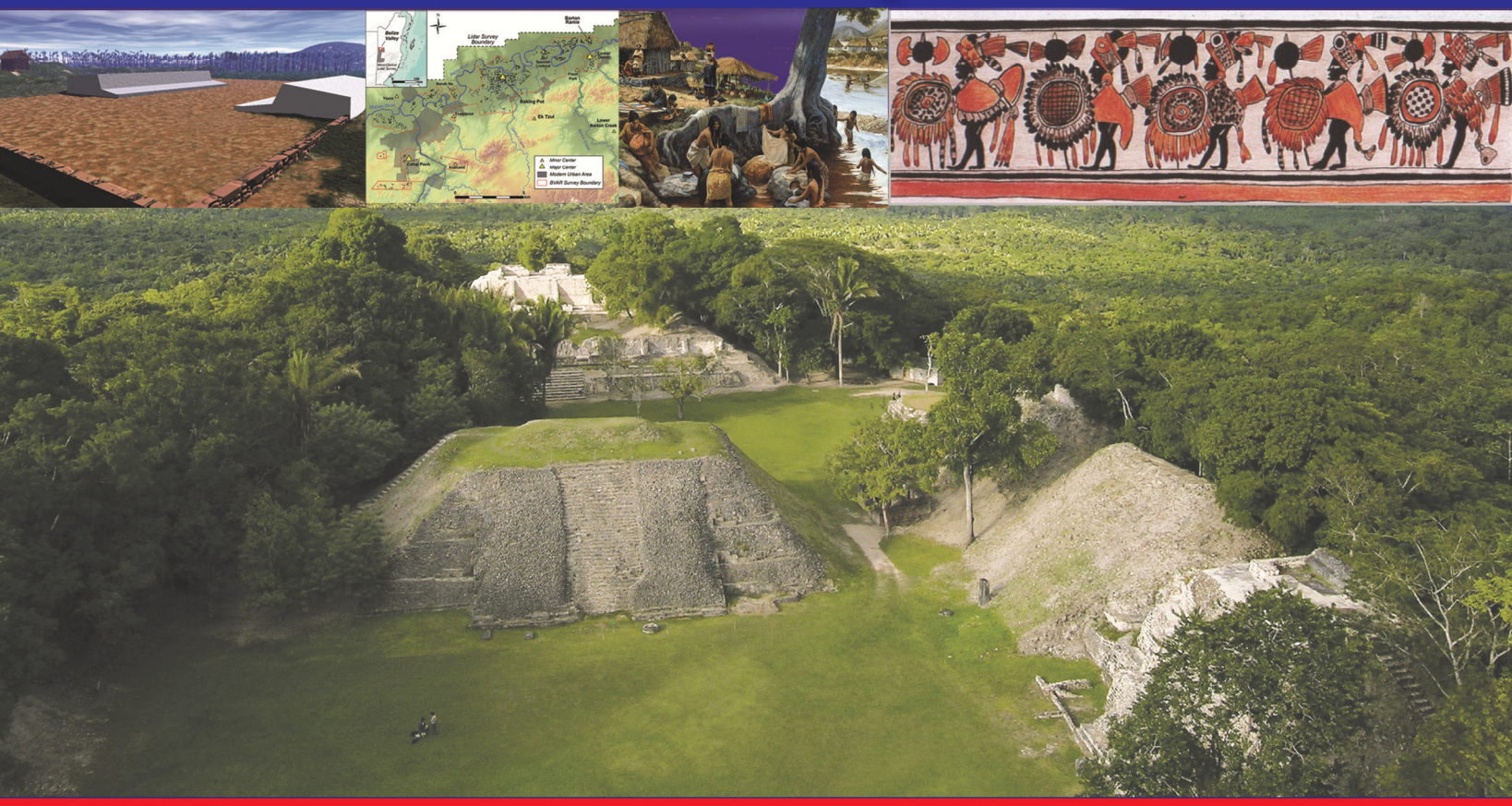
Research Reports in Belizean Archaeology
Papers of the 2015 Belize Archaeology Symposium

