2002; Robin 2002, 2003, 2006). In her 2006 article, for instance, Robin reassesses ethnographic, ethnohistoric, and archaeological data in order to challenge previously held notions of ancient Maya gender and in-field/out-field dichotomies based on biased ethnographic analogies. The in-field/out-field system (Chase and Chase 1998; Robin 2012, 2013) refers to the spatial distribution of different types of agricultural production, in which it has been argued that more intensive agriculture (i.e. the main source of subsistence for a population, such as the *milpa*) are located in the hinterlands (out-field) while less intensive agricultural production (e.g. kitchen gardens) occur close to the household. More specifically, Robin attempts to deconstruct the importance placed on segregated spaces in past research, which she argues assumes specific home/private and work/public spheres and the presumed necessity for standardization in these spheres. This argument echoes her 2003 article, in which she argues that that it is important to understand social diversity apparent among households (and presumably their agricultural strategies) in order to further understand ordinary people, and thus get a more holistic view of ancient Maya society in general (2003:307). Neff (2002) also pushes against the generalization that work routines differ between men and women in the agricultural domain, and attempts to clarify division of agricultural labor in Maya Lowland terrace agriculture, but comes to a different conclusion.

Using ethnohistoric, ethnographic, and archaeological data, Neff (2002) finds that the modern and ancient Maya gender ideology associating men with agricultural work occurring away from the household existed in the archaeological past for over 1,000 years, and argues that cultural tradition with respect to family size and child care systems within an intensive agricultural setting has defined the role of women's work, particularly in reference to working near the home. Thus, while noting women still performed a great deal of agricultural work, Neff posits that agriculture occurring away from the home was and still is symbolically and ideologically associated with men. Other authors have taken a broader approach by conducting regional investigations of ancient Maya land and water management strategies and applying it to larger social problems, such as Kunen and her work on the Far West Bajo in northwestern Belize. Research relating to agriculture in wet environments leads Kunen to introduce the concept of "resource-specialized communities" (2004:viii), where *bajo* communities are described as settlements specializing in the extraction and use of resources concentrated in the *bajo* landscape (i.e. soils and water).

Land evaluation is also particularly important in understanding agricultural strategies, especially in reference to describing, quantifying, and classifying elements of the landscape important to plant growth. Topography, for instance, influences soil development, often in the form of basins in which disintegrating bedrock, sediments and organic debris can accumulate. Sloping surfaces from which potential soil-forming materials may collect at a slower rate or are subject to erosion, making the rate of soil formation and depth of soils formed to vary closely with topography. The use of terracing and water channeling (as is evident at Actuncan) is particularly important in reference to the topography of the area. Climate studies also provide information on the biotic component of soil formation, which allows for an understanding of the rate at which plant matter is added to developing soil, though, as will be discussed further, questions regarding climate and plant matter is difficult to answer in contexts related to later time periods still associated with humus layers.

In addition, with the emergence of global warming and the continued increase in the world population, resource management and the development of better agricultural techniques have become topics of considerable research interest more generally, and archaeology provides a unique perspective on such issues (e.g. Faust 2001). Researchers investigating ancient Maya agriculture have been particularly interested in studying the multiple agricultural technologies utilized in different parts of the Maya area, often with the explicit goal of aiding modern-day populations living in the tropics (e.g. Dahlin et al.

2005; Fedick and Morrison 2004; Goméz-Pompa and Kaus 1992; 1999; Whitmore and Turner 1992). While tropical regions contain a diverse mosaic of natural resources including vegetation and water sources, they are also very fragile environments, subject to intense weather patterns (including torrential rainfall and periods of drought) and environmental degradation. In the Maya lowlands, for instance, hillslope soils are generally well-drained and fertile, but shallow and subject to erosion, particularly when cleared of vegetation (Turner 1979:106). Over time, cultivation of these soils reduces nutrient levels, which must be maintained if successful cropping is to continue. Regulation of soil moisture levels is also necessary, and includes both management of runoff during heavy rains and conservation of soil moisture during periods of dryness. As a result, it has become imperative for scholars, including those studying the ancient Maya, to understand the effects of anthropogenic change and agriculture on different environments.

The study of traditional soil knowledge, or ethnopedology, has also proven useful (Niemeijer and Mazzuccato 2003; Pawluk et al. 1992; Winklerprins 1999). The Maya Lowlands contain different soil classification schemes (Barrera-Bassols 2004; Carter 1969; Dunning 1992; Isendahl 2002; Winklerprin 1999), as is evident in the classification of *yeso* – a soft, white gypsum-laden clay found at Actuncan, which is discussed in more detail in other chapters**.** It is also important to connect these soils with modern classification of soils that see focus on soils as the end products of soil formation processes. Ethnobotanical studies have proven to be highly productive within Mexico, and the diverse biology, ecology, and culture seen in Mexico can be applied to other areas (like the Maya Lowlands) in Central America. While a long history of ethnobotany can be traced back even to Colonial texts (Guevara et al. 1993), Mexican scholars have also implemented ethnography in order to understand traditional tropical agricultural technology – a science referred to as applied ethnobotany (Barrera 1979; Goméz-Pompa 1993; Goméz-Pompa et al. 2003), which also has its roots in Ecuador and Peru. Information regarding botanical studies has also been used in a database, with a list of Mexican plants that can be accessed throughout the world (Goméz-Pompa 1993; Toledo et al. 1995).

Archaeologists have also begun to implement new analytical methodologies. Paleoethnobotany, generally described as the study of the interrelations of humans and plants in the past (Jones 1941:220; Pearsall 2015:27), has undergone rapid development in recent decades, due in large part to the emergence of new scientific techniques. Increasingly, the impact of humans on landscapes is studied directly, through the analysis of pollen, phytoliths, and charcoal, especially preserved in lake cores. New ways of using archaeological plant remains to elucidate the nature of human-plant relations have also been developed, such as the use of wood charcoal to indicate environmental disturbances and as a source of data for vegetation reconstruction (Pearsall 2010:6). The geographic origin of plant remains found in archaeological deposits also provides a potential source of information on cultural contacts (see below), including trade relationships. In terms of new field and laboratory techniques, macroremain analysis has become increasingly important due to innovations and refinements in recovery techniques. Analyses of organic residues, starch grains, and DNA have also become more common, including trace element analysis of charred cooking residues to determine food source. Hall et al. (1990), for example, were able to find cacao residues in ancient Maya vessels from Rio Azul in Guatemala. Chemical residues in soils have also been utilized in order to find evidence of food, and thus possible Maya marketplaces, in open areas (Dahlin et al. 2007), and a timeline of vegetation and erosion (Beach et al. 2011).

Pollen analysis has also come to the forefront of paleoethnobotanical studies, particularly in the application of sedimentary pollen data (i.e. pollen from lakes or other naturally accumulating sediments) to questions of anthropological significance. Examples of these applications include the antiquity of settlement by humans in certain areas (e.g. Jones 1994) and the documentation of the timing and nature of human disturbance of vegetation in relation to the origins and intensification of agriculture (Fedick 2010; McNeil et al. 2010). Both Fedick (2010) and McNeil et al. (2010), for example, have utilized pollen analysis to examine the possibility of deforestation at Copan during the Late Classic period. Evidence of an increase in pollen from pine trees during the Late Classic population has provided strong evidence that the Copan Maya were managing those trees, most likely as a valued source of firewood, thus arguing against the common misconception that the Late Classic Maya at Copan foolishly stripped away the forest, leading to collapse (Fedick 2010:953; McNeil et al. 2010:1017).

The maturation of phytolith analysis, and the identification and interpretation of plant silica bodies as a paleoethnobotanical approach, is one of the most significant developments in the field recently (Pearsall 2010:8). The last 10 years in particular have seen the development of both more standardized approaches for extracting, scanning, and quantifying phytoliths, and an increasing awareness of the need to adapt procedures to particular soil and depositional conditions (Piperno 1998). As Cummings and Magennis (1997) have shown, ancient Maya diet can be reconstructed through the use of phytolith analysis on the food particles trapped in tooth tartar. In their article on ancient Maya soil resources at the site of Piedras Negras, Fernandez and colleagues (2005) used paleoethnobotanical techniques like phytolith analysis to discuss the role of agricultural practices and exhaustion of natural resources in the ancient Maya collapse in the Lowlands. In particular, phytolith analysis was able to indicate that in the past, grasses were dominant in the soil, which provided evidence that the forest around Piedras Negras was cleared for maize agriculture (Fernandez et al. 2005:2010).

5.3 Ancient Maya Agricultural Production Strategies

As stated above, until the 1960s, literature on the ancient Maya characterized Maya agriculture as long-fallow, slash-and-burn (swidden) cultivation of maize. Relying on research by early soil scientists, the tropical soils were seen as poor in quality due to oxidation and leaching of nutrients, and as a result, it was believed that the land could not be used for anything but swidden agriculture (Fedick 1996; Wiseman 1978). When it was found that Maya sites held much higher populations than previously imagined, however, it became clear that swidden cultivation alone was insufficient to feed large populations, and archaeologists began thinking about different agricultural strategies and cultigens (Bronson 1966; Hather and Hammond 1994; Pohl et al. 1996; Rice 1978). Today, researchers acknowledge that agricultural technologies can vary in multiple ways, including spatial patterning, construction methods, and chronology of development.

Variation can result from both environment factors (erosion, rainfall, deforestation) and social processes (population growth, increasing production demand). Unmodified tropical environments in particular generally foster increased soil loss, erosion, and sedimentation, and a number have studies have shown that these issues plagued the ancient Maya as well as modern-day inhabitants (Binford 1983; Binford et al. 1987; Dahlin et al. 2006; Deevey et al. 1979; Fedick and Morrison 2004; Goméz-Pompa and Kaus 1992, 1999; Rice 1991, 1993; Rice and Rice 1984; Rice et al. 1985). In order to combat such problems, the ancient Maya utilized multiple agricultural techniques to provide the necessary amount of produce. Some of the different agricultural systems that have been proposed for Maya subsistence that are most relevant to the proposed study include: a.) swidden agriculture; b.) high-performance *milpa*; c.) artificial rain forest; d.) arboriculture; e.) raised fields; f.) household garden, g.) terracing, and h.) *chich* mounds (or piles of stone cobbles).

5.3.1 Swidden Agriculture

Swidden, or slash-and-burn, agriculture involves the impermanent agricultural use of plots produced by cutting back and burning off vegetative cover (Conklin 1954:133). Criticisms of such a system as the main foundation for civilizations include the relatively large amount of land per capita that must be available for agricultural use, and that settlements cannot remain permanently in one place (Meggers 1954). Wolf (1990), for example, stated that slash-and-burn cultivation usually implies a scattered population, unwilling to pay homage to a center of control. In particular, settlements are often forced to move to keep up with swidden agriculture and the depletion of soil fertility (Dumond

1961:305). Even if the compulsion for frequent movement of villages is not inherently part of tropical swidden farming, the need for large amounts of land per capita cannot be avoided. As a result, the main limiting factor in swidden agriculture is a limit to productivity per area, rather than productivity per person-hour. The total number of people supportable in a given area is smaller, and population density is necessarily more limited. In the case of some extremely low-density populations, then, areas of population concentration are possible. For swidden agriculturalists, in addition to the ability to support of population of limited overall density, there is also a tendency for the population to be dispersed in small towns or villages (Conklin 1961:306).

While Maya archaeologists have demonstrated that swidden agricultural strategies alone could not support the population density of ancient Maya polities and villages (see historical research below), much of the past research on Maya agriculture has nonetheless been concentrated on maize and swidden agriculture, which may skew our research on other agricultural technologies. Relying on research by early soil scientists, the tropical soils were viewed by Maya scholars as being poor in quality due to oxidation and leaching of nutrients, and as a result it was believed that the land could not be used for anything but swidden agriculture (Fedick 1996; Wiseman 1978). One of the earliest discussions of swidden agriculture was that of John Lloyd Stephens and Frederick Catherwood during the 1850s. In the documentation of his travels, Stephens' Chapter 11 in *Incidents of Travel in Central America, Chiapas, and Yucatan* focused mainly on Maya maize agriculture, and he wrote extensively on maize at the site of Uxmal and its "modern-day" (in 1856) cultivation (1856:226, 228-230). During this time period,both

Stephens and Catherwood, as well as the Maya currently living in the Yucatán, were likely to be much more acquainted with the less-intensive swidden agriculture, which led to a general leaching of the soil's nutrients. According to Stephens' records, it appears that the farmers were forced to keep fields fallow for an extended period of time, and that they could only use a plot of land to plant maize once due to the plant's harmful nature to the soil. Stephens believed that the planting and cultivation of maize, "probably [differed] little now from the system followed by the Indians before the conquest." (1856:233-234). Stephens, however, had failed to take into account the drastically lower population of modern-day Maya versus the ancient Maya, which, as will be discussed further below, has a large impact on agricultural systems.

5.3.2 High Performance Milpa

The "high performance *milpa*" system – the inter-planting of multiple species within a field, often in conjunction with shorter fallow periods – was one way archaeologists were able to retain the idea of swidden agriculture while still making it a feasible system for the new, larger population estimates (Wilken 1971:442). The high performance *milpa* ("field") uses techniques that allow for multi-cropping with either reduced or no fallow periods. Crop rotation and intercropping are seen as the main mechanisms for reducing fallow times, in which perennial species (such as root crops like manioc or *malanga*, a tuber similar to manioc) were planted annually in order to produce crops during the fallow period, or were planted with maize in order to increase the overall productivity of the *milpa* (Wiseman 1978:84). Thus, the Maya would not only maintain several kinds of fields, but would also plant two or three crops a year within each field.

Colonial documents attest to agriculture, as in a 1696 report coming from the Petén, from Avendaño y Loyola (cited by Thompson 1970:72), which discussed how the Maya planted maize, beans, chiles, and “other seeds” two to three times a year.

This agricultural system has also been evident from ethnographic research in the Maya area. In general, two or occasionally three crops are grown in succession on a given tract of land after its clearing. Modern-day intercropping, however, appears to have declined in efficiency since the Conquest-era, as ethnographic research also states that these tracts of land rarely have more than two crops on a piece of land. As a result, modern fields must be allowed to grow back to bush for a fallow period of three to five years (Drucker and Heizer 1960:40). With the combination of other agricultural practices (e.g. kitchen gardens, arboriculture and aquatic systems; [Frapolli et al. 2008]), however, it has been shown that in modern villages in the Yucatán Peninsula, up to 300 plant species can be grown with intercropping (Toledo 2008:345). Research has also shown that modern pest management of *milpas* by indigenous peoples in other regions of the Maya area, such as the Cakchiquel Maya farmers in Patzún, Guatemala, is highly effective, revealing a broad knowledge of cultural preventive pest control practices leading to few pest problems in their traditional *milpas* (Morales and Perfecto 2000; Scarborough et al. 1995).

Ethnohistoric and ethnographic research is the main source available since it is difficult to find archaeological evidence of such inter-cropping at ancient Maya sites, aside from well-preserved sites such as Ceren in El Salvador. Nevertheless, some archaeologists have argued that this shifting cultivation system could have fed the majority of the Maya population if these fields were made slightly more productive (Arnason et al.1982; Gilessman et al. 1981; Wilken 1971). In particular, it has been argued that limits to *milpa* productivity are not population growth or the shortening of the fallow period, but rather labor availability and skill (Nigh 2008). It has been suggested that possible methods to increase productivity may include the pulling of weeds by hand and including even more crop varieties (Morley 1946:135). As practiced by modern traditional farmers, *milpas* are devoted primarily to maize, with intercrops selected from over a hundred species domesticated in pre-Columbian times and complemented today by additional species from all over the world (Terán and Rasmussen 1994). This also entails the rotation of annual crops with a series of managed and enriched intermediate stages of short-term perennial shrubs and trees, culminating in a further re-establishment of the tropical forest and possible future arboriculture (Terán and Rasmussen 1994; Terán et al. 1998).

5.3.3 Artificial Rain Forest

An artificial rain forest is a mixture of tree, vine, root, and seed crops that are combined in a specific way so as to favor certain crops while still preserving the normal cycle of the parent forest (including the death and re-growth of the trees). It has been suggested (Wiseman 1978) that this type of agricultural system most likely results from a selective clearing process, which is used by the modern Maya in Petén today. In this process, the farmer does not completely cut down the forest to create a *milpa*, but rather keeps some culturally useful species while eliminating those plants that are not considered useful. These favored species would then gain light, space, and nutrients due to reduced root and shade competition, while those plants deemed “useless” would be repeatedly cut down, possibly even leading to a regional extinction (Wiseman 1978:85). Selection for shade-tolerant varieties would therefore be crucial, which would in turn explain the extensive use of shade-tolerant root crops. These root crops would also be useful because they leach fewer local nutrients from the forest than seed crops like maize and cereals, which also means there would be less root competition between the root crops and trees (Wiseman 1978:86).

Utilizing archaeological data, particularly at the Belizean site of El Pilar, and ethnographic data from the region, Drs. Anabel Ford and Ronald Nigh in particular have tried to show that the use of artificial rain forests, or “forest gardening,” could support a model of long-term, sustainable management of forests by the ancient Maya (Ford and Nigh 2009; 2015). For Ford and Nigh, fields are not utilized solely for *milpa* crop cultivation, nor are the fields ever truly abandoned when they are allowed to reforest during the fallow period. Even before the *milpa* is cultivated, the selection of trees and bushes for the woodland stage begins, and, through the selection of woody species during the initial phases of the *milpa* cycle, the Maya farmers are able to shape the forest recovery to their needs (Ford and Nigh 2009:218; Nigh 2008). Such long-term sustainable use of the forest can be exemplified by the cultivation of cacao in the Yucatan (Goméz-Pompa et al. 1990) and the managed succession that promotes wildlife habitat in the Petén **(**Ferguson and Griffith 2004**)**.

5.3.4 Arboriculture

Arboriculture is the cultivation of tree crops in extensive stands rather than household gardens. Tree crops (such as ramón, cacao, and sapodilla) require much less labor than maize cultivation since weeding is not necessary, and some species of fruits and nuts can simply be collected from the ground. Intercropping could also be used in this cultivation system in order to create an "artificial rain forest" system (Sharer 2006:645). Currently, the present-day Maya create and manage forests in which favored arboreal species are selected for and encouraged. Modern managed forests, or "orchard gardens," contain a diverse amount of useful species. The Lacandon, for example, plant what the call *pakchekol* ("planted tree *milpa*") on the depleted soils of their agricultural fields (Atran 1993; Nations and Nigh 1980). Ethnographic research focused on indigenous villages in southern and south-eastern Mexico have also shown has shown that there were usually two types of managed forests – primary (larger) and secondary (smaller). The primary forest was the principal provider of construction materials, work and artisanal instruments, and firewood. The secondary forest – often smaller than the primary forest – was used more often for medicinal products, fertilizer, dyes, poisons, and stimulants. Food products, however, were seen in equal distribution in both primary and secondary forests (Toledo et al. 1995:181).

The forests that characterize arboriculture in the Maya area were first reported in the Colonial period by Diego de Landa (1975 [1566]) in the Yucatán Peninsula, where cacao was grown along with other arboreal and herb species in *cenotes* (sinkholes) and *rejolladas* (dry, karstic depressions) (Fedick 2014). Ethnographic and ethnohistoric sources regarding arboriculture are fairly abundant, but researchers have discussed Pre-Columbian arboriculture's importance for quite some time as well (Puleston 1982). Arboriculture was most likely vital to the ancient Maya for producing a range of important trade goods in addition to food, including pine, cacao, copal, and rubber (Lentz 1991, 2000). At Copan during the Late Classic period, it has been argued that the lack of extensive hydraulic-agriculture at the site may provide evidence for a swidden technique that was augmented by a form of arboriculture (Lentz 1991:282). Archaeobotanical results have shown that a variety of tree fruits have been found at Tikal in addition to those found at Copan (Lentz 1991). Lentz's image of the arboriculture used at Copan parallels the type of artificial rainforest described by Wiseman (1978), in which fruit trees were planted in small orchard plots adjacent to residential units and shade-tolerant species were grown on the floor of the orchard.

Further work related to arboriculture has focused on a series of methods and techniques, including "natural" forest ecosystems, *pet kot* (man-made tropical forests), raised fields, shifting (*milpa*) agriculture, *tolche* (the conservation of a strip of "old" arboreal vegetation surrounding a *milpa*), and tree plantations (Goméz-Pompa 1987:9; Goméz-Pompa et al. 1987). During *milpa* cultivation, for instance, several techniques related to silviculture are used. After the selection of useful tree species on the site chosen for cultivation (based on interest, knowledge, and needs of the farmer), the best individuals are protected and allowed to remain standing. In the slash phase of Maya *milpa* cultivation, the farmer performed additional and more substantial selection by identifying and pruning fast-growing secondary species, leaving stumps ready to take advantage of the fallow that will occur when the area is abandoned two to three years later. Any advantage in the competition for light enhances the success of those individual trees that survived the fire after the slash, and those protected as stumps which survive the fire will have the further advantage of already being established, with nutrients storied in the roots (Goméz-Pompa 1987:7). After the initial cut, part of the root system dies, in turn contributing additional nutrients to the *milpa* crops (Goméz-Pompa 1987:9).

5.3.5 Raised Fields

When discussing raised fields in Mesoamerica, the *chinampa,* or raised field, system used in the Basin of Mexico is most often used as the main example. In an effort to understand and describe the wetland agricultural methods employed by the ancient Maya, archaeologists working in the Maya area have subsequently tried to use the *chinampa* system as an analogous technique. According to Siemens (1996), however, the water-control features seen in this system were not the same as those implemented by the ancient Maya. *Chinampas* are dependent on an arrangement of dams and dikes that controls the water level, allowing for year-round cultivation. These water-control features have not been seen in the Maya Lowland raised-field systems. Instead, it appears that the ancient Maya left the fields subject to the seasonal fluctuation of water levels. Termed "benign flooding," this type of raised field system meant that ancient farmers could exploit, rather than fighting, flooding cycles. Within the lowland floodplain and wetland environments of the Maya area, then, the maintenance of raised fields was based on the scheduled exploitation of microenvironments orchestrated with seasonal flooding (Lucero et al. 2011; Scarborough 1983, 1994).

It should be noted, however, that others (e.g. Pohl et al. 1996) have argued that some wetland manipulation was restricted to ditching rather than the actual construction of raised fields, and that platforms though to be raised fields were actually the result of natural processes. Pulltrouser Swamp in particular is known for its contested "raised fields." Archaeologists working at the site found platforms that they believed were constructed within the main body of the swamp in order to provide for year-round cultivation (Harrison 1996; Turner and Harrison 1983). Pohl and colleagues (1996), however, have argued that platforms such as those found at Pulltrouser Swamp were formed by carbonate and gypsum accumulation that may have formed during drier episodes centuries or millennia earlier, and were not artificial construction as previously thought. It is my hope that my investigations into cobble mounds found along the Mopan River floodplain east of Actuncan, however, which I argue may have been used as raised fields (see below), will add evidence to these debates. The linear nature of these cobble mounds, however, lead me to believe that, if used for agricultural purposes, these raised fields were the result of intentional anthropogenic construction.

Ethnohistoric accounts suggest that raised fields were used as planting surfaces for maize and cotton, and Puleston (1977) was able to identify these cultigens in canal sediments using pollen fossil samples. Based on excavations conducted in the 1970s, it was suggested that the raised fields were initially built up out of floodplain sediments and were then converted at some later date into limestone platforms. In addition to maize and cotton, previous cultivation experiments have shown that squash, beans and tomatoes also grow well on raised fields (Puleston 1974; Thompson 1974).

5.3.6 Household Gardens

One of the most common types of agriculture seen in use by modern Maya is the household garden. Defined as a small, fenced enclosure, the plants raised in modern gardens are ornamental flowers, medicinal herbs, crops like chile and manioc, and fruit and shade trees (Wiseman 1978:79). Much of the household activity is carried out in the shade of this garden, and household refuse is easily used for mulching and fertilizer (Redfield and Rojas 1971; Wiseman 1978:81). Consequently, kitchen gardens are primarily defined by their proximal location to the household (Killion 1990, 1992). Ethnographic studies have shown that the Maya continue to maintain garden plots near the household (Wilk 1991), and ethnohistoric documents from the late 1500s record kitchen gardens in the Maya Lowlands located within household clusters (Hellmuth 1977). According to Netting (1977), kitchen gardens were most likely used to grow supplementary food, such as condiments, medicines, and spices, but they may also have been instrumental in providing an alternative source of food at the household level during times of famine (Marcus 1982). Ethnographic work has also been carried out in the Yucatan Peninsula, including investigation by García de Miguel (2000). Through a two-year study carried out in the Mayan kitchen gardens of fifteen communities in the Northern Yucatan Peninsula, García de Miguel focused on establishing a typology of these kitchen gardens based on their floristic composition as well as aspects of agronomic management of the system in order to understand how modernizing techniques have affected changes in the use of kitchen gardens. It was found that even though there had been a large Spanish influence on agro-systems since Colonial times, the villagers continued traditional techniques based on rainforest management and conservation of wild plants in the face of continued deforestation. As Ford and Nigh (2010:155-173) have pointed out, however, modernization in the twenty-first century has led to a poor understanding of how best to conserve these rainforests, particularly as Western conservation techniques (e.g. use of pasture and plow) fail to take local kitchen and rainforest gardening practices into account.

Archaeologically speaking, remains of Preclassic garden plots have been found throughout the Maya area, including the Belize River Valley (Ball and Kelsay 1992) and the Petexbatun (Dunning et al. 1997). Indirect evidence for the use of household gardens by the ancient Maya has also been provided by botanical and settlement pattern studies (Sharer 2006:645). At the site of Sayil in the Yucatán, for instance, analysis of archaeological soil phosphates (which were compared to modern-day kitchen garden soil) was able to show areas around identified households at the site that may have been used for gardening and food processing (Smyth et al. 1995:326-327). Evidence for the growth of root crops in a kitchen garden setting, based on botanical analysis, has been discovered as well at Cuello in northern Belize, including manioc and *malanga* (a tuber similar to manioc) (Hather and Hammond 1994). The site of Ceren also shows the presence of kitchen gardens located adjacent to households, with a ridged field containing a variety of different crops, including maize, manioc and *malanga* (Sheets 2002). In areas where crops are not so well-preserved, chemical testing of soils adjacent to household structures has been used to identify potential kitchen gardens. As a result of food processing and soil amendments, soil phosphate levels may rise through time, and potential agricultural areas near households have been found at sites like Sayil (Killion et al. 1989; Smyth et al. 1995) and Xunantunich (Braswell 1998).

5.3.7 Terracing

Terracing involves the creation of artificial systems of canals and terraces for irrigation. Agricultural terracing is particularly useful in the tropics because it significantly slows down soil erosion, and helps overcome the problems inherent in cultivating on slopes (Donkin 1979:2). As Goméz-Pompa has stated (1987:2), there is evidence that the ancient Maya used terraces extensively, but we do not know their purpose, nor the species cultivated there. One reason for this is a lack of current ethnographic data, as the present-day Maya no longer use agricultural terraces in the lowland area. What is known is the general uses terraces can be meant for and how they were constructed. Terraces impede erosion by trapping downward-moving soil behind walls. As soil accumulates, a deep and (usually) level planting surface is created. Deeper soils, in turn, allow for deep root development (Treacy and Denevan 1994:95). Terrace walls also distribute slopewash, often redirecting it so that sediment and soil nutrients are deposited behind other terraces. In addition, the rubble fill of terrace walls is porous, facilitating drainage and reducing the possibility that planting surfaces will become waterlogged (Treacy and Denevan 1994; Turner 1983).

There are three basic types of terraces found in the Maya area, although typologies vary slightly from region to region (Chase and Chase 1998; Kunen 2001; Turner 1983). 1.) Cross-channel terraces, also called weir terraces or check dams, are constructed across gullies, drainages, and other topographic constrictions. These types of terraces are used to check runoff, concentrating the soil and water resources of limited catchments in a cultivatable area (Donkin 1979:131; Dunning and Beach 1994:59). 2.) Dry slope terraces increase soil depth by trapping eroding soil on slopes and improving the land's ability to absorb and conserve moisture. Dry slope terraces can either be contour terraces, which change direction to conform to topography, and linear terraces, which do not (Donkin 1979:131). In his study of terraces found at Chan, Wyatt (2008) found that contour terraces, a type of dry slope terrace, were the most widespread type of agricultural construction at the site, making up over 89 percent of the total (2008:10). 3.) A form of dry-slope terraces, box terraces are usually found on moderately flat land near residences, but, within the archaeological record, they are subtle features that are difficult to discern unless located in modern cleared fields (Beach et al. 2002:386). These terraces are unique in that they are enclosed, and thus not necessarily used solely for water drainage or soil build-up, and Fedick (1994) has hypothesized that in the Upper Belize River Valley, the combination of box terraces and contour terraces indicates the expansion of intensive cultivation beyond residences. In addition, as they are always located near residences, Fedick (1996) and others have also identified them as seedbeds or garden terraces (Beach et al. 2002; Dunning and Beach 1994). Footslope terraces are combined with the box terrace type, and are situated at the base of long or steep slopes that are left otherwise unprotected. These features capture colluvium, creating large planting surfaces at the foot of the slope (Dunning and Beach 1994:59). All three types of terraces are constructed in a similar manner. They usually consist of either a single or a double wall of unshaped boulders stacked atop bedrock. A fill of smaller limestone and/or chert rubble is placed behind the single wall or between the double walls for both strength and porosity (Kunen 2001:327).

It is interesting to note that, while there is evidence for the use of terracing in much of the Maya area, it nonetheless appears to have been largely absent from the central Petén and some other regions in the Maya Lowlands. It is possible, however, that slope-conservation techniques other than stone terraces were used in these areas (such as land terraforming, or the anthropogenic movement of land, often to aid water drainage) – thereby leading to a lack of terrace preservation. At the site of Actuncan, Belize, for instance, silty clay has been found in an open field area, near the site's *aguada*, or waterhole, in the shape of a slanted terrace, suggesting the use of soil for water management (personal observation, 2015). Population densities and environmental factors have also been used to explain both the presence of terraces in some hilly regions of the Maya area and the apparent absence of terraces in others (Healy et al. 1983; Killion and Dunning 1992; Killion et al. 1991; Turner 1974). As Dunning and Beach (1994:62) have pointed out, however, regions without much terracing are generally characterized by steeper, longer, convex, or unbroken slopes. In these regions, terraces are not necessary for water drainage control, which also shows that, as stated above, studies of regional ecological variation are particularly important for understanding local agricultural systems.

5.3.8 Chich Cobble Mounds

Chich Cobble Mounds, or mounds or piles of stone cobbles, are labeled *chich* by modern-day Maya, are found at sites throughout the Belize River valley and the Yucatán

Peninsula. At the site of Sayil in the Yucatan, for instance, researchers found around 600 *chich* mounds in the site periphery, which scholars like Sabloff and Tourtellot (1992:158) suggested to have served as platforms for small structures. At Sayil, the *chich* mounds increased in frequency toward the border of the site, and were determined to be the only potentially artificial features found beyond the site periphery. Sabloff and Tourtellot (1992) did, however, acknowledge that it was possible that the most distant *chich* features may really be field rather than domestic structures. In their own studies of the site, Killlion and colleagues (1989**)** also posit that the *chich* mounds may have been originally constructed to serve as foundations for shelters close to a water source before the construction of a more substantial dwelling. *Chich* mounds found elsewhere at the site were suggested to represent these temporary dwellings, or other domestic ancillary structures on the platforms. It was also suggested, however, that the mounds were simply piles of stone resulting from the clearance of interresidential space for cultivation purposes off platforms, which at the very least, suggests intense cultivation of areas in between residential clusters at Sayil (Killion et al. 1989:286)

At sites like Chunchucmil in the Yucatán and T'isil in the Yalahau region, scholars have argued that these *chich* mounds could provide evidence for arboriculture. At Chunchucmil, Dahlin and colleagues (2006) identified stone circles in the residential district of the site, about 3 m in diameter, which have been argued to be the remnants of tree foundations intended to conserve moisture. Kepecs and Boucher (1996) found walls similar to these mounds erected around large trees for the same purpose in the Yucatan today, and further suggested that the ancient *chich* mounds found at Maya sites also functioned to conserve moisture and provide support for trees cultivated in the shallow soils of the northern lowlands. At the site of T'isil, Fedick and Morrison (2004:214) found 178 *chich* mounds, which were common throughout much of the mapped settlement area, with an average density of 4.7 *chich* mounds/hectare. Based on this information, then, it is possible that these *chich* mounds were used for agricultural purposes as opposed to the domestic structures suggested by researchers at Sayil.

The 2011 remapping of Actuncan found multiple possible agricultural areas in the Northern Settlement Zone, a domestic area situated on the northern periphery of the site, with a segment of cobble, or *chich*, mounds located along the Mopan River floodplain (LeCount 2012:7). VandenBosch (1993) and others (Holley et al. 2000) found that these types of cobble mounds were common along this stretch of the Mopan River, and could be found on either side of the river north and east of Xunantunich (Figure 4). Before VandenBosch's excavations, remote sensing was conducted on the eastern banks of the Mopan River northeast of Xunantunich through the Xunantunich Archaeological Project, which showed that these cobble mounds were generally found to depress conductivity values. Remote sensing "Block 1" revealed the greatest number of these cobble mounds, which were buried but immediately below the surface, and it was determined that this particular portion of the valley had undergone tremendous fluvial change through the Preclassic period, with stabilization of the valley occurring prior to, or early within, the Late Classic period, with cobble mounds buried under a stable surface (Holley et al. 2000). VandenBosch mapped and tested cobble mounds near the site of San Lorenzo as part of the Xunantunich Settlement Survey in 1992, classifying the morphology based on shape, including: 1.) long linear mounds, 2.) isolated mounds, and 3.) mounds attached to linear features (VandenBosch 1993:85). Excavations revealed both natural and cultural factors for cobble mound creation, with evidence for formal Late Classic architecture and domestic trash in both small and large cobble mounds. In addition, deep test pits found that the constructions sat directly on a coarse, yellow-brown sand deposit underlain by a series of alluvial deposits characteristic of high intensity, high velocity flood to low velocity floods (VandenBosch 1993:91). Evidence for this flooding was also found due to the fact that the cobbles were heavily stained by organics, and extremely water worn sherds were found in the deposits. In addition, minor lensing of sands and pebbles indicated that the lower strata were deposited by recurrent flooding, probably during the Early Classic period. About a meter and a half below ground surface, VandenBosch (1993:91-92) uncovered remains of two houses with earthen floors, post molds, and possible hearths. These cobble mounds were originally interpreted as domestic structures, but their association with the river and location on the first alluvial terrace suggests that people who lived or worked on these structures were tied directly to economic resources of the ecological niche.

LeCount (2011) notes that, although the larger, more formally arranged mounds might be patio groups or single domestic platforms, some of the linear/grid shaped alignments may have formed raised fields, impoundments, or channels to direct and/or hold river water for the raising of water-hungry crops, fish or shellfish. Fish weirs, used for raising fish, generally consist of cobble and wood barriers in shallow coastal estuaries or river offshoots. They are designed to allow water to flow in and block fish from swimming out. Raised fields in the Maya area are usually low platforms constructed to control the moisture level of soils for cultivation, and are meant to prevent flooding in well-watered zones and soil erosion. During the 2011 field season survey project, cobble mounds were found to the east of Actuncan on the Mopan River floodplain (Figure 5). The anomalous mounds, which consist primarily of assorted chert cobbles, stretch up and down the western side of the Mopan River. The cobble mounds range in elevation from less than half a meter to roughly two meters in height, and vary greatly in shape, length, and diameter. Some cobble mounds are roughly circular with diameters ranging from slightly less than five to more than 15 m across. The majority of the features, however, are long, linear lines, with widths of roughly three to 10 m across and lengths of 10 to over 100 m. Mapping of *chich* mounds during the 2011 field season included taking topographic points at roughly two meter intervals in order to establish the necessary precision to accurately represent the mounds (Salberg 2012:28). Contour maps and Triangular Irregular Networks maps were also created in ArcGIS using this topographic map in order to represent the dimensions of these mounds.

In 2015, Borislava Simova of Tulane University used a Digital Elevation Model (DEM) of the Actuncan site core derived from a regional LiDAR survey (provided by Drs. Jason Yaeger and Bernadette Cap) with a vector map of the site from survey and excavation data in order to study the cobble mounds found at Actuncan with ArcGIS. More specifically, the goal of the project was to map and investigate the purpose of the low cobble features found along the Mopan River edge, just northeast of the site core. As noted above, two hypothesized uses for these mounds were that they were either fish weirs or raised agricultural fields. Since these two hypotheses have different water requirements, GIS hydraulic modeling was used to corroborate the possibility of either use (Figure 6). Based on flooding and rain accumulation in the area, Simova's spatial analysis of the cobble features (or *chich* mounds) indicated that they were unlikely to have served as fish weirs - the *chich* cobble mounds at Actuncan are raised and do not fill with enough water through regular river flood-cycles to create the correct environment for fish farming. They do, however, collect a significant amount of water during rainfalls, which was determined to make them better suited to agriculture, while remaining safely above flood levels. Based on this information, I also believe that these *chich* cobble mounds were used for agricultural purposes, possibly as raised fields, and thus may provide for a comparative analysis between agricultural techniques at the site of Actuncan (i.e. *chich* cobble mounds vs. terracing).

5.4 Evidence of Ancient Maya Terracing

Ethnographic observations have shown that present-day terrace systems are created in an unplanned manner. It has therefore been argued by some that, like the modern terraces created in the region, ancient terrace systems were the natural consequence of the cultivation of slopes where both farmers and erosion pulled rocks and soil downslope. Rocks were then worked into the walls in order to improve soil characteristics (i.e. water absorption and drainage) as well as crop yields (Wilken 1987; Williams 1990). New research, however, has also shown that ancient Maya terracing may have been more planned than previously thought. Construction of agricultural facilities often marks the growing importance of socioeconomic status based on control of land resources (Fedick 1989; Kunen 2001; McAnany 1995). Kunen (2001), for example, has argued that the spatial patterning of agricultural features (like terraces and berms) can be used to infer aspects of the organization of agriculture, such as the organization of labor, the involvement of royal or other elite groups in production, and social stratification based on differential resource holdings. Fedick (1994) also argued that terrace systems found in the Belize River valley were organized on a small scale by farm families operating within a secure land tenure system and thus amenable to long-term improvements to fields. For Fedick (1994), decisions about the organization of agricultural production were made at the household or smallholder level, as evidenced in the small scale of terrace systems and their close integration with residential mounds. Similarly, Neff and colleagues (1995:157) and Wyatt (2008) found no evidence for state-sponsored centralized labor organization for terrace construction and agricultural use. Neff attributed the majority of systems to single households, though the size and formal arrangement of two identified types of terrace systems also suggest suprahousehold community labor organization, while Wyatt has suggested that terracing occurred at a community level (at the site of Chan) based on terraces cross-cutting multiple households.

At the lowland Maya site of Caracol, however, little of the land exists without some sort of terracing, and the regular arrangement, large scale, and uniform size and appearance of the terraces found at Caracol suggests the explosive growth of planned intensive agricultural practices (Chase and Chase 1998; Healy et al. 1983). According to Chase and Chase (1998), terracing at the site, as well as the large size of individual features, represent both the centralized implementation of intensive agriculture and a large labor investment in agricultural improvements. In addition, it has been postulated that the integration of terracing with dense but uniformly dispersed settlement points towards a carefully planned urban agricultural landscape, suggesting that resource control was not maintained at the household level but at a larger societal scale. The fact that this terracing occurred at the center of Caracol, as opposed to being placed outside the city, and conforming to an in-field/out-field system, has led to labeling Caracol as a "garden city" – an immense metropolis where intensive agricultural production (i.e. main mode of sustaining a large population) occurs within the city itself (Chase and Chase 1987:53; Tourtellot 1993:222). Chase and Chase (1998:66) further argue that the terrace systems at this site were most likely adopted as a means of attaining agricultural self-sufficiency during a period of population growth. Previous excavations have shown rapid population expansion at Caracol between AD 562 and AD 650 (Chase and Chase 1989), which corresponds to the dates of terrace construction at the site – around AD 550 to AD 800, suggesting an important correlation between the two. Whether an increase in terracing led to the population increase, or an increase in terracing was a response to population growth, is undetermined.

As stated by Wyatt (2012), however, a Late Classic bias has led many researchers (e.g. Hageman and Lohse 2003) to assume that intensive agriculture appeared as a response to rising population levels and the need to increase production. Certainly, the expansion of elite power during the Late Classic led to elite appropriation of much of the agricultural production of farmers during this time, and a logical conclusion to draw would be that the expansion of agricultural intensification during the Late Classic was tied to the appropriation of agricultural resources by the growing elite culture of the lowland Maya. Contradicting this idea, however, are Wyatt's findings that at the site of Chan in Belize, excavations have revealed a long chronology of terrace construction beginning in the Middle Preclassic and continuing through the history of the community. Chan settlement surveys mapped 1,223 terraces, grouped into 398 terrace sets, with the identification of two types of terraces (contour terraces and cross-channel terraces; see above) – each adapted to different slope and drainage conditions. The types, heights and lengths, construction material, and placement of terraces in relation to settlement at Chan were found to be quite diverse (Wyatt 2012:75-76). In addition, unlike in other heavily terraced sites in the Rio Bec region (Turner 1983), there were no apparent walls designating property divisions in the terraced landscape at Chan. In fact, Wyatt found that the terraces often extended through several household groups, suggesting that the management of these features involved multiple households and may have been organized cooperatively (see also below).

In addition to terraces, excavators at Chan also found evidence of other types of agriculture, with data collected by Lentz et al. (2012) suggesting that what appear to be empty space at Chan was likely filled with gardens, orchards, and permanent, intensively managed fields. In addition, these other types of agricultural technologies appear to be in an unsystematic and dispersed pattern on the landscape. As a result, Wyatt (2012:77) and others (Lentz et al. 2012) suggest that agricultural activity at Chan was not based on a planned system organized and constructed by a centralized authority. Rather, it is probable that organization was part of a process of organic, incremental growth reflecting local control of production. Following this line of thinking, it has also been argued that kitchen gardens are not agricultural technologies subject to elite control, but are indicative of household-level intensification (Smith and Price 1994).

5.5 Conclusion

The change in ancient Maya agriculture research from maize-focused swidden-based models to the inclusion of different crops and types of agricultural intensification demonstrates the necessity of examining ancient Maya agricultural practices with an open mind. Not only were multiple techniques, such as terracing, utilized throughout the Maya area, but the use of these techniques varies greatly depending on local environment and population needs. While the *milpa* is still seen as the primary source of food production for the ancient Maya, scholars should also examine other forms of production such as kitchen gardens, which are often seen as minor or supplemental. As will be discussed further, the agricultural plot systems found in the residential areas of Actuncan can best be described as box terraces, but are unique in that they form an interconnected series of boxes, or plots, and are placed along a slope as opposed to flat land. Other features are also integrated into the plot systems that are not present in box terraces in the region. Agricultural Plot System 1, for instance, contains a field house, a *yeso* feature with a posthole and a possible sluice gate, while Agricultural Plot System 2 contains two pit features and a possible platform. The plot systems are also distinctive in that there is a variety of terrace height throughout, ranging from one to five courses, with some single walls even changing in course number. It is probable that, like normal box terraces, the boxes or rectangles were used as seedbeds or household gardens, but the unique features associated with these systems indicate a high level of maintenance and agricultural intensification.

Chapter 6. EXCAVATIONS

6.1 Introduction

Excavations were organized by Operation, Suboperation, and Lot. An Operation is a clearly defined separated area, though Operation 14 originally spanned the entirety of the Northern Settlement Zone before it based on previous survey of the region. Operation numbers were assigned sequentially across the entire Actuncan Archaeological Project based on when excavations began. A suboperation, also referred to as a unit or test pit, is a clearly defined unit within an operation associated with a single test pit that ranged from 1 x 1 m to 2 x 2 m in size. Although suboperations generally begin on the surface and extend to the end of excavations, a suboperations could be joined into one, depending on the characteristics of a feature, as was the case with Operation 51E and 51H being joined to form 51J. Suboperations were assigned alphabetically, and when Z was reached, they began again with AA. The Lot is the smallest unit of excavation within a suboperation and may be designated based on arbitrary, natural, or cultural features. Due to the clear stratigraphy of the areas excavated and the goal of the research, the majority of lots were excavated based on natural and cultural features.

Excavations were performed with picks and trowels, and dirt was transported to screens in 5-gallon plastic buckets, with the number of buckets per lot noted to determine general volumetrics. All dirt was screened through ¼' window screen, and all artifacts were collected and bagged at the site, labeled with the correct provenance based on the Op/Subop/Lot designations and sorted in the lab. Artifacts designated as worthy of greater attention were bagged separately, labeled as a Special Artifact, and given a unique number. Both horizontal and vertical excavations were undertaken based on the goal of excavations, with Operation 51 and 2016 and 2017 excavations of Operation 14 focused on revealing the entire agricultural plots systems through horizontal excavation and Operation 52 focused on revealing the region's stratigraphy through vertical excavation. Soil samples used for flotation were collected in 4L bags, while soil samples collected for future botanical analysis were placed in 200 mL whirl-pak bags. Charcoal was collected and placed in aluminum foil and put in the laboratory for future radiocarbon analysis.

Excavations are broken up into five main areas: Agricultural Plot System 1 (Op. 14Q, R, T, U, W, and X through BA), Agricultural Plot System 2 (Op. 51), Terraforming (Op. 14K and 14M), Water Channel System (Op. 14N, P, S, and V), and Chich Cobble Mounds (Op. 52). Agricultural Plot System 1, Agricultural Plot System 2, Terraforming, and the Water Channel System are located in Actuncan's Northern Settlement Zone (Figures 6.1 and 6.2), while the Chich Cobble Mounds are located outside the Actuncan core site, along the Mopan River Floodplain (Figure 6.3)

6.2 Agricultural Plot System 1

Units 14Q, R, T, U and W covered the length of a stone terrace called Stark Wall. All test pits were 1 x 1 ½ m in size with Units Q and R measuring 1 m (facing north-south) by 1 ½ m (facing east-west), and Units T, U and W measuring 1m (facing east-west) by 1 ½ m (facing north-south). Stark Wall was found to be a single course of stone cobbles and limestone blocks in Units Q, R and T until it turned into four courses of stone cobbles and limestone blocks in Unit U (Figure 6.4).

Units 14X through 14BA were placed a year later to further explore the terrace system associated with Stark Wall and the box-like construction found in 14W during the 2016 field season (Figure 6.5). These finds pointed to a system of intersecting walls along the terrace. Named "Agricultural Plot System 1," and defined as an interconnected group of terraces and agricultural plots (Figures 6.5, 6.6 and 6.7 – refer to Figure 6 for wall names/plots). The first plot was excavated to the east of Stark Wall and is bounded by Baratheon, Tully, Bolton, and Reed Walls. While most of the walls in the system consist of one course of mixed chert cobbles and limestone blocks, Reed Wall, the wall that creates the eastern boundary of the system, consists of large limestone blocks layered in three courses (Figure 6.8). This plot was fairly square, about 2 m by 2 m in size. The second plot, to the west, is bounded by Baratheon, Tully, Mormont and Stark Walls, creating a long rectangular plot 1 m (east-west) by 3 m (north-south) in size. The largest plot, further west, is bounded by Baratheon, Stark, Mormont and Barristan/Baelish/Greyjoy Walls and is roughly 3.5 m (north-south) by 5 m (east-west) in size. The western-most boundary is not a straight line of cobbles and blocks, and with the turning of the wall, three walls – Barristan, Baelish and Greyjoy – connect to form the western boundary of this larger plot. There is likely a fourth plot, or possibly more, but excavations ended before it was completely revealed. This plot is in the northwest portion of the system and bounded by Karstark and Dondarrion Walls to the west, Baratheon Wall to the south, and Stark Wall to the north. The northern end of Dondarrion Wall was reached in 14BA, and a small wall, Targaryan Wall, was found coming off of Dondarrion Wall running east, possibly to connect to Stark Wall. Excavations were not conducted inside this possible plot due to time constraints, so subdivisions could exist inside the plot. If Targaryan Wall connects to Stark Wall, the plot would be 3 m (east-west) by 5 m. These interconnected excavation units ranged from 1 m by 1 m to 2 m by 1.5 m in size and were placed to follow new walls as they were encountered. A total of 15 walls were found, making up at least three, but probably four (or more) agricultural plots.

A platform, called Platform 1, was also revealed on the southeast edge of the agricultural system, roughly 2 m by 2 m (Figure 6.9). Unlike in other areas of the system, many small chert cobbles were found in this square, bounded by Tully, Bolton, Reed and Mormont Walls. While not raised above the rest of the system, the platform is bounded on the north, south and east by multi-course walls, unlike the one-course walls found in other portions of the system suggesting a different function. If the area is an agricultural system, it is possible that this platform was created as a sort of field house, where the person tending the field could stay for a short time to get out of the elements. At the northeast corner of the system, to the east of the Stark Wall terrace and north of the first plot described, excavations revealed a line of *yeso*, a soft grayish clay. In Spanish, y*eso* is defined as plaster, but in a geological setting, it is a term for gypsum and chalk. Located in 14AL, 14AS and 14AU, this *yeso* feature, Feature 11 (Figure 6.10), was found below a dark yellowish-brown clay layer containing very few artifacts. Stretching 3 m east-west, and between 1 and 0.5 m north-south, the *yeso* was only about 5 cm thick. The dark yellowish-brown clay continued underneath it. Excavations did not continue farther east due to time constraints, but it appears that the feature continues further east. It also appears to follow a line west towards Stark Wall, which was not evident when Stark Wall was originally excavated. A small posthole, Feature 12, about 10 cm in diameter was found along the southern edge of the eastern portion of Feature 11 (in 14AL). It was not associated with any other known structures. The entire system was bounded with walls, with the area outside the boundary containing very few artifacts (Figure 6.11). The following is a description of units, which are identified in Figure 6.6.

Unit 14Q. Unit 14Q revealed a stone terrace wall, named Stark Wall, angling southeast from the northern sidewall. The main goal for excavating this unit was to uncover the stone terrace that had been previously identified via survey by Angela Keller as a mound with three stones in alignment on the ground surface. The unit was placed across these stones and north/northeast of the previously excavated Unit 14L. Since the total station was not available this year, the unit's exact grid coordinates are currently unknown, and its position on Figures 6.1 and 6.2 is based on Keller's survey map. Unit 14Q consisted of six lots, with lots Q/1 and 2 excavated to uncover both sides of Stark Wall. The remaining four lots were excavated to recover deposits and find sterile soil. Lots below Q2 consisted of natural soil with a few artifacts – a light gray clay (10YR7/2) with brownish yellow mottling (10YR6/6). This deposit was found in the northwest and northeast portion of the unit surrounding Stark Wall and was 10-15 cm thick, except in the northwest corner of the unit where it measured 50 cm thick. As it was found just below Stark Wall, it is believed that the artifacts within the natural soil was the result of water moving small artifacts and fine sediment downslope under Stark Wall.

Stark Wall was first found at the northeast corner of Unit 14Q and was made largely of limestone, but it was also surrounded on both sides by chert cobbles. It was determined that the wall was most likely a stone terrace because it lay perpendicular to the slope. Interestingly, fill was found on the south / southeast side of the wall and was made up predominately of large ceramic sherds and lithics, particularly cores. Based on the presence of daub, as well as numerous types of sherds and lithics, the fill was determined to be from domestic contexts. The fill was as deep as Stark Wall with the majority of artifacts being concentrated in the humus layer (Lot Q1). Its single course of limestone blocks and chert cobbles was roughly 10 cm in height and 75 cm long.

Unit14R. Unit 14R was created as an eastern extension of Unit Q to follow Stark Wall that angled southeast from the unit's northern sidewall. In addition, the unit was also excavated to find out what was to the northeast of the wall since the majority of Unit 14Q contained fill materials west of the wall and little soil to the east of it. Unit R consisted of two lots. Lot 1 was the humus layer, which revealed Stark Wall, and Lot 2 continued to sterile soil. Stark Wall was not removed during excavation, but rather preserved. Lot 1 coincided with Lot Q1, and Lot R2 coincided with LotQ3. Loose charcoal (sample 92) was found in the middle, western side of the unit near Stark Wall at the top of Lot 2. A small burnt area also was found in the same location further down in Lot 2 as well, and more charcoal (sample 93) was collected 93 cm below datum 16. Excavations stopped at grayish clay, where the amount of artifacts drastically diminished. At this point, both sides of Stark Wall were clearly revealed for the first time. In general, few artifacts were found on the upslope side of the wall, and it was determined that further excavations should focus solely on revealing the extent of the wall. It was also decided that the fill found in Lot14Q was sufficient for later artifact analysis and, due to time constraints, uncovering of Stark Wall should be the main focus. In Unit 14R, Stark Wall consisted of two rows of stone, both consisting of chert and limestone cobbles. It is possible that these rows of stone are the result of a collapsed or sagged double coursed wall, but currently it is difficult to tell because of the informal nature of the construction. At its highest point, the wall had an elevation between 20 cm and 30 cm.

Unit 14T. Unit T was created to follow Stark Wall by extending Unit R to the south. The unit followed Stark Wall as it angled southeast from the northern sidewall of the unit. Unit T consisted of two lots. Lot 1 was a humus layer, and Lot 2 was fill and, in some places, natural soil. Here, Stark Wall consisted of four courses of chert cobbles and limestone blocks, measuring roughly 40 cm total in elevation. Excavations stopped once the bottom of Stark Wall was revealed (ending at dark yellowish-brown clay). To preserve Stark Wall and avoid unnecessary excavation into fill that has been found on the western side of the wall, only the east side of Stark Wall was excavated.

Unit 14U. Unit U was an extension of the Unit T staggered to the east from the unit's southern sidewall to follow Stark Wall. Here, the wall consisted of five courses of chert cobbles and limestone blocks. It dropped in elevation downward from the north to the south and had a total elevation of about 60 cm. Like Units R and T, the goal was to reveal the extent of Stark Wall by only excavating the eastern portion of the unit to avoid the fill found on the downslope side of the wall. Again, excavations consisted of two lots with the humus root zone as Lot 1 and cultural deposits as Lot 2. Charcoal was found in Lot 2 in the southeast corner of the unit at about 91 cm bd (labeled sample 95). A 4L flotation sample (sample 96) was also taken in the southeast portion of the unit at about

95 cm bd. Gray clay appeared in the middle of Lot 2, and, as a result, another 4L flotation sample (sample 97) was taken at 99 cm bd. In Unit U, Stark Wall averaged roughly 40 cm in elevation. It was difficult to discern how many courses of stacked chert cobbles and limestone blocks made up this portion of Stark Wall, but based on the southern portion of the wall in this unit, I believe it was most likely five courses high. Another possible wall, named Lannister Wall, was encountered along the southern sidewall in Lot 2. It consists of two large chert cobbles and it ran at an angle slightly perpendicular to Stark Wall to the east at roughly 120-degrees.

Unit 14W. Unit W extended Unit U south staggered to the east. It was excavated to determine whether Lannister Wall continued or, for that matter, was even a wall at all. Again, Unit W was excavated in two lots. Lot 1 was the humus root zone, and Lot 2 the matrices below it. Lot 2 was excavated to find how far down Stark and another wall found perpendicular to it (Baratheon Wall) went, as well as to expose the walls (Figure 6.12). Lot 2 ended at 30 to 35 cm in depth and revealed Martell Wall and more of Lannister Wall. Although Baratheon Wall is perpendicular to Stark, Martell abuts Lannister. It is unclear if Stark Wall continues south past Unit W. Only one large limestone block appeared past Baratheon Wall. Future excavations will determine if Stark Wall continues or if this single limestone block marks the end of it.

The intersecting walls in the southern portion of the terrace are difficult to interpret. Lannister Wall consists of two stone cobbles located parallel to Unit W's northern sidewall, and Martell Wall consists of two stone cobbles parallel to Stark Wall (located to the east), while Baratheon Wall runs perpendicular to Stark Wall. Baratheon

Wall is a single row of ten stone cobbles only a course high. Like Unit Q, the fill around all these walls is made up predominately of large ceramic sherds and large lithics, particularly cores, and it was found mostly to the south/southeast of Stark Wall. The fill can best be described as domestic based on the presence of daub and the types of sherds and lithics present. The fill goes as deep as the base of Stark Wall with the majority of artifacts concentrated in the humus layer. Fill was also found between Lannister and Baratheon Walls. It is likely that fill deposits were used as reinforcement for the stone terrace against downslope erosion. The confluence of small walls in this area might signal a special agricultural feature or the abutment of multiple terraces, possibly built at different times or by different people.

Unit 14X. Unit 14X was placed as an extension unit along the eastern sidewall of 14W, which was excavated in 2016. Excavations in Unit 14W exposed Stark, Baratheon, Lannister, and Martell Walls, which formed a system of intersecting walls in the southern portion of the terrace. In order to understand these walls, 14X (a 1 m, facing north-south, by 1.5 m, facing east-west, unit) was placed to determine if Baratheon Wall continued east as suggested by the 14W excavations. Excavations in Unit 14X consisted of one lot—the humus layer from the modern surface down to the top of Baratheon Wall located 20 to 40 cm below the surface. The lot consisted of a very dark grayish brown clay loam (10YR3/2) with large sherds, cores, flakes, and large pieces of daub. These excavations probably penetrated both undisturbed surface and fill contexts. Baratheon Wall was constructed of chert cobbles and undressed limestone between 15 and 25 cm in diameter. It continued northeast from 14W, with fill to the south of the wall. A new wall was also found, running perpendicular to Baratheon Wall and parallel to Martell and Stark Walls. Named Tully Wally, this wall is located south of Baratheon Wall, and then connects to the northwestern portion of Baratheon Wall.

Unit 14Y. Unit 14Y was a 1 m (north-south) by 1.5 m (east-west) unit placed as an extension of the western sidewall of the previously excavated 14W. One lot was excavated, which was intended to reveal the top of a wall/architecture. This lot was made up of very dark grayish brown clay loam (10YR3/2) with large sherds, cores, and flakes, combining both undisturbed surface and fill contexts. Excavations were stopped at about 30 cm down, as the unit was mostly fill consisting of large artifacts and chert cobbles. A number of stones pointed towards the western sidewall, suggesting that Baratheon Wall may have extended further west, but it was decided that they could also have just been a part of the chert cobble fill. It is interesting to note that groundstone—possibly part of a broken *mano* or *metate*—was found in this lot, which suggests the fill was composed of redeposited domestic trash.

Unit 14Z. Unit 14Z was placed as a 1 (north-south) by 1.5 (east-west) m extension unit along the southern sidewall of 14W to continue Stark Wall to the south of the previously excavated unit. 14Z contained one lot, a combination of undisturbed surface (humus layer, very dark grayish brown clay loam – 10YR3/2) and fill. Stark Wall did continue the southeast, but the composition of the fill in 14Z appeared to be slightly different from previously excavated units as it contained more cobbles in some areas. Thus, while large sherds, cores and flakes (i.e. redeposited domestic fill) were more prevalent to the southwest (downslope) of Stark Wall, chert cobbles were more prevalent to the northeast (upslope) of Stark Wall. Whether this was intentional or a result of natural formation processes over the years is unknown, and will be analyzed further. Excavations were stopped after the top of Stark Wall was revealed, between 10 and 30 cm below the surface.

Unit 14AA. Unit 14AA was a 1 m (east-west) by 1.5 m (north-south) unit placed as an extension from the southern sidewall of unit 14X in order to determine if Tully Wall continued to the south. The unit consisted of one lot of very dark grayish brown clay loam (10YR3/2) with large sherds, cores, flakes, and large cobbles (i.e. undisturbed surface and fill). The artifacts were located towards the northern end of the unit and chert cobbles (as well as artifacts) to the southern end of the unit. About 10-20 cm below the surface, Tully Wall appeared and continued southeast through the unit, until it began to curve west about 25 cm north of the southern sidewall of the unit before going into the southwest corner of the unit. The curve was unusual in comparison to the previously straight parallel/perpendicular walls, making it unclear if Tully Wall was connecting to a new perpendicular wall. As a result, the curve from Tully Wall going to the southwest was named Arryn Wall in case it turned into a different wall after further investigation. Another new wall was also revealed, called Bolton Wall, that ran perpendicular to Tully Wall (on the eastern/upslope side of Tully Wall) and into the eastern sidewall of Unit 14AA.

Unit 14AB. Unit 14AB was a 0.5 m (east-west) by 1.5 m (north-south) unit placed as an extension from the western sidewall of 14AA to follow Arryn Wall west of 14AA. The unit consisted of one lot of very dark grayish brown clay loam (10YR 3/2) with large chert cobble inclusions in the humus layer and one undressed limestone block in the southern part of the unit. Neither Arryn Wall, nor any other walls, were found in this unit that contained mainly cobble fill.

Unit 14AC. Unit 14AC was a 1 m (east-west) by 1.5 m (north-south) unit placed as an extension from the eastern sidewalls of 14X and 14AA to determine if Baratheon and Bolton Walls continued to the east of the previously excavated units. The unit consisted of two lots: the first of very dark grayish brown clay loam (10YR 3/2) and the second of dark yellowish brown clay (10YR 4/6). 14AC1 consisted of undisturbed surface and fill, with large sherds, cores, and flakes in the north, west, and south ends of the unit. The lot revealed that Baratheon Wall continued east along the northern sidewall of the unit while Bolton Wall continued to the northeast through the unit. A new wall was also found in the eastern portion of the unit, perpendicular to both Baratheon and Bolton Walls, and was named Reed Wall. No fill, and only a few artifacts, were found in the northeast area of the unit (upslope from Reed Wall). Between 20 and 40 cm thick, 14AC1 was excavated until the three walls were uncovered. The area without fill in the northeast corner was composed of different color and type of soil. This 40 by 50 cm space was excavated separately from 14AC1 and 14AC2. This lot connects to the eastern sidewall of 14AQ2 (which was excavated before 14AC2 and is described below). More of Reed Wall was uncovered in this 5 to 20 cm thick lot, which showed that the wall consisted of three courses. Redeposited domestic fill was found throughout the unit except east (upslope) of Reed Wall.

Unit 14AD. Unit 14AD was a 1 m by 1 m unit extending from the southern sidewall of previously excavated 14Y and excavated to see if Baratheon Wall continued to the southwest. The unit comprised of one lot consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds, cores, and flakes (i.e. undisturbed surface and fill). Large cobbles were also found to the south of Baratheon Wall (20 to 40 cm deep) and Baratheon Wall was shown to continue southwest across the unit.

Unit 14AE. Unit 14AE was a 1 m (east-west) by 1.5 m (north-south) unit excavated to see if Stark and Arryn Walls continue southeast of 14Z and 14AB. The unit comprised of one lot consisting of very dark grayish brown clay loam (10YR 3/2) with cobble (0 to 25 cm in diameter) fill present to the north (upslope) of Stark Wall. Arryn Wall did not continue, and it was decided that it was not actually a distinct wall, but rather an extension from Tully Wall. Stark Wall did continue through the southeast part of the unit into the southeast corner. The southwest corner of the unit was not excavated to the bottom of Stark Wall as it was clear that no walls were present on that side, making the unit/lot between 10 and 30 cm thick.

Unit 14AF. Unit 14AF was a 1.5 m (north-south) by 2 m (east-west) unit placed as an extension from the western sidewall of 14AD to see if Baratheon Wall continued to the west of 14AD. The unit comprised of one lot consisting of very dark grayish brown clay loam (10YR 3/2) with cobble (0 to 25 cm in diameter) fill. Baratheon Wall continued southwest in the unit, with the cobble fill present on either side of the wall. A possible wall, Karstark Wall, appeared perpendicular to Baratheon Wall was seen in the northern portion of the unit. Excavations continued until Baratheon Wall was uncovered, about 10 to 20 cm below the surface.

Unit 14AG. Unit 14AG was a 1 m (north-south) by 1.5 m (east-west) unit placed as an extension from the eastern sidewall of 14AE to determine if Stark Wall continued southeast of 14AE. The unit comprised of one lot, 10 to 20 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds, cores, flakes, and some chert cobbles (0 to 15 cm in diameter), which were likely redeposited domestic fill. Stark Wall continues slightly into the unit, with new walls, named Umber Wall and Mormont Wall, appearing in the northwest corner of the unit and running northeast. Both Umber and Mormont Walls are perpendicular to Stark Wall and parallel to each other, and enter the northern sidewall of the unit. Umber Wall has two courses and is separated from Mormont Wall by the redeposited domestic fill.

Unit 14AH. Unit 14AH was a 1 m (north-south) by 1.5 m (east-west) unit extended from the southwest corner of 14AF to see if Baratheon Wall continued to the southwest. The unit comprised of one lot, 10 to 15 cm thick that consisted of very dark grayish brown clay loam (10YR 3/2) with large sherds, cores, flakes, and some chert cobbles (0 to 20 cm in diameter), where were likely redeposited domestic fill. Baratheon Wall continues across the unit. Additionally, a new wall, called Greyjoy Wall, was identified extending perpendicularly from Baratheon Wall's southern face of Baratheon Wall towards the southeast corner of the unit. It was unclear as to whether Greyjoy Wall also continued through the unit to the northwest or if Baratheon Wall continued to the southwest.

Unit 14AI. Unit 14AI was a 1.5 m by 1.5 m unit placed along the northeast corner of 14AG to see if Mormont and Umber Walls continued to the northeast. The first lot of the unit, between 15 and 40 cm thick, consisted of very dark grayish brown clay loam (10YR 3/2) with many limestone and chert cobbles (0 to 30 cm in diameter) in certain areas. Excavations in the northeast corner this lot revealed the corner where Reed Wall and Mormont Wall meet (Figure 6.13). Limestone and chert cobbles were found in between the two walls, but no fill was found outside the walls (i.e. no fill was encountered in the southern portion of the unit), which indicates that this was the corner of a platform. The second lot, about 30 cm thick, consisted of dark yellowish brown clay (10YR 4/6) and revealed that Mormont Wall contains three courses, with all blocks made of undressed limestone (Figure 6.14). Compared to the rest of the excavation area, very few artifacts were found in both lots.

Unit 14AJ. Unit 14AJ was a 1 m (north-south) by 1.5 m (east-west) unit placed along the southeast corner of 14AH in order to investigate whether Greyjoy Wall continued to the southeast. The unit comprised of one lot, 15 to 20 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with many large limestone and chert cobbles (0 to 30 cm in diameter), large cores, and a limestone biface. In the northwest corner of the unit, Greyjoy Wall turned from running southeast to directly south following along the western sidewall of the unit. Similar to Arryn Wall, it was unclear if this turn was part of a new wall. This section of the wall was named Baelish Wall. It was also unclear if Baelish Wall continued to the southwest. No cobbles (fill or part of the cobble wall) were encountered in the unit's southwest corner.

Unit 14AK. Unit 14AK was a 2 m (north-south) by 1.5 m (east-west) unit placed along the southern sidewall of 14AH and the western sidewall of 14AJ to see if Stark, Baratheon and/or Greyjoy Walls continued to the southwest. The unit comprised of one lot, 5 to 15 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with few artifacts and some limestone and chert cobbles (0 to 25 cm in diameter) along the eastern sidewall of the unit. The majority of the excavated matrix consisted only of the humus layer. No walls were found, suggesting this unit is most likely the southwest extent of the agricultural system (see Figure 6.11).

Unit 14AL. Unit 14AL was a 1 m by 1 m unit placed along the northern sidewall of 14AC to determine if the corner of Reed and Baratheon Walls (suspected to be the northeast edge of the agricultural system) had been reached. The unit comprised of five lots, the first of which was 20 to 30 cm thick and consisted of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and some small undressed limestone inclusions. Baratheon and Reed Walls meet at the southwest corner of the unit, rising higher than in 14X and 14AC. 14AL2 was a roughly 1 m by 0.7 m lot created to dig down into the northern half of the unit to expose all of three courses of Baratheon and Reed Walls. The lot, 15 to 20 cm thick, consists of dark yellowish brown clay (10YR 4/6) and small undressed limestone inclusions. *Yeso* clay – a softer dark yellowish brown clay – was hit at the bottom of the walls, appearing in the western portion and northeast corner of the unit, and was called Feature 11. 14AL3 was created to excavate down until *yeso* was hit in the rest of the unit. The lot was focused only on the western side of the unit (0.7 m by 0.7 m), was about 10 cm thick, and consists of dark yellowish-brown clay

(10YR 4/6) with small undressed limestone inclusions. A possible posthole was found between the walls and the *yeso*, so the lot was stopped in order to excavate the posthole. 14AL4 was a posthole, Feature 12, about 10 cm in diameter, with no artifacts, containing very dark grayish brown clay loam (10YR 3/2). The hole only went down 2 cm. It likely was originally deeper; however its original top was not recognized during the excavation of previous lots. 14AL5 was about 17 cm by 18 cm, placed in the southern portion of the unit, and was created to find more *yeso*. Between 2 and 10 cm thick, the lot consists of dark yellowish brown clay (10YR 4/6) with few artifacts (see Figure 6.10 for *yeso* and meeting of Baratheon and Reed Walls). After excavating further and examining the profile of the *yeso* layer (Feature 11), it appears that the *yeso* was about 5 cm thick and that the dark yellowish-brown clay continues underneath it. Excavations ended when it was determined that we would not hit more *yeso,* and the thin lining of *yeso* above and below these different soils suggests that the yeso feature was purposefully place here instead of being a naturally occurring stratum.

Unit 14AM. Unit 14AM was a 1 m (north-south) by 2 m (east-west) unit placed along the northern sidewall of 14AI, the southern sidewall of 14AC and the eastern sidewall of 14AA to determine the dimensions of the platform bounded by Reed and Mormont Walls. The unit comprised of two lots, the first of which was 10 to 40 cm thick (with the deeper portion on the eastern side of the unit), consisting of very dark grayish brown clay loam (10YR 3/2) with few artifacts. This lot was ended at a soil change in the eastern portion of the unit. 14AM2 was excavated as a 1 m (north-south) by 0.5 m (east-west) unit in the eastern portion of 14AM to expose Reed Wall's eastern face. The second lot, 20 to 30 cm thick, consisted of dark yellowish brown clay (10YR 4/6) with very few artifacts and revealed that Reed Wall is four courses tall, about 45 cm in total height.

Unit 14AN. Unit 14AN was a 1 m (north-south) by 1.5 m (east-west) unit placed along the southern edge of 14AE and western edge of 14AG to follow a limestone block that seemed to go through the western sidewall of 14AG and which may continue to the southwest. The unit comprised of one lot, 30 to 35 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2), with some large sherds, flakes, and cores, and small chert cobble fill (0 to 5 cm) in the northern side of the unit. Mormont Wall continued to the southwest across the unit, perpendicular to Stark Wall.

Unit 14AO. Unit 14AO was a 1 m (north-south) by 1.5 m (east-west) unit placed in the middle of 14AE, 14AG, 14AA, 14AI, and 14AM to uncover western edge of the platform/platform fill found in 14AM and 14AI. The unit comprised of one lot, 10 cm thick in the eastern half of the unit and 35 cm thick in the western half of the unit, consisting of very dark grayish brown clay loam (10YR 3/2), with chert cobble fill (0 to25 cm) in the eastern portion of the unit. More of Tully Wall was found, extending from the southern sidewall of 14AA towards the southeast. The platform/platform fill is located only in the eastern portion of the unit, east of Tully Wall, which suggests that Tully Wall marks the western, downslope, edge of the platform. Excavations on the eastern portion of the unit ended with the appearance of cobble fill and excavations on the western portion of the unit ended at a soil color change found to the west of Tully Wall.

Unit 14AP. Unit 14AP was a 1.5 m by 1.5 m unit placed off the southwest corner of 14AN in order to determine if Mormont Wall continued to the southwest. The unit comprised of two lots, the first of which was 10 to 30 cm thick and consisted of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, and cores. 14AP1 was terminated at a soil change at the same depth where the line of Mormont Wall was revealed. 14AP2 was excavated to reveal more of the Mormont Wall face to determine if it constructed with more than one course of stones. It was 30 to 40 cm deep and consisted of dark yellowish brown clay (10YR 4/6) with some chert cobbles (5 to 20 cm) in the northwest corner of the unit, north of Mormont Wall. These excavations determined that the undressed limestone blocks making up Mormont Wall were larger (roughly 25 cm tall) and more rectangular than previously believed, but the wall was only one course high. It also appears that some of the limestone blocks making up Mormont Wall fell on their sides at some point towards the northern portion of the unit.

Unit 14AQ. Unit 14AQ was a 1 m (north-south) by 1.5 m (east-west) unit placed along the eastern edge of 14AC and northern edge of 14AM to reveal more of Reed and Bolton Walls (which seemed to form the eastern and northern sides of the platform). The unit comprised of two lots, the first being 30 to 40 cm thick and consisting of very dark grayish brown clay loam (10YR 3/2) with few artifacts and no cobbles. Bolton Wall did not continue east, but Reed Wall did. Excavations in this first lot were stopped at a soil change. 14AQ2 was 20 to 35 cm thick and was excavated to reveal more of the Reed Wall profile. The matrix in this lot consisted of dark yellowish-brown clay (10YR 4/6) with very few artifacts. Reed Wall, constructed of undressed limestone, was three courses in height.

Unit 14AR. Unit 14AR was a 1 m (north-south) by 1.5 m (east-west) unit placed along the western edge of 14AP to follow Mormont Wall southwest. The unit comprised of one lot, 30 to 40 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and chert cobbles (0 to 15 cm) along the northern portion of the unit. Mormont Wall continued to the southwest, with chert cobbles only north of Mormont Wall.

Unit 14AS. Unit 14AS was a 1 m by 1 m unit placed along the western sidewall of 14AL to investigate the *yeso* feature, Feature 11. The unit comprised of two lots, the first of which, 15 to 20 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with fewer artifacts than in other areas. *Yeso* was not found, so a new lot was created at a soil change. 14AS2 was 20 to 30 cm thick and consists of dark yellowish-brown clay (10YR 4/6) with few artifacts and some undressed limestone inclusions. Feature 11 continues west from 14AL and rises slightly in elevation.

Unit 14AT. Unit 14AT was a 1 m (north-south) by 1.5 m (east-west) unit placed along the western edge of 14AR to reveal more of Mormont Wall and to determine if it continues to the southwest. The unit was excavated in one lot, 10 to 20 cm thick, that consisted of very dark grayish brown clay loam (10YR 3/2) with a few sherds, flakes, cores, and small cobbles (0 to 5 cm) in the northeast corner of the unit. It was unclear if Mormont Wall continued southwest; instead it turned at about a 130-degree angle into the north sidewall of the unit. This stone alignment was called a new wall, Barristan Wall, but later excavations have led to the conclusion that Barristan Wall was likely a continuation of Mormont Wall and Baelish Wall (see Unit 14AV and 14AX descriptions).

Unit 14AU. Unit AU was a 1 m by 1 m unit placed along the western sidewall of 14AS to investigate the *yeso* feature, Feature 11. The unit comprised of two lots; the first of which, 5 to 20 cm thick (with the deepest portion located in the western area of the unit) and consists of very dark grayish brown clay loam (10YR 3/2) with fewer artifacts than in other areas. *Yeso* was encountered in the southwest corner, and a new lot was created after a soil change. 14AS2 was 5 to 50 cm thick (with the shallowest portion located in the southwest corner of the unit) and consists of dark yellowish-brown clay (10YR 4/6) with few artifacts and some undressed limestone inclusions. The *yeso* of Feature 11 covers the bottom of the unit, rising and falling at different depths.

Unit 14AV. Unit 14AV was a 1 m (north-south) by 1.5 m (east-west) unit placed along the northern edge of 14AT to determine if Barristan Wall continued to the northeast. The unit comprised of one lot, 15 to 20 cm thick, consisting of very dark grayish brown clay loam (10 YR 3/2) with large sherds, flakes, cores, and chert cobbles (0 to 10 cm) in the western portion of the unit. A large amount of charcoal was also found in the northwest and southwest corners of the unit, around 136 cm below datum 16. Barristan Wall appears to continue north, connecting to Baelish Wall, suggesting it is actually a continuation of Baelish Wall (with Baelish Wall possibly being a continuation of Mormont Wall). The majority of the chert cobbles and redeposited domestic fill were found to the west of this wall, along with the charcoal.

Unit 14AW. Unit 14AW was a 1 m (east-west) by 1.5 m (north-south) unit placed along the northern sidewall of 14AF to see if the cobbles (about 20 cm in diameter, found in a fairly straight line) in the northwest portion of 14AF form a wall perpendicular to Baratheon Wall. The unit comprised of one lot, 5 to 15 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with a few artifacts and chert cobbles (0 to 25 cm) in the eastern portion of the unit. A new wall, called Karstak Wall, was revealed (perpendicular to Baratheon Wall and parallel to Stark Wall) heading northwest. There are a number of cobbles to the east of this new wall that running upslope towards Stark Wall. These cobbles are similar to those found in 14AO, 14AM, 14AA, and 14AI, which suggests there may be another platform in the northwest corner of this area.

Unit 14AX. Unit 14AV was a 90 cm by 90 cm unit placed along the northern sidewall of 14AV and southern sidewall of 14AJ to determine if the wall found in 14AV (Barristan Wall) connects to Baelish Wall and is thus actually part of Baelish Wall. The unit comprised of one lot, 5 to 20 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and chert cobbles (0 to 5 cm). A line of chert and limestone cobbles appeared during excavations, connecting the walls found in 14AV and 14AJ, which suggests that Barristan Wall is actually a part of Baelish Wall. There were also some limestone cobbles to the east of Barristan/Baelish Wall (running north-south, against the slope), which are most likely collapse from the wall.

Unit 14AY. Unit 14AY was a 1 m (east-west) by 1.5 m (north-south) unit placed northwest of 14AW to determine if Karstark Wall continues to the northwest. The unit comprised of one lot, 10 to 20 cm deep, consisting of very dark grayish brown clay loam

(10YR 3/2) with large sherds, flakes, cores, and chert cobbles (0 to 15 cm). It was determined that Karstark Wall continues to the northwest while a new wall, called Dondarrion Wall, also appears to the west of Karstark, running perpendicular to the first wall (i.e. also going northwest). There is about 20 cm between the two walls, which creates a narrow channel. It is also possible that the platform in 14AW also appears to the east of Karstark Wall. Chert cobbles and many artifacts were encountered to the west of Dondarrion Wall.

Unit 14AZ. Unit 14AZ was a 1.5 m by 1.5 m unit placed along the northern sidewall of 14AH to determine if any cobbles from 14AH made another wall or connected to Dondarrion Wall. The unit comprised of one lot, 10 to 35 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with many large chert and undressed limestone cobbles (0 to 50 cm). Due to the high number of large cobbles, it is unclear if there is another line of cobbles/blocks, or if the unit is purely collapse.

Unit 14BA. Unit 14BA was a 1 m (east-west) by 1.5 m (north-south) unit placed along the northern sidewall of 14AY to determine if Karstark and Dondarrion walls continue to the northeast. The unit comprised of one lot, 20 to 30 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, and cores. Karstark Wall does not continue, but Dondarrion does penetrate slightly into the unit. Two new walls, Targaryan and Frey appear to connect to Dondarrion and continue east, creating a corner. Based on the direction of Targaryan Wall, it is likely that it meets up with Stark Wall in the northeast, connecting the entire agricultural system, but excavations were stopped in Op. 14 due to time constraints.

6.3 Agricultural Plot System 2

Another agricultural system, Agricultural Plot System 2 (Units 51A through 51T)— determined to be either a terrace or agricultural plots—was first identified by Drs. Lisa LeCount and Angela Keller upslope (east) of Operation 14. A line of cobbles was re-discovered in this area during the 2017 field season, which looked similar to the cobbles found on the surface of Agricultural Field System 1, and excavations revealed at least eight distinct walls (Figures 6.15 and 6.16).

Unfortunately, likely due to natural erosion, this system was not well-preserved and was covered by a large amount of collapse that made it difficult to find specific walls and plots (see Figure 6.15 for wall labels). The entire system was bounded by Orthanc Wall to the north and Rohan Wall to the east, both of which were constructed of larger limestone blocks. Possible plots include one bounded by Hobbiton, Shire, Rohan and Orthanc Walls, roughly 2 m (north-south) by 3 m (east-west) in size. Another may be bounded by Isengard, Gondor and Mordor Wall, a third by Isengard, Mordor and Valinor Walls, and a fourth by Gondor, Orthanc and Hobbiton or Shire Walls. None of these possible plots are completely bounded, but this could be due to lack of further excavation, or an intentional construction method different from Agricultural Plot System 1.

Large sherds, flakes, and cores were found throughout the system, pointing to a similar process of filling the interior of the plots with redeposited domestic fill. There also appears to be a large rectangular platform (2 m by at least 3.5 m) in the middle of the system based on the presence of a level surface of chert cobbles found in this area, similar to those found on the platform in the first agricultural plot system. Two pit features (Feature 1 and Feature 2) were also found— Feature 1 is in the possible platform, and Feature 2 is at the southeast edge of the system. Both pits are about 70 cm deep. Feature 1 was circular, bounded by a circle of chert and limestone cobbles and filled with soil similar to the humus excavated above (Figure 6.17). These pits contained large pottery sherds and charcoal at the bottom, but not throughout, the pits. Feature 2 was not completely excavated – only the northern semi-circle was excavated (Figure 6.18). Chert and limestone cobbles surrounded the pit. The purpose of these pits is unclear, and future investigation and analysis is required to determine their function. The following is a discussion of individual units, which are labeled on Figure 6.15.

Unit 51A. Unit 51A was a 1 m (east-west) by 1.5 m (north-south) unit placed upslope from Operation 14 (Agricultural Plot 1) to find evidence of another terrace/agricultural plots. The unit was placed in this area because four limestone cobbles were found on the surface running northwest to southeast. The unit comprised of one lot, 10 to 25 cm thick, of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes and cores, and chert cobbles and undressed limestone (0 to 25 cm). The southern-most block of the four limestone blocks found on the surface was very degraded but also large – almost 40 cm long. The wall created by the limestone blocks was called Hobbiton Wall (running north-south, against the slope) while a new wall – Buckleberry Wall – made of chert cobbles and undressed limestone was found at a lower depth and perpendicular to Hobbiton, running east. Redeposited domestic fill was located to the east of Hobbiton Wall, and cobbles (determined to be collapse) were found in the southwest corner of the unit.

Unit 51B. Unit 51B was a 1 m (east-west) by 1.5 m (north-south) unit placed along the eastern sidewall of 51A to determine if Hobbiton Wall continued southeast. The unit comprised of two lots, the first of which, about 10 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2), large sherds, flakes, cores, and many chert and undressed limestone cobbles (0 to 25 cm). The large artifacts appear to be redeposited domestic fill while the cobbles appear to be collapse. A possible new wall, composed of small limestone and chert cobbles, was found in the northern portion of the unit running southeast, named Shire Wall. It appeared to run in a similar direction to Hobbiton Wall, connecting to the southern end of Hobbiton Wall, but was not in a direct line (instead running more towards the south than southeast) with Hobbiton Wall and thus was given a different name. 51B2, 5 to 10 cm thick, was excavated below Shire Wall (which could be a wall, or a line of collapsed stones) to see if other walls appeared below it. The lot consists of very dark grayish brown clay loam (10YR 3/2) – the same matrix as the humus layer in the lot above it – with large sherds, flakes, and cores in the northeast portion of the unit and chert cobbles to the southeast. Shire Wall continued down, though it was only constructed of one course of stone, and it appears to create a boundary between the redeposited domestic fill in the northeast and cobbles that may be part of a platform, or collapse. These cobbles are smaller than those identified as collapse in the other areas of the larger system, but both are at the same level, and it could be that the smaller cobbles (present further downslope) were broken up more during later flooding events.

Unit 51C. Unit 51C was a 1 m (north-south) by 1.5 m (east-west) unit placed along the eastern sidewall of 51B to determine if Shire Wall continues to the southeast. The unit was excavated in two lots, the first of which was 10 to 15 cm thick and consisted of very dark grayish brown clay loam (10YR 3/2) with many artifacts and small rock inclusions, especially on the northeast side of the unit. It was unclear if Shire Wall continued or if any other walls appeared. At this point a second lot was created. 51C2, about 20 cm thick, consists of dark yellowish-brown clay (10YR 4/6) with fewer artifacts and small cobbles (0 to 5 cm). A possible arcing wall, called Moria Wall, was found curving from the southwest corner of the unit into the middle of the northern sidewall, running both against and along the slope. It was later noted that collapse from a wall excavated afterwards, Rohan Wall, could be seen along the eastern sidewall of the unit.

Unit 51D. Unit 51D was a 1 m (north-south) by 1.5 m (east-west) unit placed along the eastern sidewall of 51A (towards the northeast) to determine if Buckleberry Wall continued west. The unit comprised of one lot, 15 to 20 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds and flakes. Many chert and undressed limestone cobbles (0 to 20 cm) were found as well, which are most likely the result of collapse. Buckleberry Wall appeared to continue in small arc, similar to Moria Wall, as did a new wall— Rivendell Wall—which appeared in the northeast center of the unit, curving to the southwest then going north. It was unclear if Hobbiton Wall continued and connected to other curving walls, as it was very difficult to identify new walls versus those connected to Hobbiton Wall as a result of the large amount of collapse. Later excavations indicated that what was previously identified as Hobbiton Wall in Unit

51D could actually be collapse, a part of Orthanc Wall (see below), or may have represented a wall completely different from Hobbiton Wall.

Unit 51E. Unit 51E was a 1 m (north-south) by 1.5 m (east-west) unit placed along the southern sidewall of 51D in order to determine if any of the walls (Buckleberry, Moria or Hobbiton) found in 51D continued south. The unit comprised of two lots, the first of which, was 10 to 20 cm thick and consisted of very dark grayish brown clay loam (10YR 3/2) with chert and undressed limestone cobbles (0 to 10 cm). It is possible that previous walls continued in 51E, or that new walls were present, but it was difficult to distinguish between separate walls as the possible alignments curved and connected to each other. All of the walls in Agricultural Plot System 1, aside from Arryn Wall, form straight lines that connected to each other at right angles, but some walls in Agricultural Plot System 2 (i.e. Moria, Lothlorien, Buckleberry and Rivendell) have straight and curving components. Additionally, their ends were difficult to identify among other, small cobbles. These walls may have been intentionally constructed this way, or their appearance may be the result of collapse. Buckleberry Wall does appear to continue, and stop, in the northwest corner of the unit. A hemispherical feature (Feature 1) was revealed at the level of a soil change evident in the rest of the unit. Feature 1 consisted of a pit containing the humus matrix in the southern portion of the unit encircled by a line of cobbles. Curiously, these cobbles were not at the mouth of the pit, but were encountered 3cm below the pit's mouth. The lot ended at the aforementioned soil change. The southeast corner of the unit was excavated a bit lower than the rest of the unit (20 cm below surface) to investigate Feature 1. 51E2 was 35 cm thick and was created to excavate deeper into Feature 1. This lot consists of very dark grayish brown clay loam (10YR 3/2—like the previous lot) with large, broken pieces of ceramic, some of which may have previously been from a whole bowl broken at the time of deposition. The feature in this lot was half of a larger circle, with a radius of 35 cm running north-south and a diameter of 50 cm running east-west within and below 51E1. Some of the feature was excavated, but after it was determined to be part of a larger circle, and it would be too difficult to excavate only one side of the feature, the bottom of the feature was not reached until the creation of 51J1 (see below).

Unit 51F. Unit 51F was a 1 m (north-south) by 1.5 m (east-west) unit placed along the northern sidewall of 51C to determine if Moria Wall continues to the north. The unit was comprised of two lots, the first of which consists of a 20 cm thick layer of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, and chert and undressed limestone cobbles (0 to 25 cm). Moria Wall appears to continue north through the middle of the unit. Limestone blocks were also found, but they seem to be the result of slopewash or collapse. One limestone face was found along the eastern sidewall of the unit, in the southeast corner. It was unclear if this was part of collapse, but later excavations revealed that the limestone face is part of Rohan Wall. 51F2 was created to continue through the soil change that was seen at the end of 51F1 to reveal more of Moria Wall, if present. The lot, 5 to 10 cm thick (on the western side, as only the western portion of the unit was excavated), consists of dark yellowish brown clay with fewer artifacts and cobbles. Moria Wall continues to the north, appearing to split into two walls, but later excavations led to the conclusion that it was still one wall. Another wall, Lothlorien Wall, appeared in the form of three limestone cobbles, also continuing north, against the slope.

Unit 51G. Unit 51G was a 1 m (north-south) by 1.5 m (east-west) unit placed along the northern sidewall of 51D, facing northwest, to determine if any of the walls (Buckleberry, Moria or Hobbiton) from 51D continue the south. The unit comprised of two lots, the first of which, about 30 to 40 cm thick, consists of very dark grayish brown clay loam (10YR 3/2) large sherds, flakes, cores, and some small chert cobbles (0-5 cm). Some limestone blocks were encountered in this lot, including the face of a dressed limestone block along the southern sidewall, at the southwest corner of the unit. It was unclear if this one limestone block was part of a larger wall, and a new lot was created at a soil change to determine if any other blocks would be found below. Excavations in other units later showed that this block is part of Orthanc Wall. 51G2 was 5 to 10 cm thick in the eastern portion of the unit and 55 cm thick in the western portion of the unit and consists of dark yellowish-brown clay (10 YR 4/6) and many small (0 to 1 cm) limestone inclusions. No new limestone blocks were encountered, but there was a larger than normal quantity of obsidian blades in the northeast corner of the unit.

Unit 51H. Unit 51H was a 1 m (north-south) by 1.5 m (east-west) unit placed along the southern sidewall of 51E to determine if Feature 1, found in 51E, continues south. The unit was excavated in two lots, the first of which was 10 to 15 cm thick and consisted of very dark grayish brown clay loam (10YR 3/2) with some artifacts. Many limestone cobbles and blocks and some chert cobbles were found surrounding the other side of Feature 1. More chert cobbles were found in the eastern portion of the unit, while limestone blocks were found in the western portion of the unit. Excavations in this lot exposed the blocks, and a new lot was created to dig into Feature 1. It is possible, based on the lines of rocks in the unit, that one or two walls were encountered in the western portion of the unit, but it was difficult to follow the lines. 51H2 was a half-circle lot with a radius of 40 cm, running north-south, and a diameter of 90 cm, running east-west, within and below 51E1. The lot, 50 to 70 deep, consists of very dark grayish brown clay loam (10YR 3/2) with large pieces of broken ceramics and chert and limestone cobbles. A large limestone block was found in the western side of Feature 1 near the surface, but it was removed so it wouldn't fall as we excavated deeper. The bottom of Feature 1 was not reached due to logistical issues (also encountered in 51E2), and it was decided that a new unit would be created to excavate the entire Feature.

Unit 51I. Unit 51I was a 1 m (north-south) by 1.5 m (east-west) unit placed along the northern sidewall to determine if Moria and Lothlorien Walls continue north. The unit was excavated in two lots, the first of which consisted of a 10 to 30 cm thick layer of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and some chert and undressed limestone cobbles (0 to 25 cm). Possible walls were found in the middle of the unit, and a new lot was created at a soil change to determine if cobbles found in 51I1 were part of Moria and Lothlorien walls. Later excavations, however, determined that Rohan Wall and wall collapse is probably located along the eastern sidewall of the unit. 51I2 consists of a 5 to 10 cm thick layer of dark yellowish brown clay (10YR 4/6) with small chert and undressed limestone cobbles (0-5 cm). Moria and Lothlorien walls did not continue into unit 51I, but Rohan Wall was revealed more clearly along the eastern sidewall of the unit.

Unit 51J. Unit 51J was a circular unit with a 90 cm diameter located in both 51E and 51H, below 51E2 and 51H2. This unit was created to continue excavating Feature 1 as a combined unit. As discussed above, Feature 1 consisted of a very dark grayish brown clay (10YR 3/2) with few artifacts, unlike the 10YR 4/6 soil change that occurred around it. This unit was excavated in one lot, 30 to 60 cm deep. The unit and Feature 11 began at 90 cm in diameter at the top, then began decreasing in diameter starting at 40 cm below its surface. In total, Feature 1 was found to be about 75 cm deep. Charcoal was found at the bottom of the unit. The function of Feature 1 is not yet clear.

Unit 51K. Unit 51K was a 1 m (north-south) by 1.5 m (east-west) unit placed along the southern sidewall of 51G to determine if the limestone cobbles/blocks found in the southwest corner of 51G continue south. The unit was excavated in two lots, the first of which consisted of a 10 to 20 cm thick layer of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and some small chert and undressed limestone cobbles (0 to 5 cm). A wall appeared in the unit, running north-south and facing east-west against the slope, along the eastern sidewall of the unit, termed Gondor Wall. It connects to another wall found later, called Orthanc Wall, facing perpendicular to Gondor Wall, running east-west and located along the southern sidewall of 51G. Some limestone cobbles were found to the west (downslope) of Gondor Wall, but it was unclear at the time if they formed a wall, or if they were collapse from Gondor Wall. 51K2 was created at a soil change, and to determine if Gondor Wall went down further. This second lot, 10 to 30 cm thick, comprises of dark yellowish brown clay (10YR 4/6) with small pieces of undressed limestone (0 to 5cm). It was revealed that Gondor Wall did not have any more courses, but later excavations confirmed that what was previously described as collapse from Gondor Wall in the southern and southwestern parts of the unit is likely a wall called Mordor Wall (see Figure 6.19 for Mordor Wall and meeting of Gondor and Orthanc Wall).

Unit 51L. Unit 51L was a 1 m (east-west) by 1.5 m (north-south) unit placed along the western sidewall of 51C, running southwest, to determine if Rohan Wall continues south. The unit included one lot, about 10 to 15 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and chert and undressed limestone cobbles (0 to 25 cm). Rohan Wall continues to run south, with a small angle towards the east, and it was determined that the wall also goes through 51F, along the unit's eastern sidewall. Large ceramic pieces, including a large jar rim, were found in the southeast corner, about 6 cm below datum. Additionally, chert and limestone cobbles—probably the result of collapse— are present to the east (upslope) of Rohan Wall.

Unit 51M. Unit 51M was a 1 m (east-west) by 1.5 m (north-south) unit placed along the southern sidewall of 51L to determine if Rohan Wall continues to the south or southeast. The unit comprised of one lot, about 5 to 20 cm thick and consisted of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, chert and undressed limestone cobbles (0 to 10 cm), and small limestone inclusions. Rohan Wall is sparse— only two large limestone blocks with a few limestone cobbles— but is still able to be traced and continued southeast.

Unit 51N. Unit 51N was a 1 m (east-west) by 2 m (north-south) unit placed along the southern sidewall of 51K and western sidewalls of 51E and 51H to determine if Gondor Wall continues southeast and if the cobbles found in 51K are a wall or just collapse. The unit comprised of two lots, the first of which, 10 to 20 cm, consisted of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes and cores, and small chert and undressed limestone cobbles (0 to 5 cm). Gondor Wall continues. Additionally, another line of cobbles appeared in the western part of the unit. This line corresponded with a soil change, so a new lot was created. 51N2, 5 to 10 cm thick, consists of dark yellowish-brown clay (10YR 4/6) with large chert cobbles and undressed limestone (0 to 25 cm). Excavations revealed that Gondor Wall may be a part of some limestone cobbles found in the southwest corner of 51H, which suggests that Gondor Wall continues to the southeast (i.e. not just south, which it seems to be in 51N, where the wall is present along the entire eastern sidewall). Another limestone block was found in line with the two limestone blocks seen in 51N1, in the western side of the unit. It was unclear if these stones are collapse from Gondor Wall or created a new wall. I identified this alignment as a separate wall—Isengard Wall (see Figure 6.20 for Gondor and Isengard Walls). Many cobbles were also found in the southeast corner of the unit, between Gondor and Isengard Walls.

Unit 51O. Unit 51O was a 1 m (east-west) by 1.5 m (north-south) unit placed along the southern sidewall of 51M, running southeast, in order to determine if Rohan

Wall continues southeast. The unit comprised of one lot consisting of a 15 cm thick layer of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and many large chert and undressed limestone cobbles (0 to 25 cm). It is unclear if Rohan Wall continued southeast through this unit, as the entire unit was filled with limestone and chert cobbles. The large limestone block that was revealed in the southeast corner of 51M travels about 5 cm into 51O, but no other large blocks were found. Some small limestone blocks were found aligned toward the eastern sidewall of the unit that I believe might show the line of Rohan Wall (if it continued, which was not determined).

Unit 51P. Unit 51P was a 1.5 m by 1.5 m unit placed along the southern sidewalls of 51N and 51H (south of 51N and southwest of 51H) to determine if Gondor and Isengard Walls continued southeast. The unit was excavated in two lots, the first of which consisting of a 10 to 20 cm thick layer of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and some chert and undressed limestone cobbles (0 to 25 cm). Many small chert cobbles were also found in the southern part of the unit. Isengard and Gondor Walls appear to continue southeast, but a large amount of collapse was encountered in 51P1 obscuring the line of these walls. Based on these findings, I suggest that Isengard Wall was collapse from Gondor Wall. A new lot was created at soil change to determine if Isengard Wall was actually a wall. 51P2 consisted of a 5 to 20 cm thick layer of mainly dark yellowish-brown clay (10YR 3/2). Large limestone blocks were found at the bottom of the lot, forming Isengard Wall, which continued to the south-southeast. A new wall, called Mirkwood Wall, was found in the southwest corner of the unit. The wall is curved, with one side entering the southern sidewall and one entering the western sidewall, appearing to form a half-circle around a posthole or pit that was found in the southwest corner of the unit— called Feature 2. Charcoal was found in a screen from the soil of Feature 2 (which consisted of very dark grayish brown clay loam, 10YR 3/2). It was determined that excavations should continue to the west of the unit to see if Feature 2 is a pit like Feature 1, or a posthole.

Unit 51Q. Unit 51Q was a 1 m (east-west) by 2 m (north-south) unit placed along the eastern sidewall of 51O to determine if Rohan Wall is still present and, if so, if it continues southeast. The unit comprised of one unit, 10 to 15 cm thick, consisting of very dark grayish brown clay loam (10YR 3/2) with many artifacts and chert and limestone cobbles (0 to 5 cm). There is no indication that Rohan Wall continues. Instead, the entire unit is filled with chert and limestone cobbles and large pieces of ceramic—possibly indicated fill on top of a platform. Due to time constraints, excavation did not continue in this area. Additionally, investigating this area did not cohere with my goal of locating walls. There is a "slit" of soil coming off the eastern sidewall of the unit that does not contain cobbles, but the reason for the formation is unclear.

Unit 51R. Unit 51R was a 0.5 m (north-south) by 2.5 m (east-west) m unit placed along the eastern sidewall of 51G and the western sidewall of 51I. The unit comprised of one 20 to 25 cm thick lot that consisted of very dark grayish brown clay loam (10YR 3/2) with large sherds, flakes, cores, and some small chert and undressed limestone inclusions (0 to 5 cm). The entire unit is also filled with limestone block collapse the remnants of Orthanc Wall (Figure 6.21). Orthanc Wall appears to connect to Gondor and Rohan Walls, and forms the northernmost wall of the research area.

Unit 51S. Unit 51S was a 1 m (east-west) by 1.5 m (north-south) unit placed along the western sidewall of 51P to find the western edge of Feature 2 and determine if other walls are present to the west. The unit comprised of one 5 to 20 cm thick lot that consisted of very dark grayish brown clay loam (10YR 3/2) with some large sherds. Feature 2 continues into this lot, including the curved wall surrounding it (Mirkwood Wall). A large amount of collapse was found in the center of the unit, but it is unclear if it originally formed a wall of its own, or if it is collapse from Isengard Wall. In case it is a wall, it was named Valinor Wall.

Unit 51T. Unit 51T was a 1 m by 1 m unit placed along the northern sidewall of 51B to determine if the redeposited domestic fill found in the northeast portion of 51B/2 continues north and if any other walls were present. The unit comprised of one 15 to 30 cm thick lot that consisted of very dark grayish brown clay loam (10YR 3/2) and large sherds, flakes, and cores. Some limestone blocks appeared at a soil change, where excavations stopped, that may be from the collapse of Orthanc Wall or Rohan Wall. Some of Orthanc Wall—or Orthanc Wall's collapse—can be seen along the northern sidewall of the unit.

6.4 Terraforming

Previous excavations in this area were conducted by Jane E. Millar (2016) during the 2015 field season and C. Ted Nelson (Blitz et al. 2012) in the 2011 field season (Figure 6.22). Those excavations targeted magnetic anomalies identified by a 2011 gradiometer survey (Walker 2012) of the northern settlement zone – a residential district containing patio-focused groups to the north of the civic center. Millar's excavations revealed terraforming (Units 14K and M) in the western portion of the settlement. In Unit 14K, yellow clay turned to the dense white clay called *yeso* about 50 cm bs. Best seen in the south profile of 14K, the clay was cut to form low berms perpendicular to the slope and redeposited behind it. A similar construction was found in Unit 14M, where *yeso* was found at varying levels throughout the unit, first appearing just 35 cm below surface in the northeast corner and as deep as 55 to 60 cm below surface in areas of the south profile. The dense, impermeable *yeso* stratum appears to have been cut and redeposited much like that seen in Unit 14K. Once excavations entered *yeso*, artifact densities decreased immediately. Only a single utilized flake was recovered from the berm. These excavations suggest that drainage channels were common along the western edge of the northern settlement, possibly forming a large field system associated with berms, stone terraces and other features. Here, the land gently slopes downward towards a drainage that emanates from the site's aguada.

Unit 14K. Unit 14K was a 1x2 m unit oriented N60˚E, laid to investigate one of the weak positive magnetic rectangular patterns that make up the larger interlocking field system in the southwestern portion of the drainage near the aguada. Dark brown clay and humus (Stratum A, 10YR 3/2) transitioned to lighter, more compacted yellow clay (Stratum B, 2.5Y 5/4-5/6) at 22 to 25 cmbs. Midway through Stratum B, excavation had to be postponed when the unit reached the water table, raised by recent rains. Unit 14K was bailed, left to dry, and reopened twice due to heavy rains and prolonged drainage of rainwater. Overall, Actuncan is well-drained because rainwater percolates down to the clay dome underneath the site and exits onto the lower slopes of the hilltop. However, the placement of this unit near the *aguada* outtake meant that the pit was constantly filling with water. About 50 cmbs the yellow clay transitioned to dense white clay (Stratum D) called "yeso" by Santos Penados Jr. in the field and later confirmed by Anabel Ford. Best seen in the south profile (Figure 6.23), the clay forms low berms perpendicular to the slope, perhaps evidence of terraforming. The clay forming these possible berms was uniformly dense and white, while the natural clay was mottled yellowish-brown and blocky. The admixture of the two matrices, presumably through cultural processes, is interpreted as Strata C (Figure 6.24). If such differences do indicate modifications to the natural clays with prehistoric cut-and-fill events, this could explain the source of the magnetic signature.

Unit 14M: Unit 14M lay 20 m northeast of Structure 90, on a gentle slope north of Group 7. This 1 x 2 unit with its long axis oriented east-west was placed to investigate a weakly positive rectilinear magnetic signature. The initial stratum of dark brown clay and humus (Stratum A, 10YR 3/2) was 20 to 25 cm thick, after which soil transitioned to lighter yellow clay (Stratum B, 2.5Y 6/4). Excavations struck grayish-white clay or *yeso* (Stratum D, 2.5Y 7/2-6) at varying levels throughout the unit (Figure 6.25). It first appeared just 35 cmbs in the northeast corner, but in areas of the south profile it lay as deep as 55 to 60 cmbs. This dense, impermeable stratum appears to have been manipulated in a cut-and-fill terraforming event. The morphology is best defined in the west side wall, which shows a swale filled with mottled white and yellow clay (Stratum C, 2.5Y 6/4 and 2.5Y 7/2), then a possible berm of solid grayish-white clay (Stratum D) with no inclusions (Figure 6.26). The latter was easily identifiable from the surrounding natural soil by its homogeneity and clear profile morphology, which contrasted with the mottled, blocky clays found at the sterile level of other excavations in the southwestern section of the Northern Settlement Zone. Dense, sticky gley soils (Stratum E) appeared around 90 cmbs, and excavation ceased at 130 cmbs because corresponding strata had proven sterile in previous units.

Artifacts in upper strata included ceramic, lithic, obsidian, and jute, probably washed down from the structures uphill. Once the excavations entered *yeso*, artifact densities decreased immediately. A single utilized flake was recovered from the dense white clay in the possible berm, perhaps supporting the interpretation of prehistoric manipulation of the deposits. Micromorphology, soil chemistry, and flotation samples were taken throughout. The manipulation of the *yeso* could account for the magnetic anomaly.

6.5 Water Channel System

Excavations occurred north of Group 7 between Structure 90 and a possible buried structure identified in the magnetometer data. 2015 excavations, conducted by Jane Millar, revealed a sloping terrace wall in Unit 14N (Cedar Wall), leading to the later uncovering of two other plastered walls. The façade of Cedar Wall, as well as Willow and Mahogany Walls in Units 14S and 14V excavated in 2016, face downslope and angle upward towards the slope (see Figure 6.2 for excavation area). Water likely would have been caught between these walls and carried west-northwest. It is possible that the construction and placement of these walls suggest this structure may have been a water drainage system (see Figure 6.27 for Plan View).

Operation 14 Unit N: Unit 14N was a 1x1 m unit oriented north-south, laid to investigate a linear dipole signature running between Structure 90 and a possible buried structure identified in the magnetometer data. The linear signature ran east to west perpendicular to the slope, perhaps representing a terrace wall or platform edge between the two structures. Below the first 20 to 25 cm of humus and dark brown clay (AU1, 10YR 3/2) lay more compacted and mottled clay rich in natural and anthropogenic inclusions (AU2, 2.5Y 4/4) loosely termed "unknown occupation" (Figure 6.28) Stratum B was only 5 to 15 cm thick, and beneath it soil transitioned to yellow fill of a softer texture than clays above (Stratum C, 2.5Y 5/6-6/6), which was much less dense and blocky than the natural clay encountered in other units at this depth. Just below the transition between Strata B and C, a zone of reddish mottled fill, possibly representing a burning event (Stratum D, 7.5YR 5/6) appeared in the north and east profiles, and was sampled for flotation given the possibility that this was an ancient occupation surface. Strata A, B, and the top ~20 cm of C yielded ceramic, lithic, jute, and a single piece of marine shell, but most of the yellow fill was sterile.

Cedar Wall, a terrace wall made of large cut-limestone blocks covered in plaster and tilting noticeably with the slope, appeared about ~1m below surface, buried by Stratum C and sitting on natural deposits (Stratum E, 10YR8/1). Its outer face—the side facing downhill—met the unit profile at a 40˚ angle, sloping in the same direction as the natural topography but much steeper, the natural slope being between 10˚ and 25˚. The wall ran east-west across the unit. It was constructed of one to three courses of stone stacked end-to-end so that their largest faces created the wall façade (Figure 6.29). A small area of tamped sascab named Pearl Floor (Stratum D) lay just inside the wall, on its south side. Pearl Floor was 7 cm thick at most, with another 3 cm of darker soil underneath, but no discernable ballast. A single obsidian blade, perhaps indicative of activities on the terrace created by Cedar Wall, was recovered during the removal Pearl Floor. The excavation ceased when sterile, friable grayish-white clay had been reached on both sides of the wall. Therefore, the wall sits on *yeso*. The source of the linear magnetic signature is most certainly the digging and filling event associated with Cedar Wall.

Unit 14P. Unit P abutted the eastern sidewall of Millar's Unit 14N (see Figure 6.27), which had been cleaned of backfill at the beginning of the season. Cedar Wall lay in the middle of her 1 by 1m unit with the wall continuing into the western profile. Unit 14P was created to determine whether the wall, originally thought of as a stone terrace, connected to a buried structure to the southeast. Unit 14P was excavated in seven lots. Lots 1-5 were excavated to find the top of Cedar Wall, which according to Millar's excavations should have been about 1 m below the surface. When Cedar Wall was not found, we excavated down to sterile soil, which occurred around 130 cm bs.

The stratigraphy encountered in Unit P was very similar to that seen in 14N with a large amount of yellow and mottled clay fill with a fairly soft texture and very few artifacts. While no structural elements were found, Unit P was still excavated down to and though 5-10 cm of *yeso*. Because no structures were found and the *yeso* contained only a few artifacts, it was decided that excavations should stop. It is unclear how far down the *yeso* layer goes.

Unit 14S. Unit 14S was created as a western extension to Unit 14N in the hopes of uncovering more of Cedar Wall. Unit S had strata similar to Op14N, but excavations ended at the beginning of the *yeso* layer between 100 and 120 cm bs. Unit 14S was excavated in four lots. Lot 1 was the humus root zone, Lot 2 was light brown clay with many small (0-1 cm) limestone inclusions, and Lot 3 was found to be yellow, soft clay fill. The presence of six human tooth fragments, one complete human molar and nine shell beads suggests it may have contained a burial or cache. The teeth did not show any evidence of roots and, as such are likely from a small child or infant who did not have their adult teeth. No analysis has been conducted on these teeth yet. It is unclear as to whether they represent a tooth cache, or if the teeth are the sole remains of a child burial since child and infant bones are rarely preserved in acidic soil. The shell beads have not been analyzed and, as a result, it is unclear what species these shells belong to. The teeth were found around 92 cm bd (74 cm from the eastern sidewall and 10 cm from the northern sidewall), while the beads were found about 89 cm bd (79 cm from the eastern sidewall and 61 cm from the northern sidewall). Fragments of plaster suggestive of Cedar Wall or another construction were found 10-15 cm below the human teeth and shell beads. It is unclear what the connection (if any) there is between the possible cache or burial and the architecture below it.

More of Cedar Wall was revealed in the yellow soft clay of Lot 4, and a 4 L soil sample (sample #98) was taken in front of the northwest portion of it and along the northern sidewall of the unit for further analysis. Excavations also revealed another wall, Willow, the top of which we originally thought was Millar's Pearl Floor. The remnants of a new plaster floor, Opal, were also found between Willow (located to the south) and Cedar (located to the north) Walls, so the area was left unexcavated. Our excavations found that Cedar Wall was broken in two different directions. Therefore, it was divided into Cedar (found in the middle wall of Unit S and continuing into Unit N) and Ash (found going into the northern sidewall of Unit S) Walls. As in Unit N, all walls appear to sit atop the *yeso* layer.

Unit 14V. Unit V was created as a northern extension of Unit S to determine how far north Ash Wall went and if any other walls could be found. The unit consisted of five lots with stratigraphy resembling that found in Unit S directly south. A possible posthole was found below the humus root zone (Lot 1) in the southwest corner of the west sidewall in Lot 2 at about 25 cm bs. This 25 cm (facing north-south) by 20 cm (east-west) posthole appears to have been the bottom of the post mold. It terminated just above the soil stratum that covered Cedar, Ash, and Willow Walls, thus postdating the construction. The entirety of the posthole (excavated as Lot 3) was between 20 and 25 cm deep. Excavations then continued into the yellow soft clay fill also found in Unit S at this level just above the appearance of architecture. The northern end of Ash Wall and a new wall to the north, Mahogany, were found between 75 and 85 cm bs and continued down to the *yeso* layer. Mahogany Wall started at the south sidewall of Unit V and continued north for 40 cm and, like Ash Wall, continued into the west sidewall of the unit. Excavations did not excavate into the walls, but that will be a goal for future excavations. Based on the general surface appearance, however, it appears that the walls were made of blocks of plaster, which have now become heavily degraded (Figures 6.30 and 6.31).

6.6 Chich Cobble Mounds

Operation 52 excavations were conducted to the east of the Actuncan site core, along the western edge of the Mopan River, where *chich* (or cobble) mounds have previously been identified by survey and LiDAR (refer to Figure 6.3). Vertical excavations were conducted in this area, specifically a unit on the western slope of what has been named Cobble Mound 1 (52A; Figure 6.32), a unit a meter east of Cobble Mound 1 lays in between multiple cobble mounds (52B; Figure 6.33), and a unit on top of a mound called Cobble Mound 2 (52C; Figure 6.34) to determine the stratigraphy of the area and to collect soil samples for future macrobotanical analysis. Unit 52A revealed a humus layer with cobbles, a sandy loam layer underneath with few artifacts or inclusions, and a darker sandy loam layer with more chert cobbles as well as some charcoal. 52B was placed close to Cobble Mound 1 in the space between it and other cobble mounds to examine the stratigraphy inside the space created by the cobble mounds. The unit consisted of a humus layer with few artifacts present. A floor, July Floor (Figure 6.35), constructed of many chert cobbles and artifacts was found below the humus. A layer of fill containing many artifacts was encountered below the floor. Soil samples (both in Whirl-Pak bags and as flotation samples) were taken throughout excavations. Analysis has not been done on these soil samples, and more excavations are necessary in this area to gain a clear idea of the activities that occurred here. The appearance of a floor and the large quantity of artifacts, however, suggest that people may have lived in this area. Unit 52C comprised mainly of chert and limestone cobbles and lithic debitage, with the occupation area sitting atop a natural yellow sandy soil.

Unit 52A. Unit 52A was a 1.5 m by 1.5 m unit placed along the edge of Cobble Mound 1 to examine the stratigraphy along the mound's edge and to excavate below the humus layer to reach a more pristine context for botanical sampling (see Figure 6.36 for complete stratigraphy). The unit comprised of three lots, the first of which consisted of a 10 to 30 cm thick layer of very dark grayish brown clay loam (10YR 3/2) with very few artifacts and some small limestone and cobble inclusions (0 to 5 cm). A new lot was created when the soil changed. 51A2, a 10 to 20 cm thick layer, consisted of a dark yellowish brown sandy loam (10YR 3/4) with very few artifacts or inclusions. 51A3, a 5 to 10 cm thick layer, was created at another soil change that consisted of brown sandy loam (10YR 5/3) with small limestone inclusions and very few artifacts. More chert cobbles (0 to 20 cm) appeared in this lot, particularly in the southwest corner. While not at the same depth as the cobbles on the modern surface that make up the bulk of the mound, it is probable that these cobbles are part of early constructions of the mound. Excavations ended due to time constraints.

Unit 52B. Unit 52B was a 1.5 m by 1.5 m unit placed 1 m away from Cobble Mound 1 to examine the stratigraphy between cobble mounds and to excavate below the humus layer to reach a less disturbed context to sample for botanical materials (See Figure 6.37 for complete stratigraphy). The unit comprised of three lots, the first of which was a 20 to 30 cm thick layer consisting of very dark grayish brown clay loam (10YR 3/2) with some small limestone inclusions and chert cobbles (0 to 20 cm) and very few artifacts. Excavations ended at a soil change. 51B2 consists of a 15 to 20 cm thick layer of dark yellowish-brown clay loam (10YR 3/4) with many cobbles (0 to 20 cm), small limestone inclusions, and many artifacts, including a broken groundstone *metate*. The cobbles created a floor, July Floor, which appeared shortly after the lot was begun (refer back to Figure 6.37 for July Floor and area below July Floor). A new lot was created after the removal of the cobbles and a soil change. 51B3 is a 10 to 15 cm thick layer that consists of 10YR 4/4 clay loam with no inclusions but many artifacts, including large ceramic sherds that may refit into a partial vessel located in the northwest corner of the unit. Excavations ended after the recovery of these sherds due to time constraints.

Unit 52C: Unit 52C was a 1 (N-S) x 1.5 (E-W) m test unit in the chich cobble mounds, along the floodplain of the Mopan River, placed specifically on top of one cobble mound to examine the stratigraphy and collect soil samples. The unit was comprised of three lots, the first of which (52C1) was a 40 to 45 cm thick layer consisting of very dark grayish brown clay loam (10YR 3.2) with small to medium-sized chert and limestone cobbles (mostly between 10-20 cm in size). A large amount of lithic and ceramic sherd artifacts were found, as well as some jute. Excavations ended at a soil change. Lot 52C2 was 50 to 55 cm thick and consisted of dark brown clay loam (10YR3/3) with small to medium-sized chert and limestone cobbles similar to those found in 52C1. Fewer artifacts, especially ceramics, were found in this lot, but there were more jute than in the previous lot. Lot 52C3 was 15 to 20 cm thick and consisted of brown sandy loam (10YR5/3) with small to medium-sized chert and limestone cobbles, but the cobbles were smaller (5-10 cm) than those found in the lots above. Very few artifacts were found, but there was an increase in jute, and the lot sits atop a sandier, more yellow (yellowish brown 10YR 5/6) soil with no cobbles. It was determined that this was natural soil and excavations were ended after 52C3 (see Figures 6.38 and 6.39 for stratigraphy).

A total of 15 soil samples were collected from 52C for macrobotanical and pollen analysis. 4L flotation samples (Samples #27, 29 and 30) and pollen samples (Samples #31-42) were collected in 200mL Whirl-Pak bags from each lot – one flotation sample per lot and four pollen samples per lot. Pollen samples were taken from all sidewalls in the three lots, starting from the bottom and moving upwards to avoid contamination. One C14 sample (Sample #28) was also collected from 52C1.

6.7 Analytical Units

The following section describes the individual analytical units defined in Units 14Q through BA; Units 51A through T; Units 14K and 14M; Units 14N, 14P, 14S and 14V; and 52 A through B. The descriptions are separated into three main constructions: 1) Agricultural Plot System 1 (Op. 14); 2) Agricultural Plot System 2 (Op. 51); 3) Terraforming; 4) Water Channel System, and 4) *Chich* Cobble Mounds (Op. 52). For a chart of Analytical Units, see Tables 6.1, 6.2 and 6.3 for Operation 14, Table 6.4 for Operation 51, and Table 6.5 for Operation 52.

Agricultural Plot System 1

Stark Wall Humus and Fill – AU1. Lots Excavated: 14Q1, 14R1, 14T1, 14U1, 14W1. This analytical unit describes modern soil development (humus layer), as well as (presumed) Terminal Classic domestic fill mixed within the humus layer. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 10 and 50 cm thick depending on the slope found in the five different units. Areas with a deeper humus layer included construction fill that contained a substantial amount of large sherds and cores, as well as chert cobbles and undressed limestone inclusions, ranging between 0-50 cm in size. Stark Wall was located in the lower layer of humus that contained fill. The fill, located to the west of Stark Wall, was likely used to support the wall and prevent it from toppling when water ran downslope. In addition, it is likely that the fill was created from domestic refuse due to the amount of sherds and cores. Based on its depth and preliminary ceramic investigation, AU1 probably dates between the Late and Terminal Classic periods.

Stark Wall Fill – AU2. Lots Excavated: 14Q2. The matrix was a brown clay (10YR 4/3) loam located below the humus layer at the same level as Stark Wall and was roughly 20 cm thick. The same large artifacts and cobbles seen in the Lot Q1 fill (i.e. AU1) was found in AU2, as well as chert cobbles and undressed limestone ranging from 0-25 cm in size. It should be noted that this fill was not found in all of Lot Q2, but only the southern half of the unit. The northwest corner did not have any fill layer. At the bottom of the fill, the soil changed to brown clay and gray mottled clay.