Settlement and Landscape Archaeology:

Social Organization & Political Boundaries of the Ancient Maya



Edited by
John Morris, Melissa Badillo
Sylvia Batty and George Thompson
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Archaeological Investigations in the Eastern Maya Lowlands: Papers of the 2015 Belize Archaeology Symposium

Edited by John Morris, Melissa Badillo, Sylvia Batty and George Thompson

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SECTION ONE: SETTLEMENT AND LANDSCAPE ARCHAEOLOGY

1 THE ANCIENT MAYA CITY: ANTHROPOGENIC LANDSCAPES, SETTLEMENT ARCHAEOLOGY, AND CARACOL, BELIZE

Arlen F. Chase and Diane Z. Chase

Maya archaeology has seen substantial effort invested in mapping and recording site plans and boundaries. This research has been particularly advanced through the application of LiDAR technology to the ancient Maya landscape, which has more easily permitted the registration of both the topography and the modifications made to the land surface – features only rarely mapped at large-scale by archaeological projects. When combined with over 30 years of archaeological research, LiDAR permits us to determine Caracol's spatial and temporal boundaries and landscape modifications, as well as to demonstrate how the site operated as a city through the use of embedded administrative nodes connected to an extensive solar causeway system. A comparative review of settlement data in the Maya region indicates that the ancient Maya minimally had two kinds of cities. In one form of urbanism, such as at Caracol, sustainable agricultural practices could be carried out within the boundaries of the city; in the other form of Maya urbanism, the settlement was too dense and compact for the practice of sustainable agriculture, meaning that primary agricultural fields must have existed outside the city boundaries. This conclusion significantly advances our understanding of tropical urbanism in antiquity.

Introduction

"To estimate population it is necessary to define the boundaries of sites. This is not an easy matter in parts of the Maya lowlands."
(Rice and Culbert 1990:20)

Among the many issues that have bedeviled Maya archaeologists is whether or not the Maya had true cities. During the last two centuries, scholars have argued various positions, ranging from the ancient Maya being a complex society living in urban environments to them being mere peasants who occasionally used vacant ceremonial centers (Becker 1979; D. Chase et al. 1990; Sanders and Webster 1988; Smith 1989). Because of the subtropical forest that covered most Maya ruins, researchers have had trouble mapping the full extent of ancient Maya settlement, often of necessity sampling settlement distribution on the landscape. The use of LiDAR in support of Maya settlement research has now helped to resolve many of the past questions and issues, fully revealing Maya cities, smaller centers, and the scale and nature of their regional settlements (A. Chase et al. 2010, 2011, 2012, 2014a, 2014b; D. Chase et al. 2011). However, even without LiDAR, the long and extensive history of research in the Maya area is itself sufficient to identify the nature of and variation among ancient Maya cities.

While ancient Maya settlement differs from that found in Europe and the Middle East, it is nevertheless consistent with a form of urban development found in other tropical environments around the world. Tropical urbanism is often characterized by a dispersed settlement pattern that is fully integrated with agriculture – forming a truly "green" city in the sense of modern aspirations. Many of the ancient tropical cities covered large areas of anthropogenically-modified landscape and were also home to large populations. The city of Angkor in Cambodia is believed to have had a population of 750,000 people that covered 1000 sq km at C.E. 900 (Evans et al. 2013); Anuradhapura, Sri Lanka had a population of at least 250,000 people that covered 500 sq km in C.E. 1100 (Lucero et al. 2015). Caracol, Belize was occupied by at least 100,000 people and covered more than 200 sq km of area by C.E. 700 (A. Chase et al. 2011, 2014). However, this form of tropical urbanism – termed "low density agrarian-based urbanism" (Fletcher 2009, 2012) – encompasses a wide range of variability in form, even in the Maya area.