Stark Wall Fill and Natural Soil – AU3. Lots Excavated: 14Q3, 14R2, 14T2, 14U2, 14W2. This analytical unit was comprised of a dark yellowish brown (10YR4/6) clay between 20 and 50 cm thick. Thickness was highly variable based on where the humus layer ended directly above it and the location of fill in the unit. The fill in this analytical unit was similar to the fill found in AU1 and AU2 with sherds and cores, and inclusions of 0-10 cm in size, but artifacts were far less prevalent. The bottom of Stark Wall was revealed in this analytical unit.

Gray Soil under Stark Wall – AU4. Lots Excavated: 14Q4. This was a matrix of light gray (10YR7/2) clay mottled with brownish yellow (10YR6/6) clay found surrounding Stark Wall in the northwest and northeast portion of Unit Q. The clay was between 10 and 15 cm thick, except in the northwest corner of Unit Q where it was about 50 cm thick. Very few artifacts were found, and it appears that the clay was built up from natural soil deposited from water draining though and around Stark Wall.

Brown Soil under Stark Wall – AU5. Lots Excavated: 14Q5, 14Q6. This analytical unit consists of a dark yellowish brown (10YR4/6) clay roughly 40 cm thick. The majority of the AU was natural soil with only a few artifacts. It was located below the fill of Stark Wall and associated matrix.

Humus Layer with Cobble Fill outside of the System Boundary– AU6. Lots Excavated: 14AK1, 14AZ1. This analytical unit describes modern soil development (humus layer) without redeposited domestic fill and no associated walls. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 10 and 35 cm thick depending on the slope in/between the units. This layer contained a substantial amount of large chert and undressed limestone cobbles (0 to 50 cm), which may have supported the western portion of the agricultural system as it does not appear to be part of any plots, but is located directly downslope from the western-most boundary walls.

Humus and Redeposited Domestic Fill within Wall Boundaries – AU7. Lots Excavated: 14X1, 14Y1, 14AA1, 14AB1, 14AC1, 14AD1, 14AE1, 14AF1, 14AG1, 14AH1, 14AI1, 14AJ1, 14AM1, 14AN1, 14AO1, 14AP1, 14AQ1, 14AR1, 14AT1, 14AV1, 14AW1, 14AX1, 14AY1, 14BA1. This analytical unit is a layer of modern soil development (humus layer) mixed with some (presumed) Terminal Classic domestic fill intruding into the humus layer. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 10 and 40 cm thick depending on the slope found in the different units. This layer contained a substantial quantity of large sherds and cores, as well as chert cobbles and undressed limestone inclusions ranging from 0 to 20 cm in size. The tops of walls from the agricultural system appeared at the bottom of this layer. All of these lots have at least one wall in them. The fill, located towards the inside of the system, may have been used to support the walls and/or create better soil fertility. In addition, it is likely that the fill was created from domestic refuse due to the quantity of sherds and cores. Based on its depth and preliminary ceramic investigation, AU1 probably dates to the Late and Terminal Classic time periods.

Humus and Platform Fill – AU8. Lots Excavated: 14AA1, 14AC1, 14AI1, 14AM1, 14AO1. This analytical unit consists of a very dark grayish brown (10YR 3/2) clay loam humus between 15 and 40 cm thick. The area contained a large amount of undressed limestone and chert cobbles and fewer artifacts than in other humus layers in the agricultural plot system. Excavations in this analytical unit ended once the base of the excavation unit was covered entirely in cobbles. It was determined that certain areas of 14AA, 14AC, 14AI, 14AM, and 14AO form a 2 by 2 m platform, but it should be noted that other areas of these units also were excavated as part of analytical unit 2. Based on its depth and preliminary ceramic investigation, AU3 probably dates to between the Late and Terminal Classic time periods.

Unknown Occupation to the West of Reed Wall – AU9. Lots Excavated: 14AC2, 14AM2, 14AQ2. This analytical unit consisted of a dark yellowish brown clay (10YR 4/6) with small undressed limestone inclusions and very few artifacts, mostly between 20 and 30 cm thick. Reed Wall is a 4 m long wall forming the eastern-most edge of the agricultural plot system (as well as the platform) and was constructed in three courses, two of which are below the humus layer, at a lower depth than the other walls. This analytical unit is the soil that covered the last two courses of Reed Wall.

Unknown Occupation to the South of Mormont Wall – AU10. Lots Excavated: 14AI2. This analytical unit was comprised of a dark yellowish-brown clay (10YR 4/6) with small undressed limestone inclusions and very few artifacts. Mormont Wall is a 4 m long wall forming the southern-most edge of the agricultural plot system (as well as the platform – called Platform 1 – and was constructed of three courses of stone, two of which are below the humus layer and at a lower depth than the other walls. This analytical unit is the soil that covered the last two courses of Mormont Wall. This analytical unit was about 30 cm thick.

Humus and Redeposited Domestic Fill above Yeso Feature – AU11. Lots Excavated: 14AL1, 14AS1, 14AU1. This analytical unit describes modern soil development (humus layer), as well as Late and Terminal Classic domestic fill mixed within the humus layer. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 20 and 30 cm thick. This layer contained a substantial quantity of large sherds and cores, as well as chert cobbles and undressed limestone inclusions ranging between 0 and 20 cm in size. Walls began appearing near the bottom of this layer. All of the lots in this analytical unit have at least one wall in them. The area of redeposited fill was located towards the inside of the system and may have been used to support the walls and/or create better soil fertility. In addition, the redeposited fill may have been created from domestic refuse based on the amount of sherds and cores. Based on its depth and preliminary ceramic investigation, AU6 probably dates to the Late and Terminal Classic time periods.

Unknown Occupation Surrounding/Below Yeso Feature – AU12. Lots Excavated: 14AL2, 14AL3, 14AL5, 14AS2, 14AU2. This analytical unit consisted of a dark yellowish-brown clay (10YR 4/6) with small undressed limestone inclusions and very few artifacts. Its matrix is similar to AU4 and AU5. *Yeso* (Feature 11) appeared at the soil change separating AU6 and AU7, and this analytical unit represents the soil excavated to uncover all of the *yeso* feature. The feature did not cover of the entire base of the lots in AU7. Excavations revealed that Feature 11 was about 5 cm below which the matrix resembles that in AU7. None of the feature was excavated. The analytical unit was between 10 and 30 cm thick in 14AL and 20 to 50 cm thick in 14AS and 14AU.

Posthole Associated with Yeso Feature – AU13. Lots Excavated: 14AL4. This analytical unit consisted of a very dark grayish brown clay loam similar to the humus encountered over the remainder of the agricultural plot system, but without redeposited domestic fill or cobbles. This analytical unit was a posthole located next to Feature 11's southeastern edge. The posthole, Feature 12, was about 10 cm in diameter and 2 cm deep. It may have originally been deeper, but our excavations did not recognize the difference in matrix where it penetrated the humus layer.

Agricultural Plot System 2

Humus Layer – AU1. Lots Excavated: 51G1, 51K1. This analytical unit describes the modern soil development (humus layer) outside of Orthanc and Gondor Walls. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 10 and 20 cm thick. This layer did not contain the quantity of fill and collapse evident in the humus layer of other parts Agricultural Plot System 2, and it is likely that the two lots containing this analytical unit are located beyond the agricultural plots. It should be noted, however, that while the majority of 51K1 and 51G1 contain this analytical unit, Gondor and Mordor Walls penetrate slightly into 51K1 along the eastern and southern sidewalls and Orthanc Wall goes penetrates into 51G1 along the southern sidewall. In addition, some of the platform that is bounded by Gondor Wall is also present along the eastern sidewall of 51K1.

Humus Layer with Cobble Fill outside of the System Boundary– AU2. Lots Excavated: 51O1, 51Q1. This analytical unit describes a humus layer without redeposited domestic fill and no associated walls. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 10 and 35 cm thick depending on the slope in the unit. This layer contained a substantial amount of large chert and undressed limestone cobbles (0 to 50 cm), which may have supported the western portion of the agricultural system. This area does not appear to be part of any plots and is located directly upslope from the eastern-most boundary wall—Rohan Wall.

Humus, Redeposited Domestic Fill and Wall Collapse – AU3. Lots Excavated: 51A1, 51B1, 51B2, 51C1, 51F1, 51I1, 51L1, 51M1, 51N1, 51P1 51S1, 51T1. 51R1. This analytical unit describes an area of modern soil development (humus layer) mixed with (presumed) Terminal Classic domestic fill. The matrix was a very dark grayish brown (10YR 3/2) clay loam humus that ranged between 10 and 30 cm thick depending where on the slope the excavation units were located. This layer contained a substantial quantity of large sherds and cores, as well as chert and undressed limestone cobbles, ranging between 15 and 25 cm thick. Walls began appearing towards the bottom of the layer. All of these lots, except 51C1, have at least one wall in them. The redeposited fill, located towards the inside of the system, may have been used to support the walls and/or create better soil fertility. In addition, I determined that the fill was created from domestic refuse based on the quantity of sherds and cores recovered. The area was poorly preserved due to the sharp slope and natural processes of erosion occurring over the years. It is likely that many cobbles found in these lots derived from collapsing walls. Based on its depth and preliminary ceramic investigation, AU3 probably dates to the Late and Terminal Classic periods.

Humus and Platform Fill – AU4. Lots Excavated: 51A1, 51D1, 51E1, 51H1, 51K1, 51N1, 51P1. This analytical unit consisted of a very dark grayish brown (10YR 3/2) clay loam humus between 15 and 40 cm thick. The area contained a large amount of undressed limestone and chert cobbles and fewer artifacts than in the humus layers over other parts of the agricultural plot system. Excavations in this analytical unit ended once cobbles covered the base of the unit. At the base of these lots a platform of unknown size—it was not fully excavated—similar to that in Agricultural Plot System 1 was identified. Based on its depth and preliminary ceramic investigation, AU4 probably dates to the Late and Terminal Classic periods.

Unknown Occupation to the West of Rohan Wall – AU5. Lots Excavated: 51C2, 51F2, 51I2. This analytical unit consisted of a dark yellowish brown clay (10YR 4/6) with small undressed limestone inclusions and few artifacts, mostly between 10 and 20 cm thick. Rohan Wall is a 4 m long wall forming the eastern-most edge of the agricultural plot system, and is the only wall encountered in this analytical unit. No wall was encountered in 51C.

Unknown Occupation around Isengard and Gondor Walls – AU6. Lots Excavated: 51N2. This analytical unit was comprised of a dark yellowish-brown clay (10YR 4/6) with small undressed limestone inclusions and very few artifacts, mostly between 20 and 30 cm thick. Isengard Wall is a 2 m long wall forming the western-most wall running north-south that was excavated. Unit 51N contains both Isengard and Gondor Walls, and probably contains the beginning of a new plot, but excavations in this western portion of the agricultural plot were ended due to time constraints.

Unknown Occupation outside the System Boundary – AU7. Lots Excavated: 51G2, 51K2. This analytical unit consisted of a dark yellowish brown clay (10YR 4/6) with small undressed limestone inclusions and very few artifacts, about 55 cm thick. This area contains part of Orthanc Wall, along the southern sidewall of unit 51G; however this analytical unit also excavated below the one-course wall. Orthanc Wall was the northern-most wall in the system.

Feature 1 Pit – AU8. Lots Excavated: 51E2, 51H2, 51J1. This analytical unit consisted of a very dark grayish brown clay loam (10YR 3/2) similar to the humus encountered in the rest of the agricultural plot system, but without the any evidence of redeposited domestic fill or cobbles. These excavations dug into a pit containing large pottery sherds and charcoal, both at its bottom. The pit is located in what appears to be the middle of the possible platform. A circle of cobbles surrounded the opening of the pit. Feature 1 is a circle with a 90 cm diameter at the top of the pit, then slowing decreasing in diameter starting at 40 cm below surface. This analytical unit and Feature 1 were about 75 cm deep.

Feature 2 Pit – AU9. Lots Excavated: 51P2, 51S1. This analytical unit consisted of a very dark grayish brown clay loam (10YR 3/2) similar to the humus in the rest of the agricultural plot system, but without the same type of redeposited domestic fill or cobbles (similar to AU8/Feature 1). This pit contained a few large pottery sherds and charcoal, as well as an oval piece of slate decorated with an engraved geometric design, all at the bottom, and was located to the west of Isengard Wall and south of Valinor Wall. A circle of cobbles surrounded the opening of the pit, called Mirkwood Wall. Due to time constraints, only the northern portion of the feature was excavated, creating a half-circle, but it is likely that it formed a full circle like Feature 1. Feature 1 is a circle with a 90 cm diameter running east-west, with 60 cm excavated running north-south (it is likely that the Feature is 90 cm in diameter in total). This analytical unit and Feature 2 were about 20 cm deep.

Terraforming

Humus – AU1. Lots Excavated: 14K1, 14M1. The humus consists of a dark brown (10YR3/2) clay loam that contained undressed limestone inclusions between 0 and 1 cm in size. The layer was between 20 and 25 cm thick.

Yellow Clay – AU2. Lots Excavated: 14K2, 14K3, 14K4, and 14M2. The humus layer transitioned to a lighter yellow clay (2.5Y6/4) with no inclusions. The layer was around 20 cm thick.

Mottled Clay – AU3. Lots Excavated: 14K5, 14M3, 14M4. This layer consisted of mottled white and yellow clay colored both 2.5Y7/2 and 2.5Y6/4. The layer was around 10 cm thick.

*Yeso – AU4. Lots Excavated: 14M5, 14M6.*Excavations struck grayish-white clay or *yeso* (2.5Y7/2 and 2.5Y7/6) with no inclusions. In 14M, it appeared 35 cm bs in the northeast corner of the unit, but in areas of the south profile it lay as deep as 55 to 60 cm bs. In 14K, *yeso* appeared about 50 cm bs.

Natural Clay/Yeso – AU5. Lots Excavated: 14K6, 14K7, 14K9. In 14K, excavations continued further down than in 14M, where soil turned a darker brown (10YR7/2*)* with a mix of white yeso. This layer was between 25 and 50 cm thick.

Gleysol – AU6. Lots Excavated: 14M8. Excavations in 14M continued until gleysol was hit, colored GLEY I 10Y7/2, about 120 cm bs. These excavations did not continue past gleysol.

Water Channel

Humus above Drainage System – AU1. Lots Excavated: 14N1, 14P1, 14S1,14V1. The humus consists of a dark brown (10YR3/2) clay loam that contained undressed limestone inclusions between 0 and 1 cm in size. The layer was between 20 and 40 cm thick.

General Occupation above Drainage System – AU2. Lots Excavated: 14N2, 14P2, 14S2, V2. This analytical unit consists of a mottled light brown (2.5Y4/4) clay with small (0-1 cm) undressed limestone inclusions. It ranged between 10 and 20 cm thick.

Posthole – AU3. Lots Excavated: 14V3. Below 14V2, a very dark grayish brown (10YR3/2) clay loam, similar to the humus layer above it, filled a hole in the southwest corner of Unit V. The posthole continued into the southwest corner of the west sidewall of Unit V. The bottom of the posthole was placed just above the soil stratum that covered Cedar and Mahogany Walls (see AU11). This analytical unit was between 20 and 25 cm thick.

Fill above Buried Walls – AU4. Lots Excavated: 14N4, 14N5, 14N6, 14P3, 14P5, 14P6, 14S3, 14V4. This layer consists of a yellow (2.5Y5/6 and 2.5Y6/6) soft clay fill between 10 and 70 cm thick with Unit P containing the thickest stratum (50-70 cm). The fill was located between the general occupation layer and the soil stratum located above the walls, which might be part of a drainage system. In addition, this was the layer in which six teeth and nine shell beads were found in 14S3.

Red Clay Feature above Buried Walls – AU5. Lots Excavated: 14N3, 14P/4. This analytical unit contains mottled reddish (7.5YR5/6) clay down to about 50 cm. Located 70 cm east of Unit 14P's western sidewall and 65 cm south of the northern sidewall, it was only found in the northwest corner of the unit and may have resulted from some kind of burning event.

Soil or Fill Covering Buried Walls – AU6. Lots Excavated: 14S/4; V/5. This matrix consisted of yellow (10YR8/6) soft clay fill between 15 and 65 cm thick depending on where the tops of the walls of the possible drainage system were discovered. The layer covered Willow, Cedar, Ash, and Mahogany Walls and Opal Floor. It contained very few artifacts.

Yeso Associated with Buried Walls – AU7. Lots Excavated: 14N7, 14P/7. This layer contains very soft and smooth white (10YR8/1) clay that has been identified as being made of gypsum. No walls were found in Unit 14P and, as a result, the *yeso* was excavated to find sterile soil. It is believed that the walls of the possible drainage system sits atop the *yeso*. As it was decided that excavations should stop after about 5-10 cm of excavations into this clay, so it is unclear as to how far down this analytical unit goes.

Chich Cobble Mounds

Humus along and beside Cobble Mound 1 – AU1. Lots Excavated: 52A1, 52B1. This analytical unit consisted of a very dark grayish brown clay loam (10YR 3/2), between 10 and 30 cm deep with few artifacts and small limestone and cobble inclusions. It appeared to be a natural soil layer.

Yellow Sandy Loam along the edge of Cobble Mound 1 – AU2. Lots Excavated: 52A2. This analytical unit consisted of a dark yellowish brown sandy loam (10YR 3/4) between 5 and 10 cm deep with very few artifacts and no inclusions. It appeared as a natural soil layer.

July Floor beside Cobble Mound 1 – AU3. Lots Excavated: 52B2. This analytical unit consisted of a dark yellowish brown clay loam (10YR 3/4), 15 to 20 cm deep, with many cobbles and small limestone inclusions. It contains some soil from above the floor, the floor itself, and a small bit of sediment from under the floor. The matrix under the floor is very similar to that above the floor likely due to bioturbation that has taken place as the floor eroded away. July Floor consisted of a layer of chert cobbles about 20 to 25 cm in size beneath a layer of many large sherds, flakes, and a broken groundstone *metate* that were sitting on the cobbles. The cobble floor itself also contained many artifacts.

Brown Sandy Loam along the edge of Cobble Mound 1 – AU4. Lots Excavated: 52A3. This analytical unit was comprised of a very dark grayish brown sandy loam (10YR 5/3) with few artifacts and small limestone inclusions. More cobbles, like those used to construct Cobble Mound 1, began to appear in the southwest corner of 52A3. Excavations into this analytical unit were 5 to 10 cm deep. They were ended due to time constraints so the base of this analytical unit was not reached.

Unknown Occupation beside Cobble Mound 1 – AU5. Lots Excavated: 52B3. This analytical unit consisted of a 10YR 4/4 clay loam with many artifacts, including a pile of large ceramic sherds in the northwest corner of 52B3 that probably fit together. Excavations into this analytical unit were 10 to 15 cm deep. They ended due to time constraints, and it is unclear how deep this matrix continued down.

Cobbles in Humus Layer on Cobble Mound 2 – AU6. Lots Excavated: 52C1. This analytical unit consisted of a 10YR 3/2 very dark grayish brown clay loam with small to medium-sized chert and limestone cobbles (mostly between 10-20 cm in size). About 40 to 45 cm thick, this layer contained a large amount of lithics and ceramics and a few jute shells.

Cobbles in Clay Loam below Humus Layer on Cobble Mound 2 – AU7. Lots Excavated: 52C2. This analytical unit was comprised of small to medium-sized chert and limestone cobbles (10-20 cm in size) in 10YR 3.3 dark brown clay loam. About 50 to 55 cm thick, this layer contained much fewer artifacts than the layer above it, but more jute.

Cobbles in Sandy Loam on Cobble Mound 2 – AU8. Lots Excavated: 52C3. This analytical unit consisted of a 10YR 5/3 brown sandy loam with small to medium-sized limestone and chert cobbles (5-20 cm in size), but with much smaller cobbles and fewer artifacts than the layers above it. A large amount of jute was found in this analytical unit, and it sits above a sandier, more yellow (10YR 5/6 yellowish brown) soil with no cobbles.

Chapter 7. ARTIFACT ANALYSIS

7.1 Introduction

As laid out in previous chapters, five different contexts will be discussed, including: 1) Agricultural Plot System 1 (Operation 14); 2) Agricultural Plot System 2 (Operation 51); 3) Terraforming feature (Operation 14); 4) Water Channel system (Operation 14); and 5) *Chich* cobble mound (Operation 52). Agricultural Plot Systems 1 and 2 refer to two groups of bounded plots hypothesized to be used for agricultural purposes. A series of walls delineate different plots in both systems (Figures 3 and 4), which contains a large density of redeposited domestic trash. Terraforming refers to anthropogenic manipulation of natural soils. At Actuncan, inhabitants utilized *yeso* – a white, soft gypsum-laden sediment – to create berms and channels that would allow for better water drainage and possibly collection along the slopes of the Northern Settlement Zone. Another form of water drainage improvement can be seen in a Water Channeling System, which consists of low walls built atop *yeso* that would aid in channeling water. Finally, *Chich* Cobble Mounds, as discussed above, refers to a series of linear mounds consisting of river cobbles and lithic debitage that are hypothesized to be used for agricultural purposes, with a particular focus on orchards.

Artifact categories included lithic, ceramic, groundstone, slate, quartz, daub, plaster, faunal remains, and shell. The majority of artifacts were chipped stone lithics and ceramics. The main goal of analyzing artifacts from Agricultural Plot Systems 1 and 2 was to determine if the assemblages were from redeposited domestic trash or if these materials are, in fact, associated with in situ activities such as lithic production. The small and very low architecture present in the agricultural systems were likely not residences, therefore I suggest that the artifacts found in the plot are associated with domestic middens from nearby patio-focused groups. But this idea requires testing. Household middens contain discarded, yet potentially valuable objects such as expedient and formal tools, manos and metates, flakes and sherds, and other materials. Because artifacts in middens have not been moved since their discard, they should be large in size and the assemblage should be indicative of domestic activities. Domestic trash is often redeposited in field systems to provide fertilizer for plants under cultivation (Killion 1990, 1992). Artifacts produced from in situ activities such as lithic production are smaller in size as these areas are regularly swept and cleared of large debris, but microdebitage is difficult to sweep away and is usually not removed from its locus of production, thus remaining in its primary context. In situ contexts also contain a higher proportion of one type of artifact (e.g. only lithic debitage), whereas household middens contain a variety of artifacts (Moholy-Nagy 1990:271). If the assemblages of the agricultural plots are from redeposited domestic trash, then they will resemble household midden assemblages.

Many materials recovered from the agricultural plot systems came from the modern humus root zone, which is not a reliable location for the analysis of ancient activities. Therefore, artifact analysis focused on materials from lots below the humus and in the broadest horizontal exposures associated with architecture. These are the most secure context for evaluating the purpose of the systems. Few artifacts were found associated with the water channel system (Heindel 2017) and other terraforming (Millar

2016) near the constructed agricultural plots. This absence indicates that these areas may have been sculpted from underlying clay sediments and used to guide water, a function that does not require added mulch in the form of domestic material seen in the agricultural plot systems. The *chich* cobble mounds are primarily made up of chert and limestone cobbles, which indicates that the mounds were likely constructed from locally available stones rather than resulting from lithic production debris or redeposited domestic trash. Any artifacts or residues therefore are likely directly associated with activities at the mounds.

As will be discussed further, lithic analysis was focused on reduction stage, which is a good indicator for determining if the trash present is the result of production, redeposited production trash, domestic midden, or redeposited domestic trash. Ceramic analysis focused on determining time period using the type:variety method. My analysis indicates that the agricultural systems and *chich* cobbles mounds were built and used during the Late through Terminal Classic periods. Unfortunately, due to a lack of artifacts deposits associated with the water channel system and episodes of terraforming, I could not date these features because they did not contain any diagnostic sherds. Groundstone was analyzed based on type and material, slate was analyzed to determine if it was worked, quartz was analyzed base on basic production typologies (nodule vs. chunk vs. flake fragment), and daub and plaster analyses were focused on quantity and weight. Few faunal ecofacts were found, with only one possible claw and six deciduous teeth. Shell was divided into two types (jute and marine shell), each of which was analyzed separately. The majority of shells were ridged and smooth jute. Broken tips and holes on jute were also recorded. These attributes provide evidence to determine whether the jute was used for food (Friewald 2018).

7.2 Lithic Analysis

The main goal of my analyses was to determine the reduction stage(s) present in lithic materials found in the field systems at Actuncan. It is hypothesized that redeposited domestic trash was used in areas of agricultural production to boost soil fertility. Lithic artifacts found in domestic trash consist of multiple stages of production, as well as the presence of tools and resharpening and retouch flakes. In contrast, a lack of informal tools or expedient flakes, formal tools, and resharpening and retouch flakes is indicative of a lithic workshop or tool reduction trash, as the majority of lithics found in tool production are almost exclusively debitage. Lithic assemblages have been broken up into five main groups based on the location of excavations dicussed above: Agricultural System 1, Agricultural System 2, terraforming, a water channeling system, and *chich* cobble mounds. While all five areas contained assemblages made up of reduction debitage, the lithic analysis shows that the agricultural systems as a whole contain a wide variety of debitage type, formal and informal tools, and resharpening and retouch flakes

7.2.1 Lithic Production

7.2.1.1 Raw Material Procurement

The first step in lithic production is to find the actual raw material that will be knapped. When choosing raw material for knapping, the properties of stone as well as the mechanics of knapping must be kept in mind. The basic mechanism of knapping is the conchoidal fracture. Material is good for knapping if it fractures conchoidally, where the fracture surfaces are curved inward. This type of fracture allows the shape and direction of the conical fracture to be controlled by changing the "forces, angles, and shapes of the surfaces involved" (Whittaker 1994:12). By knowing how these changes will create differences in the fracture, a knapper can then fracture a piece of rock in desirable ways.

A stone's suitability for being knapped is controlled by structure, strength, and elasticity (Patten 1999:17). When at a quarry, a knapper will usually take off a few sample flakes to determine the quality of the stone. For a piece of stone to have good structure, it must be uniform, or homogenous, throughout. The graininess of a piece of chert, for instance, does not really matter as long as all the grains within the piece are relatively the same size. Any irregularities, cracks, flaws, or differences in texture may cause a non-conchoidal fracture, which results in mistakes, unpredictable fractures, and unplanned products. The strength of a stone does not equate with hardness. In fact, a "brittle" rock is much preferable to a "hard" rock (Whittaker 1994:13). If a rock is strong, it means that the bonding between the individual particles within the stone is strong (Patten 1999:18). A brittle rock can still have strong particle bonds and, as a result, will break relatively easily, particularly if it is distorted too much. This second feature is particularly important because a broken off piece is better than a deformed piece. If the stone has good elasticity, then the material will return to its original shape if it was not deformed so much as to break (Whittaker 1994:14).

7.2.1.2 First Stage: Primary Reduction

After obtaining the correct raw material, a piece suitable for knapping, a preform or core, is created. A preform is a piece of stone knapped into the general shape of what the tool will look like, while a core is a piece of stone that will be used to knock off flakes that will be the tools themselves. This initial reduction is often done right at the quarry. A few flakes have already been knocked off the piece as a result of initial material testing, and it is easier to carry a smaller piece of stone back to the main site of lithic reduction. However, a knapper would generally not make the whole tool right at the quarry, particularly if the quarry is far from his or her residence, due to potential wear and damage on the way to the intended area of use and the time required to reduce the core or preform down to a finished product.

Initial or primary reduction involves removing the cortex, the rough outer layer of the stone. Decortication (the removal of cortex) can also take place away from the quarry, but this is then generally still considered part of the primary reduction stage. At this point, a stone hammer, is usually the tool of choice when striking off large, decortication flakes, a method called hard hammer percussion. Greenstone, basalt, and quartzite are all good materials for hammerstones because they are hard enough to fracture chert but not so hard that they break the whole nodule (Patten 1999:28). If a softer hammerstone is needed, limestone or sandstone can also be used.

Using a hard hammer creates what is known as a “Hertzian cone”. A blow from a hammerstone perpendicular to the flat surface compresses the stone until a shallow ring crack forms around the area of contact. Outward bending of the stone moves the crack back toward the free face and forms a bulb of percussion (or force). Ripples on this bulb represent a plane perpendicular to the direction of force (Patten 1999:81). This bulb of percussion is a main characteristic of flakes produced from hard hammer percussion. John Whittaker (1994: 91) conducted an experiment to determine what variables were important in percussion flaking. Based on examination of the effects of slight changes to independent variables (those controlled by the knapper) such as platform depth, angle of blow, exterior platform angle, and force of blow, on subsequent dependent variables such as interior platform angle and flake length and thickness, Whittaker was able to see what factors were the most important in creating a good flake. He found that more forceful blows create larger flakes while a greater platform depth (how far back from the edge you strike the platform) creates longer and thicker flakes. A longer flake was also produced when the exterior platform angle (the angle formed by the platform and the surface where the flake will be removed) was closer to 90 degrees. Thus, to knock off a good, large flake for the initial shaping of a tool (for instance), a knapper would want to strike a forceful blow farther away from the platform edge, on a platform with an almost 90 degree angle to the core's exterior surface. Because of the hard nature of hammerstones, hard hammer percussion generates larger, chunkier flakes with large bulbs of percussion (VandenBosch 1999; Whittaker 1994, Whittaker et al. 2009). If done during the earlier stages of reduction, these will have cortext on their dorsal surface.

A discussion of percussion flaking should also include an overview of the importance of platforms when hitting a stone. The platform must not be too weak or sharp, nor too dull. After striking off a flake, a platform may have ridges or steps left by previous flakes. If the platform is not "cleaned", or slightly abraded, a blow will crush these ridges or steps and disperse the force created with the blow without actually removing a flake. Platform, or edge, preparation is done at every step of production, and can make up quite a bit of the microdebitage created from tool production. Removing flakes from the platform surface to get rid of irregularities on the platform and increase the exterior platform angle is called facetting. Trimming is when small flakes are removed from the core surface in the same direction as the large flake that the knapper wants to remove (Whittaker 1994:101). Facetting and general platform preparation, such a abrading the edge with stone to strengthen an edge, tend to indicate later stages in reduction (such as thinning).

7.2.1.3 Second Stage: Secondary Reduction (Thinning)

Once the preform or general core is made, more precise reduction is done to further reduce the piece toward a finished tool or core for striking flakes. This additional thinning, also known as secondary reduction, often takes place away from the quarry site. A hammerstone may still be used in this stage, but usually the hammerstone is traded in for a soft hammer that allows for more control of blows and thus exact flaking. Soft hammers, or billets, can be made out of any soft material, such as antler, bone, wood, or copper. The use of a billet to strike flakes is called "soft hammer percussion". A soft hammer is particularly useful in thinning, flattening, and sharpening tools like bifaces (a tool with two worked surfaces, so that the cutting edge is sharp on both sides) because it creates large but relatively flat and thin flakes that do not remove large portions of a stone like a hard hammer blow does. Whittaker (1994:185) explains that this is because when the billet strikes the stone, it compresses a little, spreading out the resulting force, which in turn distributes the force through the stone more slowly and evenly. Soft hammer percussion thus provides the control needed to strike smaller, thinner flakes that result in a more carefully shaped tool, closer to the desired end product than is possible with hard hammer production.

Because the fracture formed by a soft hammer is different from that formed by a hard hammer in that it lacks a Hertzian cone, the resulting flakes have very diffuse bulbs of percussion. The flakes produced from soft hammer percussion in the production of bifaces are often called "biface thinning flakes". In addition to the flatter bulb of percussion, these flakes are also relatively thin, flat, and somewhat curved. The platform is generally smaller as well, and in biface reduction, it has a small lip on the interior, a remnant of the edge of a biface (Whittaker 1994:185). While the second stage of lithic reduction is mostly focused on thinning, some flakes might still have cortex on their dorsal surface.

7.2.1.4 Third Stage: Tertiary Reduction (Final Shaping and Retouching)

The third stage of reduction is focused on putting the finishing touches on a tool. Again, thinning is the main goal in this final shaping of a stone tool, and, if creating a biface, flakes from this stage are characteristically biface thinning flakes. Thin, smaller, and with a lipped platform, these flakes generally have no cortex and many flake scars. At the final stages of stone tool production, the cortex has been taken off and, as a result of this decortication and previous attempts at thinning during second stage reduction, the largest amount of flake scars is generally seen during tertiary reduction. In addition, since final thinning is the main focus of this stage, the flakes will be thin as well as a result of the knapper's efforts to be as precise as possible in the thinning process (so as to not ruin all previous hard work).

When making flake tools, pressure flaking may also be used to create a sharper edge (Waldorf 2006:23). The thin, pointed end of a billet (like an antler) is used in pressure flaking, as opposed to the thicker, more rounded end of the billet that is used for soft hammer percussion. Pressure is applied with this pointed part to the edge of the piece and pointed in the direction the flake is to go. The flake is then detached by adding downward force on the edge. Edge preparation must be kept in mind at all times when pressure flaking. A dull edge will cause the billet tip to slip off the flake, while an edge that is too sharp will be crushed by the pressure (Whittaker 1994:152). The flakes that come off as a result of pressure flaking are usually very small, like microdebitage, and have few actual flake traits that can be seen with the naked eye.

7.2.1.5 Use, Resharpening, and Discard

Use and resharpening can continue for an extended period of time before final discard takes place. After a tool becomes too dull to use, a knapper may knock off flakes to resharpen the tool. Flakes produced during this resharpening process have use wear polish or striations on the arrises of the dorsal surface. The arrises on a flake (or on the stone tool from which the flake came off) are the ridges created by converging flakes scars. When a tool is being used, the highest parts on the tool will be worn down first, thus making the arrises the areas with the most use wear.

7.2.2 Summary of Lithic Production

In summary, the actual procurement of the raw material must be done before lithic reduction can take place. Raw material may be found in a limestone deposit containing chert nodules or veins, or it may occur as redeposited cobbles in alluvial deposits or karst brecchias. A few large flakes or chunks with cortex on them will be knocked off these nodules in order to determine the quality of the material. If the material is deemed suitable for knapping, it is then reduced further during the first stage of reduction where the majority of the cortex is flaked off and a preform or core is created (Whittaker 1994:12). Hard hammer percussion with a hammerstone is implemented in this initial reduction stage. Usually, the general form of the tool or the core is made, and most of the decortication is done at the actual site of material procurement. This hard hammer percussion can, however, be carried over in time to the place where later reduction stages take place. The hard hammer flakes produced during this first stage are usually thicker and chunkier with large bulbs of percussion than those in later production stages. They also tend to be covered in 25% or more cortex on their dorsal side and, as a result of being in the earlier stages of lithic reduction and thus having some of the first flakes knocked off, they also have fewer flake scars (Patten 1999). Second stage lithic reduction is usually characterized by the use of soft hammer percussion for thinning. This reduction is done away from the site of procurement and requires more skill with a hard hammer than first stage reduction. Flakes from this stage are relatively thinner with diffuse bulbs of percussion, little to no cortex, and have multiple flake scars. If a flake tool is being manufactured, then the second stage will actually be pressure flaking, which results in very small flakes and flake fragments (Whittaker 1994:195). For this analysis, stage three of lithic reduction includes retouching and final thinning of the tool. At this point, few if any flakes should have cortex on them and, usually, all flakes would be categorized as soft hammer or biface thinning flakes. Retouching along the edges would also be done at this stage to make the final edge both strong and sharp (Whittaker 1994:152). After a tool is finished, it can be used and resharpened multiple times before its final discard. Flakes taken off in the hopes of resharpening a tool are characterized by use wear along arrises, or the raised ridges between flake scars resulting from reduction, on the dorsal surface.

7.3 Lithic Analysis Methods

Due to the focus on reduction stage, a flake typology that specifically addressed reduction sequences was utilized, including the identification of the presence of cortex, the presence of platform preparation, hammer type, number of flake scars, and the presence of use-wear. Categorization of debitage type was undertaken because different reduction stages contain different types of debitage besides flakes.

Cortex percentage was categorized into groups as follows: 0%, 1-25%, 26-50%, 51-75%, 75-99% and 100%. Flake scars were counted as 0, 1-2, and 3 or more. Hammer type was divided into soft and hard hammer categories. Soft hammer percussion is characterized by a lipped platform and diffuse bulb of percussion while hard hammer flakes have a large bulb of percussion and no lipped platform. In addition, if a platform was multi-faceted or had visible grinding along the edges, the flake was labeled as having platform preparation. If the flake was chipped and thus had no platform or bulb, it was referred to it as a “flake fragment,” and no information was given on platform preparation or hammer type. Due to the number of flake fragments, cortex percentage for flake fragments is defined as 0%, 1-50%, 51-99%, and 100% in the appendices, though more specific cortex percentages were collected in the original analyses. These categories are combined due to the nature of flake fragments (i.e. not being whole) and more nuanced cortex percentages may not reflect the overall cortex percentage of the whole flake. Those flakes and flake fragments that showed evidence of worked edges (i.e. pressure flaking, use-wear on edges) were labeled as "expedient tools."

Other types of lithic artifacts included microdebitage, nodules, shatter, chunks, cores, and preforms. Microdebitage was characterized as lithic debitage that passed through a ¼" screen. Microdebitage is, by definition, very small debitage and, as such, is too small to contain identifiable flake attributes. Due to the small number of microdebitage in the collected assemblages, it was possible to take a count of microdebitage. Nodules were characterized as "rock" if they appear to have had only a flake or two knocked off. According to VandenBosch's (1999) definition, a core has four or more flakes removed, so nodules are not categorized as cores. Nodules are often discarded after a flake or two was taken off. Shatter is characterized as angular fragments that do not have flake characteristics (flake scars, platforms, etc.), but still appear to be part of tool production. Shatter is often found in early stage production (first stage), but can be seen in later stages of production as well. Chunks, on the other hand, are almost exclusively found in early stage tool production. Like shatter, chunks have no identifiable flake features, but are larger and often more circular in nature (with usually >1'' circumference) with multiple flat surfaces than tested (and discarded) nodules. As stated above, cores are defined as having four or more flakes removed, either in a multidirectional or tabular manner, with a clear and large platform(s) on one or both ends. Preforms are categorized as a piece of stone knapped into the general shape of what the tool will look like.

Material type was also collected, and categories included chert, chalcedony (a type of fine chert), siliceous limestone, and limestone. Dolomitic limestone is available in the geographic region, but none was found in the assemblages. Chert is a hard, dense microstyaline or cryptocryalline sedimentary rock, consisting of small interlocking crystals of quartz (Kooyman 2000:28). Due to its predictable conchoidal fracture, it is an ideal material for flintknapping. Chalcedony is a type of fine chert that is translucent when examined under a strong light source and tends to be easier to flintknap. Siliceous limestone is hardened limestone and has the look of limestone. Limestone flakes are much rarer, due to the softness of the material, but there is evidence of limestone general utility bifaces, and, while uncommon, limestone flakes were found in the assemblages.

Informal tools are referred to as expedient tools, which are flakes or flake fragments that have been removed from a parent piece or core for use. Nonetheless, these flakes were not turned into a specific tool shape. They are recognizable by indications of use visible along their worked edges, generally produced through pressure flaking or general use (VandenBosch 1999:119.). These types of tools are often used in domestic settings due to the ease with which these simple tools (often used for basic cutting and scraping) can be used. Blades, often produced by bipolar cores, are flakes that are longer than wide, and come with either two or three flakes (Figure 7.1). Expedient flakes are also a form of informal tools, which are flakes with evidence of pressure flaking.

Formal tools have a morphology that is definable in reference to various established tool types, such as bifaces and unifaces, and are produced by removing a series of flakes to create a particular desired form. Formal tool types found in the Maya lowlands include: unifaces (Figure 7.2), general utility bifaces (Figures 7.3 and 7.4), thin bifaces (Figure 7.5), chisels (Figure 7.6), burins (Figure 7.7), scrapers, macroblades (Figure 7.8), drills (Figure 7.9), and gravers (Figure 7.10). Unifaces are tools that have only been worked on one surface (i.e. flake scars are only on one surface) and generally take scraper-like forms. General Utility Bifaces (simply named bifaces in tables) are characterized by evidence of flake removal on both sides and are particularly thick with less attention to detailed workmanship. Thin bifaces have similar characteristics to General Utility Bifaces but rarely have cortex and are generally 2 cm or less in thickness. Bifaces have a myriad of uses, but hafting is common, which is evident in a long flake taken off the proximal, medial side of one surface. Chisels are distinctive for their long narrow outline and thick diamond shaped cross section. Often, abrasion has blurred or completely erased flake scars on their surfaces. A burin is similar to a chisel but is unifacially worked leading to a triangular cross section. A scraper is a unifacially-shaped flake characterized by visible polish on its dorsal surface and edges, as opposed to an expedient flake, which only has use-wear on its edges. A macroblade is a thick tool shaped like a prismatic blade, and a drill is categorized as such based on its pointed end. Gravers are a type of drill that can be made from blades or flakes and can be identified by their pointed ends shaped by steep, unifacial retouching. Gravers are different from "proper drills" because drill-like portion is curved (VandenBosch 1999:316-317).

7.4 Lithic Analysis Results

Reduction stage was the primary method of analysis for lithic debitage, which can be seen in Chart 7.1. Agricultural Plot Systems 1 and 2, as well as terraforming comprised of primarily of second stage reduction, while the Water Channel System and *Chich* Cobble Mounds had a larger amount of third stage reduction. As will be discussed below, however, the different units in the *Chich* Cobble Mounds had different reduction stages in their assemblages (Chart 7.2). See Appendix A for lithic tables.

7.4.1 Op. 14: Agricultural Plot System 1

The vast majority (94.7%) of flake debitage was categorized as chert, while chalcedony made up only 3.7% of flaked materials. Analysis of flakes focused on 1) cortex percentage, 2) number of flake scars, 3) hammer type, and 4) presence of platform preparation. The highest percentage of flakes (51.5%) are classified as second stage flakes, followed by hard hammer flakes with three or more flake scars, no platform preparation and between 0% and 50% cortex present. In this analysis, a large proportion of flakes (24.4%) is also categorized as third stage flakes produced by a hard hammer, identified by three or more flake scars, no platform preparation, and between 0% and 50% cortex present. Based on the frequencies of flake types, it is unlikely that the assemblage is the result of early or late stage production because early stage production would include flakes with much more cortex, and late stage production (particularly biface thinning) would include more soft hammer flakes with very little cortex.

There is much more attribute variation for flake fragments. While the largest proportion (28.5%) of flake fragments have no cortex and three or more flake scars, there are also many (12.8%) flake fragments that have 76-99% cortex and 1 to 2 flake scars, as well as 1-25% cortex with three or more flake scars (13.4%). Without all the attributes present on flakes, it is not possible to determine production stage exactly, but the variation does suggest that there is more than one production stages present in the assemblage.

There is also a large amount of variation in debitage types (microdebitage, flake fragment, blade, nodule, chunk, shatter, resharp, retouch, expedient, core, preform) and formal tool types (biface, thin biface, chisel, graver, scraper, macro-blade, burin and drill) of chipped stone found in the assemblage. While the majority (75%) of the assemblage consists of flake and flake fragment debitage, there are also a variety of formal and informal tools. Cores are present, as are preforms of future bifaces. The tools present include: fourteen general utility bifaces, a thin biface, two chisels, two gravers, one scraper, one macroblade, two burins, and one drill. Five blades and twenty expedient flakes were also found – with the majority containing evidence of usewear.

The number and variety of formal and informal tools indicate that the assemblage is redeposited domestic trash because all of these tools would be used in a domestic setting as opposed to a lithic workshop, which would produce midden with different contents. The small percentage of microdebitage (6.1%) compared to macrodebitage provides evidence that lithic reduction activity did not occur at the location of the agricultural system. Trash redeposition tends to contain larger debitage because small pieces of debitage are less likely to be transported from location to another. Evidence of resharpening and retouch flakes also indicates that the assemblage represents more than just lithic reduction—evidence of reuse is also present in the assemblage.

7.4.2 Op. 51: Agricultural Plot System 2

Similar to Agricultural Plot System 1, the majority of the lithic assemblage found in Agricultural Plot System 2 is made up of chert debitage (87.2%), but chalcedony and siliceous limestone flakes are also present. Also similar is the fact that the majority (54%) of flakes are from second stage production, though third stage production is also well represented (36%). More specifically, the largest portion (23.1%) of flakes in this assemblage are categorized as having less than 50% cortex, three or more flake scars, and produced with a hard hammer with no platform preparation – indicative of second stage reduction. However, there is also a large percentage of third stage flakes, with no cortex, three or more flake scars, and created by a hard hammer with no platform preparation. The flake fragments present in the assemblage suggest later stage production, with the largest amount of flake fragments (36.1%) showing no cortex and three or more flake scars. The majority of flake fragments (84.6%) are categorized as chert, with some chalcedony, limestone, and siliceous limestone also present.

The majority (72.2%) of debitage in the assemblage fall under the flake and flake fragment categories, but other types of debitage include microdebitage, nodules, chunks, shatter, cores, preforms, general utility bifaces, gravers, drills, expedient flakes, resharpening flakes, and retouch flakes. Microdebitage, nodules, chunks, and shatter, which together make up 25.6% of the assemblage, fall under the category of production debris with flakes and flake fragments, indicating that the majority of the assemblage is the result of informal production at the household level. The presence of formal and informal tools, as well as resharpening and retouch flakes, also indicates that the redeposited trash found in Agricultural System 2 was not only the result of reduction activity, which would consist of only flakes and flake fragments. As discussed above, the variety of debitage type is more indicative of domestic trash. The lithic assemblage recovered from Agricultural Plot System 2, then, is similar to that recovered from Agricultural Plot System 1.

7.4.3 Op. 14: Terraforming

A low density of artifacts was found in Units 14K and 14M in comparison to Agricultural Systems 1 and 2, but the presence of 196 lithic artifacts suggests some redeposition of trash in these areas. The majority of flakes were the result of second (40%) and third (41.2%) stage reduction , with the highest percentages represented by flakes with no cortex, three or more flake scars, and hard hammer production with no platform preparation (20.6%), as well as flakes with less than 50% cortex, three or more flake scars, and hard hammer production with no platform preparation (32.5%). Flake fragments point towards third stage production, with 33.8% of flake fragments categorized as having no cortex and three or more flake scars. Material types included only chert and chalcedony, with no evidence of siliceous limestone or limestone. Production debris such as microdebitage (5.1%), chunks (2%), and shatter (4.6%) are also present, as well as three utilized formal tools: a general utility biface, a chisel, and a drill.

The presence of formal tools suggests the lithic assemblage may have been the product of redeposited domestic trash.

7.4.4 Op. 14: Water Channel System

Like the test units that encountered other types of terraforming, the water channel deposits exhibit a low density of lithic artifacts in comparison to the agricultural systems. Similarly, this material appears to be redeposited trash. A total of 711 lithic artifacts were collected. Both second (41.8%) and third (45.5%) stage production are present in the assemblage, with the highest percentage of flakes (29.1%) categorized as having 0% cortex and three or more flake scars created through hard hammer percussion with no platform preparation. While chalcedony, limestone, and siliceous limestone flakes are present, they only make up 7.2% of the assemblage. The majority of flake fragments are also chert, and the largest portion of flake fragments (31.3%) is categorized as having 0% cortex and three or more flake scars. No formal or informal tools were found in the assemblage, nor were there any resharpening or retouched flakes or flake fragments. As such, the assemblage can be categorized as containing all production debris, with the majority of lithics being flakes and flake fragments. Microdebitage, nodules, chunks, and shatter are also present, with shatter making up a large portion of non-flake and non-flake fragment debitage at 22.1% of the assemblage. As a result, it is unlikely that the lithics found in the test units were from redeposited domestic trash.

7.4.5 Op. 52: Chich Cobble Mounds

Chich cobble mounds found along the Mopan River floodplain were created by piling cobbles, and as such, they consist mainly of lithic material. Care therefore was taken to separate human modified materials including microdebitage, flakes and flake fragments, formal and informal tools, and resharpening flakes from ecofacts. Three test units were placed in various areas of the cobble mound area, including one on top of a mound (52C), one on the edge of a mound (52A), and one in the empty space between mounds (52B).

In a combined analysis of all three units, the majority of debitage (82.6% of flakes and 83.7% of flake fragments) was categorized as chert, and all formal and informal tools are made of chert. These three units also contained mainly second (35.7% total) and third stage (52.1% total) reduction flakes, although 52A (75.9%) and 52B (56.8%) contained mostly third stage flakes, while 52C contained a larger proportion (53.7%) of second stage flakes (see Chart 7.2). The largest proportion of flake fragments in 52A (48.6%) 52B (23.9%) and 52C (25.9%) had 0% cortex and three or more flake scars, but variation was still present. All test units contained microdebitage (8.6% of the total assemblage), nodules (.2%), chunks (5.3%) and shatter (5.6%), as well as flakes (28.5%) and flake fragments (48.8%), pointing to the presence of multiple reduction stages. Formal tools were also present in all three test units, including: a uniface, a general utility biface, two thin bifaces, a chisel, a graver, a drill, and two macroblades, though there was variation in the type of tools found in each test unit. Expedient (informal) flake tools were only found in 52A and 52B, and only one resharpening flake was found in 52C. Out of the total 1647 lithic artifacts, the majority (98.6%) of artifacts were the result of reduction (microdebitage, flakes and flake fragments, cores, preforms, nodules, chunks and shatter), with formal tools only making up 0.5% of the assemblage, and utilized and resharpening flakes consisting 0.9% of the assemblage. These findings indicate that redeposited domestic trash was probably not used in the creation of the cobble mounds, as household middens contain a larger variety of debitage types.

7.5 Ceramic Analysis Methods

Ceramic analyses were performed to provide chronological determinations. Type:variety and attribute analysis, following LeCount's (1996) dissertation work at Xunantunich, was utilized do determine the time period each diagnostic sherd was likely produced. Due to the water inundation inherent in the targeted excavation areas, large portions of the assemblages were identified as too eroded to be sufficiently analyzed for chronological attributes. Those sherds, including bodies and rims, that could be diagnostically identified were analyzed along 5 major ceramic aspects: paste/temper composition, surface treatment, formal aspects, decorative technique, and decorative motif (LeCount 1996:131). Based on my analyses, the diagnostic ceramics recovered from the agricultural systems and cobble mounds come from Late Classic I, Late Classic II and Terminal Classic time periods. Due to the eroded nature of sherds recovered from the terraforming and water channel systems, no temporal designations could be gleaned from the few sherds that were found.

Late Classic ceramics are chronologically differentiated by Gifford (1976:225) into two complexes ---Tiger Run and Spanish Lookout---, with Spanish Lookout further divided into early and late facet. As noted by LeCount (1996:129), however, the low frequency of late facet Spanish Lookout ceramics (Terminal Classic) at Barton Ramie did not allow Gifford to clearly separate diagnostics from his early facet Spanish Lookout

(Late Classic II) assemblages. As a result, while my Late Classic ceramic identification relies heavily on Gifford's descriptions of the Spanish Lookout Complex from Barton Ramie, Terminal Classic identification follows LeCount's Xunantunich Terminal Classic typology.

7.5.1 Ceramic Analysis: Type:Varieties

The only distinctive Late Classic type found in all the ceramic assemblages belongs to the Chial ceramic group. An opaque carbonate ware, the Chial Group contains a fine textured paste, with paste color ranging from red to reddish yellow to an occasional brown, though the majority of ceramics falling into the Chial Group in the assemblages have a reddish yellow paste. In addition to its distinctive color, the Chial Group is also known for many small white carbonate inclusions. Undecorated Chial sherds were found in the assemblages, in addition to Chial bowls (LeCount 1996:395).

Belize Red Group (Figure 7.11) is a member of British Honduras ware that dates to the Late and Terminal Classic periods. It is identified by a polished red slip applied to an ash-tempered paste, with a gritty, often highly weathered surface. While paste colors have a wide range, most Belize Red ceramics found in the assemblages contained a yellow or reddish yellow paste (LeCount 1996:395). Belize Red Type varieties included undecorated Belize Red, Belize Red Incised, and Belize Red Punctated, with both jars and bowl forms present. San Lorenzo Black is identified by its highly polished black slip on ashware, and dates to the Terminal Classic period. Like Belize Red, this type falls under the category of ash ware with an ash-tempered past and a gritty, often highly weathered surface. Found as sherds, San Lorenzo Black was not well-represented in the assemblages. The Chunhuitz Ceramic Group, categorized as a Vincacous Tawny ware, is also identified by ash-tempered paste. Dating to the Late and Terminal Classic period, it is identified by its orange slip, and is often found highly weathered (LeCount 1996:398). Both Chunhuitz body sherds and bowl forms were found.

The Macaw Bank Group, dating to the Late Classic II period, is best identified by a reddish-brown surface containing reflective particles of gold mica or biotite and quartz, as well as a reddish brown paste and a temper consisting of granitic material and occasionally mica. The reflective nature of Macaw Bank makes it easily identifiable, and its surface treatment can be plain or have punctated dots, lines, or appliques (LeCount 1996:370). Undecorated Macaw Bank body sherds were present in the assemblages, as well as Macaw Bank Applique, Macaw Bank Punctated, and Macaw Bank Scalloped varieties. Macaw Bank jars rims were present.

Mt. Maloney Black (Figures 7.12 and 7.13) is the most well-represented type found in the assemblages. Identified as a Pine Ridge Carbonate Ware, it is distinctive for its matte black slip applied to a calcite tempered paste. The black slip is found on both the interior and exterior of open and closed forms. Mt. Maloney Black dates from Late Classic I through the Terminal Classic, but differences in rim angle point to more specific time periods of manufacture. The most abundant and easily recognizable form is the incurving bowl. The earliest bowls, found in the Late Classic I period, have vertical lips which are rounded along the top and bottom face. Over time, lips begin to bevel upward, with Late Classic II bowls lips exhibiting elaborated edged and grooved faces. The upward bevel of the lip ends in the Terminal Classic period, when lips are square and oriented horizontally to the rim orifice (LeCount 1996:391). The large presence of Mt. Maloney Black and its distinctive bowl and lip forms allowed for a more nuanced chronology for the assemblages. Mt. Maloney black body sherds were abundant along with jar and Late Classic I through Terminal Classic bowl rims.

Like Mt. Maloney Black, the Dolphin Head Group falls under Pine Ridge Carbonate Ware. It is identified by a velvety red slip applied to a calcite tempered red-borwn paste. Dolphin Head Red is restricted mainly to the Late Classic II period, and Dolphin Head body sherds as well as jar and bowl rims were found in the assemblages. Vaca Falls, another carbonite ware, is similarly red, but dates to the Terminal Classic period. It is characterized by a soft, friable, irregular textured, red to reddish-brown paste and a soft red slip (LeCount 1996:372-373). Vaca Falls body sherds, as well as jars and bowls, were found.

Alexander Type jars, dating to the Late and Terminal Classic period, are categorized by tall, constricted and open neck jars (LeCount 1996:369) made of Uaxactun Unslipped Ware and falling in the Cayo Ceramic Group. Alexander Type is identified by very large, thick-walled, medium brown or tan jars with medium brown or tan paste and coarse texture (Gifford 1976: 283). Alexander Type Pie Crust variety rims in particular are identifiable by a piecrust decoration and flaring rim (Figure 7.14). Alexander sherds and jars were the least represented type in the assemblages. Two ceramic censor lids (Figures 7.15 and 7.16) were also found in in the assemblages, both in Agricultural Plot System 1.

7.6 Ceramic Analysis Results

Diagnostic sherds were analyzed for time period and type:variety. The Terraforming and Water Channel Systems did not contain any diagnostic sherds, but Charts 7.3 and 7.4 show ceramics in Agricultural Plot System 1, Agricultural Plot System 2, and Chich Cobble Mounds by time period and type:variety. See Appendix B for ceramic analysis tables.

7.6.1 Op. 14: Agricultural Plot System 1

A total of 23,165 ceramic sherds were found in Agricultural Plot System 1, with 5169 diagnostic sherds. The majority of sherds were too eroded to be diagnostic. This state of preservation is unsurprising because the area of excavation is on a steep slope that is frequently eroded by water running off the ridgetop. All diagnostic sherds were categorized as general Late to Terminal Classic or general Late Classic, or if more specific attributes were present as Late Classic I, Late Classic II, or Terminal Classic. Diagnostic body sherds fall under the Chial, Meditation Black, Mt. Maloney Black, Belize Red, Belize Red Incised, Belize Red Punctated, Macaw Bank, Macaw Bank Applique, Macaw Bank Punctated, Macaw Bank Scalloped, San Lorenzo Black, Dolphin Head, Vaca Falls, and Chunhuitz types and varieties. Rim sherds included Chial Bowls, Belize Red Bowls, Belize Red Jars, Mt. Maloney Black Bowls, Mt. Maloney Black Jars, Dolphin Head Bowls, Dolphin Head Jars, San Lorenzo Black Jars, Chunhuitz Bowls, Vaca Falls Bowls, Vaca Falls Jars, Alexander Jars, and an Alexander Pie Crust Jar. Both humus and general occupation layers contained a variety of sherds dating from Late Classic I through the Terminal Classic periods.

7.6.2 Op. 51: Agricultural Plot System 2

A total of 8188 ceramic sherds were found in Agricultural System 2, with 1669 diagnostic sherds including 149 rim sherds. Like Agricultural System 1, the majority of sherds were too eroded to be diagnostic. All diagnostic sherds were categorized as general Late to Terminal Classic, general Late Classic, Late Classic I, Late Classic II, or Terminal Classic. Diagnostic body sherds fall under the Chial, Mediation Black, Mt. Maloney Black, Belize Red, Macaw Bank, Macaw Bank Applique, Macaw Bank Punctated, San Lorenzo Black, Dolphin Head, Vaca Falls, and Chunhuitz types and varieties. Rim sherds included Chial Bowls, Belize Red Bowls, Mt. Maloney Black Bowls, Mt. Maloney Black Jars, Meditation Black Jars, Macaw Bank Jars, Dolphin Head Jars, Dolphin Head Bowls, San Lorenzo Black Jars, Vaca Falls Bowls, Vaca Falls Jars, and an Alexander Jar. Both humus and general occupation layers contained a combination of sherds dating from the Late Classic to Terminal Classic, though, as expected, more Terminal Classic sherds were found in the upper humus layer.

7.6.3 Op. 14: Terraforming and Water Channel System

The ceramics found in both the water channel and terraforming areas were highly eroded, particularly below the humus layer, and it was not possible to assign types to any sherds in these assemblages. A total of 433 sherds were found in test units associated with terraforming. The majority were found in the humus and subsequent occupation layer rather than in the area around the terraforming feature itself. This was also the case with the test pits associated with other terraformed features in which 2293 sherds were recovered.

7.6.4 Op. 52: Chich Cobble Mounds

A total of 1218 ceramic sherds where found in the cobble mound area, with 233 diagnostic sherds. The cobble mounds are located along the floodplain of the Mopan River, and a previous predictive ArcGIS model created by Borislava Simova has shown the area was particularly prone to flooding in the past. Therefore, it is unsurprising that a large number of sherds were too eroded to be diagnostic. All diagnostic sherds were categorized as general Late to Terminal Classic, Late Classic I, Late Classic II, or Terminal Classic. Diagnostic body sherds fall under the Meditation Black, Mt. Maloney Black, Belize Red, Macaw Bank, San Lorenzo Black, San Lorenzo Black Incised, Dolphin Head, Vaca Falls, and Chunhuitz types and varieties. Rim sherds included: Belize Red Bowls, Mt. Maloney Bowls, Mt. Maloney Jars, Dolphin Head Jars, Alexander Jars, and an Alexander Pie Crust Jar. It should be noted that only four out of 232 diagnostic sherds (1.7%) were categorized as Late Classic I, therefore it is likely that there was little occupation during the Late Classic I time period.

7.7 Obsidian

Obsidian sourcing was based on visual attributes including refracted color, reflected color, translucency/opacity, sharp/diffused light, inclusions, and luster/texture of surface, following Braswell et al. (2000). Previous Actuncan obsidian analysis by Shults (2012) found that obsidian artifacts in many Actuncan assemblages came from the El Chayal and Ixtepeque sources, with the majority (81.4%) from El Chayal. Like this study, her analysis was also based on visual inspection of color and texture. El Chayal's refracted color tends to have a medium gray with milky or waxy appearance, with a reflected color of medium gray to black. El Chayal obsidian has frequent but small, dark gray or black banding, which is wide and somewhat irregular. It also has dusty inclusions. Ixtepeque's refracted color is usually dark brown, with a reflected color of black or medium gray. It is of medium luster, and diffused light has an appearance similar to frosted glass. There are usually no inclusions, but banding (typically milky gray to black) is common. Bands are narrow, straight, and parallel. Ixtepeque obsidian mostly contains medium translucency, but banded portions are opaque, and it often has a high luster with sharp refracted light (Braswell et al. 2000:272). Most obsidian from all assemblages was categorized as medial portions of blades and prismatic blades (see Appendix C for tables).

It is interesting to note that out of the nine prismatic blades plus one categorized as a simple blade (i.e. only two flake scars), the majority are not worked or utilized. All were found in Lot 51G2, an area of occupation outside the Agricultural Plot System 2 boundary, although the southern sidewall of the unit contained part of Orthanc Wall. Very few artifacts were found in this area, and the blades were found near to each other in the northeast corner of unit, where the lot was only 5 to 10 cm thick. All blades were from El Chayal, and the purpose of the possible obsidian cache is unclear.

7.8 Groundstone

Groundstone artifacts includes *manos*, *metates*, hammerstones, polishing stones, bark beaters, curtain weights, and pecked and worked stone. (see Appendix D for groundstone tables). *Manos* and *metates* (Figures 7.17 and 7.18) in the assemblages are primarily made of granite, though one broken *metate* found in the space between *chich* cobble mounds (Op. 52B) that is made of quartzite (see Figure 7.18). *Manos* and *metates* are used in household contexts, and thus are indicative redeposited domestic trash. One *metate* fragment and three *mano* fragments were found in Agricultural Plot System 1 and one *mano* fragment was found in Agricultural Plot System 2. Seven pieces of a broken *metate* were found in the *chich* cobble mound from 52B2, which was likely a domestic area due to the assemblage resembling domestic trash as opposed to the high proportion of lithics in 52A and 52C. All hammerstones were made of limestone and were determined to be hammerstones based on use wear along the edge of the hammerstone (Figure 7.19). Two hammerstones were found in the assemblage, both in Agricultural Plot System 2, along with one piece of worked stone and two pieces of pecked stone in Agricultural System 1. In addition, one polishing stone (Figure 7.20) two bark beaters (Figure 7.21) and one curtain weight (Figure 7.22) were found in Agricultural Plot System 1.

7.9 Slate and Quartz

Slate and quartz were not particularly prevalent in any of the assemblages (see Appendix D for tables). Slate pieces found in all assemblages was categorized as fragments, aside from one worked oval piece (Figure 7.23) and a piece featuring an inscribed geometric design 51T1 (Figure 7.24). The oval fragment was located with large pottery sherds and charcoal at the bottom of the Feature 2 Pit in 51S1, while the slate with geometric designs was located in 51T1, which comprised of humus, redeposited domestic fill, and wall collapse. Sixteen pieces of slate were found in Agricultural Plot System 1, fourteen in Agricultural System 2, and one in the Water Channel System. No slate was found in the Terraformed area or in the *Chich* Cobble Mound. Quartz artifacts were separated into flake fragments, chunks, and nodules based on chipped stone categories. The majority of quartz recovered were chunks. Nine pieces of quartz were found in Agricultural Plot System 1, four in Agricultural Plot System 2, two in the Terraformed Feature area, and two in the *Chich* Cobble Mound – no quartz artifacts were found in the Water Channel System.

7.10 Daub and Plaster

Daub is often utilized in house construction, and its presence can point to in situ construction or the use of redeposited domestic trash. Daub was counted and weighed by lot. The largest amount of quantity of daub was found in both agricultural plot systems, pointing to the usage of domestic trash in this area. However, a high density of daub was found in units associated with the platform found in Agricultural System 1 (making up 20.1% of total daub in the Operation). As the platform is hypothesized to have been used as a field house (*champa*), this is to be expected. Two pieces of plaster were also found in Agricultural Plot System 2 (see Appendix E for tables)

7.11 Faunal and Shell

Shell was differentiated between marine shell, ridged jute (*Pachychilus glaphyrurs*), and smooth jute (*Pachycilus indorum*). Jute is a common riverine snail consumed by both ancient and contemporary populations in the Maya lowlands (Halperin et al. 2003). Many jute are found with the tips broken off or with holes drilled along the center—two methods used to extract the flesh for consumption (Healy et al. 1990). For jute, I collected data on whether the shell was intact and if it had a broken tip, a hole in the middle, or a broken tip and hole. Marine shell was recorded as a separate category and was not identified by species. The largest density of jute was found in the cobble mounds, but it may be that the presence of jute in this area was due to the gathering of jute near the mouths of nearby tributaries and not the result of mass consumption. The majority (94.4%) of jute in the cobble mounds have a broken tip, however, which is indicative of preparation for consumption (see Appendix F for shell tables).

Jute, two marine shells, and a cave pearl, were found in Agricultural Plot System 1. One fragment carved in the shape of a star, possibly used as a pendant for decorating clothing, was found within Agricultural Plot System 1 (14AP1) (Figure 7.25). Marine shell was not found in Agricultural Plot System 2, but the assemblage did contain seven jute. The largest number of marine shell fragments – 23 in total – were found in the Water Channel System. Marine shell was found in all units except 14N, but the largest quantity came in the form of nine shell beads in Lot 14S3, which I categorized as fill right above the buried walls that form the channel. No marine shell was found in the *Chich* Cobble Mound but, as stated above, the assemblage did contain a large quantity of jute. The shell beads in the Water Channel System were found along with six deciduous teeth, although the number and age of the child(ren) was not determined. The purpose of the teeth and beads is unclear, and it is unknown if the teeth came from a child whose soft bones disintegrated in the acidic soil or if the teeth and beads came from a cache that only originally contained teeth. Due to the placement of the shell beads and teeth in a water channel system, they may be the result of a water offering. A possible animal claw was also found in Agricultural Plot System 1 (see Appendix F for faunal table).

7.12 Conclusion

Artifact analysis of materials from Agricultural Plot Systems 1 and 2 revealed evidence for a large amount of redeposited domestic trash. The majority of lithic flakes in Agricultural Plot System 1 were classified as second stage reduction flakes, data that lend evidence to suggest that the assemblage was not the result of early or late stage production. Variation in lithic types was also significant, with the presence of formal tools such as bifaces, chisels, gravers, scrapers, macroblades, burins, and drills in addition to expedient tools and flake blades. The lithic assemblage in Agricultural Plot System 2 was comparable to that of the first plot system discovered, with the majority of flakes falling under the second stage production category. Formal and informal tools were also encountered. Both plot systems dated to between the Late and Terminal Classic periods, although Agricultural Plot System 2 contained a larger proportion of Late Classic II sherds. Mano and *metate* fragments and daub, indicative of domestic activity, were found in both agricultural plot systems. These finds provide further support for the presence of redeposited domestic trash in the plot systems.

Fewer artifacts were found in the terraforming and water channel areas due to the difference in the volume of excavation, as well as functional contexts. Second and third reduction stage flakes were predominant in both areas, with a low percentage of first stage flakes. Three formal tools were found in the terraforming test units, and tools were also present in the water channel system. Diagnostic sherds were not available in these two contexts.

Excavations in the *chich* cobble mound area have revealed the depositional history of the area. While the majority of stone found in the *chich* cobble mounds took the form of river cobbles, the mounds were also created with lithics including a range of second and third stage reduction flakes. Very few formal tools were found, however, indicating that debitage was preferred for the building of the mounds. It is also possible that this material derives from redeposited lithic production areas near the river where cobbles are abundant. Based on ceramic analysis, the majority of sherds date to between the Late Classic and Terminal Classic periods. A broken *metate* was also found in the open area between the cobble mounds, along with a larger amount of ceramics, which indicates domestic activity. Future analyses of soil samples will reveal more information regarding the possible agricultural purposes of the *chich* cobble mounds.

Chapter 8: CONCLUSION

The original goals of this study were to investigate magnetic anomalies identified in the Northern Settlement Zone as well as provide a greater understanding of the *chich* cobble mounds located along the Mopan River floodplain. Investigations in the Northern Settlement Zone revealed a number of agricultural and water channel features, as represented in 1) Agricultural Plot System 1; 2) Agricultural Plot System 2; 3) Terraforming; and 4) a Water Channel System; while excavations on and around the *chich* cobble mounds revealed their general stratigraphy and allowed for soil sample collection. In this concluding chapter, I will re-examine the historical trajectory of the site of Actuncan, and its commoners in particular, in addition to discussing why archaeologists studying land use must examine microenvironments, while providing an overview of theoretical concepts. I will then summarize my findings from excavation and artifact analysis in order to support by hypotheses, and, finally, I will examine the utility of my work for other archaeologists and anthropologists, as well as discuss possible future endeavors.

8.1 Commoner Endurance at Actuncan

Through its 2000-year occupation, Actuncan, and its commoner inhabitants living in the Northern Settlement Zone in particular, was able to weather the waxing and waning of elite power and divine kingship seen throughout the upper Belize River valley. First settled in the terminal Early Preclassic period during the height of sites such as Baking Pot and Cahal Pech, large-scale architectural construction began at Actuncan in the Late Preclassic period. Indicating the introduction of the site in the upper Belize River valley as an influential capital, the construction of two formal civic-ceremonial groups has also been argued to be evidence of the introduction of hierarchical rulership. In particular, this broad remodeling of Actuncan's site core likely corresponds to the establishment of divine leadership at Actuncan, which sparked the construction of much of the site's ceremonial core. It is believed, in fact, that over half of the site's architecture was built during the Late Preclassic period. By the Early Classic period, however, Actuncan decreased in influence and it is likely that the remaining population of the site fell under the power of other local political centers. Buenavista del Cayo dominated the region in the Early Classic period, with Xunantunich controlling the region by the Late Classic period. While Actuncan was likely integrated into the Xunantunich polity at this time, the full extent is not completely clear. Although large-scale architectural construction at Actuncan fell during this time period, the construction of a ruler's residence may have marked the shift in regional power from Buenavista del Cayo to Xunantunich, with the multi-patio residence serving as a home of a vassal noble of Xunantunich. A revitalization occurred at Actuncan during the Terminal Classic period, but it is likely divine kingship was replaced by general elite control.

Three patio-focused household groups in the Northern Settlement Zone – Groups 1, 5, and 7 – are each comprised of four structures oriented around a central patio. Based on ceramic dating, Group 1 was founded in its current arrangement during the Late Preclassic period contemporaneously with the establishment of the site's coherent site plan. Groups 5 and 7, however, were founded during the Terminal Preclassic period, sometime after the establishment of divine kingship at the site Actuncan's Preclassic elite appear to have lived in markedly different domiciles from the polity's commoners, with three large single house mounds belonging to the heads of Actuncan's most eminent households. During Actuncan's Preclassic and Early Classic apogee, these elite households appear to have benefited from several centuries of stability, but were abandoned by the end of the Early Classic period and later re-occupied.

In contrast, the site's patio-focused groups in the Northern Settlement Zone follow a diversity of trajectories that don't follow any specific pattern. Groups 1 and 5 apparently prospered during Actuncan's period as a polity capital. In Group 1, only three patio floors were encountered for a household occupied over at least 1000 years, while the smaller Group 5 had at least 13 patio floor surfaces, many of which had been constructed by the end of the Early Classic period. Unlike the elite houses, the three commoner households had divergent outcomes following the failure of the Actuncan polity. Group 5 appears to remain the most stable, as the residents continued to renovate at a rate similar to that during the site's apogee. At Group 1, however, there is evidence that points to a slowing of renovation during the first half of the Late Classic period. It is likely that the residents of this group lost wealth and status during Actuncan's period of subordination, but it is unlikely that the Group was abandoned entirely. Group 7 structures date exclusively to the Late and Terminal Classic periods, suggesting prosperity during these later periods.

Thus, in contrast to elite members of the Actuncan community, Maya commoners experienced a diversity of outcomes during periods of political transition. Group 1 suffered the most from the failure of the polity, while Group 5 remained stable and Group

7 increased its prosperity after the fall of the Actuncan polity. The fate of the commoner residence of Group 7 is particularly important to this study, as the agricultural plot systems, terraforming, and water channeling are located closest to Group 7. Architecture indicates Group 7 prosperity during the Late and Terminal Classic periods, after Actuncan lost its power, but associated agricultural production strategies and water channeling also provides evidence for the household's endurance through political turmoil. The agricultural plot systems, with box terraces and its connected features, suggest a large amount of agricultural intensification on the part of Group 7's residence, while the use of *yeso* and low plastered walls for channeling water indicate knowledge related to the local topography, hydrology, and soils of the area. Through the implementation of intensive gardens and water channeling systems, the residents of Group 7 were able to thrive and endure during political and social changes in the upper Belize River valley.

8.2 Theoretical Perspectives and Localized Contexts

Agricultural intensification as general idea has been discussed for over a century, often focused on labor input and its connection to increased populations (Malthus 1878; Boserup 1965; Brookfield 1972). More specifically, as populations rise, pressures on natural resources increase and societies respond by intensifying agricultural production to meet the rising demand for food. Dichotomies emerged, including Doolittle's (1984) systemic vs. incremental view of agroecosystem change and Kirch's (1994) distinction between intensification and innovation. For Doolittle, agricultural intensification can occur at one specific time (systemic) or over a longer time span (incremental), particularly in reference to the actual agro-engineering features. In contrast, Kirch argued that scholars should identify intensification as the amount of labor input, while agro-engineering features associated with increasing agricultural production should be identified as innovation. Doolittle's focus, then, is on intensification based on time scale, while Kirch only identifies intensification with labor inputs as opposed to also considering crop output. While both time scale and the distinction between labor and the agroeccosystem change are important, I believe they both lack a holistic version of a definition of agricultural intensification.

Examining agricultural intensification on a more localized scale allows scholars to analyze how specific environmental, social, and political contexts affect agricultural intensification, with theories based specifically on the lowland Maya area beginning with Hammond (1978) and McAnany (1992). These early theorists focused mainly on the idea of marginal land, in which agricultural intensification is likely to occur in areas with hydrologic problems and poor soil. McAnany (1992) in particular added a social and political context for agricultural intensification, as she argued that elite groups, or those with most power, would take the "good" land (i.e. good for agricultural production) and leave commoners with the marginal land. Other important additions to definitions of agricultural intensification in the Maya lowlands relate to the focus on households as the primary locus for agricultural intensification (Killion 1992). In this household model, social patterning is included to determine the mostly likely place for agricultural intensification, such that agricultural production decreases in intensity the farther it is from the household. The agricultural plot systems found in the Northern Settlement Zone are located close to the commoner residence of Group 7, and the addition of features such as multi-course walls, a field house, a water channeling feature, and encircled pits indicate a high level of agricultural intensification. The amount of agricultural intensification needed to grow cacao in the chich cobble mound area is unclear. While located away from the Northern Settlement Zone, and the Actuncan site core in general, there is evidence of residential occupation between the cobble mounds, possibly indicating the necessity for general upkeep.

Finally, I utilize the theory of laboresque vs. landesque capital first outlined by Blaikie and Brookfield (1987), in which laboresque capital constitutes the labor input into agricultural production while landesque capital investments are the actual agro-engineering features (such as the construction of terraces and irrigation systems. Blaikie and Brookfield, however, make a point to identify landesque capital investments as those that require increased labor at the outset, but save labor in future cropping cycles, creating less work for future generations. This viewpoint thus combines Kirch's distinction between labor input and agro-engineering features while acknowledging the importance of time scales addressed by Doolittle's systemic vs. incremental view without pitting a singular planned event vs. incremental change as a way to determine intensification. Within the Maya lowlands, the construction of terraces is often identified as incremental, but the agricultural plot systems associated with Group 7 appear to have been the result of a highly planned, single construction even that most likely led to general maintenance later on. Thus, the agricultural plot systems would be more indicative of landesque capital investment in agricultural intensification.

8.3 Summary of Excavations and Artifact Analysis

Agricultural Plot System 1, situated to the south of Group 7 in the Northern Settlement Zone, consisted of an interconnected group of terraces and agricultural plots, creating four plots in total. Sixteen walls were counted in all, and while a high density of artifacts were found inside the system, there were little to no artifacts outside of the walls bounding the system. Located downslope, the agricultural plots were also associated with a number of other features. A probable field house, consisting of a platform sharing multiple walls with the larger plot system, and a high density of cobbles to artifacts, was found towards the east and may have been used to hold agricultural tools and possibly for shade. A thin layer of yeso was also found along the northern side of the system, connecting to a multi-course wall, which may have been utilized for channeling water. A small posthole was found just south of the yeso feature, but it is not clear what structure it is associated with. In addition, a small enclosed box was revealed between Stark and Baratheon walls, which may have worked as a sluice gate or some form of water collection.

Also located downslope, but further upslope than, and to the east of, Agricultural Plot System 1, Agricultural Plot System 2 was not as well preserved, most likely as a result of post-occupation wall collapse. Three identifiable plots were found in this system, though excavations to uncover the entire system were not conducted. A possible platform was also found in Agricultural Plot System 2, but it may just be the result of wall collapse. In addition, two pit features were uncovered, each encircled by cobbles but unlined. Both around 90 cm in diameter and 70 cm deep, the pits also contained large broken pieces of pottery and charcoal at the bottom. The purpose of these pits is unclear, or if they are directly related to agricultural functions

Terraforming was also identified in the Northern Settlement Zone, with one berm just to the south of Group 7 and another berm just to the north of Group 7. The berms were constructed out of *yeso* and involved the transporting and molding of the *yeso*. The use of terraforming to create berms at Actuncan is unique for two reasons: 1) berms at the site are earthen as opposed to those made out of stone in other areas of the Maya lowlands; and 2) the occupants at Actuncan utilized the local soil (i.e. *yeso*) to create these berms. It is likely that these berms were created to channel water and/or aid in the collection of rainfall. A more formal water channeling system, located north of Group 7 and in close association with Structure 90, consisted of a series of three low, diverging, plastered walls that angled up to the slope of the area. The remnants of a plaster floor were also found between two of the walls, and the floor and three walls were all placed atop a layer of *yeso*. Due to the use of plaster, as well as the presence of six deciduous teeth and nine shell beads, it is possible that the Water Channel System served a more ritualistic purpose, and channeled water towards Structure 90.

The *chich* cobble mounds located to the east of the Actuncan site core, along the western edge of the Mopan River floodplain, were excavated to further understand the stratigraphy of the cobble mound area and provide soil samples to be analyzed for macrobotanicals and pollen at a later date. Test pits were placed along the side of a *chich* cobble mound, in between chich cobble mounds, and atop a *chich* cobble mound. The *chih* cobble mounds appear to have been placed atop a sandy soil, and consist of chert river cobbles and lithic debitage. It is interesting to note, however, that excavations between the cobble mounds revealed evidence of Late and Terminal Classic period occupation, including a cobble floor.

Artifact analysis of materials from Agricultural Plot Systems 1 and 2 revealed evidence for a large amount of redeposited domestic trash. The majority of lithic flakes in Agricultural Plot System 1 were classified as second stage reduction flakes, data that lend evidence to suggest that the assemblage was not the result of early or late stage production. Variation in lithic types was also significant, with the presence of formal tools such as bifaces, chisels, gravers, scrapers, macroblades, burins, and drills in addition to expedient tools and flake blades. The lithic assemblage in Agricultural Plot System 2 was comparable to that of the first plot system discovered, with the majority of flakes falling under the second stage production category. Formal and informal tools were also encountered. Both plot systems dated to between the Late and Terminal Classic periods, although Agricultural Plot System 2 contained a larger proportion of Late Classic II sherds. Mano and *metate* fragments and daub, indicative of domestic activity, were found in both agricultural plot systems. These finds provide further support for the presence of redeposited domestic trash in the plot systems.

Fewer artifacts were found in the terraforming and water channel areas. While reduction flakes were present, few formal tools were found. In addition, most likely due to the water drainage function of these two features, no diagnostic sherds were present. Few artifacts, besides lithic debitage, were found on the top and along the side of two chich cobble mounds, but ceramic analysis indicate the area was occupied during the Late and Terminal Classic periods – coincident with the usage of the agricultural plot systems. The floor found between the cobble mounds contained a broken *metate* along with a higher density ceramics, which is indicative of domestic trash. In addition, a particularly high density of jute was found in this test pit as well. The majority of jute had holes and/or broken tips, which is generally associated with jute consumption, suggesting a possible feasting event.

8.4 Conclusion and Future Directions

The study of five different land use features at the site of Actuncan indicates the necessity for examining land use on a localized scale, especially in terms of environmental, social, and political contexts. Actuncan's power waxed and waned along with the rest of the upper Belize River valley, but as evidenced particularly by the occupation of Group 7 in the site's Northern Settlement Zone, not all commoners felt the effects of Actuncan's fall as a political capital the same way. Group 7, for instance, thrived during the Late and Terminal Classic periods, and ceramic analysis indicates the agricultural plot systems near Group 7 were utilized during these time periods, suggesting the plot systems were utilized by the residents of Group 7. These plot systems, most likely box terraces used for gardening, but with additional features, represent agricultural intensification based on landesque capital. While other scholars have equated terracing with incremental construction, there appears to be an initial landesque capital investment based on a single (or short time frame) construction event based on pre-planning. Agricultural Plot System 1, for instance, also contains a probable field house and a thin yeso feature utilized for water channeling, which were likely a part of the original construction plan. Likewise, Agricultural Plot System 2 contains two pit features encircled by cobbles, though their purpose is not yet clear. Thus, the agricultural plot systems found in the Northern Settlement Zone represent a form of box terrace gardening located in a residential area, and while it has already been argued that household gardens are a locus for agricultural intensification, the added features to these terraces suggest an even higher amount of agricultural intensification.

The terraforming provides a unique insight in how the ancient Maya at Actuncan, and commoners in particular, utilized their land. *Yeso* is found throughout the upper Belize River valley, but no earthen berms, particularly earthen berms created from *yeso*, have been identified at other sites, suggesting a local phenomenon. Water management appears to be the main function of these berms, and the use of *yeso* seems to be associated with water channeling. The three plastered walls and plastered floor of the Water Channel System all site atop a layer of *yeso*, though it is likely this water channel system had a more formal function, such as channeling water to Structure 90 for ritualistic purposes, such as a water shrine. *Chich* cobble mounds are found in modern-Maya orchards, and it is possible these mounds were used for a similar purpose. Being located on the Mopan River floodplain would make the soil particularly good for growing cacao, as well as provide an easy trade route to Xunantunich. If this hypothesis is correct, it would help elucidate the relationship between Actuncan and Xunantunich in the Late and Terminal Classic periods, possibly by indicating a tribute or trade system between the sites. Evidence of occupation in the *chich* cobble mound area also suggests the necessity to watch over the crops, and thus a level of agricultural intensification based on maintenance.

Further excavations and soil analysis will shed more light on these agricultural and water channeling features. Another probable agricultural plot system is located just east of Group 7, to the north of Agricultural Plot System 1 and Agricultural Plot System 2, and as it is located on flatter land, the archaeological record of this other system may be better preserved. It is also likely that more *yeso* berms than the two identified are located in the Northern Settlement Zone. As they appear to be unique to Actuncan, further research into these features will be fruitful in understanding their creation as well as how earthen berms may be identified at other sites. In addition, excavations of berms and the Water Channel System ended at the appearance of *yeso*, and determining the stratigraphy of *yeso* would also be beneficial. Previous excavations did not extend through the end of the water channel system, and its purpose and association with Structure 90 is not completely clear, particularly due to the tooth and shell cache placed just above the walls. Excavations of the entire system may determine its relationship with Structure 90; for instance, do the walls extend all the way to Structure 90? Finally, I believe the *chich* cobble mounds should be analyzed further, as past excavations have only focused on stratigraphy. In order to fully understand their purpose, macrobotanical and pollen analysis must be performed to determine if they were, as I argue, actually used for cacao orchards.

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Figure 2.1: Map of the Belize River Valley (from LeCount et al. 2001: Figure 1)

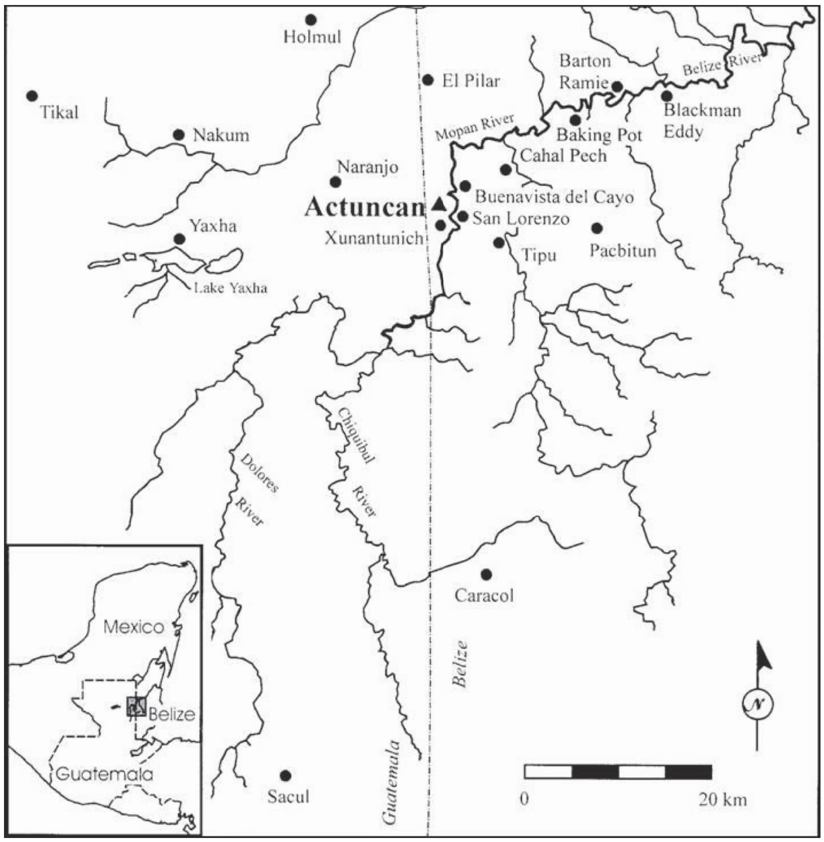

Figure 2.2: Map of the upper Belize River valley (Adapted by Mixter 2016: Figure 2.2 from Yaeger 2000: Figure 3.9)

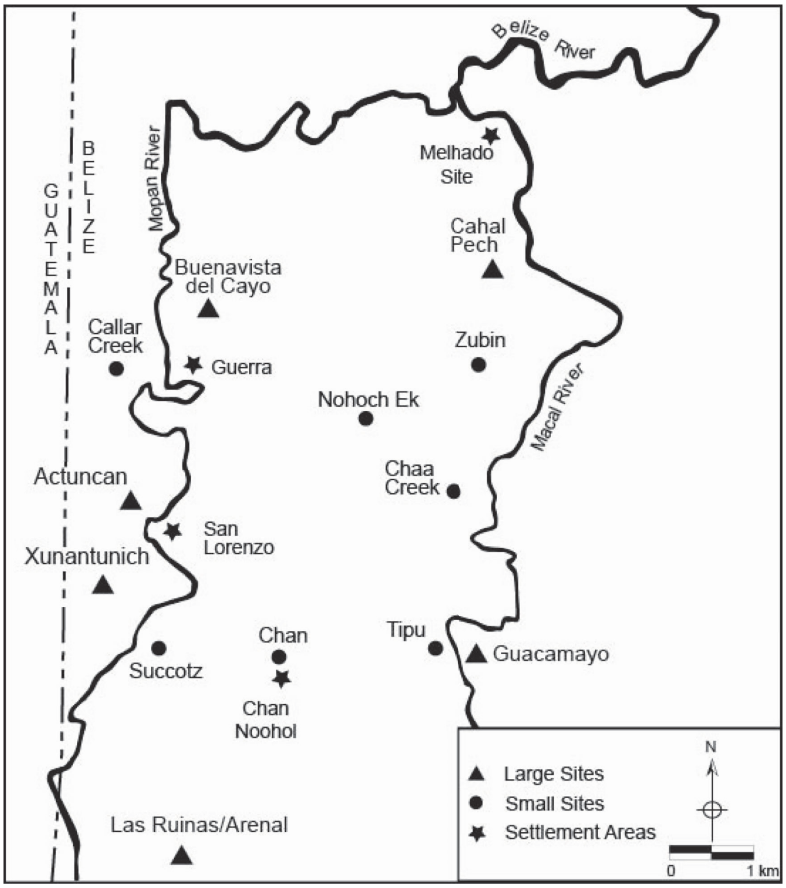

Figure 2.3: Modern Water Levels of the Mopan River in Reference to the *Chich* Cobble Mounds (with site core to the west) (from Simova 2015)

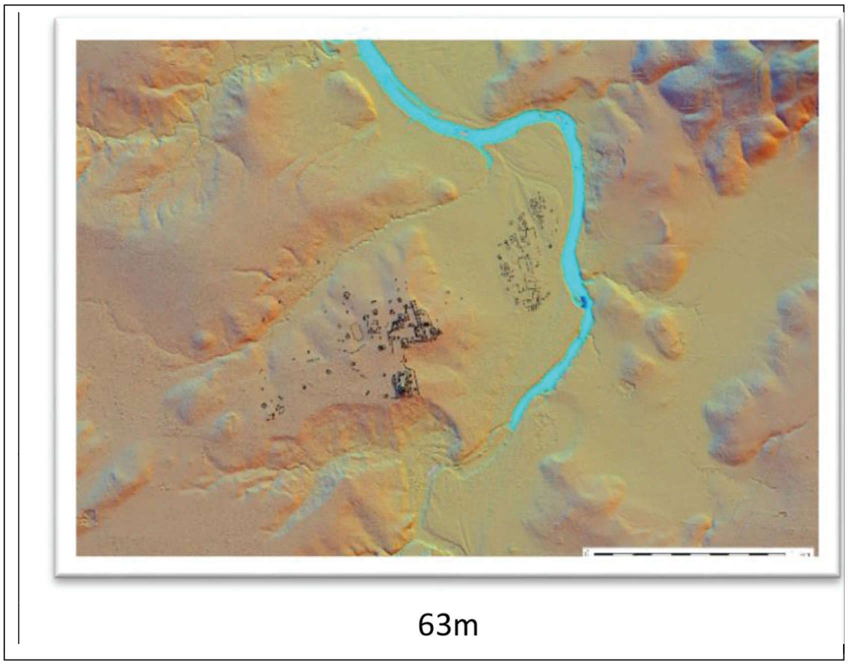

Figure 2.4: Model of Increasing Water Levels of the Mopan River in Reference to the *Chich* Cobble Mounds (with site core to the west) (from Simova 2015)

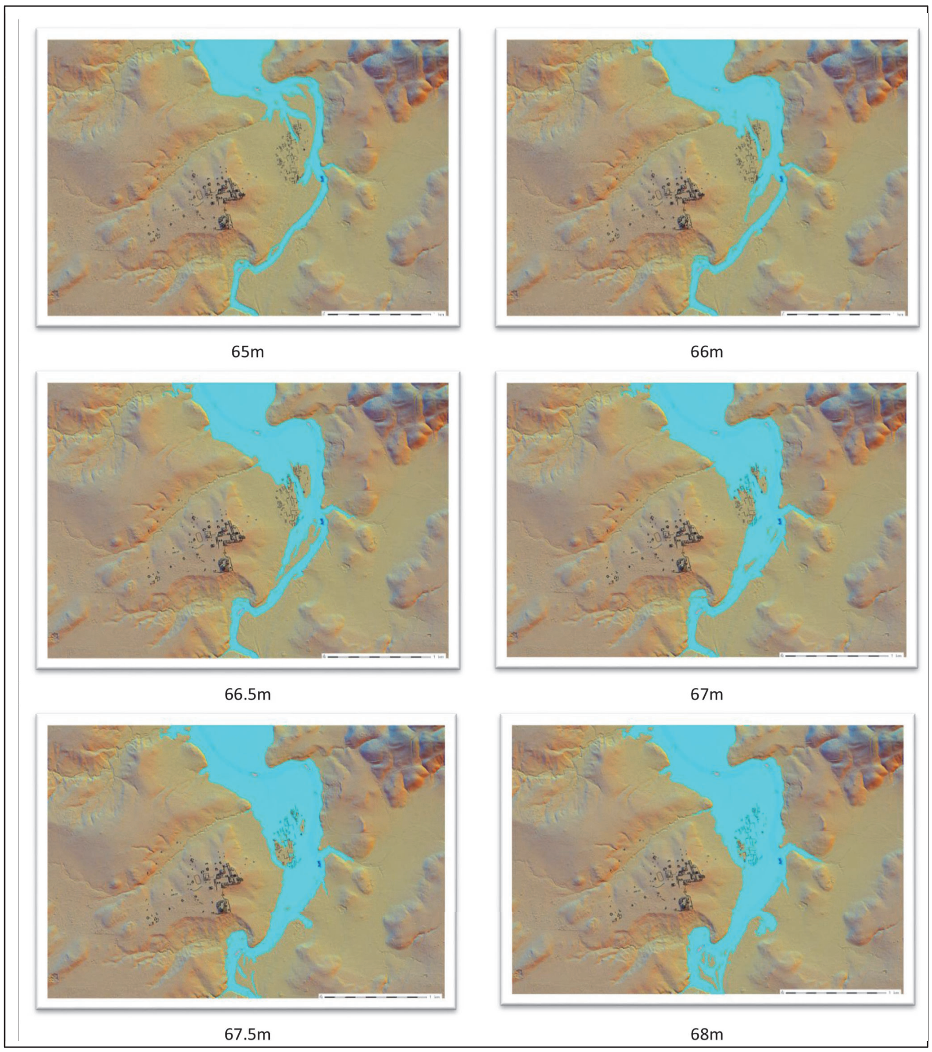

Table 3.1: Summary of lower Mopan River valley Chronology (Updated from Mixter 2016: Table 2.1 and LeCount et al. 2002) (Italicized time periods are time periods associated with this study)

Time Period	**Dates**	**Summary of Lower Mopan River Valley Politics**
Terminal Early Classic	1100-900 B.C.	Initial occupation
Middle Preclassic	900-400 B.C.	Valley dominated by Xunantunich Group E
Late Preclassic	400-150 B.C.	Early village at Actuncan superseded by a formal urban plan
Terminal Preclassic	150 B.C.-A.D. 250	Actuncan's apogee under divine rulership
Early Classic	A.D. 250-600	Actuncan is no longer the regional capital, power shifts to Buenavista del Cayo
Late Classic I	*A.D. 600-670*	*Rapid construction of Xunantunich in competition with Buenavista del Cayo*
Late Classic II	*A.D. 670-780*	*Valley dominated by kings located at Xunantunich*
Terminal Classic	*A.D. 780-1000*	*The authority of Xunantunich's kings fails, and Actuncan replaces it as the local capital*
Postclassic	A.D. 1000-1567	Limited evidence of occupation

Figure 3.1: Map of the Belize River Valley (from LeCount et al. 2001: Figure 1)

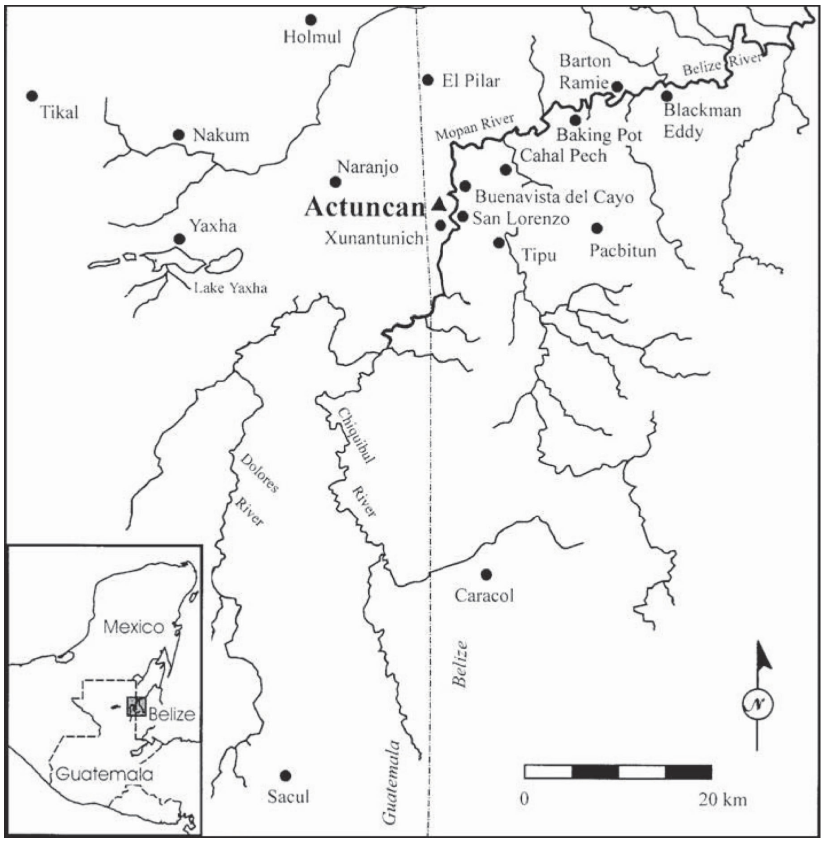

Figure 3.2: Map of the upper Belize River valley (adapted by Mixter 2016: Figure 2.2 from Yaeger 2000: Figure 3.9)

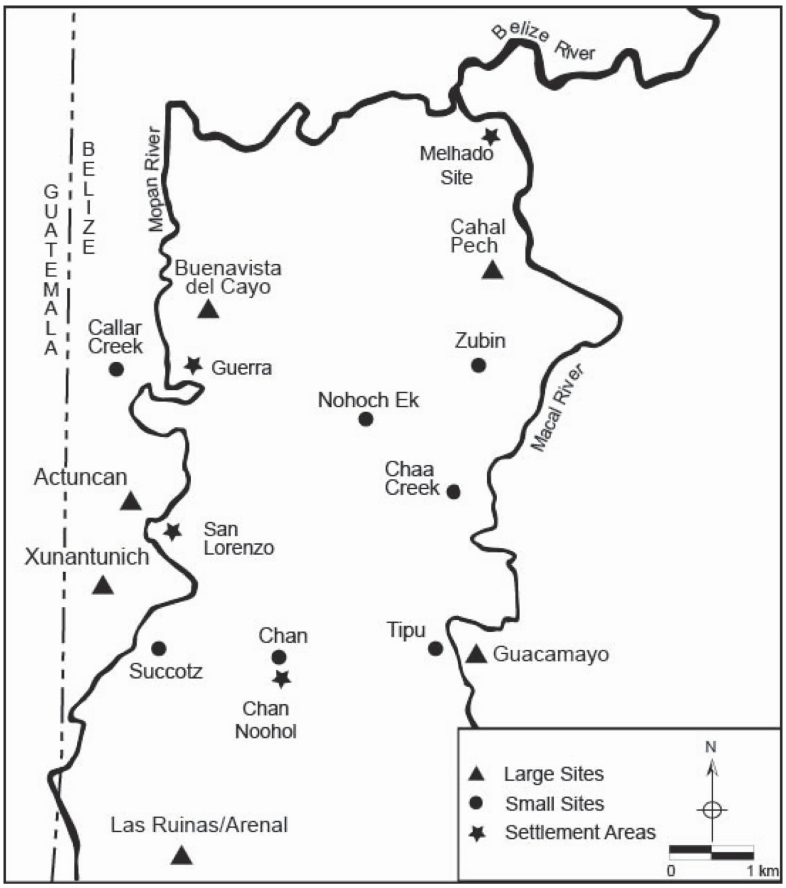

Figure 3.3: Map of Actuncan's Site Core (Mixter 2016:42)

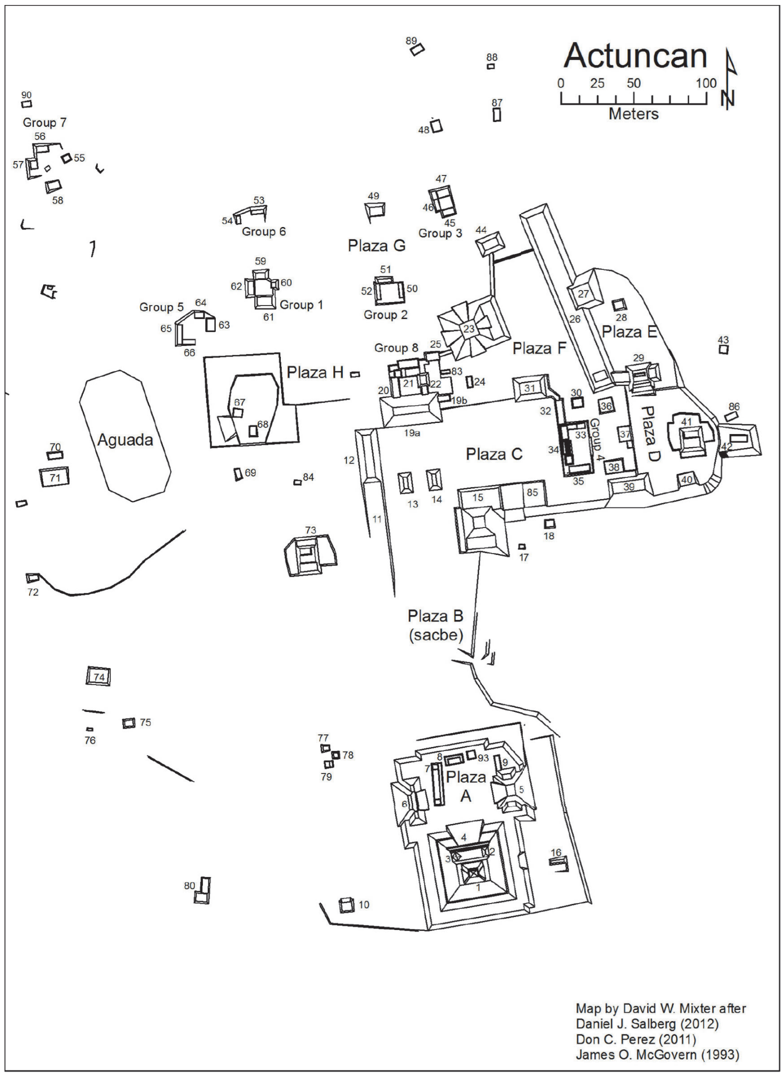

Figure 3.4: Actuncan household periods of occupation. Groups 1-3 and 5-7 are commoner households, Structures 29, 41, and 73 are elite houses. (after Mixter 2016:53)

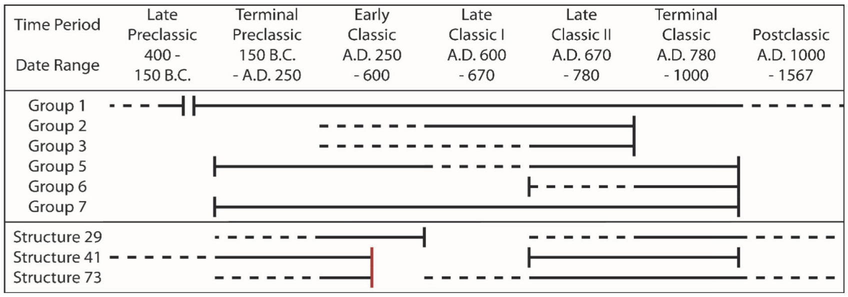

Figure 6.1: 2016 Op. 14 Area of Excavation (Water Channel System and part of Agricultural Plot System 1)

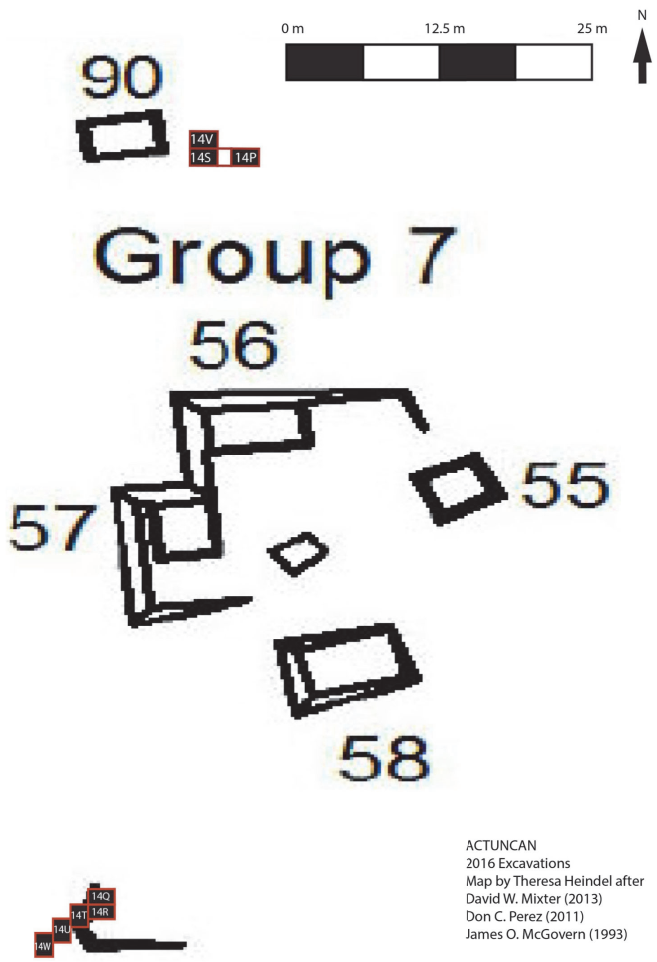

Figure 6.2: 2017 Op. 14 (Agricultural Plot System 1) and Op. 51 (Agricultural Plot System 2) Areas of Excavation

Figure 6.3: 2017 Op. 52 (*Chich* Cobble Mounds) Approximate Area of Excavation

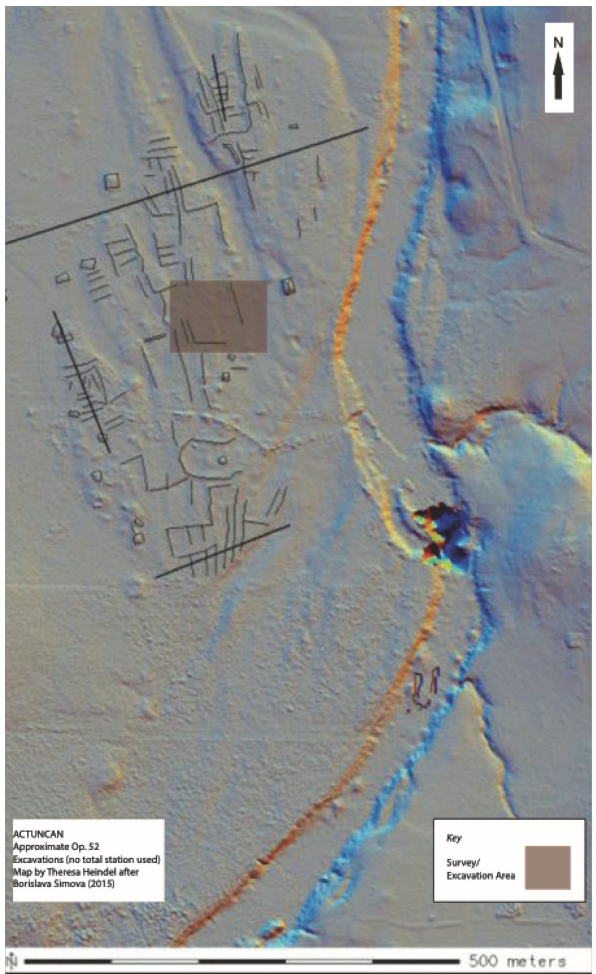

Figure 6.4: Op. 14 (Agricultural Plot System 1) – Photograph of Stark Wall

Figure 6.5: Op. 14 (Agricultural Plot System 1) – Simple Plan View Line Drawing

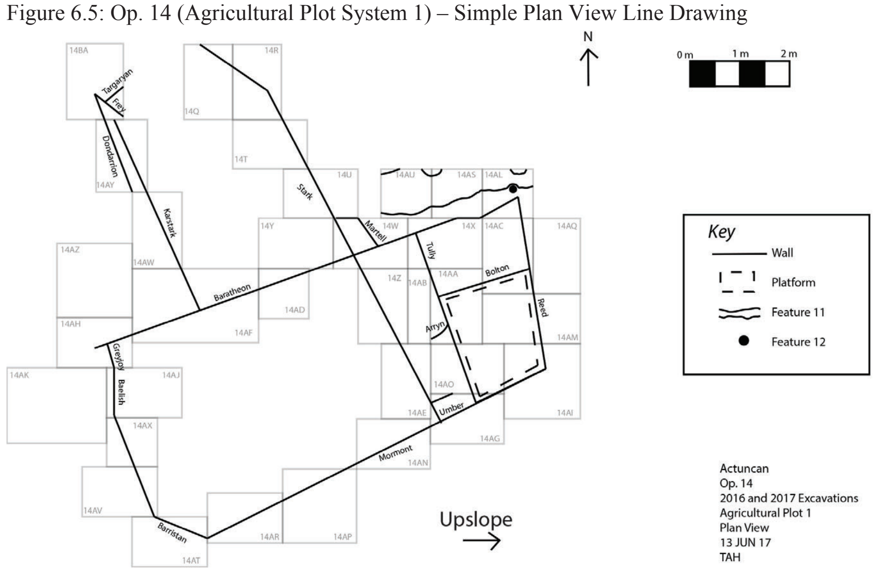

Figure 6.6: Op. 14 (Agricultural Plot System 1) – Plan View Drawing

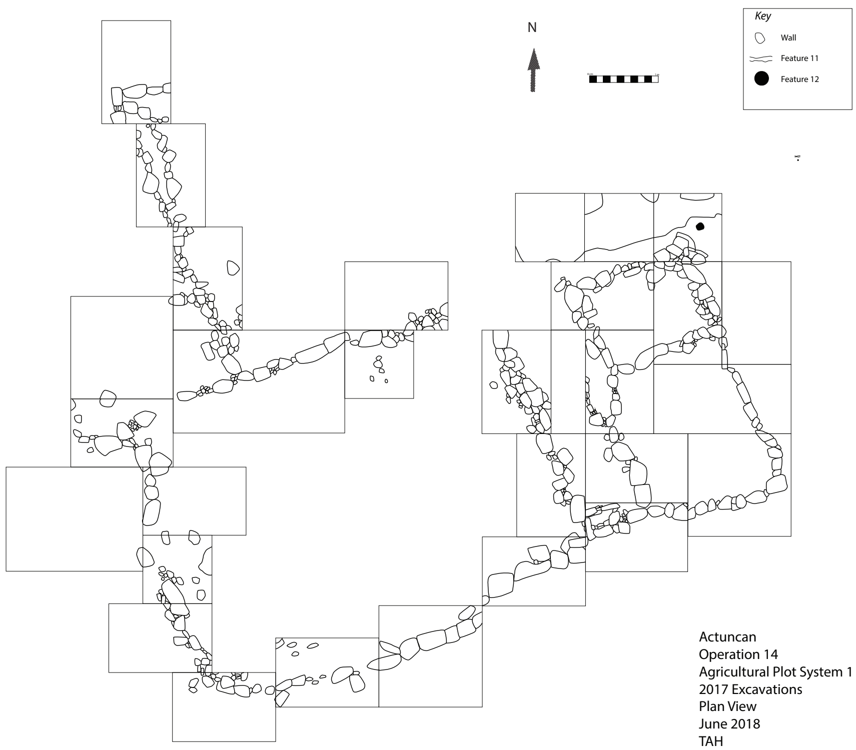

Figure 6.7: Op. 14 (Agricultural Plot System 1) – Photograph of Excavations

Figure 6.8: Op. 14 (Agricultural Plot System 1) – Reed Wall Elevation

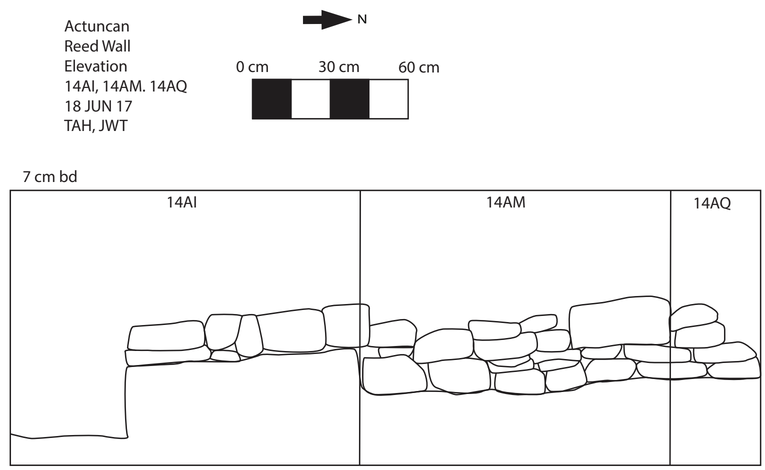

Figure 6.9: Op. 14 (Agricultural Plot System 1) – Photograph of Platform

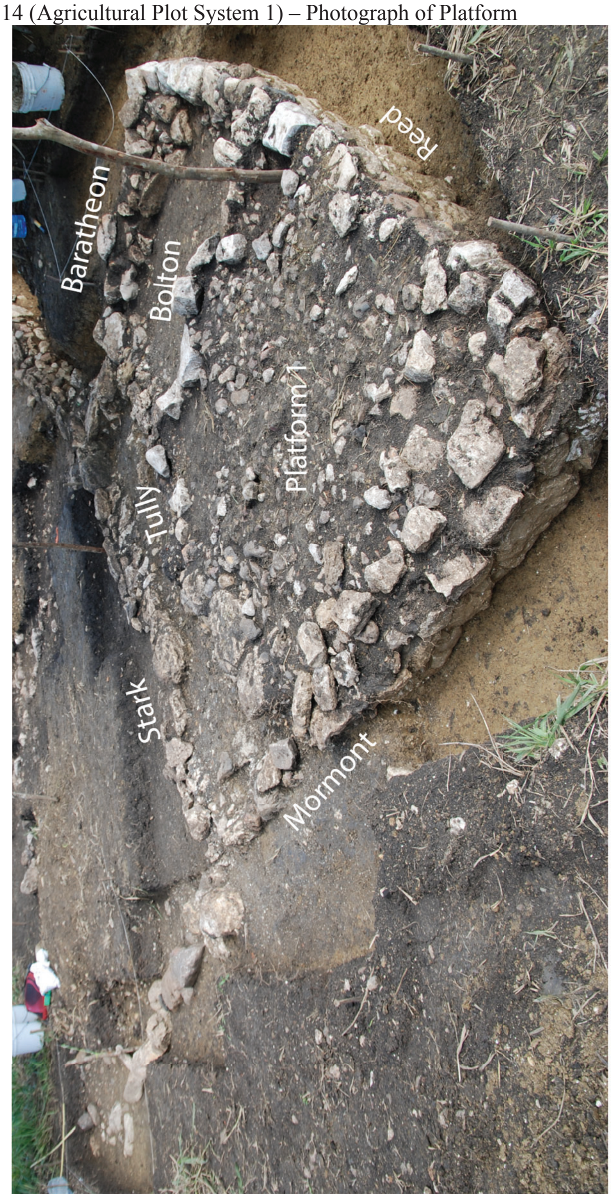

Figure 6.10: Op.14AL5 (Agricultural Plot System 1) Photograph of Feature 11

Figure 6.11: Op. 14AK (Agricultural Plot System 1) – Photograph of Area outside the System

Figure 6.12: Op. 14 (Agricultural Plot System 1) – Baratheon Wall Elevation

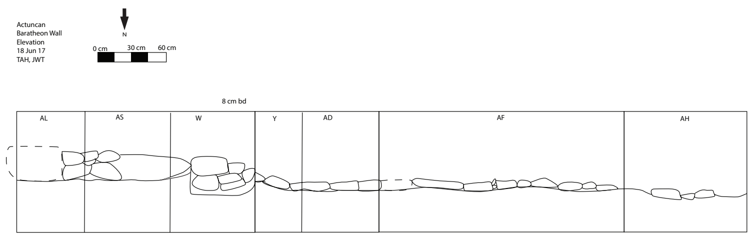

Figure 6.13: Op. 14AI2 (Agricultural Plot System 1) – Photograph of Mormont and Reed Wall Meeting

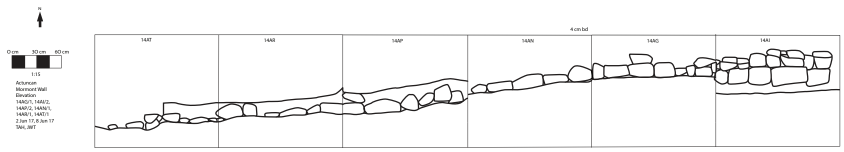

Figure 6.14: Op. 14 (Agricultural Plot System 1) – Mormont Wall Elevation

Figure 6.15: Op. 51 (Agricultural Plot System 2) – Simple Plan View Line Drawing

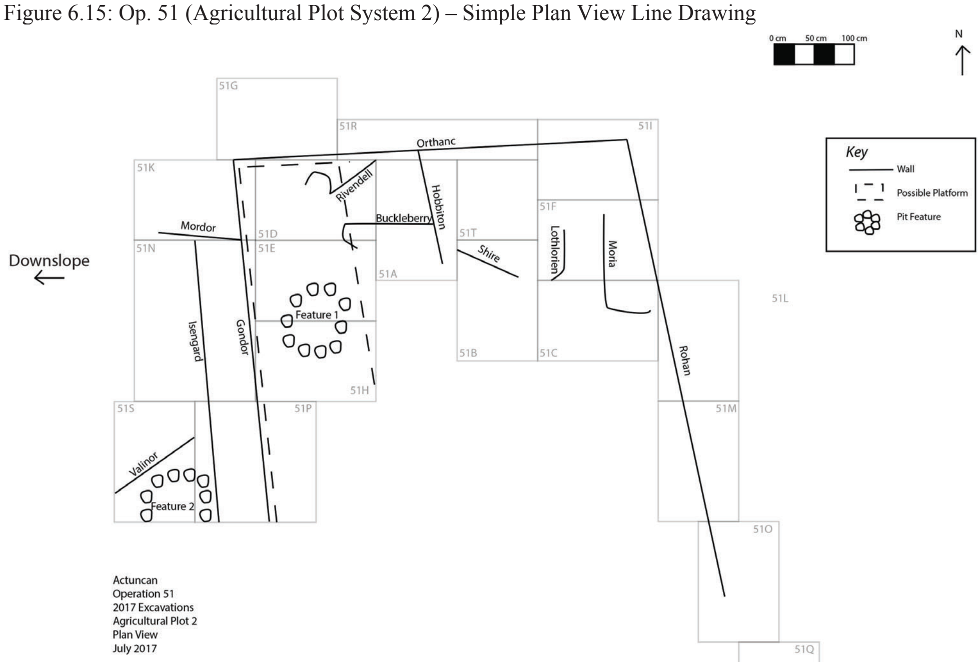

Figure 6.16: Op. 51 (Agricultural Plot System 2) – Plan View

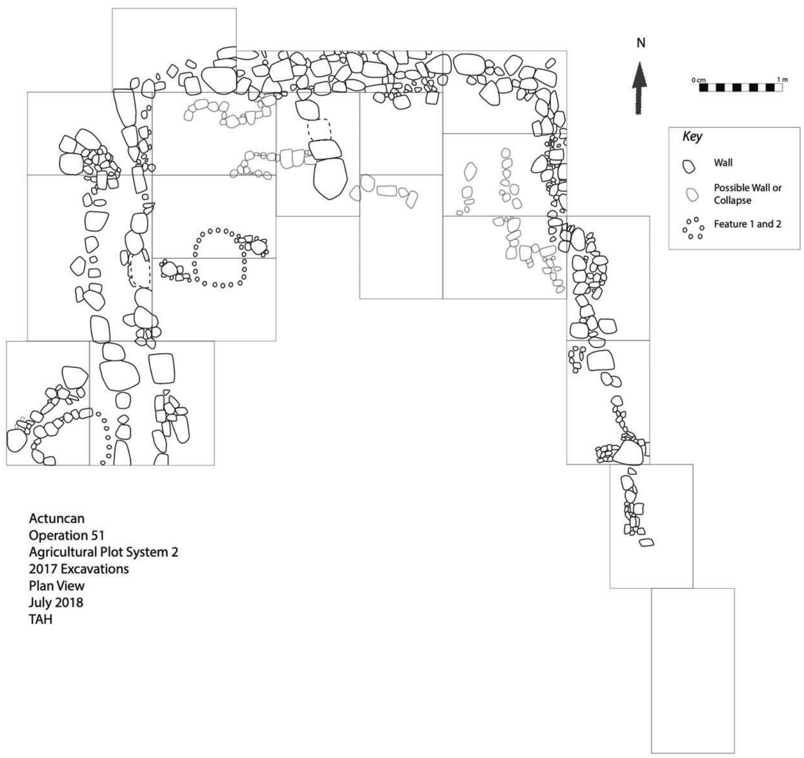

Figure 6.17: Op. 51J (Agricultural Plot System 2) – Photograph of Feature 1

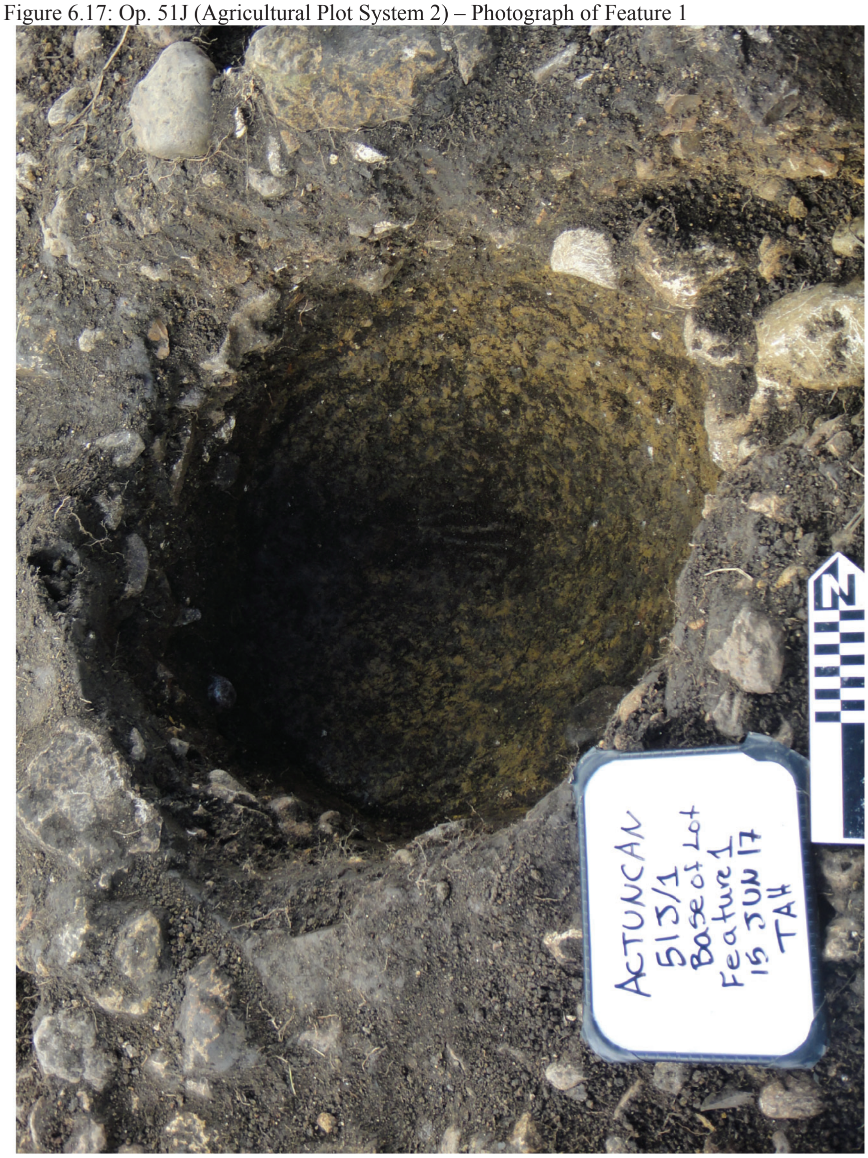

Figure 6.18: Op. 51P and 51S (Agricultural Plot System 2) – Photograph of Feature 2

Figure 6.19: Op. 51K (Agricultural Plot System 2) – Photograph of Mordor, Gondor and Orthanc Walls

Figure 6.20: Op. 51N (Agricultural Plot System 2) – Photograph of Gondor and Isengard Walls

Figure 6.21: Op. 51R (Agricultural Plot System 2) – Photograph of Orthanc Wall

Figure 6.22: Op. 14K and 14M (Terraforming) – Contour Map

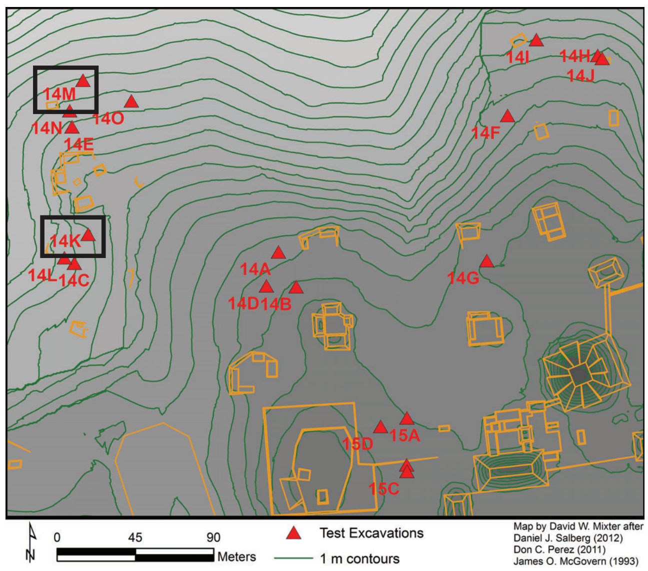

Figure 6.23: Op. 14K – Photograph of South Profile

Figure 6.24: Op. 14K – South Profile

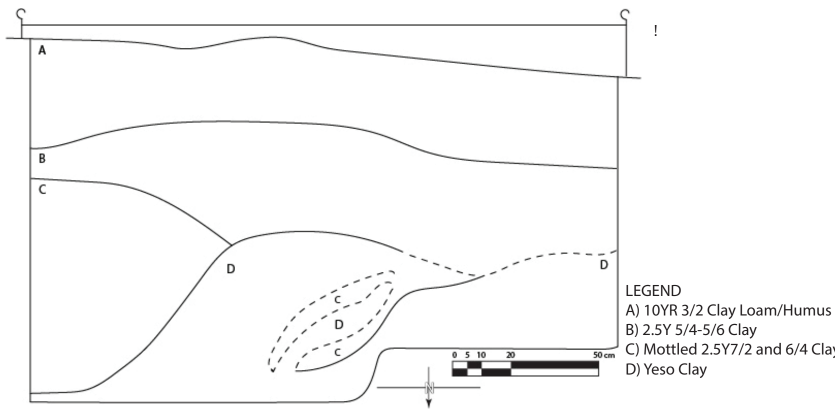

Figure 6.25: Op. 14M – Photograph of West Profile

Figure 6.26: Op. 14M – South Profile

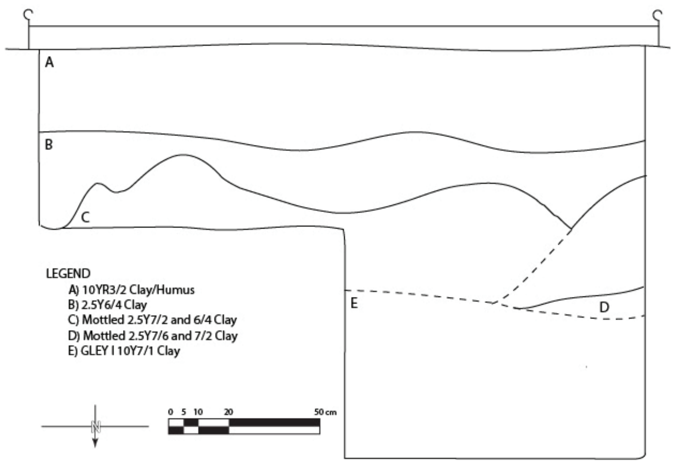

Figure 6.27: Op. 14N, 14V, and 14S – Water Channel Plan View

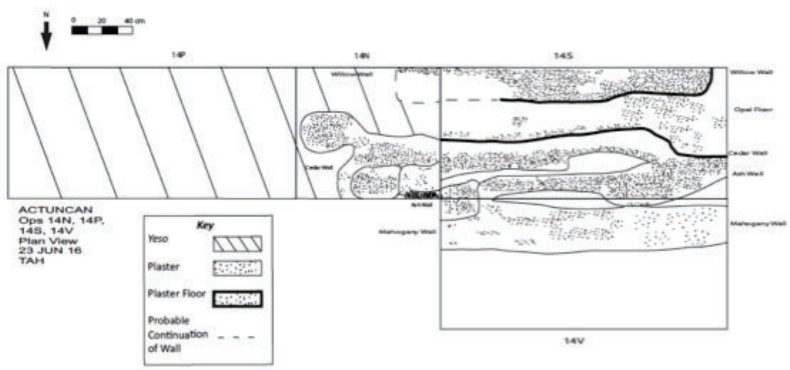

Figure 6.28: Op. 14N – West Profile

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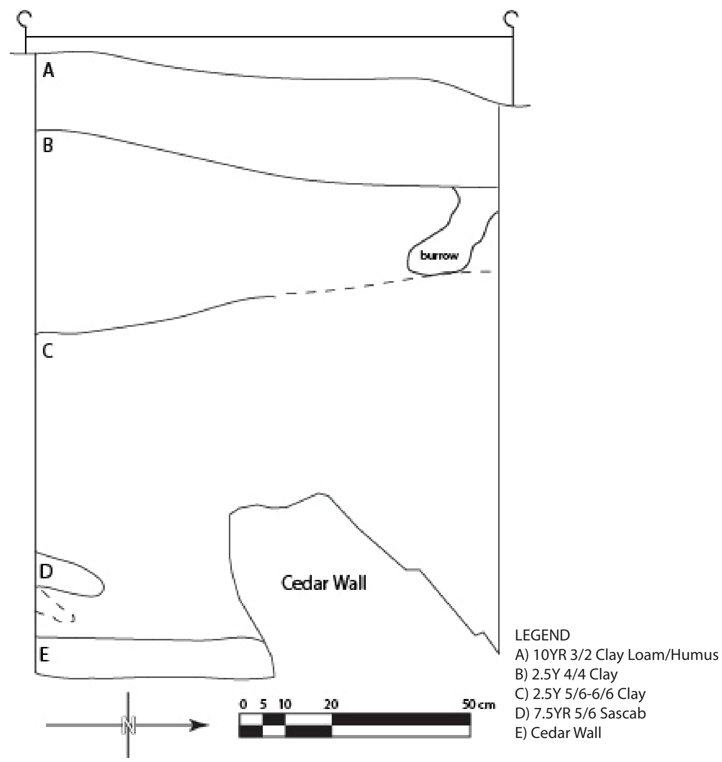


Figure 6.29: Op. 14N – Photograph of Cedar Wall

Figure 6.30: Op. 14 – Photograph of Water Channel System (facing Southeast)

Figure 6.31: Op. 14 – Photograph of Water Channel System (facing North)

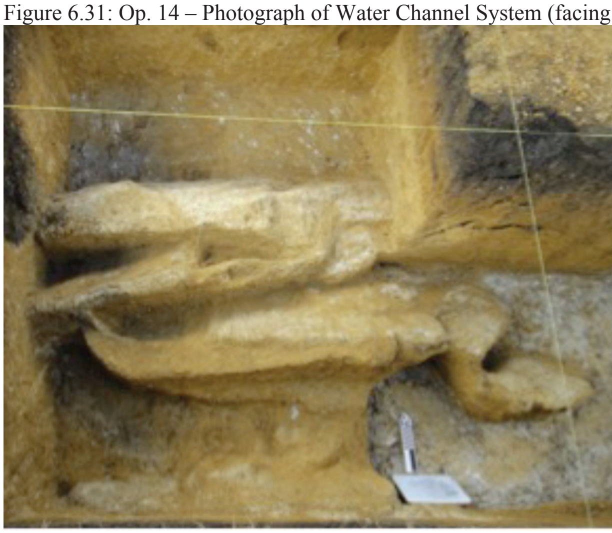


Figure 6.32: Op. 52A1 – Photograph of Top of Lot

Figure 6.33: Op. 52B1 – Photograph of Top of Lot

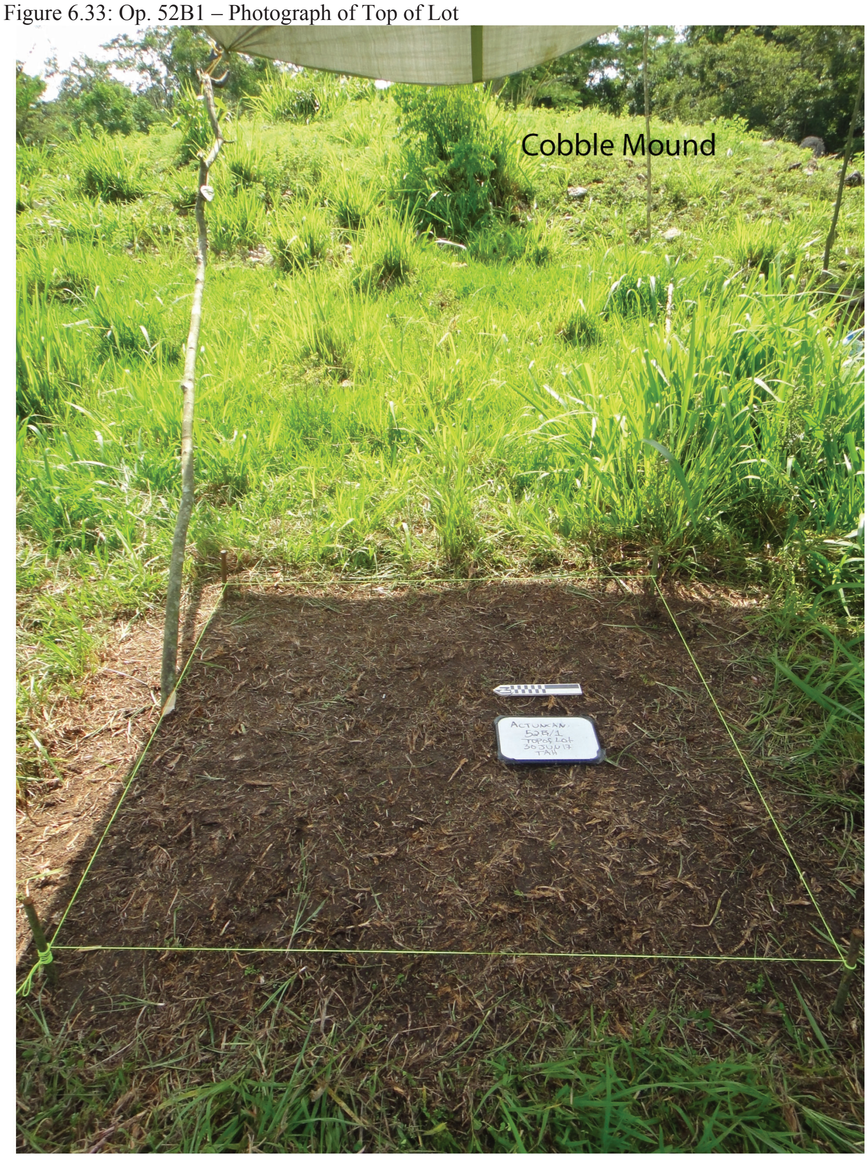


Figure 6.34: Op. 52C1 – Photograph of Top of Lot

Figure 6.35: Op. 52B2 – Photograph of July Floor

Figure 6.36: Op. 52A3 – East Profile

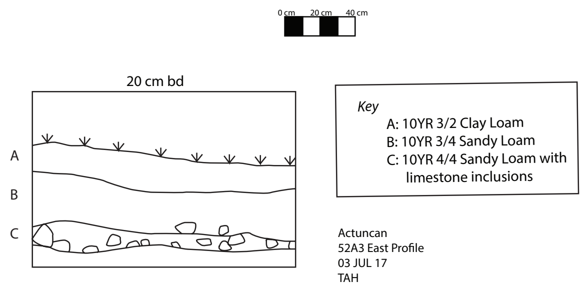


Figure 6.37: Op. 52B3 – East Profile

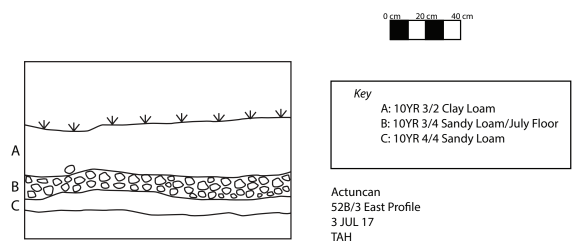
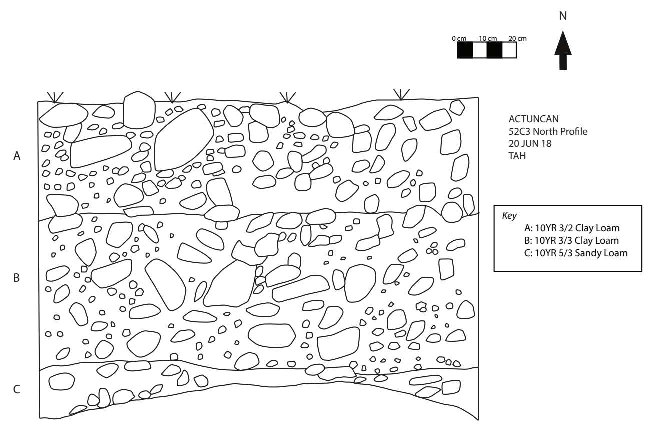


Figure 6.38: Op. 52C3 – Photograph of Base of Lot

Figure 6.39: Op. 52C3 – North Profile



ANALYTICAL UNITS

Table 6.1 Agricultural Plot System 1

AU Number	Analytical Unit Name	Lots
1	Stark Wall Humus and Fill	14Q1, R1, T1, U1, W1
2	Stark Wall Fill	14Q2
3	Stark Wall Fill and Natural Soil	14Q3, R2, T2, U2, W2
4	Gray Soil under Stark Wall	14Q4
5	Brown Soil under Stark Wall	14Q5, Q6
6	Humus Layer with Cobble Fill Outside of System Boundary	14K1, Z1
7	Humus and Redeposited Fill Within System Boundary	14X1, Y1, AA1, AB1, AC1, AD1, AE1, AF1, AG1, AH1, AI1, AJ1, AM1, AN1, AO1, AP1, AQ1, AR1, AT1, AV1, AW1, AX1, AY1, BA1
8	Humus and Platform Fill	14AA1, AC1, AI1, AM1, AO1
9	Unknown Occupation to the West of Reed Wall	AC2, AM2, AQ2
10	Unknown Occupation to the South of Mormont Wall	AI2
11	Humus and Redeposited Domestic Fill Above *Yeso* Feature	AL1, AS1, AU1
12	Unknown Occupation Surrounding/Below *Yeso* Feature	14AL2, AL3, AL5, AS2, AU2
13	Posthole Associated with *Yeso* Feature	AL4

Table 6.2 Agricultural Plot System 2

AU Number	Analytical Unit Name	Lots
1	Humus Layer	51G1, K1
2	Humus Layer with Cobble Fill Outside of System Boundary	51O1, Q1
3	Humus, Redeposited Domestic Fill and Collapse	51A1, B1, B2, C1, F1, I1, L1, M1, N1, P1, S1, T1, R1
4	Humus and Possible Platform Fill	51A1, D1, E1, H1, K1, N1, P1
5	Unknown Occupation to the West of Rohan Wall	51C2, F2, I2
6	Unknown Occupation Around Isengard and Gondor Walls	51N2
7	Unknown Occupation Outside System Boundary	51G2, K2
8	Feature 1 Pit	51E2, H2, J1
9	Feature 2 Pit	51P2, S1

Table 6.3 Terraforming

AU Number	Analytical Unit Name	Lots
1	Humus	14K1, M1
2	Yellow Clay	14K2, K3, K4, M2
3	Mottled Clay	14K5, M3, M4
4	*Yeso*	14M5, M6
5	Natural Clay/Yeso	14K6, K7, K9
6	Gleysol	14M8

Table 6.4 Water Channel System

AU Number	Analytical Unit Name	Lots
1	Humus Above Drainage System	14N1, P1, S1, V1
2	General Occupation Above Drainage System	14N2, P2, S2, V2
3	Posthole	14V3
4	Fill Above Buried Walls	14N4, N5, N6, P3, P5, P6, S3, V4
5	Red Clay Feature Above Buried Walls	14N3, 14P4
6	Soil or Fill Covering Buried Walls	14S4, V5
7	*Yeso* Associated with Buried Walls	14N7, P7

Table 6.5 *Chich* Cobble Mounds

AU Number	Analytical Unit Name	Lots
1	Humus Along and Beside Cobble Mound 1	52A1, B1
2	Yellow Sandy Loam Along the Edge of Cobble Mound 1	52A2
3	July Floor Beside Cobble Mound 1	52B2
4	Brown Sandy Loam Along the Edge of Cobble Mound 1	52A3
5	Unknown Occupation Beside Cobble Mound 1	52B3
6	Cobbles in Humus Layer on Cobble Mound 2	52C1
7	Cobbles in Clay Loam below Humus Layer on Cobble Mound 2	52C2
8	Cobbles in Sandy Loam on Cobble Mound 2	52C3

Chart 1. Different Area Lithics by Reduction Stage

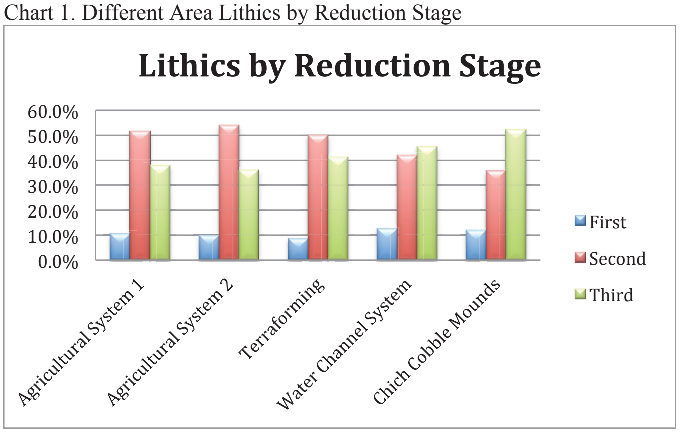


Chart 2. Op. 52 – Chich Cobble Mound Lithics by Reduction Stage

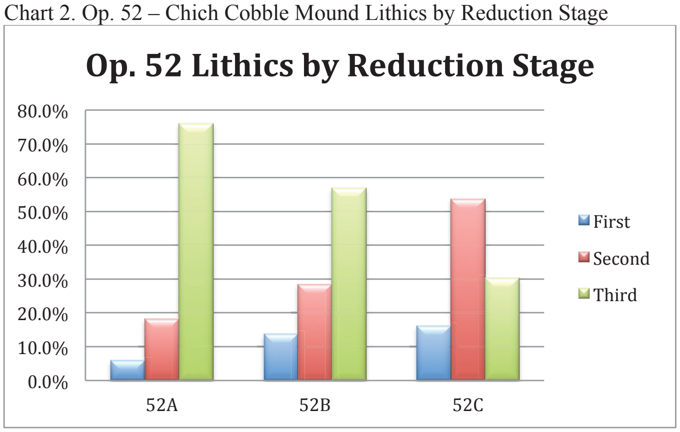


Chart 3. Different Area Ceramics by Time Period

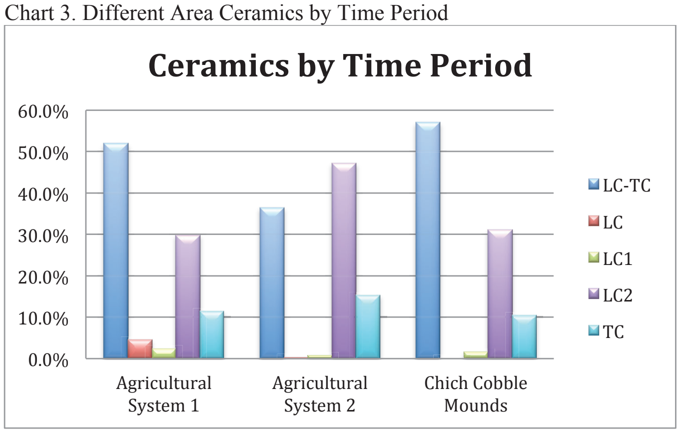


Chart 4. Different Area Ceramics by Type:Variety

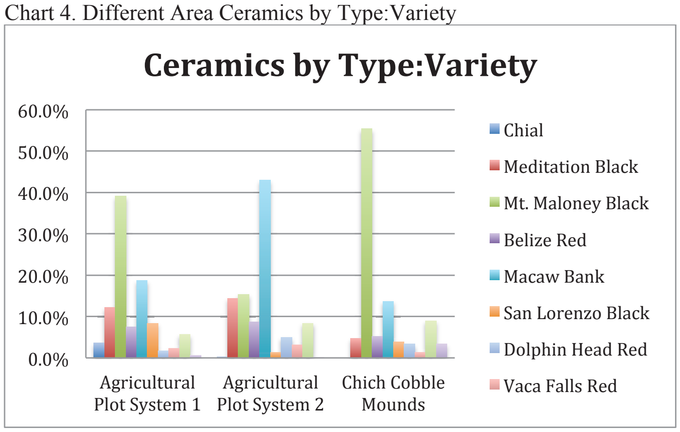


Figure 7.1: 14AF – Blade

Figure 7.2: 52C1 – Uniface

Figure 7.3: 14AN1 – General Utility Biface

Figure 7.4: 14AK1 – Limestone Biface

Figure 7.5: 14AR1 – Thin Biface

Figure 7.6: 14W1 – Chisel

Figure 7.7: 14AC1 – Burin

Figure 7.8: 14AF1 – Macroblade

Figure 7.9: 51F1 – Drill

Figure 7.10: 14AG1 – Graver

Figure 7.11: 51L1 – Belize Red Jar

Figure 7.12: 14AN1 – Mount Maloney Black Bowl (Terminal Classic Period)

Figure 7.13: 14AP2 – Mount Maloney Black Bowl (Terminal Classic Period)

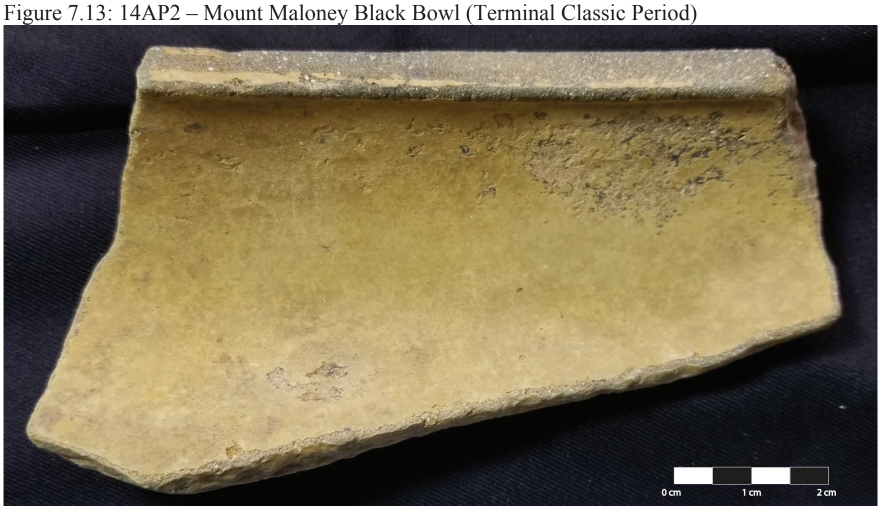


Figure 7.14: 52C1 – Alexander Pie Crust Jar

Figure 7.15: 14AH – Censor Lid

Figure 7.16: 14X1 – Censor Lid

Figure 7.17: 14AU1 – Mano

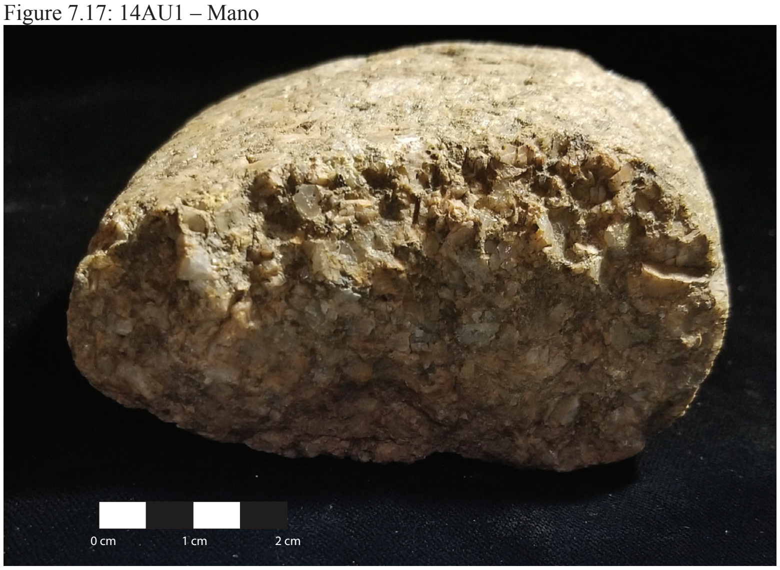


Figure 7.18: 52B2 – Metate

Figure 7.19: 51C2 – Hammerstone

Figure 7.20: 14X1 – Polishing Stone

Figure 7.21: 14W1 – Bark Beater

Figure 7.2: 14Y1 – Curtain Weight

Figure 7.23: 51S1 – Oval Slate

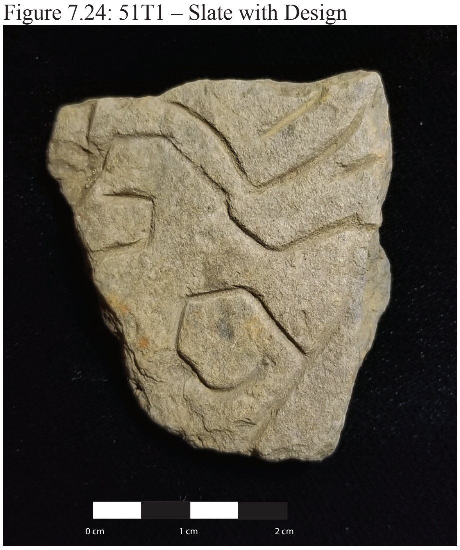

Figure 7.24: 51T1 – Slate with Design


Figure 7.25: 14AP1 – Star

APPENDIX A: LITHIC ANALYSIS

Table 1. Op. 14 – Agricultural Plot System 1: Lithic Type by Count

Op/Subop/Lot	Microdebitage	Flake	Fragment	Blade	Core	Preform	Biface	Thin Biface	Chisel	Graver	Scraper
14Q1	4	293	203		10	1					
14Q2		93	47		1						
14Q3		23	5								
14Q4		2									
14Q5		8	1								
14Q6		3	1								
14R1	9	121	64		6						
14R2	2	71	32		1						
14T1	7	59	37		5	1	2				
14T2		23	14								
14U1		81	59				1		1		
14U2	3	41	30								
14W1		76	45				1				
14W2		15	10								
14X1	5	51	25				1				
14Y1	19	181	199		3	1					
14Z1	48	97	43		4						
14AA1	3	62	14								
14AB1	15	115	59		1		1				
14AC1	7	155	33								
14AC2	4	17	3								
14AD1	3	44	12		2						
14AE1	10	80	12								
14AF1	7	185	42	1	1						
14AG1	65	190	60		1					1	
14AH1	10	52	21								
14AI1	17	124	35								
14AI2		38	20								
14AJ1	5	120	88	1	1		1				
14AK1		28	17		1		2				
14AL1		64	11								
14AL2		6	4								
14AL3											
14AL5		1									
14AM1	22	92	38		2		2				
14AM2	7	79	25								
14AN1	7	113	33	1	1		1				
14AO1	35	111	37								
14AP1		87	43		1		1				1
14AP2	3	108	57	1		1					
14AQ1	23	96	9							1	
14AQ2	5	84	23								
14AR1	18	168	68		5			1			
14AS1	8	29	11								
14AS2		13	3								
14AT1	37	87	20								
14AU1	7	19	2								
14AU2			2								
14AV1	5	41	25								
14AW1	15	75	27						1		
14AX1		33	14								
14AY1	3	81	45								
14AZ1	1	9		1							
14BA1	23	52	26				1				
Total	462	3896	1754	5	46	4	14	1	2	2	1

Table 1, cont..

Op/Subop/Lot	Macroblade	Burin	Drill	Nodule	Chunk	Shatter	Expedient	Resharp	Retouch	Total
14Q1				8	31	60	1	1		612
14Q2					5	9				155
14Q3						8				36
14Q4						2				4
14Q5					4	2				15
14Q6						2				6
14R1				3	19	31		1		254
14R2					6	41				153
14T1					5	21				137
14T2						8		1		46
14U1					2	27				171
14U2						16	1			91
14W1					1	35				158
14W2						8				33
14X1					1	5	3		1	92
14Y1				8	19	18	5			453
14Z1					9	15	1			217
14AA1		1	1		2	5	1			89
14AB1					1	9				201
14AC1		1		2	2	11				211
14AC2					3	3				30
14AD1					5	4				70
14AE1					4	7				113
14AF1	1			1	9	1				248
14AG1					3	98	1		5	424
14AH1						32	1			116
14AI1						78			1	255
14AI2						28			1	87
14AJ1				3		60		2		281
14AK1						17			1	66
14AL1					1	19			1	96
14AL2						2	1			13
14AL3						2				2
14AL5										1
14AM1						39	2			197
14AM2						32		3		146
14AN1						63	2		2	223
14AO1				1	3	35				222
14AP1						40				173
14AP2					9	15	1	2		197
14AQ1					1	1		1		132
14AQ2					12	18		2		144
14AR1				4	31	23				318
14AS1					4	4				56
14AS2					2					18
14AT1					9	13				166
14AU1					1	3				32
14AU2						2				4
14AV1				1	1	12				85
14AW1				1	13	16				148
14AX1					2	6				55
14AY1					6	16				151
14AZ1						5				16
14BA1					8	4				114
Total	1	2	1	32	234	1031	20	13	12	7533

Table 2. Op. 14 – Agricultural Plot System 1: Lithic Type by Percentage

Op/Subop/Lot	Microdebitage	Flake	Fragment	Blade	Core	Preform	Biface	Thin Biface	Chisel	Graver	Scraper
14Q1	0.7%	47.9%	33.2%		1.6%	0.2%					
14Q2		60.0%	30.3%		0.6%						
14Q3		63.9%	13.9%								
14Q4		50.0%									
14Q5		53.3%	6.7%								
14Q6		50.0%	16.7%								
14R1	3.5%	47.6%	25.2%		2.4%						
14R2	1.3%	46.4%	20.9%		0.7%						
14T1	5.1%	43.1%	27.0%		3.6%	0.7%	1.5%				
14T2		50.0%	30.4%								
14U1		47.4%	34.5%				0.6%		0.6%		
14U2	3.3%	45.1%	33.0%								
14W1		48.1%	28.5%				0.6%				
14W2		45.5%	30.3%								
14X1	5.4%	55.4%	27.2%				1.1%				
14Y1	4.2%	40.0%	43.9%		0.7%	0.2%					
14Z1	22.1%	44.7%	19.8%		1.8%						
14AA1	3.4%	69.7%	15.7%								
14AB1	7.5%	57.2%	29.4%		0.5%		0.5%				
14AC1	3.3%	73.5%	15.6%								
14AC2	13.3%	56.7%	10.0%								
14AD1	4.3%	62.9%	17.1%		2.9%						
14AE1	8.8%	70.8%	10.6%								
14AF1	2.8%	74.6%	16.9%	0.4%	0.4%						
14AG1	15.3%	44.8%	14.2%		0.2%					0.2%	
14AH1	8.6%	44.8%	18.1%								
14AI1	6.7%	48.6%	13.7%								
14AI2		43.7%	23.0%								
14AJ1	1.8%	42.7%	31.3%	0.4%	0.4%		0.4%				
14AK1		42.4%	25.8%		1.5%		3.0%				
14AL1		66.7%	11.5%								
14AL2		46.2%	30.8%								
14AL3											
14AL5		100.0%									
14AM1	11.2%	46.7%	19.3%		1.0%		1.0%				
14AM2	4.8%	54.1%	17.1%								
14AN1	3.1%	50.7%	14.8%	0.4%	0.4%		0.4%				
14AO1	15.7%	49.8%	16.6%								
14AP1		50.3%	24.9%		0.6%		0.6%				0.6%
14AP2	1.5%	54.8%	28.9%	0.5%		0.5%					
14AQ1	17.4%	72.7%	6.8%							0.8%	
14AQ2	3.5%	58.3%	16.0%								
14AR1	5.7%	52.8%	21.4%		1.6%			0.3%			
14AS1	14.3%	51.8%	19.6%								
14AS2		72.2%	16.7%								
14AT1	22.2%	52.4%	12.0%								
14AU1	21.9%	59.4%	6.3%								
14AU2			50.0%								
14AV1	5.9%	48.2%	29.4%								
14AW1	10.1%	50.7%	18.2%						0.7%		
14AX1		60.0%	25.5%								
14AY1	2.0%	53.6%	29.8%								
14AZ1	6.3%	56.3%		6.3%							
14BA1	20.2%	45.6%	22.8%				0.9%				
% of Total	6.1%	51.7%	23.3%	0.07%	0.60%	0.05%	0.2%	0.01%	0.03%	0.03%	0.01%

Table 2., cont.

Op/Subop/Lot	Macroblade	Burin	Drill	Nodule	Chunk	Shatter	Expedient	Resharp	Retouch
14Q1				1.3%	5.1%	9.8%	0.2%	0.2%	
14Q2					3.2%	5.8%			
14Q3						22.2%			
14Q4						50.0%			
14Q5					26.7%	13.3%			
14Q6						33.3%			
14R1				1.2%	7.5%	12.2%		0.4%	
14R2					3.9%	26.8%			
14T1					3.6%	15.3%			
14T2						17.4%		2.2%	
14U1					1.2%	15.8%			
14U2						17.6%	1.1%		
14W1					0.6%	22.2%			
14W2						24.2%			
14X1					1.1%	5.4%	3.2%		1.1%
14Y1				1.8%	4.2%	4.0%	1.1%		
14Z1					4.1%	6.9%	0.5%		
14AA1		1.1%	1.1%		2.2%	5.6%	1.1%		
14AB1					0.5%	4.5%			
14AC1		0.5%		0.9%	0.9%	5.2%			
14AC2					10.0%	10.0%			
14AD1					7.1%	5.7%			
14AE1					3.5%	6.2%			
14AF1	0.4%			0.4%	3.6%	0.4%			
14AG1					0.7%	23.1%	0.2%		1.2%
14AH1						27.6%	0.9%		
14AI1						30.6%			0.4%
14AI2						32.2%			1.1%
14AJ1				1.1%		21.4%		0.7%	
14AK1						25.8%			1.5%
14AL1					1.0%	19.8%			1.0%
14AL2						15.4%	7.7%		
14AL3						100.0%			
14AL5									
14AM1						19.8%	1.0%		
14AM2						21.9%		2.1%	
14AN1						28.3%	0.9%		0.9%
14AO1				0.4%	1.3%	15.7%			
14AP1						23.1%			
14AP2					4.6%	7.6%	0.5%	1.0%	
14AQ1					0.8%	0.8%		0.8%	
14AQ2					8.3%	12.5%		1.4%	
14AR1				1.3%	9.7%	7.2%			
14AS1					7.1%	7.1%			
14AS2					11.1%				
14AT1					5.4%	7.8%			
14AU1					3.1%	9.4%			
14AU2						50.0%			
14AV1				1.2%	1.2%	14.1%			
14AW1				0.7%	8.7%	10.8%			
14AX1					3.6%	10.9%			
14AY1					4.0%	10.6%			
14AZ1						31.3%			
14BA1					7.0%	3.5%			
% of Total	0.01%	0.03%	0.01%	0.4%	3.1%	13.7%	0.3%	0.2%	0.2%

Table 3. Op. 14 – Agricultural Plot System 1: Flake Count by Material and Attributes

Material	Cortex	Scars	Hammer	Prep,	Stage	14Q1	14Q2	14Q3	14Q5	14Q6	14R1	14R2	14T1
Chert	0%	1-2	Soft	Y	Third								
Chert	0%	1-2	Soft	N	Second	2							
Chert	0%	1-2	Hard	Y	Second	1							1
Chert	0%	1-2	Hard	N	Second	2	1					1	1
Chert	0%	3+	Soft	Y	Third	2	1				2	1	1
Chert	0%	3+	Soft	N	Third	11					2		2
Chert	0%	3+	Hard	Y	Third	2	2					1	
Chert	0%	3+	Hard	N	Third	53	9	1	1		20	12	9
Chert	<50%	0	Hard	N	First								
Chert	<50%	1-2	Soft	Y	Second		1						
Chert	<50%	1-2	Soft	N	Second		1						
Chert	<50%	1-2	Hard	Y	Second								
Chert	<50%	1-2	Hard	N	Second	21	4	2			9	4	2
Chert	<50%	3+	Soft	Y	Third								
Chert	<50%	3+	Soft	N	Second	2					2		
Chert	<50%	3+	Hard	Y	Second		1				1		3
Chert	<50%	3+	Hard	N	Second	62	14				21	10	11
Chert	>50%	1-2	Soft	Y	First								1
Chert	>50%	1-2	Soft	N	First	1							
Chert	>50%	1-2	Hard	Y	First								
Chert	>50%	1-2	Hard	N	First	16	7	2			1		4
Chert	>50%	3+	Soft	Y	Second								
Chert	>50%	3+	Soft	N	Second	1							
Chert	>50%	3+	Hard	Y	Second								
Chert	>50%	3+	Hard	N	Second	17	3					1	
Chert	100%	0	Soft	Y	First								
Chert	100%	0	Soft	N	First								
Chert	100%	0	Hard	Y	First	1							
Chert	100%	0	Hard	N	First	8	1			1	3	2	2
Chalcedony	0%	1-2	Soft	Y	Third								
Chalcedony	0%	1-2	Hard	N	Second								
Chalcedony	0%	3+	Soft	Y	Third								
Chalcedony	0%	3+	Soft	N	Third								
Chalcedony	0%	3+	Hard	Y	Third								
Chalcedony	0%	3+	Hard	N	Third								
Chalcedony	<50%	1-2	Soft	Y	Second								
Chalcedony	<50%	1-2	Hard	N	Second						1		
Chalcedony	<50%	3+	Soft	Y	Third								
Chalcedony	<50%	3+	Soft	N	Second								
Chalcedony	<50%	3+	Hard	Y	Second								
Chalcedony	<50%	3+	Hard	N	Second		1						
Chalcedony	>50%	1-2	Hard	N	First								
Chalcedony	>50%	3+	Soft	Y	Second								
Chalcedony	>50%	3+	Hard	N	Second								
Limestone	0%	1-2	Hard	N	Second		1						
Limestone	0%	3+	Hard	N	Third								
S. Limestone	0%	1-2	Hard	N	Second								
S. Limestone	0%	3+	Soft	Y	Third						1		
S. Limestone	0%	3+	Soft	N	Third								
S. Limestone	0%	3+	Hard	Y	Third								
S. Limestone	0%	3+	Hard	N	Third						1		
S. Limestone	<50%	3+	Soft	N	Second								
S. Limestone	<50%	3+	Hard	N	Second	1							
					Total	203	47	5	1	1	64	32	37

Table 3., cont.

Material	Cortex	Scars	Hammer	Prep,	Stage	14T2	14U1	14U2	14W1	14W2	14X1	14Y1	14Z1
Chert	0%	1-2	Soft	Y	Third								1
Chert	0%	1-2	Soft	N	Second								
Chert	0%	1-2	Hard	Y	Second								
Chert	0%	1-2	Hard	N	Second		2		1		1		
Chert	0%	3+	Soft	Y	Third		1	3	3			11	1
Chert	0%	3+	Soft	N	Third	1	3	1	1			1	
Chert	0%	3+	Hard	Y	Third		2	1	1			2	2
Chert	0%	3+	Hard	N	Third	3	17	8	18	5	4	11	7
Chert	<50%	0	Hard	N	First								
Chert	<50%	1-2	Soft	Y	Second							1	1
Chert	<50%	1-2	Soft	N	Second	1						2	1
Chert	<50%	1-2	Hard	Y	Second								
Chert	<50%	1-2	Hard	N	Second		7	1	2		1	2	1
Chert	<50%	3+	Soft	Y	Third							7	
Chert	<50%	3+	Soft	N	Second		5	1	4	1	2	4	3
Chert	<50%	3+	Hard	Y	Second		2	2	1		8	9	3
Chert	<50%	3+	Hard	N	Second	7	13	6	13	2	3	15	10
Chert	>50%	1-2	Soft	Y	First								
Chert	>50%	1-2	Soft	N	First							1	
Chert	>50%	1-2	Hard	Y	First						2		
Chert	>50%	1-2	Hard	N	First	1	2	2		1	2	9	1
Chert	>50%	3+	Soft	Y	Second							1	1
Chert	>50%	3+	Soft	N	Second							1	
Chert	>50%	3+	Hard	Y	Second							5	1
Chert	>50%	3+	Hard	N	Second	1	3	2		1		3	4
Chert	100%	0	Soft	Y	First			1					
Chert	100%	0	Soft	N	First		1					2	
Chert	100%	0	Hard	Y	First		1						
Chert	100%	0	Hard	N	First			1	1		1	1	
Chalcedony	0%	1-2	Soft	Y	Third								
Chalcedony	0%	1-2	Hard	N	Second								
Chalcedony	0%	3+	Soft	Y	Third							1	
Chalcedony	0%	3+	Soft	N	Third								
Chalcedony	0%	3+	Hard	Y	Third							1	
Chalcedony	0%	3+	Hard	N	Third						1		
Chalcedony	<50%	1-2	Soft	Y	Second								
Chalcedony	<50%	1-2	Hard	N	Second							1	
Chalcedony	<50%	3+	Soft	Y	Third							1	
Chalcedony	<50%	3+	Soft	N	Second							1	1
Chalcedony	<50%	3+	Hard	Y	Second								
Chalcedony	<50%	3+	Hard	N	Second							1	2
Chalcedony	>50%	1-2	Hard	N	First								
Chalcedony	>50%	3+	Soft	Y	Second								1
Chalcedony	>50%	3+	Hard	N	Second							1	
Limestone	0%	1-2	Hard	N	Second								
Limestone	0%	3+	Hard	N	Third							1	
S. Limestone	0%	1-2	Hard	N	Second								
S. Limestone	0%	3+	Soft	Y	Third							1	
S. Limestone	0%	3+	Soft	N	Third							2	1
S. Limestone	0%	3+	Hard	Y	Third			1					1
S. Limestone	0%	3+	Hard	N	Third							1	
S. Limestone	<50%	3+	Soft	N	Second								
S. Limestone	<50%	3+	Hard	N	Second								
					Total	14	59	30	45	10	25	100	43

Table 3., cont.

Material	Cortex	Scars	Hammer	Prep,	Stage	14AA1	14AB1	14AC1	14AC2	14AD1	14AE1	14AF1
Chert	0%	1-2	Soft	Y	Third							
Chert	0%	1-2	Soft	N	Second			2			1	
Chert	0%	1-2	Hard	Y	Second							
Chert	0%	1-2	Hard	N	Second		1	2				1
Chert	0%	3+	Soft	Y	Third	4	3	1		2	1	1
Chert	0%	3+	Soft	N	Third		2	1			2	4
Chert	0%	3+	Hard	Y	Third		3	5	1	1		
Chert	0%	3+	Hard	N	Third	1	13	2		3	1	10
Chert	<50%	0	Hard	N	First							
Chert	<50%	1-2	Soft	Y	Second							
Chert	<50%	1-2	Soft	N	Second							
Chert	<50%	1-2	Hard	Y	Second							
Chert	<50%	1-2	Hard	N	Second	1	3	2			1	1
Chert	<50%	3+	Soft	Y	Third			1			1	
Chert	<50%	3+	Soft	N	Second		3	5				3
Chert	<50%	3+	Hard	Y	Second		1	1	1			
Chert	<50%	3+	Hard	N	Second	5	12	5		5	1	17
Chert	>50%	1-2	Soft	Y	First							
Chert	>50%	1-2	Soft	N	First						1	1
Chert	>50%	1-2	Hard	Y	First							
Chert	>50%	1-2	Hard	N	First		2		1		1	1
Chert	>50%	3+	Soft	Y	Second	1						
Chert	>50%	3+	Soft	N	Second		3					1
Chert	>50%	3+	Hard	Y	Second							
Chert	>50%	3+	Hard	N	Second	2	3	3		1	1	1
Chert	100%	0	Soft	Y	First							
Chert	100%	0	Soft	N	First		1					
Chert	100%	0	Hard	Y	First							
Chert	100%	0	Hard	N	First		2	1				
Chalcedony	0%	1-2	Soft	Y	Third			1				
Chalcedony	0%	1-2	Hard	N	Second							
Chalcedony	0%	3+	Soft	Y	Third							
Chalcedony	0%	3+	Soft	N	Third							
Chalcedony	0%	3+	Hard	Y	Third							
Chalcedony	0%	3+	Hard	N	Third							
Chalcedony	<50%	1-2	Soft	Y	Second							
Chalcedony	<50%	1-2	Hard	N	Second		1					
Chalcedony	<50%	3+	Soft	Y	Third							
Chalcedony	<50%	3+	Soft	N	Second		1					
Chalcedony	<50%	3+	Hard	Y	Second							
Chalcedony	<50%	3+	Hard	N	Second							1
Chalcedony	>50%	1-2	Hard	N	First							
Chalcedony	>50%	3+	Soft	Y	Second		1					
Chalcedony	>50%	3+	Hard	N	Second		1					
Limestone	0%	1-2	Hard	N	Second							
Limestone	0%	3+	Hard	N	Third							
S. Limestone	0%	1-2	Hard	N	Second		1					
S. Limestone	0%	3+	Soft	Y	Third							
S. Limestone	0%	3+	Soft	N	Third							
S. Limestone	0%	3+	Hard	Y	Third							
S. Limestone	0%	3+	Hard	N	Third			1			1	
S. Limestone	<50%	3+	Soft	N	Second		1					
S. Limestone	<50%	3+	Hard	N	Second		1					
					Total	14	59	33	3	12	12	42

Table 3., cont.

Material	Cortex	Scars	Hammer	Prep,	Stage	14AG1	14AH1	14AI1	14AI2	14AJ1	14AK1	14L1
Chert	0%	1-2	Soft	Y	Third							
Chert	0%	1-2	Soft	N	Second							
Chert	0%	1-2	Hard	Y	Second	1						
Chert	0%	1-2	Hard	N	Second	2		1		1		
Chert	0%	3+	Soft	Y	Third	4	1		1	1		
Chert	0%	3+	Soft	N	Third	10		4	2	1	1	
Chert	0%	3+	Hard	Y	Third	3	3	2				
Chert	0%	3+	Hard	N	Third	10	3	4	4	19	2	6
Chert	<50%	0	Hard	N	First	1						
Chert	<50%	1-2	Soft	Y	Second							
Chert	<50%	1-2	Soft	N	Second				1	2		
Chert	<50%	1-2	Hard	Y	Second					1		
Chert	<50%	1-2	Hard	N	Second	2	2	3	1	3	1	
Chert	<50%	3+	Soft	Y	Third	1			1	4	1	
Chert	<50%	3+	Soft	N	Second	1	1	1	1	5	1	
Chert	<50%	3+	Hard	Y	Second	3		2		6	1	
Chert	<50%	3+	Hard	N	Second	10	11	2	7	24	7	3
Chert	>50%	1-2	Soft	Y	First	1						
Chert	>50%	1-2	Soft	N	First	1						
Chert	>50%	1-2	Hard	Y	First	1						
Chert	>50%	1-2	Hard	N	First	3		5		9	1	
Chert	>50%	3+	Soft	Y	Second	2						
Chert	>50%	3+	Soft	N	Second				1	2		
Chert	>50%	3+	Hard	Y	Second							
Chert	>50%	3+	Hard	N	Second	1		2		4	1	
Chert	100%	0	Soft	Y	First							
Chert	100%	0	Soft	N	First							1
Chert	100%	0	Hard	Y	First							
Chert	100%	0	Hard	N	First	2		1		3		
Chalcedony	0%	1-2	Soft	Y	Third							
Chalcedony	0%	1-2	Hard	N	Second							
Chalcedony	0%	3+	Soft	Y	Third							
Chalcedony	0%	3+	Soft	N	Third				1			1
Chalcedony	0%	3+	Hard	Y	Third			1				
Chalcedony	0%	3+	Hard	N	Third	1		2				
Chalcedony	<50%	1-2	Soft	Y	Second							
Chalcedony	<50%	1-2	Hard	N	Second							
Chalcedony	<50%	3+	Soft	Y	Third							
Chalcedony	<50%	3+	Soft	N	Second							
Chalcedony	<50%	3+	Hard	Y	Second					2		
Chalcedony	<50%	3+	Hard	N	Second			3		1		
Chalcedony	>50%	1-2	Hard	N	First			1				
Chalcedony	>50%	3+	Soft	Y	Second							
Chalcedony	>50%	3+	Hard	N	Second							
Limestone	0%	1-2	Hard	N	Second							
Limestone	0%	3+	Hard	N	Third							
S. Limestone	0%	1-2	Hard	N	Second							
S. Limestone	0%	3+	Soft	Y	Third			1				
S. Limestone	0%	3+	Soft	N	Third						1	
S. Limestone	0%	3+	Hard	Y	Third							
S. Limestone	0%	3+	Hard	N	Third							
S. Limestone	<50%	3+	Soft	N	Second							
S. Limestone	<50%	3+	Hard	N	Second							
					Total	60	21	35	20	88	17	11

Table 3., cont.

Material	Cortex	Scars	Hammer	Prep,	Stage	14L1	14AL2	14AM1	14AM2	14AN1	14AO1	14AP1
Chert	0%	1-2	Soft	Y	Third							
Chert	0%	1-2	Soft	N	Second					1		1
Chert	0%	1-2	Hard	Y	Second			2				
Chert	0%	1-2	Hard	N	Second		1				2	
Chert	0%	3+	Soft	Y	Third				3	1	1	5
Chert	0%	3+	Soft	N	Third			4	4	3	2	5
Chert	0%	3+	Hard	Y	Third			2	2	2	2	1
Chert	0%	3+	Hard	N	Third	6		10	3	13	8	9
Chert	<50%	0	Hard	N	First							
Chert	<50%	1-2	Soft	Y	Second							1
Chert	<50%	1-2	Soft	N	Second			1		2		1
Chert	<50%	1-2	Hard	Y	Second						2	1
Chert	<50%	1-2	Hard	N	Second			3	1	3		1
Chert	<50%	3+	Soft	Y	Third		1					1
Chert	<50%	3+	Soft	N	Second			1				3
Chert	<50%	3+	Hard	Y	Second		1					1
Chert	<50%	3+	Hard	N	Second	3		3	8	5	12	6
Chert	>50%	1-2	Soft	Y	First							
Chert	>50%	1-2	Soft	N	First			1				
Chert	>50%	1-2	Hard	Y	First							
Chert	>50%	1-2	Hard	N	First			7	2	1	3	1
Chert	>50%	3+	Soft	Y	Second							
Chert	>50%	3+	Soft	N	Second							
Chert	>50%	3+	Hard	Y	Second					1		
Chert	>50%	3+	Hard	N	Second		1	1				1
Chert	100%	0	Soft	Y	First							
Chert	100%	0	Soft	N	First	1						
Chert	100%	0	Hard	Y	First							
Chert	100%	0	Hard	N	First			2	1			
Chalcedony	0%	1-2	Soft	Y	Third							
Chalcedony	0%	1-2	Hard	N	Second							
Chalcedony	0%	3+	Soft	Y	Third							
Chalcedony	0%	3+	Soft	N	Third	1		1				
Chalcedony	0%	3+	Hard	Y	Third						1	
Chalcedony	0%	3+	Hard	N	Third							2
Chalcedony	<50%	1-2	Soft	Y	Second				1			
Chalcedony	<50%	1-2	Hard	N	Second					1	2	1
Chalcedony	<50%	3+	Soft	Y	Third							
Chalcedony	<50%	3+	Soft	N	Second							
Chalcedony	<50%	3+	Hard	Y	Second							
Chalcedony	<50%	3+	Hard	N	Second						2	2
Chalcedony	>50%	1-2	Hard	N	First							
Chalcedony	>50%	3+	Soft	Y	Second							
Chalcedony	>50%	3+	Hard	N	Second							
Limestone	0%	1-2	Hard	N	Second							
Limestone	0%	3+	Hard	N	Third							
S. Limestone	0%	1-2	Hard	N	Second							
S. Limestone	0%	3+	Soft	Y	Third							
S. Limestone	0%	3+	Soft	N	Third							
S. Limestone	0%	3+	Hard	Y	Third							
S. Limestone	0%	3+	Hard	N	Third							
S. Limestone	<50%	3+	Soft	N	Second							
S. Limestone	<50%	3+	Hard	N	Second							
					Total	11	4	38	25	33	37	43

Table 3., cont.

Material Type	Cortex	Scars	Hammer	Prep,	Stage	14AP1	14AP2	14AQ1	14AQ2	14AR1	14AS1	14AS2
Chert	0%	1-2	Soft	Y	Third							
Chert	0%	1-2	Soft	N	Second	1			2	1		
Chert	0%	1-2	Hard	Y	Second			1				
Chert	0%	1-2	Hard	N	Second		3		2	5	1	
Chert	0%	3+	Soft	Y	Third	5	2	1	2			
Chert	0%	3+	Soft	N	Third	5	3	1	2	4		
Chert	0%	3+	Hard	Y	Third	1			1	1		
Chert	0%	3+	Hard	N	Third	9	14	2	2	11	4	1
Chert	<50%	0	Hard	N	First					6		
Chert	<50%	1-2	Soft	Y	Second	1						
Chert	<50%	1-2	Soft	N	Second	1			1			
Chert	<50%	1-2	Hard	Y	Second	1			1			
Chert	<50%	1-2	Hard	N	Second	1	5		2	4	1	1
Chert	<50%	3+	Soft	Y	Third	1			1			
Chert	<50%	3+	Soft	N	Second	3	1	2	1	2		
Chert	<50%	3+	Hard	Y	Second	1	3		1			
Chert	<50%	3+	Hard	N	Second	6	13	1	1	17	1	1
Chert	>50%	1-2	Soft	Y	First							
Chert	>50%	1-2	Soft	N	First				1	1		
Chert	>50%	1-2	Hard	Y	First		1		1			
Chert	>50%	1-2	Hard	N	First	1	3	1	1	5	1	
Chert	>50%	3+	Soft	Y	Second							
Chert	>50%	3+	Soft	N	Second							
Chert	>50%	3+	Hard	Y	Second		1					
Chert	>50%	3+	Hard	N	Second	1	4			7	2	
Chert	100%	0	Soft	Y	First							
Chert	100%	0	Soft	N	First							
Chert	100%	0	Hard	Y	First							
Chert	100%	0	Hard	N	First				1			
Chalcedony	0%	1-2	Soft	Y	Third							
Chalcedony	0%	1-2	Hard	N	Second					1		
Chalcedony	0%	3+	Soft	Y	Third							
Chalcedony	0%	3+	Soft	N	Third							
Chalcedony	0%	3+	Hard	Y	Third							
Chalcedony	0%	3+	Hard	N	Third	2	1					
Chalcedony	<50%	1-2	Soft	Y	Second							
Chalcedony	<50%	1-2	Hard	N	Second	1	1					
Chalcedony	<50%	3+	Soft	Y	Third							
Chalcedony	<50%	3+	Soft	N	Second							
Chalcedony	<50%	3+	Hard	Y	Second						1	
Chalcedony	<50%	3+	Hard	N	Second	2	2			3		
Chalcedony	>50%	1-2	Hard	N	First							
Chalcedony	>50%	3+	Soft	Y	Second							
Chalcedony	>50%	3+	Hard	N	Second							
Limestone	0%	1-2	Hard	N	Second							
Limestone	0%	3+	Hard	N	Third							
S. Limestone	0%	1-2	Hard	N	Second							
S. Limestone	0%	3+	Soft	Y	Third							
S. Limestone	0%	3+	Soft	N	Third							
S. Limestone	0%	3+	Hard	Y	Third							
S. Limestone	0%	3+	Hard	N	Third							
S. Limestone	<50%	3+	Soft	N	Second							
S. Limestone	<50%	3+	Hard	N	Second							
					Total	43	57	9	23	68	11	3

Table 3., cont.

Material	Cortex	Scars	Hammer	Prep,	Stage	14AT1	14AU1	14AU2	14AV1	14AW1	14AX1	14AY1	14BA1
Chert	0%	1-2	Soft	Y	Third								
Chert	0%	1-2	Soft	N	Second								
Chert	0%	1-2	Hard	Y	Second								
Chert	0%	1-2	Hard	N	Second			1	1	1	2	1	1
Chert	0%	3+	Soft	Y	Third								
Chert	0%	3+	Soft	N	Third				1			1	
Chert	0%	3+	Hard	Y	Third								
Chert	0%	3+	Hard	N	Third	11	1	1	8	9	4	12	8
Chert	<50%	0	Hard	N	First								
Chert	<50%	1-2	Soft	Y	Second								
Chert	<50%	1-2	Soft	N	Second							1	
Chert	<50%	1-2	Hard	Y	Second								
Chert	<50%	1-2	Hard	N	Second	1				3		10	2
Chert	<50%	3+	Soft	Y	Third				1			1	
Chert	<50%	3+	Soft	N	Second								
Chert	<50%	3+	Hard	Y	Second					1			
Chert	<50%	3+	Hard	N	Second	4			4	7	6	15	5
Chert	>50%	1-2	Soft	Y	First								
Chert	>50%	1-2	Soft	N	First								
Chert	>50%	1-2	Hard	Y	First								
Chert	>50%	1-2	Hard	N	First	2	1		2	3	1	1	5
Chert	>50%	3+	Soft	Y	Second								
Chert	>50%	3+	Soft	N	Second								
Chert	>50%	3+	Hard	Y	Second								
Chert	>50%	3+	Hard	N	Second	2			4	1			2
Chert	100%	0	Soft	Y	First								
Chert	100%	0	Soft	N	First								
Chert	100%	0	Hard	Y	First								
Chert	100%	0	Hard	N	First								
Chalcedony	0%	1-2	Soft	Y	Third								
Chalcedony	0%	1-2	Hard	N	Second						1	1	1
Chalcedony	0%	3+	Soft	Y	Third								
Chalcedony	0%	3+	Soft	N	Third								
Chalcedony	0%	3+	Hard	Y	Third								
Chalcedony	0%	3+	Hard	N	Third				1	1			
Chalcedony	<50%	1-2	Soft	Y	Second								
Chalcedony	<50%	1-2	Hard	N	Second					1			
Chalcedony	<50%	3+	Soft	Y	Third								
Chalcedony	<50%	3+	Soft	N	Second								
Chalcedony	<50%	3+	Hard	Y	Second								
Chalcedony	<50%	3+	Hard	N	Second				1				
Chalcedony	>50%	1-2	Hard	N	First								
Chalcedony	>50%	3+	Soft	Y	Second								
Chalcedony	>50%	3+	Hard	N	Second								
Limestone	0%	1-2	Hard	N	Second								
Limestone	0%	3+	Hard	N	Third								
S. Limestone	0%	1-2	Hard	N	Second				1				
S. Limestone	0%	3+	Soft	Y	Third								
S. Limestone	0%	3+	Soft	N	Third								
S. Limestone	0%	3+	Hard	Y	Third								
S. Limestone	0%	3+	Hard	N	Third				1			1	1
S. Limestone	<50%	3+	Soft	N	Second								
S. Limestone	<50%	3+	Hard	N	Second							1	
					Total	20	2	2	25	27	14	45	26

Table 4. Op. 14 – Agricultural Plot System 1: Flake Percentage by Material and Attributes

Material	Cortex	Scars	Hammer	Prep,	Stage	Total	Percentage
Chert	0%	1-2	Soft	Y	Third	1	0.06%
Chert	0%	1-2	Soft	N	Second	10	0.6%
Chert	0%	1-2	Hard	Y	Second	6	0.4%
Chert	0%	1-2	Hard	N	Second	38	2.3%
Chert	0%	3+	Soft	Y	Third	60	3.6%
Chert	0%	3+	Soft	N	Third	79	4.8%
Chert	0%	3+	Hard	Y	Third	42	2.5%
Chert	0%	3+	Hard	N	Third	387	23.4%
Chert	<50%	0	Hard	N	First	7	0.4%
Chert	<50%	1-2	Soft	Y	Second	4	0.2%
Chert	<50%	1-2	Soft	N	Second	14	0.8%
Chert	<50%	1-2	Hard	Y	Second	5	0.3%
Chert	<50%	1-2	Hard	N	Second	113	6.8%
Chert	<50%	3+	Soft	Y	Third	21	1.3%
Chert	<50%	3+	Soft	N	Second	55	3.3%
Chert	<50%	3+	Hard	Y	Second	52	3.1%
Chert	<50%	3+	Hard	N	Second	405	24.5%
Chert	>50%	1-2	Soft	Y	First	2	0.1%
Chert	>50%	1-2	Soft	N	First	8	0.5%
Chert	>50%	1-2	Hard	Y	First	4	0.2%
Chert	>50%	1-2	Hard	N	First	111	6.7%
Chert	>50%	3+	Soft	Y	Second	5	0.3%
Chert	>50%	3+	Soft	N	Second	9	0.5%
Chert	>50%	3+	Hard	Y	Second	8	0.5%
Chert	>50%	3+	Hard	N	Second	79	4.8%
Chert	100%	0	Soft	Y	First	1	0.06%
Chert	100%	0	Soft	N	First	5	0.3%
Chert	100%	0	Hard	Y	First	2	0.1%
Chert	100%	0	Hard	N	First	34	2.0%
Chalcedony	0%	1-2	Soft	Y	Third	1	0.06%
Chalcedony	0%	1-2	Hard	N	Second	4	2.4%
Chalcedony	0%	3+	Soft	Y	Third	1	0.06
Chalcedony	0%	3+	Soft	N	Third	3	0.2%
Chalcedony	0%	3+	Hard	Y	Third	3	0.2%
Chalcedony	0%	3+	Hard	N	Third	9	0.5%
Chalcedony	<50%	1-2	Soft	Y	Second	1	0.06%
Chalcedony	<50%	1-2	Hard	N	Second	9	0.5%
Chalcedony	<50%	3+	Soft	Y	Third	1	0.06%
Chalcedony	<50%	3+	Soft	N	Second	3	0.2%
Chalcedony	<50%	3+	Hard	Y	Second	3	0.2%
Chalcedony	<50%	3+	Hard	N	Second	19	1.1%
Chalcedony	>50%	1-2	Hard	N	First	1	0.06%
Chalcedony	>50%	3+	Soft	Y	Second	2	0.1%
Chalcedony	>50%	3+	Hard	N	Second	2	0.1%
Limestone	0%	1-2	Hard	N	Second	1	0.06%
Limestone	0%	3+	Hard	N	Third	1	0.06%
S. Limestone	0%	1-2	Hard	N	Second	2	0.1%
S. Limestone	0%	3+	Soft	Y	Third	3	0.2%
S. Limestone	0%	3+	Soft	N	Third	4	0.2%
S. Limestone	0%	3+	Hard	Y	Third	2	0.1%
S. Limestone	0%	3+	Hard	N	Third	7	0.4%
S. Limestone	<50%	3+	Soft	N	Second	1	0.06%
S. Limestone	<50%	3+	Hard	N	Second	3	0.2%
					Total	1655	100%

Table 5. Op. 14 – Agricultural Plot System 1: Flake Count and Percentage by Material

Material	Total	Percentage
Chert	1567	94.7%
Chalcedony	62	3.7%
Limestone	2	0.1%
Siliceous Limestone	22	1.3%

Table 6. Op. 14 – Agricultural Plot System 1: Flake Count and Percentage by Attribute

Cortex %	Scars	Hammer Type	Prep.	Stage	Total	Percentage
0%	1-2	Soft	Y	Third	2	0.1%
0%	1-2	Soft	N	Second	10	0.6%
0%	1-2	Hard	Y	Second	6	0.4%
0%	1-2	Hard	N	Second	46	2.8%
0%	3+	Soft	Y	Third	64	3.8%
0%	3+	Soft	N	Third	85	5.1%
0%	3+	Hard	Y	Third	47	2.8%
0%	3+	Hard	N	Third	404	24.4%
<50%	0	Hard	N	First	7	0.4%
<50%	1-2	Soft	Y	Second	4	0.2%
<50%	1-2	Soft	N	Second	14	0.8%
<50%	1-2	Hard	Y	Second	5	0.3%
<50%	1-2	Hard	N	Second	122	7.4%
<50%	3+	Soft	Y	Third	23	1.4%
<50%	3+	Soft	N	Second	60	3.6%
<50%	3+	Hard	Y	Second	44	2.7%
<50%	3+	Hard	N	Second	426	25.7%
>50%	1-2	Soft	Y	First	2	0.1%
>50%	1-2	Soft	N	First	8	0.5%
>50%	1-2	Hard	Y	First	6	0.4%
>50%	1-2	Hard	N	First	112	6.8%
>50%	3+	Soft	Y	Second	7	0.4%
>50%	3+	Soft	N	Second	9	0.5%
>50%	3+	Hard	Y	Second	8	0.5%
>50%	3+	Hard	N	Second	81	4.9%
100%	0	Soft	Y	First	1	0.1%
100%	0	Soft	N	First	5	0.3%
100%	0	Hard	Y	First	2	0.1%
100%	0	Hard	N	First	34	2.1%
				Total	1655	100%

Table 7. Op. 14 – Agricultural Plot System 1: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	175	10.6%
Second	853	51.5%
Third	625	37.8%

Table 8. Op. 14 – Agricultural Plot System 1: Flake Fragment Count by Material and Attributes

Material	Cortex %	Scars	14Q1	14Q2	14Q3	14Q4	14Q5	14Q6	14R1	14R2	14T1	14T2	14U1	14U2
Chert	100%	0												
Chert	0%	1-2	19	2	2	1		1	0	8	7	3	6	3
Chert	1-25%	1-2	10	4			1		9	6	4		6	2
Chert	26-50%	1-2	19	7	4				6	9	6		3	3
Chert	51-75%	1-2	25	8	1			1	11	8	5		6	5
Chert	75-99%	1-2	30	7	2		1	1	7	6	3	5	4	4
Chert	0%	3+	77	27	4		2		49	14	17	8	29	13
Chert	1-25%	3+	52	20	4		3		14	7	6	2	7	5
Chert	26-50%	3+	32	10	4				15	6	9	1	11	5
Chert	51-75%	3+	13	7	1	1			6	2	1	2	7	1
Chert	75-99%	3+	9		1				2				1	
Chalcedony	0%	1-2												
Chalcedony	1-25%	1-2												
Chalcedony	26-50%	1-2									1			
Chalcedony	51-75%	1-2	1										1	
Chalcedony	75-99%	1-2												
Chalcedony	0%	3+					1							
Chalcedony	1-25%	3+	1	1										
Chalcedony	26-50%	3+	2											
Chalcedony	51-75%	3+	1						1					
Chalcedony	75-99%	3+												
Limestone	0%	1-2												
Limestone	26-50%	1-2												
Limestone	75-99%	1-2												
Limestone	0%	3+	2											
S. Limestone	0%	1-2												
S. Limestone	1-25%	1-2										1		
S. Limestone	26-50%	1-2										1		
S. Limestone	51-75%	1-2												
S. Limestone	75-99%	1-2												
S. Limestone	0%	3+							1					
S. Limestone	1-25%	3+												
S. Limestone	26-50%	3+								5				
		Total	293	93	23	2	8	3	121	71	59	23	81	41

Table 8., cont.

Material	Cortex %	Scars	14W1	14W2	14X1	14Y1	14Z1	14AA1	14AB1	14AC1	14AC2	14AD1	14AE1
Chert	100%	0				2		1					
Chert	0%	1-2	6	2	3	9	9	5	4	11	4	2	8
Chert	1-25%	1-2	3	1		6	4	2	5	6		1	4
Chert	26-50%	1-2	5	1	7	15	4	5	4	6		4	7
Chert	51-75%	1-2	10		3	6	5	1	5	5	1	3	8
Chert	75-99%	1-2	11	1	6	24	13	7	24	20	2	7	16
Chert	0%	3+	23	6	13	26	24	11	25	31	4	10	14
Chert	1-25%	3+	9	3	8	27	11	11	21	28	3	9	6
Chert	26-50%	3+	5		2	21	11	7	11	23	2	3	6
Chert	51-75%	3+	3		2	9	3	3	5	2		2	3
Chert	75-99%	3+			1	14	3	2	4	14			2
Chalcedony	0%	1-2				2						1	
Chalcedony	1-25%	1-2				2				1			
Chalcedony	26-50%	1-2		1									
Chalcedony	51-75%	1-2								1			
Chalcedony	75-99%	1-2				1	1		2	1			
Chalcedony	0%	3+	1		3	5	3		1	1		1	1
Chalcedony	1-25%	3+				1		1		1		1	3
Chalcedony	26-50%	3+						1					
Chalcedony	51-75%	3+				1	1	1		2			
Chalcedony	75-99%	3+				2	1						
Limestone	0%	1-2											
Limestone	26-50%	1-2											
Limestone	75-99%	1-2											
Limestone	0%	3+				2							
S. Limestone	0%	1-2			1			3					1
S. Limestone	1-25%	1-2							1				
S. Limestone	26-50%	1-2			2		1						
S. Limestone	51-75%	1-2											
S. Limestone	75-99%	1-2				1				1			
S. Limestone	0%	3+				5	3	1	2	1	1		1
S. Limestone	1-25%	3+							1				
S. Limestone	26-50%	3+											
		Total	76	15	51	181	97	62	115	155	17	44	80

Table 8., cont.

Material	Cortex %	Scars	14AF1	14AG1	14AH1	14AI1	14AI2	14AJ1	14AK1	14AL1	14AL2	14AL5
Chert	100%	0	1									
Chert	0%	1-2	15	10	2	13	5	14	2	5	1	
Chert	1-25%	1-2	9	17	4	5	2	9	2	2	1	
Chert	26-50%	1-2	10	14	4	11	3	10	4	7		
Chert	51-75%	1-2	12	9	1	3		9	1	2		
Chert	75-99%	1-2	25	16	11	22	2	11		5	2	
Chert	0%	3+	52	56	18	26	16	21	10	26	2	
Chert	1-25%	3+	16	25	6	17	4	22	2	6		
Chert	26-50%	3+	15	22	1	9	3	8	2	4		1
Chert	51-75%	3+	6	6	2	5		9	1	2		
Chert	75-99%	3+	6	2	1			1	1	5		
Chalcedony	0%	1-2	2	1								
Chalcedony	1-25%	1-2	2	3		3		1	1			
Chalcedony	26-50%	1-2		1		1						
Chalcedony	51-75%	1-2		1		2						
Chalcedony	75-99%	1-2	1	1		1		1				
Chalcedony	0%	3+	1	4		3	1	2	2			
Chalcedony	1-25%	3+	2		1	1	1	1				
Chalcedony	26-50%	3+		2		1	1	1				
Chalcedony	51-75%	3+	1									
Chalcedony	75-99%	3+										
Limestone	0%	1-2				1						
Limestone	26-50%	1-2										
Limestone	75-99%	1-2										
Limestone	0%	3+										
S. Limestone	0%	1-2	3									
S. Limestone	1-25%	1-2										
S. Limestone	26-50%	1-2										
S. Limestone	51-75%	1-2										
S. Limestone	75-99%	1-2										
S. Limestone	0%	3+	4		1							
S. Limestone	1-25%	3+	2									
S. Limestone	26-50%	3+										
		Total	185	190	52	124	38	120	28	64	6	1

Table 8., cont.

Material	Cortex %	Scars	14AM1	14AM2	14AN1	14AO1	14AP1	14AP2	14AQ1	14AQ2	14AR1	14AS1
Chert	100%	0										
Chert	0%	1-2	12	4	18	4	6	15	19	10	17	7
Chert	1-25%	1-2	5	4	7	9	2	2	7	10	10	2
Chert	26-50%	1-2	10	6	13	13	4	7	9	13	15	1
Chert	51-75%	1-2	7	2	4	11	5	4	8	8	14	3
Chert	75-99%	1-2	16	6	11	26	8	9	6	13	20	8
Chert	0%	3+	22	30	31	23	42	36	26	17	39	6
Chert	1-25%	3+	8	12	11	13	12	14	6	5	15	2
Chert	26-50%	3+	8	7	11	9	5	9	10	3	10	
Chert	51-75%	3+	1		3		1	6			4	
Chert	75-99%	3+	1		1						8	
Chalcedony	0%	1-2			1				2		3	
Chalcedony	1-25%	1-2									2	
Chalcedony	26-50%	1-2			1			1			1	
Chalcedony	51-75%	1-2										
Chalcedony	75-99%	1-2	2	1		1					1	
Chalcedony	0%	3+			1	1	1			1	1	
Chalcedony	1-25%	3+		1						1	2	
Chalcedony	26-50%	3+		1		1		1				
Chalcedony	51-75%	3+		1								
Chalcedony	75-99%	3+										
Limestone	0%	1-2		1								
Limestone	26-50%	1-2						1				
Limestone	75-99%	1-2										
Limestone	0%	3+		1				1				
S. Limestone	0%	1-2		2			1		1	3	4	
S. Limestone	1-25%	1-2										
S. Limestone	26-50%	1-2										
S. Limestone	51-75%	1-2									1	
S. Limestone	75-99%	1-2										
S. Limestone	0%	3+						2	2		1	
S. Limestone	1-25%	3+										
S. Limestone	26-50%	3+										
		Total	92	79	113	111	87	108	96	84	168	29

Table 8., cont.

Material	Cortex %	Scars	14AS2	14AT1	14AU1	14AV1	14AW1	14AX1	14AY1	14AZ1	14BA1
Chert	100%	0									
Chert	0%	1-2	1	11		4	5	2	15	1	11
Chert	1-25%	1-2		3	2	2	4	3	1		1
Chert	26-50%	1-2		7	2		10	3	6		1
Chert	51-75%	1-2		5		5	7	2	3		4
Chert	75-99%	1-2	1	11	7	6	10	2	15	2	6
Chert	0%	3+	5	24	2	8	15	14	13	5	23
Chert	1-25%	3+	4	13	2	4	11	2	7		3
Chert	26-50%	3+	1	6	3	10	7	1	11		
Chert	51-75%	3+		3			3	1	6		
Chert	75-99%	3+				1			1		
Chalcedony	0%	1-2		1							
Chalcedony	1-25%	1-2							1		
Chalcedony	26-50%	1-2						1			
Chalcedony	51-75%	1-2				1					
Chalcedony	75-99%	1-2						1			
Chalcedony	0%	3+					1		1		
Chalcedony	1-25%	3+									
Chalcedony	26-50%	3+									1
Chalcedony	51-75%	3+									
Chalcedony	75-99%	3+									
Limestone	0%	1-2									
Limestone	26-50%	1-2									
Limestone	75-99%	1-2						1			
Limestone	0%	3+								1	
S. Limestone	0%	1-2									
S. Limestone	1-25%	1-2									1
S. Limestone	26-50%	1-2							1		
S. Limestone	51-75%	1-2					1				
S. Limestone	75-99%	1-2			1						1
S. Limestone	0%	3+	1	3			1				
S. Limestone	1-25%	3+									
S. Limestone	26-50%	3+									
		Total	13	87	19	41	75	33	81	9	52

Table 9. Op. 14 – Agricultural Plot System 1: Flake Fragment Count and Percentage by Material

Material	Total	Percentage
Chert	3675	94.3%
Chalcedony	139	3.6%
Limestone	11	0.3%
Siliceous Limestone	71	1.8%

Table 10. Op. 14 – Agricultural Plot System 1: Flak Fragment Count and Percentage by Attribute

Cortex %	Scars	Total	Percentage
100%	0	4	0.1%
0%	1-2	378	9.7%
1-25%	1-2	219	5.6%
26-50%	1-2	311	8.0%
51-75%	1-2	255	6.5%
76-99%	1-2	498	12.8%
0%	3+	1109	28.5%
1-25%	3+	521	13.4%
26-50%	3+	376	9.7%
51-75%	3+	141	3.6%
76-99%	3+	84	2.2%
	Total	3896	100%

Table 11. Op. 51 – Agricultural Plot System 2: Lithic Type by Count

Op/Subop/Lot	Microdebitage	Flake	Fragment	Core	Preform	Biface	Graver	Drill	Nodule	Chunk	Shatter	Expedient	Resharpening	Retouch	Total
51A1	25	56	138						1	2	44		1	0	267
51B1	18	31	46		1	1					24	2		0	123
51B2	2	50	60	5						10	25			1	153
51C1	15	36	69							2	32			0	154
51C2	6	46	68	1	2	1		1		3	23			0	151
51D1	10	24	44								15			1	94
51E1	3	16	27		1						9			1	57
51E2	2	10	14								9			0	35
51F1	12	105	94	4	2	2		3		5	44		1	0	272
51F2	4	41	19		1		1	1	1		14			0	82
51G1	7	30	54								36		1	0	128
51G2	2	15	37								13			0	67
51H1		15	14					1			13	1	1	0	45
51H2		2	12											0	14
51I1	2	42	62							5	12			1	124
51I2		35	33	1						4	11			0	84
51J1		9	15								13			0	37
51K1	8	9	27								17			0	61
51L1	5	28	63	1						1	30		2	0	130
51M1	5	29	40							1	19			0	94
51N1		8	18								10			0	36
51N2		3	15								5		1	0	24
51O1	6	27	42								21			0	96
51P1		28	42							2	17		1	3	93
51P2		2	4								4			0	10
51Q1		42	43								20	2	3	0	110
51R1	9	43	38	2				2		2	35			0	131
51S1		10	32						1		6			0	49
51T1	5	62	61	1				2		7	25	1	1	3	168
Total	146	854	1231	15	7	4	1	10	3	44	546	6	12	10	2889

Table 12. Op. 51 – Agricultural Plot System 2: Lithic Type by Percentage

Op/Subop/Lot	Microdebitage	Flake	Fragment	Core	Preform	Biface	Graver	Drill	Nodule	Chunk	Shatter	Expedient	Resharp	Retouch
51A1	11.1%	21.1%	51.5%						0.4%	0.8%	16.5%		0.4%	
51B1	14.6%	25.2%	37.4%		1.0%	1.0%					19.5%	1.6%		
51B2	1.3%	32.7%	39.2%	3.3%						6.5%	16.3%			1.0%
51C1	9.7%	23.4%	44.8%							1.3%	20.8%			
51C2	4.0%	30.5%	45.0%	0.7%	1.3%	0.7%		0.7%		2.0%	15.2%			
51D1	10.6%	25.5%	46.8%								16.0%			1.1%
51E1	5.3%	28.1%	47.4%		1.8%						15.8%			1.8%
51E2	5.7%	28.6%	40.0%								24.3%			
51F1	4.4%	38.6%	34.6%	1.5%	0.7%	0.7%		1.1%		1.8%	16.2%		0.4%	
51F2	4.9%	50.0%	23.2%		1.2%		1.2%	1.2%	1.2%		17.1%			
51G1	5.5%	23.4%	42.2%								28.1%		0.8%	
51G2	3.0%	22.4%	55.2%								19.4%			
51H1		33.3%	31.1%					2.2%			28.9%	2.2%	2.2%	
51H2		14.3%	85.7%											
51I1	1.6%	33.9%	50.0%							4.0%	9.7%			0.8%
51I2		41.7%	39.3%	1.2%						4.8%	13.1%			
51J1		24.3%	40.5%								35.1%			
51K1	13.1%	14.8%	44.3%								27.9%			
51L1	3.8%	21.5%	48.5%	0.8%						0.8%	23.1%		1.5%	
51M1	5.3%	30.9%	42.6%							1.1%	20.2%			
51N1		22.2%	50.0%								27.8%			
51N2		12.5%	62.5%								20.8%		4.2%	
51O1	6.3%	28.1%	45.2%								21.9%			
51P1		30.1%	45.2%							2.2%	18.3%		1.1%	3.2%
51P2		20.0%	40.0%								40.0%			
51Q1		38.2%	39.1%								18.2%	1.8%	2.7%	
51R1	6.9%	32.8%	29.0%	1.5%				1.5%		1.5%	26.7%			
51S1		20.4%	65.3%						2.0%		12.2%			
51T1	3.0%	37.0%	36.3%	0.6%				1.2%		4.2%	14.9%	0.6%	0.6%	1.8%
% of Total	5.1%	29.6%	42.6%	0.5%	0.2%	0.1%	0.03%	0.3%	0.1%	1.5%	18.9%	0.2%	0.4%	0.3%

Table 13. Op. 51 – Agricultural Plot System 2: Flake Count by Material and Attributes

Material	Cortex	Scars	Hammer	Prep.	Stage	51A1	51B1	51B2	51C1	51C2	51D1	51E1
Chert	0%	1-2	Soft	Y	Third	1						
Chert	0%	1-2	Soft	N	Second		2		2			
Chert	0%	1-2	Hard	Y	Second					1		
Chert	0%	1-2	Hard	N	Second	3				1	1	
Chert	0%	3+	Soft	Y	Third	3	1	2	2	1		
Chert	0%	3+	Soft	N	Third	7	4		3	2	3	1
Chert	0%	3+	Hard	Y	Third	5	2	1		2	1	
Chert	0%	3+	Hard	N	Third	10	9	11	7	6	5	4
Chert	<50%	1-2	Soft	Y	Second			1				
Chert	<50%	1-2	Soft	N	Second	1			2			
Chert	<50%	1-2	Hard	Y	Second				1			
Chert	<50%	1-2	Hard	N	Second	1		1	3	4	2	
Chert	<50%	3+	Soft	Y	Third				2	2	2	1
Chert	<50%	3+	Soft	N	Second	3		1		1	1	1
Chert	<50%	3+	Hard	Y	Second	1	1	3	2	2		1
Chert	<50%	3+	Hard	N	Second	10		16	7	8	3	1
Chert	>50%	1-2	Soft	Y	First							
Chert	>50%	1-2	Soft	N	First							
Chert	>50%	1-2	Hard	N	First			2		3		2
Chert	>50%	3+	Soft	N	Second					1		
Chert	>50%	3+	Hard	Y	Second	1						
Chert	>50%	3+	Hard	N	Second	3	1	4		3	1	
Chert	100%	0	Soft	N	First					1		1
Chert	100%	0	Hard	N	First	1		2		1		
Chalcedony	0%	1-2	Soft	N	Second	1						
Chalcedony	0%	1-2	Hard	N	Second		1			1		
Chalcedony	0%	3+	Soft	Y	Third			1		1		
Chalcedony	0%	3+	Soft	N	Third		1		1	1	1	
Chalcedony	0%	3+	Hard	Y	Third							
Chalcedony	0%	3+	Hard	N	Third	3	2		1	2	1	
Chalcedony	<50%	1-2	Soft	N	Second							
Chalcedony	<50%	1-2	Hard	Y	Second							
Chalcedony	<50%	1-2	Hard	N	Second			1	1	1		
Chalcedony	<50%	3+	Soft	Y	Third							
Chalcedony	<50%	3+	Soft	N	Second		2				2	
Chalcedony	<50%	3+	Hard	Y	Second							1
Chalcedony	<50%	3+	Hard	N	Second	2	4	3	2	1	1	1
Chalcedony	>50%	1-2	Hard	N	First							
Chalcedony	>50%	3+	Soft	N	Second							
Chalcedony	>50%	3+	Hard	N	Second							
Chalcedony	100%	0	Soft	N	First							
Chalcedony	100%	0	Hard	N	First							
S. Limestone	0%	1-2	Hard	N	Second							
S. Limestone	0%	3+	Soft	Y	Third							
S. Limestone	0%	3+	Soft	N	Third		1					
S. Limestone	0%	3+	Hard	Y	Third							1
S. Limestone	<50%	1-2	Hard	N	Second							
S. Limestone	<50%	3+	Soft	Y	Third							1
S. Limestone	<50%	3+	Hard	Y	Second							
S. Limestone	<50%	3+	Hard	N	Second			1				
					Total	56	31	50	36	46	24	16

Table 13., cont.

Material	Cortex	Scars	Hammer	Prep.	Stage	51E2	51F1	51F2	51G1	51G2	51H1	51H2
Chert	0%	1-2	Soft	Y	Third							
Chert	0%	1-2	Soft	N	Second	1						
Chert	0%	1-2	Hard	Y	Second					1		
Chert	0%	1-2	Hard	N	Second		2	1			1	
Chert	0%	3+	Soft	Y	Third		3	1		2		
Chert	0%	3+	Soft	N	Third	1	6	2	6	2	3	1
Chert	0%	3+	Hard	Y	Third		2					
Chert	0%	3+	Hard	N	Third	3	8	10	2	2	3	1
Chert	<50%	1-2	Soft	Y	Second		3			1		
Chert	<50%	1-2	Soft	N	Second		4					
Chert	<50%	1-2	Hard	Y	Second							
Chert	<50%	1-2	Hard	N	Second	1	7	3	1			
Chert	<50%	3+	Soft	Y	Third		3		1			
Chert	<50%	3+	Soft	N	Second		8	1	4		4	
Chert	<50%	3+	Hard	Y	Second	1	6	2	1	2	1	
Chert	<50%	3+	Hard	N	Second	1	26	12	4			
Chert	>50%	1-2	Soft	Y	First		1			1		
Chert	>50%	1-2	Soft	N	First			1	1	1	1	
Chert	>50%	1-2	Hard	N	First	1	2	1	3	2		
Chert	>50%	3+	Soft	N	Second	1						
Chert	>50%	3+	Hard	Y	Second		1	1	1			
Chert	>50%	3+	Hard	N	Second		3	2	1		1	
Chert	100%	0	Soft	N	First		1					
Chert	100%	0	Hard	N	First		3	1				
Chalcedony	0%	1-2	Soft	N	Second							
Chalcedony	0%	1-2	Hard	N	Second							
Chalcedony	0%	3+	Soft	Y	Third							
Chalcedony	0%	3+	Soft	N	Third		1					
Chalcedony	0%	3+	Hard	Y	Third		1	1			1	
Chalcedony	0%	3+	Hard	N	Third		2					
Chalcedony	<50%	1-2	Soft	N	Second					1		
Chalcedony	<50%	1-2	Hard	Y	Second				1			
Chalcedony	<50%	1-2	Hard	N	Second		2	1				
Chalcedony	<50%	3+	Soft	Y	Third							
Chalcedony	<50%	3+	Soft	N	Second		2	1				
Chalcedony	<50%	3+	Hard	Y	Second							
Chalcedony	<50%	3+	Hard	N	Second		4					
Chalcedony	>50%	1-2	Hard	N	First							
Chalcedony	>50%	3+	Soft	N	Second							
Chalcedony	>50%	3+	Hard	N	Second		1					
Chalcedony	100%	0	Soft	N	First							
Chalcedony	100%	0	Hard	N	First		2		1			
S. Limestone	0%	1-2	Hard	N	Second							
S. Limestone	0%	3+	Soft	Y	Third				1			
S. Limestone	0%	3+	Soft	N	Third				1			
S. Limestone	0%	3+	Hard	Y	Third							
S. Limestone	<50%	1-2	Hard	N	Second				1			
S. Limestone	<50%	3+	Soft	Y	Third							
S. Limestone	<50%	3+	Hard	Y	Second		1					
S. Limestone	<50%	3+	Hard	N	Second							
					Total	10	105	41	30	15	15	2

Table 13, cont.

Material	Cortex	Scars	Hammer	Prep.	Stage	51I1	51I2	51J1	51K1	51L1	51M1	51N1
Chert	0%	1-2	Soft	Y	Third							
Chert	0%	1-2	Soft	N	Second	3					1	
Chert	0%	1-2	Hard	Y	Second							
Chert	0%	1-2	Hard	N	Second	1	3			1	1	1
Chert	0%	3+	Soft	Y	Third					1		
Chert	0%	3+	Soft	N	Third	5	3	1	1	3		
Chert	0%	3+	Hard	Y	Third		1	1		1		1
Chert	0%	3+	Hard	N	Third	8	5	3	3	4	3	2
Chert	<50%	1-2	Soft	Y	Second	1						
Chert	<50%	1-2	Soft	N	Second	1					1	
Chert	<50%	1-2	Hard	Y	Second				1	1		
Chert	<50%	1-2	Hard	N	Second	3	2	1		2	1	
Chert	<50%	3+	Soft	Y	Third	1						1
Chert	<50%	3+	Soft	N	Second	4	2		4	3	4	1
Chert	<50%	3+	Hard	Y	Second		1					
Chert	<50%	3+	Hard	N	Second	8	6	3		3	6	1
Chert	>50%	1-2	Soft	Y	First	1						
Chert	>50%	1-2	Soft	N	First	1	1			2		
Chert	>50%	1-2	Hard	N	First		3			3	2	
Chert	>50%	3+	Soft	N	Second							
Chert	>50%	3+	Hard	Y	Second							
Chert	>50%	3+	Hard	N	Second	2	1			1	1	
Chert	100%	0	Soft	N	First		1					
Chert	100%	0	Hard	N	First	1	1			1	1	
Chalcedony	0%	1-2	Soft	N	Second							
Chalcedony	0%	1-2	Hard	N	Second							
Chalcedony	0%	3+	Soft	Y	Third							
Chalcedony	0%	3+	Soft	N	Third					1	1	
Chalcedony	0%	3+	Hard	Y	Third		1					
Chalcedony	0%	3+	Hard	N	Third		3				1	
Chalcedony	<50%	1-2	Soft	N	Second							
Chalcedony	<50%	1-2	Hard	Y	Second							
Chalcedony	<50%	1-2	Hard	N	Second		1				1	
Chalcedony	<50%	3+	Soft	Y	Third	1						
Chalcedony	<50%	3+	Soft	N	Second					1	2	
Chalcedony	<50%	3+	Hard	Y	Second							
Chalcedony	<50%	3+	Hard	N	Second	1					1	
Chalcedony	>50%	1-2	Hard	N	First							
Chalcedony	>50%	3+	Soft	N	Second							
Chalcedony	>50%	3+	Hard	N	Second						1	
Chalcedony	100%	0	Soft	N	First						1	
Chalcedony	100%	0	Hard	N	First							
S. Limestone	0%	1-2	Hard	N	Second							
S. Limestone	0%	3+	Soft	Y	Third							
S. Limestone	0%	3+	Soft	N	Third							
S. Limestone	0%	3+	Hard	Y	Third							
S. Limestone	<50%	1-2	Hard	N	Second							
S. Limestone	<50%	3+	Soft	Y	Third							
S. Limestone	<50%	3+	Hard	Y	Second							1
S. Limestone	<50%	3+	Hard	N	Second							
					Total	42	35	9	9	28	29	8

Table 13., cont.

Material	Cortex	Scars	Hammer	Prep.	Stage	51N2	51O1	51P1	51P2	51Q1	51R1	51S1	51T1
Chert	0%	1-2	Soft	Y	Third								
Chert	0%	1-2	Soft	N	Second								
Chert	0%	1-2	Hard	Y	Second					2			
Chert	0%	1-2	Hard	N	Second			1		2	1		
Chert	0%	3+	Soft	Y	Third		2	3			1		
Chert	0%	3+	Soft	N	Third		1	1		5	2	1	1
Chert	0%	3+	Hard	Y	Third			2		2	1		1
Chert	0%	3+	Hard	N	Third		3	5		6	7	3	10
Chert	<50%	1-2	Soft	Y	Second	1							
Chert	<50%	1-2	Soft	N	Second			1					
Chert	<50%	1-2	Hard	Y	Second						1		1
Chert	<50%	1-2	Hard	N	Second			1		4	5		4
Chert	<50%	3+	Soft	Y	Third			1			2		
Chert	<50%	3+	Soft	N	Second	1	1	1				1	
Chert	<50%	3+	Hard	Y	Second				1	1	2	1	3
Chert	<50%	3+	Hard	N	Second	1	10	4	1	8	13	2	22
Chert	>50%	1-2	Soft	Y	First					1			
Chert	>50%	1-2	Soft	N	First						1		
Chert	>50%	1-2	Hard	N	First		2	2		1	4		5
Chert	>50%	3+	Soft	N	Second								
Chert	>50%	3+	Hard	Y	Second		1			1			1
Chert	>50%	3+	Hard	N	Second		1	2		3	2		3
Chert	100%	0	Soft	N	First								
Chert	100%	0	Hard	N	First		1			1	1		6
Chalcedony	0%	1-2	Soft	N	Second								
Chalcedony	0%	1-2	Hard	N	Second			1		1			
Chalcedony	0%	3+	Soft	Y	Third								
Chalcedony	0%	3+	Soft	N	Third								
Chalcedony	0%	3+	Hard	Y	Third								
Chalcedony	0%	3+	Hard	N	Third			1					2
Chalcedony	<50%	1-2	Soft	N	Second								
Chalcedony	<50%	1-2	Hard	Y	Second								1
Chalcedony	<50%	1-2	Hard	N	Second								
Chalcedony	<50%	3+	Soft	Y	Third							1	
Chalcedony	<50%	3+	Soft	N	Second			1		1			
Chalcedony	<50%	3+	Hard	Y	Second		1						
Chalcedony	<50%	3+	Hard	N	Second					1			
Chalcedony	>50%	1-2	Hard	N	First		1					1	
Chalcedony	>50%	3+	Soft	N	Second			1					
Chalcedony	>50%	3+	Hard	N	Second		2						
Chalcedony	100%	0	Soft	N	First								
Chalcedony	100%	0	Hard	N	First								2
S. Limestone	0%	1-2	Hard	N	Second					1			
S. Limestone	0%	3+	Soft	Y	Third		1						
S. Limestone	0%	3+	Soft	N	Third					1			
S. Limestone	0%	3+	Hard	Y	Third								
S. Limestone	<50%	1-2	Hard	N	Second								
S. Limestone	<50%	3+	Soft	Y	Third								
S. Limestone	<50%	3+	Hard	Y	Second								
S. Limestone	<50%	3+	Hard	N	Second								
					Total	3	27	28	2	42	43	10	62

Table 14. Op. 51 – Agricultural Plot System 1: Flake Count and Percentage by Material and Attribute

Material	Cortex	Scars	Hammer	Prep.	Stage	Total	Percentage
Chert	0%	1-2	Soft	Y	Third	1	0.1%
Chert	0%	1-2	Soft	N	Second	9	1.1%
Chert	0%	1-2	Hard	Y	Second	4	0.5%
Chert	0%	1-2	Hard	N	Second	20	2.3%
Chert	0%	3+	Soft	Y	Third	22	2.6%
Chert	0%	3+	Soft	N	Third	65	7.6%
Chert	0%	3+	Hard	Y	Third	23	2.7%
Chert	0%	3+	Hard	N	Third	143	16.7%
Chert	<50%	1-2	Soft	Y	Second	7	0.8%
Chert	<50%	1-2	Soft	N	Second	10	1.2%
Chert	<50%	1-2	Hard	Y	Second	5	0.6%
Chert	<50%	1-2	Hard	N	Second	46	5.4%
Chert	<50%	3+	Soft	Y	Third	16	1.9%
Chert	<50%	3+	Soft	N	Second	46	5.4%
Chert	<50%	3+	Hard	Y	Second	32	3.7%
Chert	<50%	3+	Hard	N	Second	176	20.6%
Chert	>50%	1-2	Soft	Y	First	4	0.5%
Chert	>50%	1-2	Soft	N	First	9	1.1%
Chert	>50%	1-2	Hard	N	First	38	4.4%
Chert	>50%	3+	Soft	N	Second	2	0.2%
Chert	>50%	3+	Hard	Y	Second	7	0.8%
Chert	>50%	3+	Hard	N	Second	35	4.1%
Chert	100%	0	Soft	N	First	4	0.5%
Chert	100%	0	Hard	N	First	21	2.5%
Chalcedony	0%	1-2	Soft	N	Second	1	0.1%
Chalcedony	0%	1-2	Hard	N	Second	4	0.5%
Chalcedony	0%	3+	Soft	Y	Third	2	0.2%
Chalcedony	0%	3+	Soft	N	Third	7	0.8%
Chalcedony	0%	3+	Hard	Y	Third	4	0.5%
Chalcedony	0%	3+	Hard	N	Third	18	2.1%
Chalcedony	<50%	1-2	Soft	N	Second	1	0.1%
Chalcedony	<50%	1-2	Hard	Y	Second	2	0.2%
Chalcedony	<50%	1-2	Hard	N	Second	8	0.9%
Chalcedony	<50%	3+	Soft	Y	Third	2	0.2%
Chalcedony	<50%	3+	Soft	N	Second	12	1.4%
Chalcedony	<50%	3+	Hard	Y	Second	2	0.2%
Chalcedony	<50%	3+	Hard	N	Second	21	2.5%
Chalcedony	>50%	1-2	Hard	N	First	2	0.2%
Chalcedony	>50%	3+	Soft	N	Second	1	0.1%
Chalcedony	>50%	3+	Hard	N	Second	4	0.5%
Chalcedony	100%	0	Soft	N	First	1	0.1%
Chalcedony	100%	0	Hard	N	First	5	0.6%
S. Limestone	0%	1-2	Hard	N	Second	1	0.1%
S. Limestone	0%	3+	Soft	Y	Third	2	0.2%
S. Limestone	0%	3+	Soft	N	Third	3	0.4%
S. Limestone	0%	3+	Hard	Y	Third	1	0.1%
S. Limestone	<50%	1-2	Hard	N	Second	1	0.1%
S. Limestone	<50%	3+	Soft	Y	Third	1	0.1%
S. Limestone	<50%	3+	Hard	Y	Second	2	0.2%
S. Limestone	<50%	3+	Hard	N	Second	1	0.1%
					Total	854	100%

Table 15. Op. 51 – Agricultural Plot System 2: Flake Count and Percentage by Material

Material	Total	Percentage
Chert	745	87.2%
Chalcedony	97	11.4%
Siliceous Limestone	12	1.4%

APPENDIX A: LITHIC ANALYSIS

Table 16. Op. 51 – Agricultural Plot System 2: Flake Count and Percentage by Attributes

Cortex %	Scars	Hammer Type	Prep.	Stage	Total	Percentage
0%	1-2	Soft	Y	Third	1	0.1%
0%	1-2	Soft	N	Second	10	1.2%
0%	1-2	Hard	Y	Second	4	0.5%
0%	1-2	Hard	N	Second	25	2.9%
0%	3+	Soft	Y	Third	26	3.0%
0%	3+	Soft	N	Third	75	8.8%
0%	3+	Hard	Y	Third	28	3.3%
0%	3+	Hard	N	Third	161	18.9%
<50%	1-2	Soft	Y	Second	7	0.8%
<50%	1-2	Soft	N	Second	11	1.3%
<50%	1-2	Hard	Y	Second	7	0.8%
<50%	1-2	Hard	N	Second	55	6.4%
<50%	3+	Soft	Y	Third	19	2.2%
<50%	3+	Soft	N	Second	60	7.0%
<50%	3+	Hard	Y	Second	35	4.1%
<50%	3+	Hard	N	Second	197	23.1%
>50%	1-2	Soft	Y	First	4	0.5%
>50%	1-2	Soft	N	First	9	1.1%
>50%	1-2	Hard	N	First	40	4.7%
>50%	3+	Soft	N	Second	3	3.5%
>50%	3+	Hard	Y	Second	7	0.8%
>50%	3+	Hard	N	Second	39	4.6%
100%	0	Soft	N	First	5	0.6%
100%	0	Hard	N	First	26	3.0%
				Total	854	100%

Table 17. Op. 51 – Agricultural Plot System 2: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	84	10%
Second	454	54%
Third	303	36%

Table 18. Op. 51 – Agricultural Plot System 2: Flake Fragment Count by Material and Attributes

Material Type	Cortex	Scars	51A1	51B1	51B2	51C1	51C2	51D1	51E1	51E2	51F1	51F2
Chert	0%	1-2	14	7	4	7	5	3	2	1	4	1
Chert	1-25%	1-2	2	1	3	3			2	1	6	1
Chert	26-50%	1-2	10	4	3	5	2	2	4		4	2
Chert	51-75%	1-2	5	4	3	4	3	1	2		3	2
Chert	75-99%	1-2	10	3	4	4	4	2		3	8	1
Chert	0%	3+	34	15	13	26	23	13	7	4	32	5
Chert	1-25%	3+	21	3	9	4	9	8	2	2	10	3
Chert	26-50%	3+	7	1	7	4	7	4	2		12	2
Chert	51-75%	3+	7		3	2	6	1		1	3	
Chert	75-99%	3+	4		2	1						
Chalcedony	0%	1-2	2	1				1		1	1	
Chalcedony	1-25%	1-2	3		1					1	1	1
Chalcedony	26-50%	1-2	3			1	1	1			1	
Chalcedony	51-75%	1-2		1			2	1			1	
Chalcedony	75-99%	1-2		1	1			2			1	1
Chalcedony	0%	3+	6	3	2	5	2	2	3		2	
Chalcedony	1-25%	3+	1	1	1	1	2	1	1			
Chalcedony	26-50%	3+		1		1		1			1	
Chalcedony	51-75%	3+	2					1				
Chalcedony	75-99%	3+										
Limestone	0%	1-2			2							
Limestone	1-25%	1-2										
Limestone	51-75%	1-2										
Limestone	0%	3+			2	1	2				2	
Limestone	1-25%	3+							1			
S. Limestone	0%	1-2	2									
S. Limestone	1-25%	1-2	2									
S. Limestone	26-50%	1-2										
S. Limestone	51-75%	1-2										
S. Limestone	75-99%	1-2	1									
S. Limestone	0%	3+	1						1		2	
S. Limestone	26-50%	3+	1									
		Total	138	46	60	69	68	44	27	14	94	19

Table 18., cont.

Material Type	Cortex	Scars	51G1	51G2	51H1	51H2	51I1	51I2	51J1	51K1	51L1	51M1
Chert	**0%**	**1-2**	**5**	**3**			**8**	**4**	**1**	**2**	**2**	**1**
Chert	**1-25%**	**1-2**	**5**	**1**		**1**	**2**	**2**	**1**	**3**	**1**	
Chert	**26-50%**	**1-2**	**4**	**3**		**1**	**5**	**2**		**1**	**12**	**4**
Chert	**51-75%**	**1-2**	**2**	**2**			**2**	**3**	**2**	**2**	**1**	**1**
Chert	**75-99%**	**1-2**	**3**	**4**	**3**		**3**	**3**	**1**	**1**	**3**	**2**
Chert	**0%**	**3+**	**18**	**10**	**7**	**6**	**22**	**4**	**3**	**12**	**20**	**12**
Chert	**1-25%**	**3+**	**4**	**7**	**2**	**1**	**8**	**4**	**1**	**2**	**5**	**9**
Chert	**26-50%**	**3+**	**2**	**1**		**1**	**4**	**5**	**1**		**7**	**2**
Chert	**51-75%**	**3+**	**2**			**1**	**2**	**1**				
Chert	**75-99%**	**3+**									**1**	
Chalcedony	**0%**	**1-2**										**1**
Chalcedony	**1-25%**	**1-2**		**1**							**1**	**1**
Chalcedony	**26-50%**	**1-2**		**1**			**1**					
Chalcedony	**51-75%**	**1-2**						**1**	**1**			**1**
Chalcedony	**75-99%**	**1-2**	**1**	**1**	**1**		**1**					
Chalcedony	**0%**	**3+**	**2**	**1**		**1**	**1**		**2**	**1**	**6**	**4**
Chalcedony	**1-25%**	**3+**	**2**	**1**			**1**	**1**	**1**			**1**
Chalcedony	**26-50%**	**3+**					**1**	**2**	**1**	**1**	**1**	
Chalcedony	**51-75%**	**3+**										
Chalcedony	**75-99%**	**3+**										
Limestone	**0%**	**1-2**	**1**									
Limestone	**1-25%**	**1-2**		**1**								
Limestone	**51-75%**	**1-2**										
Limestone	**0%**	**3+**						**1**		**1**		**1**
Limestone	**1-25%**	**3+**										
S. Limestone	**0%**	**1-2**										
S. Limestone	**1-25%**	**1-2**									**1**	
S. Limestone	**26-50%**	**1-2**								**1**		
S. Limestone	**51-75%**	**1-2**										
S. Limestone	**75-99%**	**1-2**										
S. Limestone	**0%**	**3+**	**2**		**1**						**2**	
S. Limestone	**26-50%**	**3+**	**1**				**1**					
		Total	**54**	**37**	**14**	**12**	**62**	**33**	**15**	**27**	**63**	**40**

Table 18., cont.

Material Type	Cortex	Scars	51N1	51N2	51O1	51P1	51P2	51Q1	51R1	51S1	51T1
Chert	0%	1-2		1	1	2		6	2	1	3
Chert	1-25%	1-2		1	2			1	2		5
Chert	26-50%	1-2	1	1	3	7	1	4	2	4	2
Chert	51-75%	1-2	3	1	2	1		4	2	1	5
Chert	75-99%	1-2	2	1	4	2	1	3	5	2	1
Chert	0%	3+	5	4	13	14		13	13	5	19
Chert	1-25%	3+	2	1	5	4		1	4	8	9
Chert	26-50%	3+	4		5	6		5	3	1	6
Chert	51-75%	3+	1	1		1	1		4	3	3
Chert	75-99%	3+									
Chalcedony	0%	1-2			1						
Chalcedony	1-25%	1-2		1				1			2
Chalcedony	26-50%	1-2						1			1
Chalcedony	51-75%	1-2				1		1		1	
Chalcedony	75-99%	1-2			1	1				2	1
Chalcedony	0%	3+			2	1				3	
Chalcedony	1-25%	3+			1	1				1	
Chalcedony	26-50%	3+							1		2
Chalcedony	51-75%	3+		1							1
Chalcedony	75-99%	3+		1							
Limestone	0%	1-2		1	1						
Limestone	1-25%	1-2									
Limestone	51-75%	1-2									1
Limestone	0%	3+				1		2			
Limestone	1-25%	3+									
S. Limestone	0%	1-2									
S. Limestone	1-25%	1-2					1				
S. Limestone	26-50%	1-2									
S. Limestone	51-75%	1-2						1			
S. Limestone	75-99%	1-2									
S. Limestone	0%	3+			1						
S. Limestone	26-50%	3+									
		Total	18	15	42	42	4	43	38	32	61

Table 19. Op. 51 – Agricultural Plot System 2: Flake Fragment Count and Percentage by Material

Material	Total	Percentage
Chert	1043	84.6%
Chalcedony	137	11.8%
Limestone	16	1.8%
Siliceous Limestone	22	1.8%

Table 20. Op. 51 – Agricultural Plot System 2: Flake Fragment Count and Percentage by Attribute

Cortex	Scars	Total	Percentage
0%	1-2	105	8.5%
1-25%	1-2	65	5.3%
26-50%	1-2	105	8.5%
51-75%	1-2	74	6.0%
76-99%	1-2	99	8.0%
0%	3+	444	36.1%
1-25%	3+	167	13.6%
26-50%	3+	115	9.3%
51-75%	3+	47	3.8%
76-99%	3+	9	0.7%
	Total	1231	100%

Table 21. Op. 14 – Terraforming: Lithic Type by Count

Op/Subop/Lot	Microdebitage	Flake	Fragment	Biface	Chisel	Drill	Chunk	Shatter	Total
14K1	2	3	11			1		3	20
14K2	4	5	23					5	37
14K4		1	9						10
14K5		8	26				1	1	36
14K8				1					1
14M1	4	11	49		1		3		68
14M2		6	16						22
14M3			1						1
14M5			1						1
Total	10	34	136	1	1	1	4	9	196

Table 22. Op. 14 – Terraforming: Lithic Type by Percentage

Op/Subop/Lot	Microdebitage	Flake	Fragment	Biface	Chisel	Drill	Chunk	Shatter
14K1	10.0%	15.0%	55.0%			5.0%		15.0%
14K2	10.8%	13.5%	62.2%					13.5%
14K4		10.0%	90.0%					
14K5		22.2%	72.2%				2.8%	2.8%
14K8				100.0%				
14M1	5.9%	16.2%	72.1%		1.5%		4.4%	
14M2		27.3%	72.7%					
14M3			100.0%					
14M5			100.0%					
% of Total	5.1%	17.3%	69.4%	0.5%	0.5%	0.5%	2.0%	4.6%

Table 23. Op 14 – Terraforming: Flake Count and Percentage by Material and Attributes

Material Type	Cortex	Scars	Hammer	Prep.	Stage	14K1	14K2	14K4	14K5	14M1	14M2	Total	Percentage
Chert	0%	1-2	Hard	N	Second				1		1	2	5.9%
Chert	0%	3+	Soft	Y	Third		1		1	1		3	8.8%
Chert	0%	3+	Hard	Y	Third						1	1	2.9%
Chert	0%	3+	Hard	N	Third	1	2			4		7	20.6%
Chert	<50%	3+	Soft	Y	Third		1					1	2.9%
Chert	<50%	3+	Soft	N	Second				1			1	2.9%
Chert	<50%	3+	Hard	Y	Second					1		1	2.9%
Chert	<50%	3+	Hard	N	Second			1	4	4	1	10	29.4%
Chert	>50%	1-2	Hard	N	First		1		1			2	5.9%
Chert	>50%	3+	Hard	N	Second					1		1	2.9%
Chert	100%	0	Soft	N	First						1	1	2.9%
Chalcedony	0%	3+	Hard	Y	Third	2						2	5.9%
Chalcedony	<50%	1-2	Hard	N	Second						1	1	2.9%
Chalcedony	<50%	3+	Hard	N	Second						1	1	2.9%
					Total	3	5	1	8	11	6	34	100%

Table 24. Op. 14 – Terraforming: Flake Count and Percentage by Material

Material Type	Total	Percentage
Chert	30	88.2%
Chalcedony	4	11.8%

Table 25. Op. 14 – Terraforming: Flake Count and Percentage by Attributes

Cortex	Scars	Hammer	Prep.	Stage	Total	Percentage
0%	1-2	Hard	N	Second	2	5.9%
0%	3+	Soft	Y	Third	3	8.8%
0%	3+	Hard	Y	Third	3	8.8%
0%	3+	Hard	N	Third	7	20.6%
<50%	1-2	Hard	N	Second	1	2.9%
<50%	3+	Soft	Y	Third	1	2.9%
<50%	3+	Soft	N	Second	1	2.9%
<50%	3+	Hard	Y	Second	1	2.9%
<50%	3+	Hard	N	Second	11	32.5%
>50%	1-2	Hard	N	First	2	5.9%
>50%	3+	Hard	N	Second	1	2.9%
100%	0	Soft	N	First	1	2.9%
				Total	34	100%

Table 26. Op. 14 – Terraforming: Flake Count by Reduction Stage

Stage	Total	Percentage
First	3	8.8%
Second	17	40.0%
Third	14	41.2%

Table 27. Op. 14 – Terraforming: Flake Fragment Count and Percentage by Material and Attributes

Material Type	Cortex	Scars	14K1	14K2	14K4	14K5	14M1	14M2	14M3	14M5	Total	Percentage
Chert	0%	1-2		1			6				7	5.1%
Chert	1-25%	1-2		1			2	4			7	5.1%
Chert	26-50%	1-2	2	4		2	3	1			12	8.8%
Chert	51-75%	1-2		1		3	1				5	3.7%
Chert	75-99%	1-2	1	2	1	5	8	2			19	14.0%
Chert	0%	3+	6	8	3	4	19	2	1	1	44	32.5%
Chert	1-25%	3+		3	2	5	3	2			15	11.0%
Chert	26-50%	3+	2		2	4	5	1			14	10.3%
Chert	51-75%	3+		3	1	2	1				7	5.1%
Chert	75-99%	3+						1			1	0.7%
Chalcedony	0%	3+					1	1			2	1.4%
Chalcedony	1-25%	3+				1		1			2	2.4%
Chalcedony	26-50%	3+						1			1	0.7%
		Total	11	23	9	26	49	16	1	1	136	100%

Table 28. Op. 14 – Terraforming: Flake Fragment Count and Percentage by Material

Material Type	Total	Percentage
Chert	131	96.3%
Chalcedony	5	3.7%

Table 29. Op. 14 – Terraforming: Flake Fragment Count by Attributes

Cortex	Scars	14K1	14K2	14K4	14K5	14M1	14M2	14M3	14M5	Total	Percentage
0%	1-2		1			6				7	5.1%
1-25%	1-2		1			2	4			7	5.1%
26-50%	1-2	2	4		2	3	1			12	8.8%
51-75%	1-2		1		3	1				5	3.7%
75-99%	1-2	1	2	1	5	8	2			19	14.0%
0%	3+	6	8	3	4	20	3	1	1	46	33.8%
1-25%	3+		3	2	6	3	3			17	12.5%
26-50%	3+	2		2	4	5	2			15	11.0%
51-75%	3+		3	1	2	1				7	5.1%
75-99%	3+						1			1	0.7%
	Total	11	23	9	26	49	16	1	1	136	100%

Table 30. Op. 14 – Water Channel System: Lithic Type by Count

Op/Subop/Lot	Microdebitage	Flake	Fragment	Nodule	Chunk	Shatter	Total
14N1	10	9	45	1		13	78
14N2	1	3	9				13
14N3	1	1	2				4
14N4						1	1
14P1		26	89			35	150
14P2		8	23		4	4	39
14P3		4	30			8	42
14P4		1	1				2
14P5		1	3			1	5
14S1	3	16	53			38	110
14S2	3	7	37			15	62
14S3	1	1	7				9
14S4	1		4				5
14V1	5	26	69		2	29	131
14V2		4	25			10	39
14V3			3				3
14V4		3	11			3	17
14V5			1				1
Total	25	110	412	1	6	157	711

Table 31. Op. 14 – Water Channel System: Lithic Type by Percentage

Op/Subop/Lot	Microdebitage	Flake	Flak frag	Nodule	Chunk	Shatter
14N1	12.8%	11.5%	57.7%	1.3%		16.7%
14N2	7.7%	23.1%	69.2%			
14N3	25.0%	25.0%	50.0%			
14N4						100.0%
14P1		17.3%	59.3%			23.3%
14P2		20.5%	59.0%		10.3%	10.3%
14P3		9.5%	71.4%			19.0%
14P4		50.0%	50.0%			
14P5		20.0%	60.0%			20.0%
14S1	2.7%	14.5%	48.2%			34.5%
14S2	4.8%	11.3%	60.0%			24.2%
14S3	11.1%	11.1%	77.8%			
14S4	20.0%		80.0%			
14V1	3.8%	20.0%	52.7%		1.5%	22.1%
14V2		10.3%	64.1%			25.6%
14V3			100.0%			
14V4		17.6%	64.7%			17.6%
14V5			100.0%			
% of Total	3.5%	15.5%	58.0%	0.1%	0.8%	22.1%

Table 32. Op.14 – Water Channel System: Flake Count by Material and Attribute

Material Type	Cortex	Scars	Hammer	Prep.	Stage	14N1	14N2	14N3	14P1	14P2	14P3	14P4	14P5
Chert	0%	1-2	Soft	Y	Third		1						
Chert	0%	1-2	Soft	N	Second				1				
Chert	0%	1-2	Hard	Y	Second				1				
Chert	0%	1-2	Hard	N	Second	1			2				
Chert	0%	3+	Soft	Y	Third								1
Chert	0%	3+	Soft	N	Third				2	1			
Chert	0%	3+	Hard	Y	Third	1							
Chert	0%	3+	Hard	N	Third	2			8	4	2	1	
Chert	<50%	1-2	Soft	N	Second						1		
Chert	<50%	1-2	Hard	Y	Second								
Chert	<50%	1-2	Hard	N	Second	1	1	1	3				
Chert	<50%	3+	Soft	Y	Third		1						
Chert	<50%	3+	Soft	N	Second					1			
Chert	<50%	3+	Hard	Y	Second								
Chert	<50%	3+	Hard	N	Second				2	1	1		
Chert	>50%	1-2	Soft	N	First								
Chert	>50%	1-2	Hard	N	First				3	1			
Chert	>50%	3+	Hard	Y	Second	1							
Chert	>50%	3+	Hard	N	Second	1							
Chert	100%	0	Soft	Y	First								
Chert	100%	0	Hard	N	First				1				
Chalcedony	0%	3+	Hard	N	Third	1							
Chalcedony	<50%	3+	Hard	N	Second	1							
Limestone	0%	3+	Hard	N	Third								
Limestone	100%	0	Hard	N	First				1				
S. Limestone	0%	1-2	Hard	N	Second				1				
S. Limestone	0%	3+	Hard	N	Third								
S. Limestone	<50%	3+	Soft	N	Second				1				
					Total	9	3	1	26	8	4	1	1

Table 32., cont.

Material Type	Cortex	Scars	Hammer	Prep.	Stage	14S1	14S2	14S3	14V1	14V2	14V4	Total	Percentage
Chert	0%	1-2	Soft	Y	Third							1	0.9%
Chert	0%	1-2	Soft	N	Second							1	0.9%
Chert	0%	1-2	Hard	Y	Second		1					2	1.8%
Chert	0%	1-2	Hard	N	Second	1			1			5	4.5%
Chert	0%	3+	Soft	Y	Third	1	1		2		1	6	5.5%
Chert	0%	3+	Soft	N	Third				1			4	3.6%
Chert	0%	3+	Hard	Y	Third	1			1			3	2.7%
Chert	0%	3+	Hard	N	Third	5	2		6		2	32	29.1%
Chert	<50%	1-2	Soft	N	Second							1	0.9%
Chert	<50%	1-2	Hard	Y	Second				1			1	0.9%
Chert	<50%	1-2	Hard	N	Second	3			1	1		11	10.0%
Chert	<50%	3+	Soft	Y	Third							1	0.9%
Chert	<50%	3+	Soft	N	Second	1			2	1		5	4.5%
Chert	<50%	3+	Hard	Y	Second		1					1	0.9%
Chert	<50%	3+	Hard	N	Second		1	1	5	1		12	10.9%
Chert	>50%	1-2	Soft	N	First				1			1	0.9%
Chert	>50%	1-2	Hard	N	First	1			1	1		7	6.4%
Chert	>50%	3+	Hard	Y	Second							1	0.9%
Chert	>50%	3+	Hard	N	Second				1			2	1.8%
Chert	100%	0	Soft	Y	First	1						1	0.9%
Chert	100%	0	Hard	N	First	2			1			4	3.6%
Chalcedony	0%	3+	Hard	N	Third							1	0.9%
Chalcedony	<50%	3+	Hard	N	Second							1	0.9%
Limestone	0%	3+	Hard	N	Third				1			1	0.9%
Limestone	100%	0	Hard	N	First							1	0.9%
S. Limestone	0%	1-2	Hard	N	Second		1					2	1.8%
S. Limestone	0%	3+	Hard	N	Third				1			1	0.9%
S. Limestone	<50%	3+	Soft	N	Second							1	0.9%
					Total	16	7	1	26	4	3	110	100%

Table 33. Op. 14 – Water Channel System: Flake Count and Percentage by Attribute

Cortex	Scars	Hammer	Prep.	Stage	Total	Percentage
0%	1-2	Soft	Y	Third	1	0.9%
0%	1-2	Soft	N	Second	1	0.9%
0%	1-2	Hard	Y	Second	2	1.8%
0%	1-2	Hard	N	Second	5	4.5%
0%	3+	Soft	Y	Third	6	5.5%
0%	3+	Soft	N	Third	4	3.6%
0%	3+	Hard	Y	Third	3	2.7%
0%	3+	Hard	N	Third	32	29.1%
<50%	1-2	Soft	N	Second	1	0.9%
<50%	1-2	Hard	Y	Second	1	0.9%
<50%	1-2	Hard	N	Second	11	10.0%
<50%	3+	Soft	Y	Third	1	0.9%
<50%	3+	Soft	N	Second	5	4.5%
<50%	3+	Hard	Y	Second	1	0.9%
<50%	3+	Hard	N	Second	12	10.9%
>50%	1-2	Soft	N	First	1	0.9%
>50%	1-2	Hard	N	First	7	6.4%
>50%	3+	Hard	Y	Second	1	0.9%
>50%	3+	Hard	N	Second	2	1.8%
100%	0	Soft	Y	First	1	0.9%
100%	0	Hard	N	First	4	3.6%
				Total	110	100%

Table 34. Op. 14 – Water Channel System: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	14	12.7%
Second	46	41.8%
Third	50	45.5%

Table 35. Op. 14 – Water Channel System: Flake Count and Percentage by Material

Material Type	Total	Percentage
Chert	102	92.8%
Chalcedony	2	1.8%
Limestone	2	1.8%
Siliceous Limestone	4	3.6%

Table 36. Op. 14 – Water Channel System: Flake Fragment by Count

Material Type	Cortex	Scars	14N1	14N2	14N3	14P1	14P2	14P3	14P4	14P5
Chert	0%	1-2	7	1		14	1	6		
Chert	1-25%	1-2	4	1		7	2	1		
Chert	26-50%	1-2	3			15		1		
Chert	51-75%	1-2	2	1	1	2	1	2	1	
Chert	75-99%	1-2	11	1		9	7	4		
Chert	0%	3+	9	3		26	4	12		3
Chert	1-25%	3+	6		1	6	4	3		
Chert	26-50%	3+	3			8	1	1		
Chert	51-75%	3+		1						
Chert	75-99%	3+				1				
Chalcedony	0%	3+								
Chalcedony	1-25%	3+								
Limestone	0%	1-2								
Limestone	75-99%	1-2								
Limestone	0%	3+				1				
S. Limestone	0%	1-2								
S. Limestone	75-99%	1-2					1			
S. Limestone	0%	3+					1			
S. Limestone	1-25%	3+					1			
S. Limestone	26-50%	3+								
		Total	45	9	2	89	23	30	1	3

Table 36., cont.

Material Type	Cortex	Scars	14S1	14S2	14S3	14S4	14V1	14V2	14V3	14V4	14V5
Chert	0%	1-2	7	5	2		2	3			
Chert	1-25%	1-2	5	1		1	1	3		1	
Chert	26-50%	1-2	1	5	1		4	3			
Chert	51-75%	1-2	5	4			5	2		1	
Chert	75-99%	1-2	5	4		1	10	2			
Chert	0%	3+	20	10	2	2	25	5	2	5	1
Chert	1-25%	3+	2	3	1		4	3		1	
Chert	26-50%	3+	7	3			7	1		2	
Chert	51-75%	3+			1		2				
Chert	75-99%	3+									
Chalcedony	0%	3+					1	2			
Chalcedony	1-25%	3+	1								
Limestone	0%	1-2					1				
Limestone	75-99%	1-2							1		
Limestone	0%	3+					6				
S. Limestone	0%	1-2								1	
S. Limestone	75-99%	1-2									
S. Limestone	0%	3+		2				1			
S. Limestone	1-25%	3+									
S. Limestone	26-50%	3+					1				
		Total	53	37	7	4	69	25	3	11	1

Table 37. Op. 14 – Water Channel System: Flake Fragment Count and Percentage by Material and Attributes

Material Type	Cortex	Scars	Total	Percentage
Chert	0%	1-2	48	11.7%
Chert	1-25%	1-2	27	6.6%
Chert	26-50%	1-2	33	8.0%
Chert	51-75%	1-2	27	6.6%
Chert	75-99%	1-2	54	13.1%
Chert	0%	3+	129	31.3%
Chert	1-25%	3+	34	8.3%
Chert	26-50%	3+	33	8.0%
Chert	51-75%	3+	4	1.0%
Chert	75-99%	3+	1	0.2%
Chalcedony	0%	3+	3	0.7%
Chalcedony	1-25%	3+	1	0.2%
Limestone	0%	1-2	1	0.2%
Limestone	75-99%	1-2	1	0.2%
Limestone	0%	3+	7	1.7%
S. Limestone	0%	1-2	1	0.2%
S. Limestone	75-99%	1-2	1	0.2%
S. Limestone	0%	3+	4	1.0%
S. Limestone	1-25%	3+	1	0.2%
S. Limestone	26-50%	3+	1	0.2%
		Total	412	100%

Table 38. Op. 14 – Water Channel System Flake Fragment Count and Percentage by Attributes

Cortex	Scars	Total	Percentage
0%	1-2	50	12.1%
1-25%	1-2	27	6.6%
26-50%	1-2	33	8.0%
51-75%	1-2	27	6.6%
75-99%	1-2	56	13.6%
0%	3+	142	34.5%
1-25%	3+	36	8.7%
26-50%	3+	34	8.3%
51-75%	3+	4	1.0%
75-99%	3+	1	0.2%
	Total	412	100%

Table 39. Op. 52 – *Chich* Cobble Mounds: Lithic Type by Count

Op/Subop/Lot	Microdebitage	Flake	Fragment	Core	Preform	Uniface	Biface	Thin Biface	Chisel	Graver
52A1	2	7	4							
52A2	34	135	89					1		1
52A3	13	28	16							
52B1	19	16	26							
52B2	14	70	114	5	3			1	1	
52B3	2	9	15							
52C1	35	147	393	13	1	1	1			
52C2	19	54	142	4						
52C3	3	4	5							
Total	141	470	804	22	4	1	1	2	1	1

Table 39., cont.

Op/Subop/Lot	Drill	Macroblade	Nodule	Chunk	Shatter	Expedient	Resharp	Total
52A1		2			3	1		19
52A2				3	3	8		274
52A3				2	3			62
52B1				3	4			68
52B2				28	3	4		243
52B3					3			29
52C1			3	32	48		1	675
52C2	1			18	26			264
52C3				1				13
Total	1	2	3	87	93	13	1	1647

Table 40. Op. 52 – *Chich* Cobble Mounds: Lithic Type by Percentage

Op/Subop/Lot	Microdebitage	Flake	Fragment	Core	Preform	Uniface	Biface	Thin Biface	Chisel	Graver
52A1	10.5%	36.8%	21.1%							
52A2	12.4%	49.3%	32.5%					0.4%		0.4%
52A3	21.0%	45.2%	25.8%							
52B1	27.9%	23.5%	38.2%							
52B2	5.8%	28.8%	46.9%	2.1%	1.2%			0.4%	0.4%	
52B3	6.9%	31.0%	51.7%							
52C1	5.2%	21.8%	58.2%	1.9%	0.1%	0.1%	0.1%			
52C2	7.2%	20.5%	53.8%	1.5%						
52C3	23.1%	30.8%	38.5%							
% of Total	8.6%	28.5%	48.8%	1.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%

Table 40., cont.

Op/Subop/Lot	Drill	Macroblade	Nodule	Chunk	Shatter	Expedient	Resharp
52A1		10.5%			15.8%	5.3%	
52A2				1.1%	1.1%	2.9%	
52A3				3.2%	4.8%		
52B1				4.4%	5.9%		
52B2				11.5%	1.2%	1.6%	
52B3					10.3%		
52C1			0.4%	4.7%	7.1%		0.1%
52C2	0.4%			6.8%	9.8%		
52C3				7.7%			
% of Total	0.1%	0.1%	0.2%	5.3%	5.6%	0.8%	0.1%

Table 41. Op. 52 – *Chich* Cobble Mounds: Flake Count and Percentage by Material and Attributes

Material Type	Cortex	Scars	Hammer	Prep.	Stage	52A1	52A2	52A3	52B1	52B2	52B3	52C1	52C2	52C3	Total	Percentage
Chert	0%	1-2	Soft	Y	Third			1		1					2	0.4%
Chert	0%	1-2	Hard	Y	Second					2					2	0.4%
Chert	0%	1-2	Hard	N	Second		1			1		5	1		8	1.7%
Chert	0%	3+	Soft	Y	Third	1	47	8	3	16	2		3		80	17.0%
Chert	0%	3+	Soft	N	Third		5	1	1	1					8	1.7%
Chert	0%	3+	Hard	Y	Third	2	4	2	1	7					16	3.4%
Chert	0%	3+	Hard	N	Third		2			3		41	12	1	59	12.6%
Chert	<50%	1-2	Soft	Y	Second		2								2	0.4%
Chert	<50%	1-2	Hard	N	Second				1			18	4		23	4.9%
Chert	<50%	3+	Soft	Y	Third	1	6	2		3	1				13	2.8%
Chert	<50%	3+	Soft	N	Second		8			1			1		10	2.1%
Chert	<50%	3+	Hard	Y	Second		5	1	1	3			2		12	2.6%
Chert	<50%	3+	Hard	N	Second	2	5		1	5	1	44	19		77	16.4%
Chert	>50%	1-2	Soft	Y	First		1	1		1					3	0.6%
Chert	>50%	1-2	Soft	N	First		2		1	1	1				5	1.1%
Chert	>50%	1-2	Hard	Y	First		1								1	0.2%
Chert	>50%	1-2	Hard	N	First		2			4	1	22	7	3	39	8.3%
Chert	>50%	3+	Soft	Y	Second		2								2	0.4%
Chert	>50%	3+	Soft	N	Second					1					1	0.2%
Chert	>50%	3+	Hard	Y	Second					1					1	0.2%
Chert	>50%	3+	Hard	N	Second				1	5		8	4		18	3.8%
Chert	100%	0	Soft	Y	First			1							1	0.2%
Chert	100%	0	Hard	N	First		1	1	1	2					5	1.1%
Chalcedony	0%	1-2	Hard	N	Second							1			1	0.2%
Chalcedony	0%	3+	Soft	Y	Third	1	30	6	3	6					46	9.8%
Chalcedony	0%	3+	Soft	N	Third		1	2							3	0.6%
Chalcedony	0%	3+	Hard	Y	Third		5		1	1					7	1.5%
Chalcedony	0%	3+	Hard	N	Third			1			1	3			5	1.1%
Chalcedony	<50%	1-2	Hard	N	Second			1				2			3	0.6%
Chalcedony	<50%	3+	Soft	Y	Third		1								1	0.2%
Chalcedony	<50%	3+	Soft	N	Second		3								3	0.6%
Chalcedony	<50%	3+	Hard	Y	Second					1					1	0.2%
Chalcedony	<50%	3+	Hard	N	Second		1		1	1			1		4	0.8%
Chalcedony	>50%	3+	Hard	N	Second					1					1	0.2%
Limestone	0%	3+	Soft	Y	Third						1				1	0.2%
Limestone	>50%	1-2	Hard	N	First							1			1	0.2%
Limestone	100%	0	Soft	N	First					1					1	0.2%
S. Limestone	0%	3+	Soft	Y	Third					1					1	0.2%
S. Limestone	0%	3+	Soft	N	Third						1				1	0.2%
S. Limestone	0%	3+	Hard	Y	Third							1			1	0.2%
S. Limestone	0%	3+	Hard	N	Third							1			1	0.2%
					Total	7	135	28	16	70	9	147	54	4	470	100%

Table 42. Op. 52 – *Chich* Cobble Mounds: Flake Count and Percentage by Material

Material	Total	Percentage
Chert	388	82.6%
Chalcedony	75	16.0%
Limestone	3	0.6%
Siliceous Limestone	4	0.8%

Table 43. Op. 52 – *Chich* Cobble Mounds: Flake Count and Percentage by Attributes

Cortex	Scars	Hammer	Prep.	Stage	52A1	52A2	52A3	52B1	52B2	52B3	52C1	52C2	52C3	Total	Percentage
0%	1-2	Soft	Y	Third			1		1					2	0.4%
0%	1-2	Hard	Y	Second					2					2	0.4%
0%	1-2	Hard	N	Second		1			1		6	1		9	1.9%
0%	3+	Soft	Y	Third	2	77	14	6	23	3		3		128	27.2%
0%	3+	Soft	N	Third		6	3	1	1	1				12	2.6%
0%	3+	Hard	Y	Third	2	9	2	2	8		1			24	5.1%
0%	3+	Hard	N	Third		2	1		3	1	45	12	1	65	13.8%
<50%	1-2	Soft	Y	Second		2								2	0.4%
<50%	1-2	Hard	N	Second				1			20	4		25	5.3%
<50%	1-2	Soft	Y	Third	1	7	2		3	1				14	3.0%
<50%	3+	Hard	N	Third				1						1	0.2%
<50%	3+	Soft	N	Second		11			1			1		13	2.8%
<50%	3+	Hard	Y	Second		5	1	1	4			2		13	2.8%
<50%	3+	Hard	N	Second	2	6		1	6	1	44	20		80	17.0%
>50%	1-2	Soft	Y	First		1	1		1					3	0.6%
>50%	1-2	Soft	N	First		2		1	1	1				5	1.0%
>50%	1-2	Hard	Y	First		1								1	0.2%
>50%	1-2	Hard	N	First		2			4	1	23	7	3	40	8.5%
>50%	3+	Soft	Y	Second		2								2	0.4%
>50%	3+	Soft	N	Second					1					1	0.2%
>50%	3+	Hard	Y	Second					1					1	0.2%
>50%	3+	Hard	N	Second				1	6		8	4		19	4.0%
100%	0	Soft	Y	First			1							1	0.2%
100%	0	Soft	N	First					1					1	0.2%
100%	0	Hard	N	First		1	1	1	2					5	1.1%
				Total	7	135	28	16	70	9	147	54	4	470	100%

Table 44. Op. 52 – *Chich* Cobble Mounds: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	7	1.5%
Second	168	35.7%
Third	245	52.1%

Table 45. Op. 52A: Flake Count and Percentage by Attributes

Cortex	Scars	Hammer	Prep.	Stage	52A1	52A2	52A3	Total	Percentage
0%	1-2	Soft	Y	Third			1	1	0.6%
0%	1-2	Hard	N	Second		1		1	0.6%
0%	3+	Soft	Y	Third	2	77	14	93	54.7%
0%	3+	Soft	N	Third		6	3	9	5.3%
0%	3+	Hard	Y	Third	2	9	2	13	7.6%
0%	3+	Hard	N	Third		2	1	3	1.8%
<50%	1-2	Soft	Y	Second		2		2	1.2%
<50%	1-2	Soft	Y	Third	1	7	2	10	5.9%
<50%	3+	Hard	N	Third				1	0.6%
<50%	3+	Soft	N	Second		11		11	6.5%
<50%	3+	Hard	Y	Second		5	1	6	3.5%
<50%	3+	Hard	N	Second	2	6		8	4.7%
>50%	1-2	Soft	Y	First		1	1	2	1.2%
>50%	1-2	Soft	N	First		2		2	1.2%
>50%	1-2	Hard	Y	First		1		1	0.6%
>50%	1-2	Hard	N	First		2		2	1.2%
>50%	3+	Soft	Y	Second		2		2	1.2%
100%	0	Soft	Y	First			1	1	0.6%
100%	0	Hard	N	First		1	1	2	1.2%
				Total	7	135	28	170	100%

Table 46. Op. 52A: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	10	5.9%
Second	31	18.2%
Third	129	75.9%

Table 47. Op. 52B: Flake Count and Percentage by Attributes

Cortex	Scars	Hammer	Prep.	Stage	52B1	52B2	52B3	Total	Percentage
0%	1-2	Soft	Y	Third		1		1	1.1%
0%	1-2	Hard	Y	Second		2		2	2.1%
0%	1-2	Hard	N	Second		1		1	1.1%
0%	3+	Soft	Y	Third	6	23	3	32	33.7%
0%	3+	Soft	N	Third	1	1	1	3	3.2%
0%	3+	Hard	Y	Third	2	8		10	10.5%
0%	3+	Hard	N	Third		3	1	4	4.2%
<50%	1-2	Hard	N	Second	1			1	1.1%
<50%	3+	Soft	Y	Third		3	1	4	4.2%
<50%	3+	Soft	N	Second		1		1	1.1%
<50%	3+	Hard	Y	Second	1	4		5	5.3%
<50%	3+	Hard	N	Second	1	6	1	8	8.4%
>50%	1-2	Soft	Y	First		1		1	1.1%
>50%	1-2	Soft	N	First	1	1	1	3	3.2%
>50%	1-2	Hard	N	First		4	1	5	5.3%
>50%	3+	Soft	N	Second		1		1	1.1%
>50%	3+	Hard	Y	Second		1		1	1.1%
>50%	3+	Hard	N	Second	1	6		7	7.4%
100%	0	Soft	N	First		1		1	1.1%
100%	0	Hard	N	First	1	2		3	3.2%
				Total	16	70	9	95	100%

Table 48. Op. 52B: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	13	13.7%
Second	27	28.4%
Third	54	56.8%

Table 49. Op. 52C: Flake Count and Percentage by Attributes

Cortex	Scars	Hammer	Prep.	Stage	52C1	52C2	52C3	Total	Percentage
0%	1-2	Hard	N	Second	6	1		7	3.4%
0%	3+	Soft	Y	Third		3		3	1.5%
0%	3+	Hard	Y	Third	1			1	0.5%
0%	3+	Hard	N	Third	45	12	1	58	28.3%
<50%	1-2	Hard	N	Second	20	4		24	11.7%
<50%	3+	Soft	N	Second		1		1	0.5%
<50%	3+	Hard	Y	Second		2		2	1.0%
<50%	3+	Hard	N	Second	44	20		64	31.2%
>50%	1-2	Hard	N	First	23	7	3	33	16.1%
>50%	3+	Hard	N	Second	8	4		12	5.9%
				Total	147	54	4	205	100%

Table 50. Op. 52C: Flake Count and Percentage by Reduction Stage

Stage	Total	Percentage
First	33	16.1%
Second	110	53.7%
Third	62	30.2%

Table 51. Op. 52 – *Chich* Cobble Mounds: Flake Fragment Count and Percentage by Material and Attributes

Material Type	Cortex	Scars	52A1	52A2	52A3	52B1	52B2	52B3	52C1	52C2	52C3	Total	Percentage
Chert	100%	0		1	2	1	1	1				6	0.7%
Chert	0%	1-2		3			8	1	33	10		55	6.8%
Chert	1-25%	1-2					1		15	9		25	3.1%
Chert	26-50%	1-2		2	1	1	3		41	18		66	8.2%
Chert	51-75%	1-2	1	1	1	1	8	1	36	17		66	8.2%
Chert	76-99%	1-2	1	5	1	4	18	1	41	13		84	10.4%
Chert	0%	3+		25	8	4	18	4	71	41	4	175	21.8%
Chert	1-25%	3+		7		3	18	2	39	14	1	84	10.4%
Chert	26-50%	3+		5	1	3	8	2	49	7		75	9.3%
Chert	51-75%	3+	2	1		1	8	1	10	2		25	3.1%
Chert	76-99%	3+		3	1	3	2		3			12	1.5%
Chalcedony	100%	0		1								1	0.1%
Chalcedony	0%	1-2		6								6	0.7%
Chalcedony	1-25%	1-2		1			1		1			3	0.4%
Chalcedony	26-50%	1-2		1			1		3	1		6	0.7%
Chalcedony	51-75%	1-2								1		1	0.1%
Chalcedony	76-99%	1-2					1		3			4	0.5%
Chalcedony	0%	3+		19	1	3	4		5	1		33	4.1%
Chalcedony	1-25%	3+		5			2		4			11	1.4%
Chalcedony	26-50%	3+		1			2		2			5	0.6%
Chalcedony	51-75%	3+					1					1	0.1%
Limestone	100%	0		1								1	0.1%
Limestone	0%	1-2				1			10	3		14	1.7%
Limestone	26-50%	1-2							2			2	0.2%
Limestone	51-75%	1-2							2			2	0.2%
Limestone	76-99%	1-2							6	1		7	0.9%
Limestone	0%	3+				1			13	3		17	2.1%
Limestone	51-75%	3+							1			1	0.1%
S. Limestone	0%	1-2		1			5					6	0.7%
S. Limestone	26-50%	1-2							1	1		2	0.2%
S. Limestone	76-99%	1-2					2					2	0.2%
S. Limestone	0%	3+					1	2	2			5	0.6%
S. Limestone	1-25%	3+					1					1	0.1%
		Total	4	89	16	26	114	15	393	142	5	804	100%

Table 52. Op. 52 – *Chich* Cobble Mounds: Flake Fragment Count and Percentage by Material

Material	Total	Percentage
Chert	673	83.7%
Chalcedony	71	8.8%
Limestone	44	5.5%
Siliceous Limestone	16	2.0%

Table 53. Op. 52 – *Chich* Cobble Mounds: Flake Fragment Count and Percentage by Attributes

Cortex	Scars	52A1	52A2	52A3	52B1	52B2	52B3	52C1	52C2	52C3	Total	Percentage
100%	0		4	2	1	1	1				9	1.1%
0%	1-2		9		1	13	1	43	13		80	10.0%
1-25%	1-2		1			2		16	9		28	3.5%
26-50%	1-2		3	1	1	4		47	20		76	9.5%
51-75%	1-2	1	1	1	1	8	1	38	18		69	8.6%
76-99%	1-2	1	5	1	4	21	1	50	14		97	12.1%
0%	3+		44	9	8	23	6	91	45	4	230	28.6%
1-25%	3+		12		3	21	2	43	14	1	96	11.9%
26-50%	3+		6	1	3	10	2	51	7		80	10.0%
51-75%	3+	2	1		1	9	1	11	2		27	3.4%
76-99%	3+		3	1	3	2		3			12	1.5%
	Total	4	89	16	26	114	15	393	142	5	804	100%

Table 54. Op. 52A: Flake Fragment Count and Percentage by Attributes

Cortex	Scars	52A1	52A2	52A3	Total	Percentage
100%	0		4	2	6	5.5%
0%	1-2		9		9	8.3%
1-25%	1-2		1		1	0.9%
26-50%	1-2		3	1	4	3.7%
51-75%	1-2	1	1	1	3	2.8%
76-99%	1-2	1	5	1	7	6.4%
0%	3+		44	9	53	48.6%
1-25%	3+		12		12	11.0%
26-50%	3+		6	1	7	6.4%
51-75%	3+	2	1		3	2.8%
76-99%	3+		3	1	4	3.7%
	Total	4	89	16	109	100%

Table 55. Op. 52B: Flake Fragment Count and Percentage by Attributes

Cortex	Scars	52B1	52B2	52B3	Total	Percentage
100%	0	1	1	1	3	1.9%
0%	1-2	1	13	1	15	9.7%
1-25%	1-2		2		2	1.3%
26-50%	1-2	1	4		5	3.2%
51-75%	1-2	1	8	1	10	6.5%
76-99%	1-2	4	21	1	26	16.8%
0%	3+	8	23	6	37	23.9%
1-25%	3+	3	21	2	26	16.8%
26-50%	3+	3	10	2	15	9.7%
51-75%	3+	1	9	1	11	7.1%
76-99%	3+	3	2		5	3.2%
	Total	26	114	15	155	100%

Table 56. Op. 52C: Flake Fragment Count and Percentage by Attributes

Cortex	Scars	52C1	52C2	52C3	Total	Percentage
0%	1-2	43	13		56	10.4%
1-25%	1-2	16	9		25	4.6%
26-50%	1-2	47	20		67	12.4%
51-75%	1-2	38	18		56	10.4%
76-99%	1-2	50	14		64	11.9%
0%	3+	91	45	4	140	26.0%
1-25%	3+	43	14	1	58	10.7%
26-50%	3+	51	7		58	10.7%
51-75%	3+	11	2		13	2.4%
76-99%	3+	3			3	0.6%
	Total	393	142	5	540	100%

Table 57. Op. 14 – Agricultural Plot System 1: Diagnostic Sherds by Type:Variety

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14Q1	2501	18,106	558			
			23	Chial	Body	LC
			96	Meditation Black	Body	LC-TC
			61	Mt. Maloney Black	Body	LC-TC
			29	Belize Red	Body	LC-TC
			148	Macaw Bank	Body	LC2
			2	Macaw Bank Punctated	Body	LC2
			1	San Lorenzo Black	Body	LC2
			9	Dolphin Head Red	Body	LC2
			24	Vaca Falls Red	Body	TC
			43	Chunhuitz	Body	TC
			2	Belize Red Jar	Rim	LC-TC
			16	Mt. Maloney Black Bowl	Rim	LC1
			2	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Bowl	Rim	TC
			4	Mt. Maloney Black Jar	Rim	LC-TC
			2	Macaw Bank	Rim	LC2
			2	Macaw Bank Jar	Rim	LC2
			1	Alexander Jar	Rim	TC
			5	Vaca Falls Red	Rim	TC
14Q2	821	6682	218			
			35	Chial	Body	LC
			44	Meditation Black	Body	LC-TC
			44	Mt. Maloney Black	Body	LC-TC
			26	Belize Red	Body	LC-TC
			61	Macaw Bank	Body	LC2
			1	Macaw Bank Punctated	Body	LC2
			1	San Lorenzo Black	Body	LC2
			1	Dolphin Head Red	Body	LC2
			3	Chunhuitz	Body	TC
			2	Chial	Rim	LC
			10	Mt. Maloney Black Bowl	Rim	LC1
			3	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Jar	Rim	LC-TC
			2	Macaw Bank	Rim	LC2
			2	Dolphin Head Red	Rim	LC2
			1	Dolphin Head Red Bowl	Rim	LC2
			1	Alexander Jar	Rim	TC
			1	Vaca Falls Red	Rim	TC
14Q3	254	1410	40			
			13	Chial	Body	LC
			6	Meditation Black	Body	LC-TC
			9	Mt. Maloney Black	Body	LC-TC
			7	Macaw Bank	Body	LC2
			3	Chunhuitz	Body	TC
			1	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14Q4	**29**	**124**	**2**			
			1	**Mt. Maloney Black**	**Body**	**LC-TC**
			1	**Macaw Bank**	**Body**	**LC2**
14Q5	**84**	**411**	**30**			
			21	**Chial**	**Body**	**LC**
			5	**Mt. Maloney Black**	**Body**	**LC-TC**
			1	**Belize Red**	**Body**	**LC-TC**
			2	**Macaw Bank**	**Body**	**LC2**
			1	**Chunhuitz**	**Body**	**TC**
14Q6	**3**	**10**	**0**			
14R1	**657**	**3847**	**135**			
			20	**Meditation Black**	**Body**	**LC-TC**
			26	**Mt. Maloney Black**	**Body**	**LC-TC**
			3	**Belize Red**	**Body**	**LC-TC**
			46	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Punctated**	**Body**	**LC2**
			8	**Dolphin Head Red**	**Body**	**LC2**
			14	**Vaca Falls Red**	**Body**	**TC**
			7	**Chunhuitz**	**Body**	**TC**
			1	**Belize Red**	**Rim**	**LC-TC**
			4	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			2	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			2	**Macaw Bank**	**Rim**	**LC2**
			1	**Alexander Jar**	**Rim**	**TC**
14R2	**709**	**3545**	**104**			
			12	**Chial**	**Body**	**LC**
			4	**Meditation Black**	**Body**	**LC-TC**
			17	**Mt. Maloney Black**	**Body**	**LC-TC**
			8	**Belize Red**	**Body**	**LC-TC**
			36	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Punctated**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			18	**Chunhuitz**	**Body**	**TC**
			1	**Chial Bowl**	**Rim**	**LC**
			3	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			1	**Macaw Bank**	**Rim**	**LC2**
			1	**Macaw Bank Jar**	**Rim**	**LC2**
			1	**Chunhuitz**	**Rim**	**TC**

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14T1	325	1817	78			
			4	Chial	Body	LC
			18	Meditation Black	Body	LC-TC
			17	Mt. Maloney Black	Body	LC-TC
			7	Belize Red	Body	LC-TC
			22	Macaw Bank	Body	LC2
			1	Macaw Bank Punctated	Body	LC2
			5	Chunhuitz	Body	TC
			1	Chial	Rim	LC
			1	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	TC
			1	Macaw Bank	Rim	LC2
14T2	226	1402	76			
			21	Chial	Body	LC
			16	Meditation Black	Body	LC-TC
			16	Mt. Maloney Black	Body	LC-TC
			3	Belize Red	Body	LC-TC
			5	Macaw Bank	Body	LC2
			4	Dolphin Head Red	Body	LC2
			9	Vaca Falls Red	Body	TC
			4	Chunhuitz	Body	TC
			1	Chial	Rim	LC
			1	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Jar	Rim	LC-TC
			1	Belize Red	Rim	LC-TC
			1	Dolphin Head Red	Rim	LC2
14U1	648	5324	177			
			57	Meditation Black	Body	LC-TC
			59	Mt. Maloney Black	Body	LC-TC
			16	Belize Red	Body	LC-TC
			24	Macaw Bank	Body	LC2
			1	Macaw Bank Appliqued	Body	LC2
			3	Dolphin Head Red	Body	LC2
			3	Chunhuitz	Body	TC
			3	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			7	Mt. Maloney Black Bowl	Rim	TC
			1	Belize Red	Rim	LC-TC
			2	Alexander Jar	Rim	TC

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14U2	314	2059	102			
			26	Chial	Body	LC
			23	Meditation Black	Body	LC-TC
			18	Mt. Maloney Black	Body	LC-TC
			3	Belize Red	Body	LC-TC
			18	Macaw Bank	Body	LC2
			1	San Lorenzo Black	Body	LC2
			2	Dolphin Head Red	Body	LC2
			5	Chunhuitz	Body	TC
			4	Mt. Maloney Black Bowl	Rim	LC1
			1	Macaw Bank	Rim	LC2
			1	Chunhuitz Bowl	Rim	TC
14W1	653	5037	175			
			18	Chial	Body	LC
			36	Meditation Black	Body	LC-TC
			37	Mt. Maloney Black	Body	LC-TC
			7	Belize Red	Body	LC-TC
			34	Macaw Bank	Body	LC2
			1	Macaw Bank Appliqued	Body	LC2
			4	San Lorenzo Black	Body	LC2
			5	Dolphin Head Red	Body	LC2
			2	Vaca Falls Red	Body	TC
			10	Chunhuitz	Body	TC
			6	Mt. Maloney Black Bowl	Rim	LC1
			3	Mt. Maloney Black Bowl	Rim	LC2
			3	Mt. Maloney Black Bowl	Rim	TC
			3	Mt. Maloney Black Jar	Rim	LC-TC
			3	Belize Red	Rim	LC-TC
			1	Macaw Bank Jar	Rim	LC2
			1	Dolphin Head Red	Rim	LC2
			1	Vaca Falls Red	Rim	TC
14W2	136	898	48			
			7	Chial	Body	LC
			10	Meditation Black	Body	LC-TC
			8	Mt. Maloney Black	Body	LC-TC
			6	Belize Red	Body	LC-TC
			3	Macaw Bank	Body	LC2
			1	Vaca Falls Red	Body	TC
			4	Chunhuitz	Body	TC
			1	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			4	Mt. Maloney Black Bowl	Rim	TC
			1	Dolphin Head Red	Rim	LC2
			2	Alexander Jar	Rim	TC

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14X1	991	9423	132			
			6	Meditation Black	Body	LC-TC
			115	Mt. Maloney Black	Body	LC-TC
			23	Belize Red	Body	LC-TC
			12	San Lorenzo Black	Body	LC2
			7	Vaca Falls Red	Body	TC
			32	Chunhuitz	Body	TC
			1	Chial Jar	Rim	LC
			5	Mt. Maloney Black Bowl	Rim	LC1
			7	Mt. Maloney Black Bowl	Rim	LC2
			11	Mt. Maloney Black Bowl	Rim	TC
			2	Mt. Maloney Black Jar	Rim	LC-TC
			3	Belize Red	Rim	LC-TC
			3	Dolphin Head Red	Rim	LC2
			2	Dolphin Head Red Jar	Rim	LC2
			1	Vaca Falls Red Bowl	Rim	TC
			1	Vaca Falls Red Jar	Rim	TC
14Y1	925	7278	179			
			109	Mt. Maloney Black	Body	LC-TC
			9	Belize Red	Body	LC-TC
			8	Macaw Bank	Body	LC2
			18	San Lorenzo Black	Body	LC2
			1	Alexander	Body	TC
			7	Vaca Falls Red	Body	TC
			13	Chunhuitz	Body	TC
			13	Mt. Maloney Black Bowl	Rim	LC1
			3	Mt. Maloney Black Bowl	Rim	LC2
			10	Mt. Maloney Black Bowl	Rim	TC
			1	Macaw Bank	Rim	LC2
			1	Dolphin Head Red Bowl	Rim	LC2
			1	Dolphin Head Red Jar	Rim	LC2
			6	Alexander Jar	Rim	TC
			2	Alexander Pie Crust Jar	Rim	TC
			1	Vaca Falls Red Bowl	Rim	TC
14Z1	721	6572	166			
			87	Mt. Maloney Black	Body	LC-TC
			7	Belize Red	Body	LC-TC
			3	Macaw Bank	Body	LC2
			32	San Lorenzo Black	Body	LC2
			7	Alexander	Body	TC
			1	Vaca Falls Red	Body	TC
			7	Chunhuitz	Body	TC
			5	Mt. Maloney Black Bowl	Rim	LC1
			5	Mt. Maloney Black Bowl	Rim	LC2
			3	Mt. Maloney Black Bowl	Rim	TC
			4	Mt. Maloney Black Jar	Rim	LC-TC
			2	Belize Red	Rim	LC-TC
			1	Macaw Bank Jar	Rim	LC2

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AA1	687	6646	243			
			105	Mt. Maloney Black	Body	LC-TC
			37	Belize Red	Body	LC-TC
			7	Macaw Bank	Body	LC2
			107	San Lorenzo Black	Body	LC2
			4	Dolphin Head Red	Body	LC2
			5	Vaca Falls Red	Body	TC
			3	Mt. Maloney Black Bowl	Rim	LC1
			5	Mt. Maloney Black Bowl	Rim	LC2
			4	Mt. Maloney Black Bowl	Rim	TC
			2	Belize Red	Rim	LC-TC
			1	Belize Red Incised	Rim	LC-TC
			2	Dolphin Head Red Jar	Rim	LC2
			1	Alexander Jar	Rim	TC
14AB1	751	7433	222			
			137	Mt. Maloney Black	Body	LC-TC
			11	Belize Red	Body	LC-TC
			8	Macaw Bank	Body	LC2
			58	San Lorenzo Black	Body	LC2
			19	Vaca Falls Red	Body	TC
			11	Chunhuitz	Body	TC
			3	Mt. Maloney Black Bowl	Rim	LC1
			5	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Bowl	Rim	TC
			6	Mt. Maloney Black Jar	Rim	LC-TC
			1	San Lorenzo Black Appliqued	Rim	LC2
			3	Dolphin Head Red Bowl	Rim	LC2
14AC1	903	8124	315			
			174	Mt. Maloney Black	Body	LC-TC
			30	Belize Red	Body	LC-TC
			1	Belize Red Incised	Body	LC-TC
			14	Macaw Bank	Body	LC2
			75	San Lorenzo Black	Body	LC2
			2	Vaca Falls Red	Body	TC
			4	Mt. Maloney Black Bowl	Rim	LC1
			4	Mt. Maloney Black Bowl	Rim	LC2
			7	Mt. Maloney Black Bowl	Rim	TC
			2	Belize Red	Rim	LC-TC
			1	Macaw Bank Jar	Rim	LC2
			1	Dolphin Head Red	Rim	LC2
14AC2	82	579	22			
			9	Mt. Maloney Black	Body	LC-TC
			1	Belize Red	Body	LC-TC
			9	San Lorenzo Black	Body	LC2
			1	Dolphin Head Red	Body	LC2
			1	Mt. Maloney Black Bowl	Rim	TC
			1	Mt. Maloney Black Jar	Rim	LC-TC

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AD1	292	2878	75			
			54	Mt. Maloney Black	Body	LC-TC
			1	Belize Red	Body	LC-TC
			3	Macaw Bank	Body	LC2
			11	San Lorenzo Black	Body	LC2
			5	Vaca Falls Red	Body	TC
			4	Mt. Maloney Black Bowl	Rim	LC1
			2	Mt. Maloney Black Bowl	Rim	LC2
			2	Mt. Maloney Black Bowl	Rim	TC
			1	Macaw Bank Jar	Rim	LC2
			2	Alexander Jar	Rim	TC
14AE1	273	1591	142			
			109	Mt. Maloney Black	Body	LC-TC
			4	Belize Red	Body	LC-TC
			2	Macaw Bank	Body	LC2
			22	San Lorenzo Black	Body	LC2
			1	Mt. Maloney Black Bowl	Rim	LC2
			3	Mt. Maloney Black Bowl	Rim	TC
			1	Mt. Maloney Black Jar	Rim	LC-TC
14AF1	502	3283	151			
			54	Mt. Maloney Black	Body	LC-TC
			6	Belize Red	Body	LC-TC
			20	Macaw Bank	Body	LC2
			56	San Lorenzo Black	Body	LC2
			1	Dolphin Head Red	Body	LC2
			3	Vaca Falls Red	Body	TC
			1	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			6	Mt. Maloney Black Bowl	Rim	TC
			1	Macaw Bank Jar	Rim	LC2
			1	Chunhuitz	Rim	TC
14AG1	781	1855	149			
			32	Meditation Black	Body	LC-TC
			22	Mt. Maloney Black	Body	LC-TC
			20	Belize Red	Body	LC-TC
			43	Macaw Bank	Body	LC2
			2	San Lorenzo Black	Body	LC2
			5	Dolphin Head Red	Body	LC2
			2	Alexander	Body	TC
			10	Chunhuitz	Body	TC
			2	Mt. Maloney Black Bowl	Rim	LC1
			4	Mt. Maloney Black Bowl	Rim	LC2
			5	Mt. Maloney Black Bowl	Rim	TC
			1	Mt. Maloney Black Jar	Rim	LC-TC
			1	Alexander Jar	Rim	TC

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AH1	**211**	**1647**	**34**			
			3	**Meditation Black**	**Body**	**LC-TC**
			12	**Mt. Maloney Black**	**Body**	**LC-TC**
			2	**Belize Red**	**Body**	**LC-TC**
			9	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			2	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			4	**Mt. Maloney Black Bowl**	**Rim**	**TC**
14AI1	**356**	**2109**	**67**			
			7	**Meditation Black**	**Body**	**LC-TC**
			6	**Mt. Maloney Black**	**Body**	**LC-TC**
			1	**Belize Red**	**Body**	**LC-TC**
			35	**Macaw Bank**	**Body**	**LC2**
			3	**Dolphin Head Red**	**Body**	**LC2**
			4	**Chunhuitz**	**Body**	**TC**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			2	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			4	**Macaw Bank Jar**	**Rim**	**LC2**
			1	**Vaca Falls Red Jar**	**Rim**	**TC**
14AI2	**184**	**3897**	**64**			
			28	**Chial**	**Body**	**LC**
			6	**Meditation Black**	**Body**	**LC-TC**
			7	**Mt. Maloney Black**	**Body**	**LC-TC**
			6	**Belize Red**	**Body**	**LC-TC**
			10	**Macaw Bank**	**Body**	**LC2**
			6	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
14AJ1	**444**	**3657**	**79**			
			20	**Meditation Black**	**Body**	**LC-TC**
			15	**Mt. Maloney Black**	**Body**	**LC-TC**
			4	**Belize Red**	**Body**	**LC-TC**
			16	**Macaw Bank**	**Body**	**LC2**
			1	**Vaca Falls Red Punctated**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			4	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			9	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			4	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**Macaw Bank Jar**	**Rim**	**LC2**
			1	**Dolphin Head Red Jar**	**Rim**	**LC2**
			1	**Alexander Pie Crust Jar**	**Rim**	**TC**
			2	**Vaca Falls Red**	**Rim**	**TC**

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AK1	357	2565	52			
			12	Meditation Black	Body	LC-TC
			3	Mt. Maloney Black	Body	LC-TC
			3	Belize Red	Body	LC-TC
			17	Macaw Bank	Body	LC2
			2	San Lorenzo Black	Body	LC2
			7	Chunhuitz	Body	TC
			2	Mt. Maloney Black Bowl	Rim	LC1
			3	Mt. Maloney Black Bowl	Rim	LC2
			3	Mt. Maloney Black Bowl	Rim	TC
14AL1	152	680	49			
			5	Meditation Black	Body	LC-TC
			5	Mt. Maloney Black	Body	LC-TC
			3	Belize Red	Body	LC-TC
			34	Macaw Bank	Body	LC2
			2	Chunhuitz	Body	TC
			1	Mt. Maloney Black Bowl	Rim	TC
			1	Mt. Maloney Black Jar	Rim	LC-TC
14AL2	25	206	7			
			1	Meditation Black	Body	LC-TC
			2	Mt. Maloney Black	Body	LC-TC
			2	Macaw Bank	Body	LC2
			1	Vaca Falls Red	Body	TC
			1	Macaw Bank Jar	Rim	LC2
14AL3	4	16	1			
			1	Macaw Bank	Body	LC2
14AL5	2	8	0			
14AM1	231	1286	44			
			8	Meditation Black	Body	LC-TC
			4	Mt. Maloney Black	Body	LC-TC
			3	Belize Red	Body	LC-TC
			18	Macaw Bank	Body	LC2
			2	Dolphin Head Red	Body	LC2
			2	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			3	Mt. Maloney Black Bowl	Rim	TC
			3	Mt. Maloney Black Jar	Rim	LC-TC

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AM2	**482**	**4241**	**81**			
			41	**Meditation Black**	**Body**	**LC-TC**
			9	**Mt. Maloney Black**	**Body**	**LC-TC**
			9	**Belize Red**	**Body**	**LC-TC**
			1	**Belize Red Punctated**	**Body**	**LC-TC**
			16	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			2	**Vaca Falls Red**	**Body**	**TC**
			1	**Chunhuitz**	**Body**	**TC**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC-TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**Macaw Bank**	**Rim**	**LC2**
			1	**Dolphin Head Red Bowl**	**Rim**	**LC2**
			1	**Vaca Falls Red**	**Rim**	**TC**
14AN1	**563**	**3694**	**83**			
			11	**Meditation Black**	**Body**	**LC-TC**
			27	**Mt. Maloney Black**	**Body**	**LC-TC**
			4	**Belize Red**	**Body**	**LC-TC**
			14	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			1	**Alexander**	**Body**	**TC**
			4	**Vaca Falls Red**	**Body**	**TC**
			5	**Chunhuitz**	**Body**	**TC**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			9	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Dolphin Head Red Bowl**	**Rim**	**LC2**
14AO1	**687**	**5956**	**114**			
			29	**Meditation Black**	**Body**	**LC-TC**
			23	**Mt. Maloney Black**	**Body**	**LC-TC**
			14	**Belize Red**	**Body**	**LC-TC**
			12	**Macaw Bank**	**Body**	**LC2**
			4	**San Lorenzo Black**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			8	**Chunhuitz**	**Body**	**TC**
			1	**Belize Red**	**Rim**	**LC-TC**
			1	**Belize Red Jar**	**Rim**	**LC-TC**
			5	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			8	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			7	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			2	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AP1	**486**	**3423**	**45**			
			15	**Meditation Black**	**Body**	**LC-TC**
			4	**Mt. Maloney Black**	**Body**	**LC-TC**
			16	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			7	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			2	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
14AP2	**917**	**8037**	**149**			
			48	**Meditation Black**	**Body**	**LC-TC**
			25	**Mt. Maloney Black**	**Body**	**LC-TC**
			17	**Belize Red**	**Body**	**LC-TC**
			14	**Macaw Bank**	**Body**	**LC2**
			9	**San Lorenzo Black**	**Body**	**LC2**
			4	**Dolphin Head Red**	**Body**	**LC2**
			6	**Vaca Falls Red**	**Body**	**TC**
			14	**Chunhuitz**	**Body**	**TC**
			1	**Belize Red Jar**	**Rim**	**LC-TC**
			3	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			4	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			20	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			10	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
14AQ1	**293**	**1121**	**29**			
			3	**Mt. Maloney Black**	**Body**	**LC-TC**
			20	**Macaw Bank**	**Body**	**LC2**
			3	**Chunhuitz**	**Body**	**TC**
			2	**Macaw Bank Scalloped**	**Rim**	**LC2**
			1	**Macaw Bank Jar**	**Rim**	**LC2**
14AQ2	**298**	**1664**	**38**			
			1	**Meditation Black**	**Body**	**LC-TC**
			5	**Mt. Maloney Black**	**Body**	**LC-TC**
			11	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			17	**Chunhuitz**	**Body**	**TC**
			1	**Belize Red**	**Rim**	**LC-TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AR1	**756**	**5549**	**112**			
			55	**Mt. Maloney Black**	**Body**	**LC-TC**
			6	**Belize Red**	**Body**	**LC-TC**
			18	**Macaw Bank**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			2	**Dolphin Head Red**	**Body**	**LC2**
			6	**Chunhuitz**	**Body**	**TC**
			1	**Belize Red**	**Rim**	**LC-TC**
			1	**Belize Red Bowl**	**Rim**	**LC-TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			5	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			10	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			5	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**San Lorenzo Black Bowl**	**Rim**	**LC2**
14AS1	**127**	**639**	**16**			
			6	**Mt. Maloney Black**	**Body**	**LC-TC**
			5	**Macaw Bank**	**Body**	**LC2**
			2	**Chunhuitz**	**Body**	**TC**
			3	**Mt. Maloney Black Bowl**	**Rim**	**TC**
14AS2	**81**	**795**	**18**			
			3	**Meditation Black**	**Body**	**LC-TC**
			2	**Belize Red**	**Body**	**LC-TC**
			4	**Macaw Bank**	**Body**	**LC2**
			2	**Dolphin Head Red**	**Body**	**LC2**
			4	**Chunhuitz**	**Body**	**TC**
			2	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Dolphin Head Red Bowl**	**Rim**	**LC2**
14AT1	**210**	**1485**	**29**			
			11	**Mt. Maloney Black**	**Body**	**LC-TC**
			2	**Belize Red**	**Body**	**LC-TC**
			10	**Macaw Bank**	**Body**	**LC2**
			1	**Chunhuitz**	**Body**	**TC**
			4	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Alexander Pie Crust Jar**	**Rim**	**TC**
14AU1	**31**	**163**	**2**			
			2	**Meditation Black**	**Body**	**LC-TC**
14AU2	**8**	**36**	**0**			
14AV1	**426**	**3204**	**64**			
			5	**Meditation Black**	**Body**	**LC-TC**
			14	**Mt. Maloney Black**	**Body**	**LC-TC**
			10	**Belize Red**	**Body**	**LC-TC**
			10	**Macaw Bank**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			2	**Vaca Falls Red**	**Body**	**TC**
			4	**Chunhuitz**	**Body**	**TC**
			3	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			12	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			4	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14AW1	**223**	**1654**	**25**			
			7	**Mt. Maloney Black**	**Body**	**LC-TC**
			1	**Belize Red**	**Body**	**LC-TC**
			12	**Macaw Bank**	**Body**	**LC2**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			3	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**Belize Red Bowl**	**Rim**	**LC-TC**
14AX1	**508**	**3698**	**72**			
			18	**Meditation Black**	**Body**	**LC-TC**
			7	**Mt. Maloney Black**	**Body**	**LC-TC**
			8	**Belize Red**	**Body**	**LC-TC**
			15	**Macaw Bank**	**Body**	**LC2**
			4	**San Lorenzo Black**	**Body**	**LC2**
			13	**Chunhuitz**	**Body**	**TC**
			1	**Meditation Black Bowl**	**Rim**	**LC-TC**
			5	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			5	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			7	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			4	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
14AY1	**384**	**3119**	**71**			
			16	**Meditation Black**	**Body**	**LC-TC**
			5	**Mt. Maloney Black**	**Body**	**LC-TC**
			12	**Belize Red**	**Body**	**LC-TC**
			15	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Punctated**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			4	**Dolphin Head Red**	**Body**	**LC2**
			12	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			2	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**Belize Red**	**Rim**	**LC-TC**
			1	**San Lorenzo Black Jar**	**Rim**	**LC2**
			1	**Chunhuitz Bowl**	**Rim**	**TC**
14AZ1	**129**	**852**	**14**			
			9	**Mt. Maloney Black**	**Body**	**LC-TC**
			1	**Macaw Bank**	**Body**	**LC2**
			1	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			1	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**

Table 57., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
14BA1	**322**	**2107**	**47**			
			12	**Meditation Black**	**Body**	**LC-TC**
			18	**Mt. Maloney Black**	**Body**	**LC-TC**
			6	**Belize Red**	**Body**	**LC-TC**
			20	**Macaw Bank**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			4	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
Total	**23,165**	**173,842**	**4,945**			

Table 58. Op. 14 – Agricultural Plot System 1: Diagnostic Ceramic Sherds by Time Period

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14Q1	2501	558			
			LC-TC	218	39.1%
			LC	51	9.1%
			LC1	21	3.8%
			LC2	181	32.4%
			TC	87	15.6%
14Q2	821	218			
			LC-TC	115	52.8%
			LC	17	7.9%
			LC1	10	4.6%
			LC2	70	32.1%
			TC	6	2.8%
14Q3	254	40			
			LC-TC	15	37.5%
			LC	13	32.5%
			LC1	1	2.5%
			LC2	8	20.0%
			TC	3	7.5%
14Q4	29	2			
			LC-TC	1	50.0%
			LC	0	
			LC1	0	
			LC2	1	50.0%
			TC	0	
14Q5	84	30			
			LC-TC	6	20.0%
			LC	21	70.0%
			LC1	0	0.0%
			LC2	2	6.7%
			TC	1	3.3%
14Q6	3	0			
14R1	657	135			
			LC-TC	50	37.0%
			LC	0	0.0%
			LC1	4	3.0%
			LC2	57	42.2%
			TC	24	17.8%
14R2	709	104			
			LC-TC	29	27.9%
			LC	13	12.5%
			LC1	3	2.9%
			LC2	40	38.5%
			TC	19	18.3%
14T1	325	78			
			LC-TC	42	53.8%
			LC	5	6.4%
			LC1	1	1.3%
			LC2	24	30.8%
			TC	6	7.7%

Table 58., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14T2	**226**	**76**			
			LC-TC	**29**	**38.2%**
			LC	**22**	**28.9%**
			LC1	**2**	**2.6%**
			LC2	**10**	**13.2%**
			TC	**13**	**17.1%**
14U1	**648**	**177**			
			LC-TC	**133**	**75.1%**
			LC	**0**	**0.0%**
			LC1	**3**	**1.7%**
			LC2	**29**	**16.4%**
			TC	**12**	**6.8%**
14U2	**314**	**102**			
			LC-TC	**44**	**43.1%**
			LC	**26**	**25.5%**
			LC1	**4**	**3.9%**
			LC2	**22**	**21.6%**
			TC	**6**	**5.9%**
14W1	**653**	**175**			
			LC-TC	**86**	**49.1%**
			LC	**18**	**10.3%**
			LC1	**6**	**3.4%**
			LC2	**49**	**28.0%**
			TC	**16**	**9.1%**
14W2	**136**	**48**			
			LC-TC	**24**	**50.0%**
			LC	**7**	**14.6%**
			LC1	**1**	**2.1%**
			LC2	**5**	**10.4%**
			TC	**11**	**22.9%**
14X1	**991**	**132**			
			LC-TC	**114**	**86.3%**
			LC	**1**	**0.8%**
			LC1	**5**	**3.8%**
			LC2	**12**	**9.1%**
			TC	**0**	**0.0%**
14Y1	**925**	**179**			
			LC-TC	**110**	**61.5%**
			LC	**0**	**0.0%**
			LC1	**9**	**5.0%**
			LC2	**25**	**14.0%**
			TC	**35**	**19.6%**
14Z1	**721**	**166**			
			LC-TC	**107**	**64.5%**
			LC	**0**	**0.0%**
			LC1	**5**	**3.0%**
			LC2	**43**	**25.9%**
			TC	**11**	**6.6%**

Table 58., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14AA1	687	243			
			LC-TC	115	47.3%
			LC	0	0.0%
			LC1	3	1.2%
			LC2	115	47.3%
			TC	10	4.1%
14AB1	751	222			
			LC-TC	102	45.9%
			LC	0	0.0%
			LC1	4	1.8%
			LC2	85	38.3%
			TC	31	14.0%
14AC1	903	315			
			LC-TC	207	65.7%
			LC	0	0.0%
			LC1	4	1.3%
			LC2	95	30.2%
			TC	9	2.9%
14AC2	82	22			
			LC-TC	11	50.0%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	10	45.5%
			TC	1	4.5%
14AD1	292	75			
			LC-TC	57	76.0%
			LC	0	0.0%
			LC1	4	5.3%
			LC2	7	9.3%
			TC	7	9.3%
14AE1	273	142			
			LC-TC	114	80.3%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	25	17.6%
			TC	3	2.1%
14AF1	502	151			
			LC-TC	60	39.7%
			LC	0	0.0%
			LC1	2	1.3%
			LC2	79	52.3%
			TC	10	6.6%
14AG1	781	149			
			LC-TC	77	51.7%
			LC	0	0.0%
			LC1	2	1.3%
			LC2	54	36.2%
			TC	16	10.7%

Table 58., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14AH1	211	34			
			LC-TC	17	50.0%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	11	32.4%
			TC	6	17.6%
14AI1	356	67			
			LC-TC	15	22.4%
			LC	0	0.0%
			LC1	2	3.0%
			LC2	43	64.2%
			TC	7	10.4%
14AI2	184	64			
			LC-TC	19	29.7%
			LC	28	43.8%
			LC1	0	0.0%
			LC2	11	17.2%
			TC	6	9.4%
14AJ1	444	79			
			LC-TC	43	54.4%
			LC	0	0.0%
			LC1	1	1.3%
			LC2	22	27.8%
			TC	13	16.5%
14AK1	357	52			
			LC-TC	18	34.6%
			LC	0	0.0%
			LC1	2	3.8%
			LC2	22	42.3%
			TC	10	19.2%
14AL1	152	49			
			LC-TC	12	24.5%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	34	69.4%
			TC	3	6.1%
14AL2	25	7			
			LC-TC	3	42.9%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	3	42.9%
			TC	1	14.3%
14AL3	4	1			
			LC-TC	0	0.0%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	1	100.0%
			TC	0	0.0%
14AL5	2	0			

Table 58., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14AM1	231	44			
			LC-TC	18	40.9%
			LC	0	0.0%
			LC1	2	4.5%
			LC2	21	47.7%
			TC	3	6.8%
14AM2	482	81			
			LC-TC	64	79.0%
			LC	0	0.0%
			LC1	2	2.5%
			LC2	11	13.6%
			TC	4	4.9%
14AN1	563	83			
			LC-TC	42	50.6%
			LC	0	0.0%
			LC1	2	2.4%
			LC2	20	24.1%
			TC	19	22.9%
14AO1	687	114			
			LC-TC	72	63.2%
			LC	0	0.0%
			LC1	2	1.8%
			LC2	25	21.9%
			TC	15	13.2%
14AP1	486	45			
			LC-TC	21	46.7%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	17	37.8%
			TC	7	15.6%
14AP2	917	149			
			LC-TC	92	61.7%
			LC	0	0.0%
			LC1	3	2.0%
			LC2	32	21.5%
			TC	22	14.8%
14AQ1	293	29			
			LC-TC	3	10.3%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	23	79.3%
			TC	3	10.3%
14AQ2	298	38			
			LC-TC	8	21.1%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	13	34.2%
			TC	17	44.7%

Table 58., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14AR1	756	112			
			LC-TC	68	60.7%
			LC	0	0.0%
			LC1	1	0.9%
			LC2	27	24.1%
			TC	16	14.3%
14AS1	127	16			
			LC-TC	6	37.5%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	5	31.3%
			TC	5	31.3%
14AS2	81	18			
			LC-TC	5	27.8%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	7	38.9%
			TC	6	33.3%
14AT1	210	29			
			LC-TC	13	44.8%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	10	55.2%
			TC	6	20.7%
14AU1	31	2			
			LC-TC	2	100.0%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	0	0.0%
			TC	0	0.0%
14AU2	8	0			
14AV1	426	64			
			LC-TC	32	50.0%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	14	21.9%
			TC	18	28.1%
14AW1	223	25			
			LC-TC	12	48.0%
			LC	0	0.0%
			LC1	1	4.0%
			LC2	12	48.0%
			TC	0	0.0%
14AX1	508	72			
			LC-TC	38	52.8%
			LC	0	0.0%
			LC1	5	6.9%
			LC2	9	12.5%
			TC	20	28.8%

Table 58, cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
14AY1	**384**	**71**			
			LC-TC	**35**	**49.3%**
			LC	**0**	**0.0%**
			LC1	**1**	**1.4%**
			LC2	**20**	**28.2%**
			TC	**15**	**21.3%**
14AZ1	**129**	**14**			
			LC-TC	**10**	**71.4%**
			LC	**0**	**0.0%**
			LC1	**1**	**7.1%**
			LC2	**1**	**7.1%**
			TC	**2**	**14.3%**
14BA1	**322**	**47**			
			LC-TC	**33**	**70.2%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**12**	**25.5%**
			TC	**2**	**4.3%**

Table 59. Op. 14 – Agricultural Plot System 1: Diagnostic Ceramic Sherds Number and Percentage by Time Period

Time Period	Number of Diagnostics	% of Diagnostic Total
LC-TC	**2567**	**51.9%**
LC	**222**	**4.5%**
LC1	**119**	**2.4%**
LC2	**1474**	**29.8%**
TC	**563**	**11.4%**

APPENDIX B: CERAMIC ANALYSIS

Table 60. Op. 51 – Agricultural Plot System 2: Diagnostic Ceramic Sherds by Type:Variety

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51A1	899	11451	239			
			20	Meditation Black	Body	LC-TC
			47	Mt. Maloney Black	Body	LC-TC
			25	Belize Red	Body	LC-TC
			53	Macaw Bank	Body	LC2
			7	San Lorenzo Black	Body	LC2
			25	Dolphin Head Red	Body	LC2
			9	Vaca Falls Red	Body	TC
			29	Chunhuitz	Body	TC
			1	Chial Bowl	Rim	LC
			1	Belize Red	Rim	LC-TC
			10	Belize Red Bowl	Rim	LC-TC
			1	Mt. Maloney Black Bowl	Rim	TC
			1	Mt. Maloney Black Jar	Rim	LC-TC
			1	Macaw Bank	Rim	LC2
			1	Macaw Bank Jar	Rim	LC2
			1	Dolphin Head Red	Rim	LC2
			6	Vaca Falls Red	Rim	TC
			1	Vaca Falls Red Bowl	Rim	TC
51B1	23	161	4			
			1	Macaw Bank	Body	LC2
			2	Chunhuitz	Body	TC
			1	Dolphin Head Red	Rim	LC2
51B2	341	3776	75			
			6	Mt. Maloney Black	Body	LC-TC
			20	Belize Red	Body	LC-TC
			23	Macaw Bank	Body	LC2
			3	Vaca Falls Red	Body	TC
			12	Chunhuitz	Body	TC
			1	Mt. Maloney Black Bowl	Rim	LC1
			2	Mt. Maloney Black Bowl	Rim	LC2
			2	Mt. Maloney Black Jar	Rim	LC-TC
			3	Macaw Bank Jar	Rim	LC2
			2	Dolphin Head Red	Rim	LC2
51C1	298	1978	77			
			6	Meditation Black	Body	LC-TC
			3	Mt. Maloney Black	Body	LC-TC
			37	Macaw Bank	Body	LC2
			1	San Lorenzo Black	Body	LC2
			17	Dolphin Head Red	Body	LC2
			4	Chunhuitz	Body	TC
			4	Belize Red	Rim	LC-TC
			2	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Jar	Rim	LC-TC
			1	Dolphin Head Red	Rim	LC2
			1	Chunhuitz	Rim	TC

Table 60., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51C2	**625**	**7645**	**144**			
			32	**Meditation Black**	**Body**	**LC-TC**
			13	**Mt. Maloney Black**	**Body**	**LC-TC**
			24	**Belize Red**	**Body**	**LC-TC**
			36	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Appliqued**	**Body**	**LC2**
			8	**Dolphin Head Red**	**Body**	**LC2**
			8	**Vaca Falls Red**	**Body**	**TC**
			5	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			3	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			4	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			4	**Macaw Bank Jar**	**Rim**	**LC2**
			1	**San Lorenzo Black Jar**	**Rim**	**LC2**
			2	**Dolphin Head Red**	**Rim**	**LC2**
			1	**Dolphin Head Jar**	**Rim**	**LC2**
			2	**Vaca Falls Red Bowl**	**Rim**	**TC**
			1	**Chunhuitz**	**Rim**	**TC**
51D1	**465**	**5108**	**87**			
			3	**Chial**	**Body**	**LC**
			32	**Meditation Black**	**Body**	**LC-TC**
			11	**Mt. Maloney Black**	**Body**	**LC-TC**
			4	**Belize Red**	**Body**	**LC-TC**
			27	**Macaw Bank**	**Body**	**LC2**
			1	**Vaca Falls Red**	**Body**	**TC**
			6	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**Dolphin Head Red**	**Rim**	**LC2**
51E1	**372**	**2869**	**68**			
			7	**Meditation Black**	**Body**	**LC-TC**
			13	**Mt. Maloney Black**	**Body**	**LC-TC**
			12	**Belize Red**	**Body**	**LC-TC**
			22	**Macaw Bank**	**Body**	**LC2**
			10	**Chunhuitz**	**Body**	**TC**
			2	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Macaw Bank Jar**	**Rim**	**LC2**
			1	**Dolphin Head Red**	**Rim**	**LC2**
51E2	**153**	**1625**	**22**			
			2	**Meditation Black**	**Body**	**LC-TC**
			6	**Mt. Maloney Black**	**Body**	**LC-TC**
			14	**Macaw Bank**	**Body**	**LC2**

Table 60., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51F1	585	5606	154			
			18	Meditation Black	Body	LC-TC
			33	Mt. Maloney Black	Body	LC-TC
			10	Belize Red	Body	LC-TC
			52	Macaw Bank	Body	LC2
			8	Dolphin Head Red	Body	LC2
			17	Vaca Falls Red	Body	TC
			3	Chunhuitz	Body	TC
			1	Belize Red	Rim	LC-TC
			3	Mt. Maloney Black Bowl	Rim	LC1
			5	Mt. Maloney Black Bowl	Rim	LC2
			1	Alexander Jar	Rim	TC
			1	Vaca Falls Red Bowl	Rim	TC
			1	Vaca Falls Red Jar	Rim	TC
51F2	168	2381	49			
			3	Meditation Black	Body	LC-TC
			6	Mt. Maloney Black	Body	LC-TC
			2	Belize Red	Body	LC-TC
			13	Macaw Bank	Body	LC2
			1	Macaw Bank Punctated-Appliqued	Body	LC2
			11	San Lorenzo Black	Body	LC2
			1	Meditation Black Jar	Rim	LC-TC
			2	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Bowl	Rim	TC
			1	Macaw Bank Jar	Rim	LC2
			1	Macaw Bank Punctated Jar	Rim	LC2
			1	San Lorenzo Black Jar	Rim	LC2
			1	Vaca Falls Red	Rim	TC
			2	Chunhuitz	Body	TC
51G1	405	2686	64			
			3	Meditation Black	Body	LC-TC
			5	Mt. Maloney Black	Body	LC-TC
			33	Macaw Bank	Body	LC2
			19	Chunhuitz	Body	TC
			1	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			1	San Lorenzo Black Jar	Rim	LC2
			1	Chunhuitz Jar	Rim	TC
51G2	124	824	25			
			5	Meditation Black	Body	LC-TC
			5	Mt. Maloney Black	Body	LC-TC
			3	Belize Red	Body	LC-TC
			11	Macaw Bank	Body	LC2
			1	Macaw Bank Punctated	Body	LC2

Table 60., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51H1	**196**	**1573**	**41**			
			4	**Meditation Black**	**Body**	**LC-TC**
			2	**Mt. Maloney Black**	**Body**	**LC-TC**
			1	**Belize Red**	**Body**	**LC-TC**
			26	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Punctated**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			4	**Chunhuitz**	**Body**	**TC**
			2	**Belize Red**	**Rim**	**LC-TC**
51H2	**46**	**405**	**12**			
			6	**Mt. Maloney Black**	**Body**	**LC-TC**
			6	**Macaw Bank**	**Body**	**LC2**
51I1	**160**	**941**	**48**			
			7	**Meditation Black**	**Body**	**LC-TC**
			4	**Belize Red**	**Body**	**LC-TC**
			31	**Macaw Bank**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			2	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Macaw Bank**	**Rim**	**LC2**
51I2	**212**	**1907**	**51**			
			9	**Meditation Black**	**Body**	**LC-TC**
			4	**Mt. Maloney Black**	**Body**	**LC-TC**
			25	**Macaw Bank**	**Body**	**LC2**
			1	**Belize Red Bowl**	**Rim**	**LC-TC**
			3	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			1	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			1	**Dolphin Head Red**	**Rim**	**LC2**
51J1	**221**	**2540**	**44**			
			10	**Meditation Black**	**Body**	**LC-TC**
			12	**Mt. Maloney Black**	**Body**	**LC-TC**
			7	**Belize Red**	**Body**	**LC-TC**
			13	**Macaw Bank**	**Body**	**LC2**
			1	**Belize Red Bowl**	**Rim**	**LC-TC**
			1	**Vaca Falls Red Jar**	**Rim**	**TC**
51K1	**246**	**1899**	**34**			
			1	**Chial**	**Body**	**LC**
			7	**Meditation Black**	**Body**	**LC-TC**
			1	**Mt. Maloney Black**	**Body**	**LC-TC**
			20	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Incised**	**Body**	**LC2**
			1	**Vaca Falls Red**	**Body**	**TC**
			2	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**

Table 60., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51K2	**104**	**700**	**9**			
			2	**Meditation Black**	**Body**	**LC-TC**
			4	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			1	**Macaw Bank Jar**	**Rim**	**LC2**
			1	**Dolphin Head Red**	**Rim**	**LC2**
51L1	**207**	**1421**	**38**			
			6	**Meditation Black**	**Body**	**LC-TC**
			1	**Belize Red**	**Body**	**LC-TC**
			23	**Macaw Bank**	**Body**	**LC2**
			1	**Macaw Bank Punctated**	**Body**	**LC2**
			5	**Vaca Falls Red**	**Body**	**TC**
			1	**Chunhuitz**	**Body**	**TC**
			1	**Macaw Bank Jar**	**Rim**	**LC2**
51M1	**240**	**1532**	**61**			
			19	**Meditation Black**	**Body**	**LC-TC**
			4	**Belize Red**	**Body**	**LC-TC**
			27	**Macaw Bank**	**Body**	**LC2**
			1	**San Lorenzo Black**	**Body**	**LC2**
			2	**Dolphin Head Red**	**Body**	**LC2**
			2	**Vaca Falls Red**	**Body**	**TC**
			1	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			2	**Mt. Maloney Black Bowl**	**Rim**	**TC**
			2	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
51N1	**197**	**1625**	**32**			
			7	**Meditation Black**	**Body**	**LC-TC**
			20	**Macaw Bank**	**Body**	**LC2**
			3	**Chunhuitz**	**Body**	**TC**
			2	**Macaw Bank**	**Rim**	**LC2**
51N2	**191**	**1364**	**32**			
			6	**Meditation Black**	**Body**	**LC-TC**
			4	**Mt. Maloney Black**	**Body**	**LC-TC**
			16	**Macaw Bank**	**Body**	**LC2**
			4	**Chunhuitz**	**Body**	**TC**
			1	**Mt. Maloney Black Jar**	**Rim**	**LC-TC**
			1	**Vaca Falls Red**	**Rim**	**TC**
51O1	**194**	**1331**	**41**			
				Meditation Black	**Body**	**LC-TC**
			7	**Mt. Maloney Black**	**Body**	**LC-TC**
			2	**Belize Red**	**Body**	**LC-TC**
			23	**Macaw Bank**	**Body**	**LC2**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC1**
			1	**Mt. Maloney Black Bowl**	**Rim**	**LC2**
			1	**Macaw Bank**	**Rim**	**LC2**
			6	**Dolphin Head Red**	**Rim**	**LC2**

Table 60., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51P1	239	2202	31			
			2	Meditation Black	Body	LC-TC
			1	Mt. Maloney Black	Body	LC-TC
			2	Belize Red	Body	LC-TC
			22	Macaw Bank	Body	LC2
			1	Dolphin Head Red	Body	LC2
			1	Belize Red	Rim	LC-TC
			1	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Bowl	Rim	TC
51P2	83	1016	19			
			1	Meditation Black	Body	LC-TC
			2	Mt. Maloney Black	Body	LC-TC
			2	Belize Red	Body	LC-TC
			13	Macaw Bank	Body	LC2
			1	Dolphin Head Red	Body	LC2
51Q1	325	2431	58			
			15	Meditation Black	Body	LC-TC
			4	Mt. Maloney Black	Body	LC-TC
			1	Belize Red	Body	LC-TC
			22	Macaw Bank	Body	LC2
			1	Vaca Falls Red	Body	TC
			4	Chunhuitz	Body	TC
			5	Mt. Maloney Black Bowl	Rim	LC1
			4	Mt. Maloney Black Bowl	Rim	TC
			1	Macaw Bank Jar	Rim	LC2
51R1	547	2548	38			
			2	Meditation Black	Body	LC-TC
			2	Mt. Maloney Black	Body	LC-TC
			26	Macaw Bank	Body	LC2
			1	Macaw Bank Punctated	Body	LC2
			1	Dolphin Head Red	Body	LC2
			2	Vaca Falls Red	Body	TC
			1	Belize Red	Rim	LC-TC
			2	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Jar	Rim	LC-TC
51S1	216	1812	29			
			3	Meditation Black	Body	LC-TC
			1	Mt. Maloney Black	Body	LC-TC
			20	Macaw Bank	Body	LC2
			1	Macaw Bank Punctated	Body	LC2
			3	Chunhuitz	Body	TC
			1	Vaca Falls Red	Rim	TC

Table 60., cont.

Op/Subop/Lot	Total Sherds	Total Weight (g)	Diagnostic Total	Type:Variety	Sherd Type	Time Period
51T1	**406**	**4869**	**51**			
			12	**Meditation Black**	**Body**	**LC-TC**
			11	**Mt. Maloney Black**	**Body**	**LC-TC**
			15	**Macaw Bank**	**Body**	**LC2**
			1	**Dolphin Head Red**	**Body**	**LC2**
			8	**Chunhuitz**	**Body**	**TC**
			1	**Belize Red**	**Rim**	**LC-TC**
			1	**Macaw Bank**	**Rim**	**LC2**
			2	**Macaw Bank Jar**	**Rim**	**LC2**
Total	**8,488**	**78,226**	**1,677**			

Total Sherds: 8,488
Total Weight: 78,226
Total Diagnostic Sherds: 1,677

APPENDIX B: CERAMIC ANALYSIS

Table 61. Op. 51 – Agricultural Plot System 2: Diagnostic Ceramic Sherds by Time Period

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
51A1	**899**	**239**			
			LC-TC	**104**	**43.5%**
			LC	**1**	**0.4%**
			LC1	**0**	**0.0%**
			LC2	**88**	**36.8%**
			TC	**46**	**19.2%**
51B1	**23**	**4**			
			LC-TC	**0**	**0.0%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**2**	**50.0%**
			TC	**2**	**50.0%**
51B2	**341**	**75**			
			LC-TC	**28**	**37.3%**
			LC	**0**	**0.0%**
			LC1	**1**	**1.3%**
			LC2	**31**	**41.3%**
			TC	**15**	**20.0%**
51C1	**298**	**77**			
			LC-TC	**14**	**18.1%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**58**	**75.3%**
			TC	**5**	**6.5%**
51C2	**625**	**144**			
			LC-TC	**73**	**50.7%**
			LC	**0**	**0.0%**
			LC1	**1**	**0.7%**
			LC2	**51**	**35.4%**
			TC	**17**	**11.8%**
51D1	**465**	**87**			
			LC-TC	**48**	**55.2%**
			LC	**3**	**3.4%**
			LC1	**0**	**0.0%**
			LC2	**28**	**32.3%**
			TC	**8**	**9.2%**
51E1	**372**	**68**			
			LC-TC	**32**	**47.1%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**25**	**36.8%**
			TC	**11**	**16.2%**
51E2	**153**	**22**			
			LC-TC	**8**	**36.4%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**14**	**63.6%**
			TC	**0**	**0.0%**

Table 61,, cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
51F1	**585**	**154**			
			LC-TC	**62**	**40.3%**
			LC	**0**	**0.0%**
			LC1	**3**	**1.9%**
			LC2	**66**	**42.9%**
			TC	**23**	**14.9%**
51F2	**168**	**49**			
			LC-TC	**12**	**24.5%**
			LC	**0**	**0.0%**
			LC1	**2**	**4.1%**
			LC2	**31**	**63.3%**
			TC	**4**	**8.2%**
51G1	**405**	**64**			
			LC-TC	**8**	**12.5%**
			LC	**0**	**0.0%**
			LC1	**1**	**1.6%**
			LC2	**35**	**54.7%**
			TC	**20**	**31.3%**
51G2	**124**	**25**			
			LC-TC	**13**	**52.0%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**12**	**48.0%**
			TC	**0**	**0.0%**
51H1	**196**	**41**			
			LC-TC	**9**	**22.0%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**28**	**68.3%**
			TC	**4**	**9.8%**
51H2	**46**	**12**			
			LC-TC	**6**	**50.0%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**6**	**50.0%**
			TC	**0**	**0.0%**
51I1	**160**	**48**			
			LC-TC	**11**	**22.9%**
			LC	**0**	**0.0%**
			LC1	**0**	**0.0%**
			LC2	**35**	**72.9%**
			TC	**2**	**4.2%**
51I2	**212**	**51**			
			LC-TC	**20**	**39.2%**
			LC	**0**	**0.0%**
			LC1	**3**	**5.9%**
			LC2	**27**	**52.9%**
			TC	**1**	**2.0%**

Table 61., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
51J1	221	44			
			LC-TC	30	68.2%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	13	29.5%
			TC	1	2.3%
51K1	246	34			
			LC-TC	9	26.5%
			LC	1	2.9%
			LC1	0	0.0%
			LC2	21	61.8%
			TC	3	8.8%
51K2	104	9			
			LC-TC	2	22.2%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	7	77.8%
			TC	0	0.0%
51L1	207	38			
			LC-TC	7	18.4%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	22	57.9%
			TC	6	15.8%
51M1	240	61			
			LC-TC	25	41.0%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	31	50.8%
			TC	5	8.2%
51N1	197	32			
			LC-TC	7	21.9%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	22	68.8%
			TC	3	9.4%
51N2	191	32			
			LC-TC	11	34.4%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	16	50.0%
			TC	5	15.6%
51O1	194	41			
			LC-TC	9	22.0%
			LC	0	0.0%
			LC1	1	2.4%
			LC2	31	75.6%
			TC	0	0.0%

Table 61., cont.

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
51P1	239	31			
			LC-TC	6	19.4%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	24	77.4%
			TC	1	3.2%
51P2	83	19			
			LC-TC	5	26.3%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	14	73.7%
			TC	0	0.0%
51Q1	325	58			
			LC-TC	19	32.8%
			LC	0	0.0%
			LC1	5	8.6%
			LC2	13	22.4%
			TC	9	15.5%
51R1	547	38			
			LC-TC	6	15.8%
			LC	0	0.0%
			LC1	2	5.3%
			LC2	28	73.7%
			TC	2	5.3%
51S1	216	29			
			LC-TC	4	13.8%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	21	72.4%
			TC	4	13.8%
51T1	406	51			
			LC-TC	24	47.1%
			LC	0	0.0%
			LC1	0	0.0%
			LC2	19	37.3%
			TC	8	15.7%

Table 62. Op. 51 – Agricultural Plot System 2: Diagnostic Ceramic Sherds Number and Percentage by Time Period

Time Period	Number of Diagnostic	% of Diagnostic Total
LC-TC	612	36.5%
LC	5	0.3%
LC1	13	0.8%
LC2	791	47.2%
TC	256	15.3%

APPENDIX B: CERAMIC ANALYSIS

Table 63. Op. 14 – Terraforming: Ceramic Sherd Counts and Weights

Op/Subop/Lot	Total Sherds	Weight (g)
14K1	42	203
14K2	75	313
14K4	58	335
14M1	102	530
14M2	111	367
14M3	31	248
14M7	14	45
Total	433	2041

Table 64. Op. 14 – Water Channel System: Ceramic Sherd Counts and Weights

Op/Subop/Lot	Total Sherds	Weight (g)
14N1	359	1107
14N2	52	233
14N3	24	100
14P1	382	1367
14P2	235	805
14P3	163	356
14P4	13	70
14P5	6	18
14P6	2	37
14P7	7	29
14S1	355	1300
14S2	223	798
14S3	35	199
14S4	2	6
14V1	289	1198
14V2	179	745
14V3	8	46
14V4	67	310
Total	2293	8724

Table 65. Op. 52 – *Chich* Cobble Mounds: Diagnostic Ceramic Sherds by Type:Variety

Op/Subop/Lot	Total Sherds	Total Weight	Diagnostic Total	Type:Variety	Sherd Type	Time Period
52A1	11	150	2			
			2	Alexander Jar	Rim	LC2
52A2	151	2563	15			
			1	Mt. Maloney Black	Body	LC-TC
			1	Belize Red	Body	LC-TC
			3	San Lorenzo Black	Body	LC2
			1	San Lorenzo Black Incised	Body	LC2
			1	Dolphin Head Red	Body	LC2
			2	Mt. Maloney Black Bowl	Rim	LC1
			1	Mt. Maloney Black Bowl	Rim	LC2
			1	Mt. Maloney Black Jar	Rim	LC-TC
			1	San Lorenzo Black	Rim	LC2
			2	Alexander Jar	Rim	TC
52A3	23	272	3			
			2	Chunhuitz	Body	TC
			1	San Lorenzo Black	Rim	LC2
52B1	28	268	7			
			7	Mt. Maloney Black	Body	LC-TC
52B2	361	6468	83			
			39	Mt. Maloney Black	Body	LC-TC
			4	Macaw Bank	Body	LC2
			9	Chunhuitz	Body	TC
			1	Belize Red Bowl	Rim	LC-TC
			1	Mt. Maloney Black Bowl	Rim	LC2
			4	Mt. Maloney Black Bowl	Rim	TC
			5	Mt. Maloney Black Jar	Rim	LC-TC
			1	San Lorenzo Black	Rim	LC2
			1	Chunhuitz	Rim	TC
52B3	161	4803	42			
			8	Meditation Black	Body	LC-TC
			21	Mt. Maloney Black	Body	LC-TC
			2	Belize Red	Body	LC-TC
			2	Dolphin Head Red	Body	LC2
			2	Chunhuitz	Body	TC
			3	Mt. Maloney Black Bowl	Rim	LC2
			2	Mt. Maloney Black Jar	Rim	LC-TC
			2	Alexander Jar	Rim	TC

Table 65., cont.

Op/Subop/Lot	Total Sherds	Total Weight	Diagnostic Total	Type:Variety	Sherd Type	Time Period
52C1	401	3318	82			
			3	Meditation Black	Body	LC-TC
			26	Mt. Maloney Black	Body	LC-TC
			8	Belize Red	Body	LC-TC
			21	Macaw Bank	Body	LC2
			2	San Lorenzo Black	Body	LC2
			1	Dolphin Head Red	Body	LC2
			3	Vaca Falls Red	Body	TC
			7	Chunhuitz	Body	TC
			2	Mt. Maloney Black Bowl	Rim	LC1
			2	Mt. Maloney Black Bowl	Rim	LC2
			2	Mt. Maloney Black Bowl	Rim	TC
			4	Mt. Maloney Black Jar	Rim	LC-TC
			1	Alexander Pie Crust Jar	Rim	TC
52C2	73	735	16			
			5	Mt. Maloney Black	Body	LC-TC
			7	Macaw Bank	Body	LC2
			2	Dolphin Head Red	Body	LC2
			1	Mt. Maloney Black Jar	Rim	LC-TC
			1	Dolphin Head Red Jar	Rim	LC2
52C3	9	65	1			
			1	Dolphin Head Red	Body	LC2
Total	1,218	18,642	251			

Table 66. Op. 52 – *Chich* Cobble Mounds: Diagnostic Sherds Number and Percentage by Time Period

Op/Subop/Lot	Total	Diagnostic Total	Time Period	Number of Diagnostic	% of Diagnostic Total
52A1	11	2			
			LC-TC	0	0.0%
			LC1	0	0.0%
			LC2	0	0.0%
			TC	2	100.0%
52A2	151	15			
			LC-TC	4	26.7%
			LC1	2	13.3%
			LC2	7	46.7%
			TC	2	13.3%
52A3	23	3			
			LC-TC	0	0.0%
			LC1	0	0.0%
			LC2	1	33.3%
			TC	2	66.7%
52B1	28	7			
			LC-TC	7	100.0%
			LC1	0	0.0%
			LC2	0	0.0%
			TC	0	0.0%
52B2	361	83			
			LC-TC	52	62.7%
			LC1	0	0.0%
			LC2	19	22.9%
			TC	12	14.5%
52B3	161	42			
			LC-TC	33	78.6%
			LC1	0	0.0%
			LC2	7	16.7%
			TC	2	4.8%
52C1	401	82			
			LC-TC	41	50.0%
			LC1	2	2.4%
			LC2	33	40.2%
			TC	6	7.3%
52C2	73	16			
			LC-TC	6	37.5%
			LC1	0	0.0%
			LC2	10	62.5%
			TC	0	0.0%
52C3	9	1			
			LC-TC	0	0.0%
			LC1	0	0.0%
			LC2	1	100.0%
			TC	0	0.0%

Table 67. Op. 52 – *Chich* Cobble Mounds: Diagnostic Sherds

Time Period	Number of Diagnostic	% of Diagnostic Total
LC-TC	143	57%
LC1	4	1.6%
LC2	78	31.1%
TC	26	10.4%

Table 68. Op. 14 – Agricultural Plot System 1: Obsidian Count by Attributes

Op/Subop/Lot	Weight (g)	Portion	Size (cm)	Worked	Utilized	Type	Source
14X1	1.8	Medial and Proximal	3.1 x 1.3 x .2	Unifacially	No	Prismatic Blade	Ixtepeque
14X1	0.6	Medial	1.2 x .9 x .3	Bifacially	No	Prismatic Blade	Ixtepeque
14X1	1.5	Medial	3.1 x 1.1 x .3	No	Yes	Blade	Ixtepeque
14Y1	0.9	Medial	2.4 x .95 x .2	No	Yes	Prismatic Blade	El Chayal
14Z1	0.7	Medial and Proximal	2 x .9 x .4	Unifacially	Yes	Blade	El Chayal
14Z1	0.4	Medial and Proximal	1.5 x .9 x .3	No	No	Prismatic Blade	El Chayal
14Z1	0.3	Medial	1.7 x .9 x .2	No	No	Prismatic Blade	El Chayal
14AA1	1.8	Medial and Proximal	6.1 x 1 x .2	No	Yes	Prismatic Blade	El Chayal
14AB1	0.6	Medial	1.7 x .4 x .2	No	Yes	Prismatic Blade	El Chayal
14AB1	1.5	Medial and Proximal	2.2 x 1.1 x .3	No	Yes	Prismatic Blade	El Chayal
14AB1	3.1	Medial and Proximal	4.6 x 1.5 x .3	Bifacially	Yes	Prismatic Blade	Ixtepeque
14AC1	*0.9*	Medial	3.5 x .8 x .1	No	No	Flake Fragment	El Chayal
14AC1	0.3	Medial	1.5 x 1.1 x .2	No	Yes	Prismatic Blade	El Chayal
14AC1	0.4	Medial and Proximal	1.2 x 1.7 x .2	No	No	Flake Fragment	El Chayal
14AF1	0.5	Medial	1.6 x .9 x .3	No	Yes	Blade	El Chayal
14AF1	1.9	Medial and Proximal	3.1 x 1.3 x .3	Yes	Yes	Prismatic Blade	El Chayal
14AG1	1.6	Medial	2.8 x 1.4 x .3	Bifacially	Yes	Prismatic Blade	El Chayal
14AG1	1.8	Medial	2.9 x 1.4 x .3	Unifacially	No	Prismatic Blade	Ixtepeque
14AG1	0.3	Medial	1.1 x 1.2 x .2	No	No	Prismatic Blade	El Chayal
14AI1	0.2	Fragment	.7 cm thick	No	No	Shatter	Ixtepeque
14AI1	0.4	Medial	.9 x .5 x .2	No	No	Prismatic Blade	El Chayal
14AI1	0.5	Medial	1.5 x .7 x .2	No	No	Prismatic Blade	El Chayal
14AI1	0.6	Medial and Distal	2 x .8 x .3	Yes	No	Prismatic Blade	El Chayal
14AI2	0.6	Medial	.9 x .9 x .2	No	No	Prismatic Blade	El Chayal
14AK1	0.2	Medial	1.2 x .8 x .2	No	No	Prismatic Blade	El Chayal
14AK1	0.3	Medial	1.5 x .5 x 2	No	No	Prismatic Blade	El Chayal
14AM2	1.4	Medial	2.9 x 1.1 x .2	Bifacially	No	Prismatic Blade	Ixtepeque
14AN1	0.7	Medial	1.7 x 1.1 x .2	No	No	Prismatic Blade	Ixtepeque
14AN1	0.8	Medial	2 x .8 x .2	No	No	Prismatic Blade	El Chayal
14AN1	0.9	Medial and Proximal	2.2 x 1 x .2	No	No	Prismatic Blade	El Chayal
14AN1	0.2	Fragment	.2 cm thick	No	No	Shatter	El Chayal
14AN1	0.3	Medial	1 x .9 x ,2	No	No	Prismatic Blade	El Chayal
14AN1	0.3	Medial	.8 x 1.4 x .2	No	No	Prismatic Blade	Ixtepeque
14AP2	0.9	Medial and Proximal	2 x .9 x .2	No	No	Prismatic Blade	Ixtepeque
14AP2	0.9	Medial and Proximal	1.7 x 1 x .3	No	No	Prismatic Blade	El Chayal
14AP2	0.6	Medial and Proximal	2.6 x .8 x .2	No	No	Blade	El Chayal
14AQ1	0.3	Medial and Proximal	1.4 x .7 x .2	No	No	Prismatic Blade	El Chayal
14AQ2	0.6	Medial	1.7 x 1 x .3	No	No	Prismatic Blade	El Chayal
14AR1	0.5	Medial	1.5 x 1.1 x .2	No	No	Prismatic Blade	El Chayal
14AR1	0.5	Medial	1.6 x .9 x .1	No	No	Prismatic Blade	El Chayal
14AR1	1.0	Whole	2 x 2 x .2	No	No	Prismatic Blade	Ixtepeque
14AS1	0.7	Medial	1.6 x .9 x .2	No	No	Prismatic Blade	El Chayal
14AT1	0.2	Medial	.5 x 1.2 x .2	No	No	Flake Fragment	El Chayal
14AT1	0.9	Medial	3.3 x 1 x .1	No	No	Prismatic Blade	El Chayal
14AV1	0.3	Medial	1.4 x .9 x .4	No	No	Prismatic Blade	Ixtepeque
14AV1	0.3	Medial	1.7 x .9 x .3	No	No	Prismatic Blade	Ixtepeque
14AV1	0.6	Medial	2.1 x .9 x .2	No	No	Blade	El Chayal
14AV1	0.1	Medial	.5 x .7 x .1	No	No	Prismatic Blade	El Chayal
14AX1	0.3	Medial	1.2 x .7 x .2	No	No	Prismatic Blade	El Chayal
14BA1	0.3	Medial	1.3 x .5 x .1	No	No	Flake Fragment	El Chayal

Table 69. Op.14 – Agricultural Plot System 1: Obsidian Total Count and Percentage by Source and Attributes

Source	Total	% of Total	Worked	% Worked of Total	Utilized	% Utilized of Total
Itxtepeque	13	26%	5	38.5%	2	15.4%
El Chayal	37	74%	4	10.8%	9	10.8%
Total	50	100%	9	18.0%	11	22.0%

Table 70. Op. 51 – Agricultural Plot System 2: Obsidian Count by Attributes

Op/Subop/Lot	Weight (g)	Portion	Size (cm)	Worked	Utilized	Type	Source
51A1	0.3	Medial	1.2 x 1 x .2	No	No	Prismatic Blade	El Chayal
51A1	0.2	Fragment	1.6 x .7 x .05	No	No	Shatter	El Chayal
51B1	1.2	Medial	3.5 x 1 x .2	No	No	Prismatic Blade	El Chayal
51B1	0.3	Medial	1.7 x .8 x .2	No	No	Prismatic Blade	El Chayal
51B1	0.7	Medial	1.3 x .9 x .2	No	No	Prismatic Blade	Ixtepeque
51C1	0.4	Medial	1.6 x .9 x .2	Unifacially	No	Prismatic Blade	El Chayal
51C1	0.3	Medial	1.4 x .6 x .2	No	No	Prismatic Blade	El Chayal
51C1	0.1	Medial	.9 x .6 x .25	Unifacially	No	Prismatic Blade	El Chayal
51E2	0.8	Medial	2.5 x 1 x .2	No	No	Prismatic Blade	El Chayal
51E2	0.9	Medial	2.1 x .8 x .1	No	No	Prismatic Blade	Ixtepeque
51E2	0.1	Fragment	.9 x .6 x .2	No	No	Flake fragment	El Chayal
51E2	0.4	Medial	1 x 1.3 x .2	No	No	Prismatic Blade	El Chayal
51F1	0.3	Medial	1.1 x .7 x .2	No	No	Blade	Ixtepeque
51F1	0.4	Fragment	1.2 x .9 x .25	No	No	Flake fragment	Ixtepeque
51F1	0.2	Fragment	.9 x 1 x .1	No	No	Flake fragment	El Chayal
51F1	0.3	Medial	1.6 x .7 x .2	Bifacially	Yes	Prismatic Blade	El Chayal
51G2	*1.3*	Medial and Proximal	2.6 x .7 x .3	No	No	Prismatic Blade	El Chayal
51G2	0.6	Medial	1.9 x .7 x .2	No	No	Prismatic Blade	El Chayal
51G2	0.5	Medial	1.2 x 1.1 x .35	No	No	Prismatic Blade	El Chayal
51G2	0.4	Medial	1.4 x .7 x .2	Bifacially	No	Prismatic Blade	El Chayal
51G2	0.3	Medial	1 x .9 x .2	No	No	Prismatic Blade	El Chayal
51G2	0.1	Medial	.6 x 1.2 x .2	No	No	Blade	El Chayal
51G2	0.3	Medial	1.2 x .7 x .15	Bifacially	No	Prismatic Blade	El Chayal
51G2	0.1	Medial	.7 x 1.1 x .2	No	No	Prismatic Blade	El Chayal
51G2	0.3	Medial	.9 x 1.4 x .25	No	No	Prismatic Blade	El Chayal
51G2	0.5	Fragment	1.6 x 1.4 x .3	No	No	Flake fragment	El Chayal
51H1	1.9	Medial	3.1 x 1.3 x .3	Bifacially	Yes	Prismatic Blade	El Chayal
51K1	0.1	Fragment	1.1 x 1 x .2	No	No	Flake fragment	El Chayal
51L1	0.9	Medial	1.8 x 1.1 x .3	No	No	Prismatic Blade	Ixtepeque
51L1	0.7	Medial and Proximal	1.8 x .8 x .2	Bifacially	Yes	Blade	El Chayal
51M1	0.6	Medial	2.3 x .7 x .25	No	No	Prismatic Blade	El Chayal
51N2	1.7	Medial	3 x 1.1 x .35	Bifacially	Yes	Prismatic Blade	El Chayal
51N2	0.3	Fragment	1 x .8 x .2	No	No	Flake fragment	El Chayal
51N2	0.4	Medial	1 x 1 x .25	No	No	Blade	El Chayal
51N2	0.7	Medial and Proximal	2.1 x .8 x .2	No	No	Prismatic Blade	El Chayal
51N2	0.6	Medial	1.3 x .7 x .1	No	No	Prismatic Blade	El Chayal
51O1	1.1	Fragment	1.5 x .7 x .2	No	No	Shatter	Ixtepeque
51O1	1	Medial and Proximal	1.4 x 1 x .25	Bifacially	No	Prismatic Blade	El Chayal
51P1	0.5	Medial	.9 x 1.2 x .2	No	No	Prismatic Blade	El Chayal
51P1	0.3	Fragment	.7 x 1.1 x .1	No	No	Blade	El Chayal
51P1	0.1	Fragment	.8 x .3 x .05	No	No	Blade Fragment	Ixtepeque
51P1	1.9	Medial and Proximal	3.7 x .9 x .3	No	No	Prismatic Blade	El Chayal
51P1	0.5	Medial	1.5 x .9 x .2	No	No	Prismatic Blade	El Chayal
51P2	0.8	Medial	9 x 1 x .15	No	No	Prismatic Blade	Ixtepeque
51Q1	1.2	Medial	2.6 x .9 x .25	No	No	Prismatic Blade	El Chayal
51R1	0.5	Whole	2.3 x .6 x .3	No	No	Prismatic Blade	El Chayal
51R1	0.1	Fragment	.8 x 1 x .2	No	No	Flake fragment	El Chayal
51T1	1.1	Medial	2.7 x 1 x .3	Bifacially	No	Prismatic Blade	El Chayal
51T1	0.7	Medial and Proximal	1.8 x .7 x .15	Bifacially	No	Flake	El Chayal
51T1	0.3	Fragment	1 x .75 x .1	No	No	Flake fragment	El Chayal

Table 71. Op. 51 – Agricultural Plot System 2: Obsidian Total Count and Percentage by Source and Attributes

Source	Total	% of Total	Worked	% Worked of Total	Utilized	% Utilized of Total
Itxtepeque	6	12%	0	0.0%	0	0.0%
El Chayal	44	88%	11	100.0%	3	100.0%
Total	50	100%	11	22.0%	3	6.0%

APPENDIX C: OBSIDIAN ANALYSIS

Table 72. Op. 14 – Water Channel System: Obsidian Count by Attributes

Op/Subop/Lot	Weight (g)	Portion	Size (cm)	Worked	Utilized	Type	Source
14N1	**0.6**	**Medial and Proximal**	**1.84 x .98 x .28**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14N1	**0.25**	**Fragment**	**1.28 x .74 x .27**	**No**	**No**	**Flake fragment**	**El Chayal**
14N7	**0.42**	**Medial and Proximal**	**1.59 x .8 x .24**	**Yes**	**No**	**Prismatic Blade**	**El Chayal**
14P1	**1.43**	**Medial and Proximal**	**2.88 x 1.19 x .26**	**Yes**	**No**	**Prismatic Blade**	**El Chayal**
14P1	**0.33**	**Medial and Proximal**	**1.35 x .83 x .17**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14P1	**0.37**	**Medial and Proximal**	**1.57 x .86 x .24**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14P1	**0.42**	**Fragment**	**1.09 x 1.46 x .24**	**No**	**No**	**Flake fragment**	**El Chayal**
14P2	**0.21**	**Medial**	**1.21 x .94 x .7**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14P2	**0.28**	**Medial and Proximal**	**1 x .82 x .19**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14P4	**0.95**	**Whole**	**.95 x .69 x .24**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14P4	**0.18**	**Fragment**	**.95 x .69 x .24**	**No**	**No**	**Shatter**	**El Chayal**
15S1	**0.38**	**Medial**	**1.34 x .94 x .21**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14V1	**0.23**	**Medial**	**1 x .92 x .13**	**No**	**No**	**Prismatic Blade**	**El Chayal**
14V2	**2.38**	**Medial and Proximal**	**4 x 1.22 x .31**	**No**	**No**	**Prismatic Blade**	**El Chayal**

Table 73. Op. 14 – Water Channel System: Obsidian Total Count and Percentage by Source and Attributes

Source	Total	Worked	% Worked of Total	Utilized	% Utilized of Total
El Chayal	**14**	**2**	**14.30%**	**0**	**0%**

Table 74. Op. 14 – Agricultural Plot System 1: Groundstone Count by Attributes

Op/Subop/Lot	Total	Weight (g)	Size (cm)	Material	Type	Utilized
14U1	1	321	-	Granite	Metate Fragment	Yes
14U1	1	71	-	Granite	Mano Fragment	Yes
14W1	1	71	6.5 x 3.5 x 2.6	Limestone	Bark Beater	Yes
14Y1	1	3517	18 x 16 x 6.6	Granite	Pecked Stone	Yes
14Y1	1	352	7.4 x 6.8 x 4.4	Granite	Mano Fragment	Yes
14Y1	1	2517	16 cm diameter, 6 cm thick	Limestone	Curtain Weight	Yes
14AF1	1	187	5.9 cm in diameter, 2.9 cm thick	Limestone	Pecked Stone	Yes
14AK1	1	254	7 x 4.9 x 4.6	Limestone	Bark Beater	Yes
14AM2	1	415	6.3 x 9.4 x 6.7	Granite	Mano Fragment	Yes
Total	10	7705				

Table 75. Op. 51 – Agricultural Plot System 2: Groundstone Count by Attributes

Op/Subop/Lot	Total	Weight (g)	Size (cm)	Material	Type	Utilized
51A1	1	164	9.2 x 4.6 x 2.9	Limestone	Hammerstone	Yes
51C2	1	159	6 x 5 x 3.5	Limestone	Hammerstone	Yes
51F2	1	143	10.4 x 5.7 x 1.8	Quartzite	Unknown	Yes
51R1	1	788	7.6 x 9.1 x 5.4	Granite	Mano Fragment	Yes
51S1	1	51	-	Limestone	Worked Stone	Yes
Total	5	1305				

Table 76. Op. 52 – *Chich* Cobble Mounds: Groundstone Count by Attributes

Op/Subop/Lot	Total	Weight (g)	Thickness (cm)	Material	Type	Utilized
52B2	7	2494	3.5	Quartzite	Metate Fragments	Yes

Table 77. Op. 14 – Agricultural Plot System 1: Slate Count

Op/Subop/Lot	Total	Weight
14Q1	1	32
14A1	1	37
14R1	1	22
14U1	1	18
14X1	1	1
14Y11	1	14
14AE1	1	12
14AG1	1	8
14AI1	1	12
14AM1	1	16
14AO1	1	11
14AQ1	1	1
14AS2	1	17
14AW1	1	1
14BA1	1	26
	1	15
Total	16	243

Table 78. Op. 51 – Agricultural Plot System 2: Slate Count by Attributes

Op/Subop/Lot	Total	Weight	Size (cm)	Type	Worked
51A1	1	4	2.1 x 1.9 x .15	Fragment	No
51B1	1	7	2.7 x 1.4 x .9	Fragment	No
51B2	1	22	5.1 x 3.1 x .8	Fragment	No
51C1	1	8	3.2 x 1.9 x .7	Fragment	No
51F1	1	17	4.1 x 3.1 x .9	Fragment	No
51F1	1	22	4.4 x 3.4 x .7	Fragment	No
51G1	1	2	2.3 x 1.8 x .3	Fragment	No
51I1	1	1	1.2 x .9 x .2	Fragment	No
51L1	1	5	2.1 x 1.1 x .25	Fragment	No
51L1	1	7	3.5 x 2.1 x .4	Fragment	No
51M1	1	14	4.8 x 2.2 x .9	Fragment	No
51S1	1	1	4.6 x 3.1 x .6	Oval	Yes
51T1	1	12	4.3 x 3.5 x .8	Fragment	No
Total	13	122			

Table 79. Op. 14 – Water Channel System: Slate Count by Attributes

Op/Subop/Lot	Total	Weight	Size (cm)	Type	Worked
14V1	1	3	1.9 x 1.7 x .3	Fragment	No

Table 80. Op. 14 – Agricultural Plot System 1: Quartz Count by Attributes

Op/Subop/Lot	Total	Weight	Type
14U1	1	91	Nodule
14Y1	1	1	Flake fragment
14AF1	1	10	Flake fragment
14AI1	1	9	Chunk
14AI1	1	12	Chunk
14AM2	1	2	Chunk
14AO1	1	9	Chunk
14AQ2	1	1	Flake fragment
14AY1	1	47	Chunk
Total	9	182	

Table 81. Op. 51 – Agricultural Plot System 2: Quartz Count by Attributes

Op/Subop/Lot	Total	Weight	Type
51F1	1	16	Chunk
51F2	1	15	Chunk
51L1	1	4	Chunk
51Q1	1	40	Chunk
Total	4	75	

Table 82. Op. 14 – Terraforming: Quartz Count by Attributes

Op/Subop/Lot	Total	Weight	Type
14K2	1	8	Flake Fragment
14M1	1	10	Chunk
Total	2	18	

Table 83. Op. 52 – *Chich* Cobble Mounds: Quartz Count by Attributes

Op/Subop/Lot	Total	Weight	Type
52A2	1	6	Nodule
52B1	1	2	Nodule
Total	2	8	

Table 84. Op. 14 – Agricultural Plot System 1: Daub Count and Weight

Op/Subop/Lot	Total	Weight (g)
14Q1	26	370.2
14Q2	6	60.4
14Q3	1	15.2
14R1	2	12.2
14R2	3	37.7
14T1	4	18.6
14T2	2	5.9
14U1	6	107.5
14W1	6	36.3
14W2	2	7.7
14X1	20	169.8
14Y1	34	490.4
14Z1	5	59.0
14AA1	14	148.8
14AB1	7	236.3
14AC1	5	43.4
14AC2	1	8.1
14AE1	6	69.2
14AF1	6	89.6
14AG1	14	53.5
14AH1	3	20.2
14AI1	10	43.4
14AI2	4	21.7
14AK1	2	20.8
14AL1	1	4.3
14AL3	1	4.2
14AM1	5	69.7
14AM2	18	49.5
14AN1	2	20.0
14AO1	9	77.2
14AP1	3	23.5
14AP2	5	33.7
14AQ1	9	26.8
14AQ2	11	56.9
14AR1	11	62.9
14AS1	1	7.6
14AT1	4	28.4
14AU1	1	5.6
14AU2	1	7.1
14AV1	5	181.4
14AW1	2	16.8
14AX1	7	161.4
14AY1	12	89.0
14AZ1	5	39.3
14BA1	2	24.1
Total	304	3135.3

Table 85. Op. 51 – Agricultural Plot System 2: Daub Count and Weight

Op/Subop/Lot	Total	Weight (g)
51A1	4	36.4
51B1	11	64.1
51B2	5	57.1
51C1	32	140.8
51C2	4	38.7
51D1	3	37.4
51E1	4	79.2
51E2	1	3.9
51F1	23	152.3
51G1	20	73.2
51G1	4	31.1
51H1	9	63.6
51I1	5	23.4
51I1	3	16.5
51J1	2	8.6
51K1	2	9.4
51K2	1	18.9
51L1	3	13.0
51M1	10	58.3
51N1	1	7.7
51N2	1	3.9
51O1	15	67.4
51P1	3	71.2
51P2	3	69.7
51Q1	5	45.4
51R1	10	91.3
51S1	3	19.7
51T1	2	10.0
Total	189	1312.2

Table 86. Op. 51 – Agricultural Plot System 2: Plaster Count and Weight

Op/Subop/Lot	Total	Weight (g)
51Q1	1	31.4
51T1	1	28.2
Total	2	59.6

Table 87. Op. 14 – Agricultural Plot System 1: Shell Count by Type and Attributes

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
14X1	***Pachychilus glaphyrus*** **(ridged jute)**	**1**	**3.1**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14Y1	***Pachychilus glaphyrus*** **(ridged jute)**	**1**	**4.8**		
				Intact	
				Broken Tip	
				Hole	**1**
				Broken Tip and Hole	
				Unknown	
14Z1	***Pachychilus indiorum*** **(smooth jute)**	**1**	**0.8**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AA1	***Pachychilus indiorum*** **(smooth jute)**	**1**	**5.9**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AC2	***Pachychilus indiorum*** **(smooth jute)**	**1**	**3.7**		
				Intact	**1**
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AD1	***Pachychilus indiorum*** **(smooth jute)**	**1**	**3.1**		
				Intact	
				Broken Tip	
				Hole	
				Broken Tip and Hole	**1**
				Unknown	
14AF1	***Pachychilus glaphyrus*** **(ridged jute)**	**2**	**6.4**		
				Intact	**1**
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AG1	***Pachychilus glaphyrus*** **(ridged jute)**	**1**	**7.2**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AG1	***Pachychilus indiorum*** **(smooth jute)**	**2**	**9.7**		
				Intact	
				Broken Tip	**1**
				Hole	**1**
				Broken Tip and Hole	
				Unknown	
14AI1	**Marine Shell**	**1**	**4.6**		
14AI2	***Pachychilus indiorum*** **(smooth jute)**	**2**	**6.2**		
				Intact	
				Broken Tip	**2**
				Hole	
				Broken Tip and Hole	
				Unknown	

Table 87., cont.

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
14AJ1	***Pachychilus glaphyrus* (ridged jute)**	**1**	**3.8**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AK1	***Pachychilus indiorum* (smooth jute)**	**1**	**3.2**		
				Intact	**1**
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AL1	**Cave Pearl**	**1**	**4.7**		
14AL3	***Pachychilus indiorum* (smooth jute)**	**1**	**2.1**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AN1	***Pachychilus indiorum* (smooth jute)**	**4**	**13.7**		
				Intact	**1**
				Broken Tip	**3**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AP1	***Pachychilus glaphyrus* (ridged jute)**	**3**	**11.4**		
				Intact	
				Broken Tip	
				Hole	**1**
				Broken Tip and Hole	**2**
				Unknown	
14AP1	***Pachychilus indiorum* (smooth jute)**	**1**	**3.1**		
				Intact	**1**
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AP2	***Pachychilus glaphyrus* (ridged jute)**	**1**	**9.6**		
				Intact	
				Broken Tip	
				Hole	
				Broken Tip and Hole	**1**
				Unknown	
14AP2	***Pachychilus indiorum* (smooth jute)**	**1**	**3.8**		
				Intact	
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	**1**
14AQ1	***Pachychilus glaphyrus* (ridged jute)**	**1**	**5.5**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	
14AQ2	***Pachychilus indiorum* (smooth jute)**	**1**	**4.1**		
				Intact	
				Broken Tip	**1**
				Hole	
				Broken Tip and Hole	
				Unknown	

Table 87., cont.

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
14AR1	*Pachychilus glaphyrus* (ridged jute)	2	8.3		
				Intact	2
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AT1	*Pachychilus indiorum* (smooth jute)	1	5.9		
				Intact	
				Broken Tip	
				Hole	
				Broken Tip and Hole	1
				Unknown	
14AU1	*Pachychilus indiorum* (smooth jute)	1	2		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AU2	Pachychilus indiorum (smooth jute)	2	0.7		
				Intact	
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	2
14AV1	Marine Shell	1	4.8		
14AV1	*Pachychilus glaphyrus* (ridged jute)	2	9.5		
				Intact	
				Broken Tip	
				Hole	1
				Broken Tip and Hole	
				Unknown	1
14AV1	*Pachychilus indiorum* (smooth jute)	1	2.9		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AX1	*Pachychilus glaphyrus* (ridged jute)	1	7.2		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AX1	*Pachychilus indiorum* (smooth jute)	1	5.9		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
14AZ1	*Pachychilus indiorum* (smooth jute)	1	4.6		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	

Table 87., cont.

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
14BA1	*Pachychilus glaphyrus* (ridged jute)	1	9.2		
				Intact	
				Broken Tip	
				Hole	1
				Broken Tip and Hole	
				Unknown	
14BA1	*Pachychilus indiorum* (smooth jute)	1	3.6		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	

Table 88. Op. 14 – Agricultural Plot System 1: Shell Total by Type

Shell Type	Type Total	Weight (g)
Marine Shell	2	9.4
Cave Pearl	1	4.7
Pachychilus glaphyrus (ridged jute)	17	86
Pachychilus indiorum (smooth jute)	20	85
Total	45	185.1

Table 89. Op. 14 – Agricultural Plot System 1: Jute Total by Type and Attributes

Jute Type	Total	Broken Tip and/or Hole Present Total	% Broken Tip and/or Hole Present of Total
Pachychilus glaphyrus (ridged jute)	17	13	76.5%
Pachychilus indiorum (smooth jute)	20	13	65.0%
Total	37	26	70.2%

Table 90. Op. 51 – Agricultural Plot System 2: Shell Count by Type and Attributes

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
51C2	*Pachychilus glaphyrus* (ridged jute)	1	11.3		
				Intact	
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
51C2	*Pachychilus indiorum* (smooth jute)	1	4.2		
				Intact	1
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	
51F1	*Pachychilus glaphyrus* (ridged jute)	1	3.2		
				Intact	
				Broken Tip	
				Hole	
				Broken Tip and Hole	
				Unknown	1

Table 90., cont.

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
51O1	*Pachychilus indiorum* (smooth jute)	1	3.7		
				Intact	
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
51Q1	*Pachychilus glaphyrus* (ridged jute)	2	24.3		
				Intact	
				Broken Tip	1
				Hole	1
				Broken Tip and Hole	

Table 91. Op. 51 – Agricultural Plot System 2: Shell Total by Type

Jute Type	Total	Weight (g)	Broken Tip and/or Hole Present Total	% Broken Tip and/or Hole Present of Total
Pachychilus glaphyrus (ridged jute)	5	49.7	4	80.0%
Pachychilus indiorum (smooth jute)	2	7.9	1	50.0%
Total	7	57.6	5	71.4%

Table 92. Op. 14 – Water Channel System: Shell Count by Type

Op/Subop/Lot	Shell Type	Total	Weight	Comments
14P1	Marine Shell	3	2.3	
14P2	Marine Shell	2	7.1	
14P3	Marine Shell	1	0.8	
14S1	Marine Shell	1	1.9	
14S3	Marine Shell	9	1.2	shell beads
14V1	Marine Shell	4	1.6	
14V4	Marine Shell	3	0.9	
	Total	23	15.8	

Table 93. Op. 52 – *Chich* Cobble Mounds: Shell Count by Type and Attributes

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
52A1	*Pachychilus indiorum* (smooth jute)	1	2.1		
				Intact	
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
52A2	*Pachychilus indiorum* (smooth jute)	1	3.8		
				Intact	
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	3
52A3	*Pachychilus indiorum* (smooth jute)	1	2.3		
				Intact	
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
52B1	*Pachychilus indiorum* (smooth jute)	18	43.3		
				Intact	
				Broken Tip	15
				Hole	3
				Broken Tip and Hole	
				Unknown	
52B1	*Pachychilus glaphyrus* (ridged jute)	2	4.4		
				Intact	1
				Broken Tip	1
				Hole	
				Broken Tip and Hole	

Table 93, cont.

APPENDIX F: SHELL AND FAUNAL ANALYSIS

Op/Subop/Lot	Shell Type	Total	Weight (g)	Attributes	Total per Attribute
52B1	***Pachychilus indiorum*** **(smooth jute)**	111	393.6		
				Intact	
				Broken Tip	108
				Hole	
				Broken Tip and Hole	3
				Unknown	
52B1	Pachychilus glaphyrus (ridged jute)	1	8.8		
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
52B1	***Pachychilus indiorum*** **(smooth jute)**	3	3.3		
				Intact	2
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
52B1	***Pachychilus indiorum*** **(smooth jute)**	23	20.3		
				Intact	22
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
52B1	***Pachychilus glaphyrus*** **(ridged jute)**	2	2.6		
				Intact	
				Broken Tip	1
				Hole	
				Broken Tip and Hole	
				Unknown	
52B1	***Pachychilus indiorum*** **(smooth jute)**	92	75.3		
				Intact	
				Broken Tip	18
				Hole	6
				Broken Tip and Hole	2
				Unknown	

Table 94. Op. 52 – *Chich* Cobble Mounds: Shell Total by Type

Jute Type	Total	Weight	Broken Tip Total	% Broken Tip	Hole Present Total	%Hole Present
Pachychilus glaphyrus **(ridged jute)**	2	13.2	1	0%	0	0.0%
Pachychilus indiorum **(smooth jute)**	111	546.6	108	97.30%	3	2.8%
Total	113	559.8	109	96.40%	3	2.8%

Table 95. Op. 14 – Agricultural Plot System 1:Faunal Total

Op/SubOp/Lot	Context	Total	Weight (g)	Comments
14AF1	Agricultural Plot System 1	1	0.7	Claw