Archaeological settlement work undertaken in the past century demonstrates the range in Maya site plans and residential units across time and geographic location. No single site plan or scale of settlement monolithically defines the ancient Maya. Some sites have defined centers and other do not. The scale and density of settlement at a given site also varies. Not only are cultural, sociopolitical, and environmental factors at work, but as will be noted below, measures of residential settlement

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density may also be used to indicate the existence of varied agricultural strategies among these cities.

Yet, there are some similarities among all Maya sites. One commonality among Maya sites, regardless of scale, is the anthropogenic modification of their landscapes. The public architecture at most Maya centers includes large plazas, elevated temples, stone vaulted buildings (sometimes labeled as palaces), and ballcourts. Many Maya sites also contain formally constructed roads or causeways, but there are at minimum two different kinds of causeway systems: (1) inter-site causeways, and (2) intra-site causeways (A. Chase and D. Chase 2001; Shaw 2008). Inter-site causeways are usually fairly long-distance and serve to join one site to another site (examples include Mirador to Nakbe; Coba to Yaxuna at 101 km; and, Ake to Uki). Intra-site causeways come in several different forms and plans. They can be dendritic, as at Caracol, or quadripartite as at Coba (with two overlaying sytems), Dzibilichaltun, and Ek Balam. They can also serve to link public space to public space internally, as at Tikal, or to link high status residences to public space, as at Labna and Sayil; in other cases, intra-site causeways can link high status residences not only to public space but also to each other, as at Chichen Itza and Chunchucmil.

The long and broad history of excavation of Maya sites also permits us to see the evolution of Maya settlement on the landscape, particularly within the Southern Maya lowlands. Here, the earliest expression of formal monumental architecture is usually represented by the construction of an E Group (A. Chase et al. 2014b:8685), commonly referred to as an "astronomical observatory." To some degree, at least in the Southern lowlands, E Groups and their variants are also correlated with interactions grounded in an early trade route between the Maya interior core and the Caribbean coast (A. Chase and D. Chase 2016). Not all centers with E Groups grew to become cities. But, those centers that did construct E Groups generally retained them as core features of their landscape during later time periods because of the cosmological connotations of this distinct architectural form.

Thus, in the aggregate, certain architectural markers dominate Maya centers and cities over time. For the Middle and Late Preclassic Periods (BC 800 – AD 250) a similar core plan established central monumental architecture, the E Group. For the Late Preclassic and Early Classic Periods (B.C.E. 300 – AD 550) we can infer the ascent of dynastic rule in many Maya centers through the appearance of formal palaces (A. Chase and D. Chase 2006). In the Late Classic (AD 550 – 900) there is a transformation of some sites into major centers accompanied with the ascription of physical space for markets and administration (D. Chase and A. Chase 2014a; A. Chase et al. 2015) as population inter-dependency increases. Finally, Postclassic Period cities are more compact, potentially deriving from an earlier city patterning found in the Northern lowlands (as discussed below).

The Maya City of Caracol, Belize

The combined settlement and excavation work undertaken at Caracol, Belize provides an example of the development of one ancient Maya city. For Caracol, 23 sq km of the site was mapped by traditional means, indicating a vast settlement area that was integrated by a dendritic causeway system (A. Chase and D. Chase 1987, 2001a). In 2009, LiDAR confirmed a much larger settlement area for the site, on the order of 160 sq km of continuous residential units, as well as the northern and southern boundaries for the site (A. Chase et al. 2011). Even more LiDAR obtained in 2013 delimited the eastern boundary of Caracol, increasing the urban size to 200 sq km (A. Chase et al. 2014b). The western boundary of the site has still not been fully defined (Figure 1). What all these data show are a highly integrated city with multiple administrative and market plazas (D. Chase and A. Chase 2014a). The ancient Maya settlement found in the rest of the 2013 landscape surveyed in western Belize by LiDAR (total 2013 survey = 1057 sq km) differs in significant ways; not found elsewhere in this landscape is the broad-scale spatial integration of settlement, agricultural fields, public plazas, and causeways that occurs at Caracol (A. Chase et al. 2014b:8688). Thus, the LiDAR data not only begin to indicate the

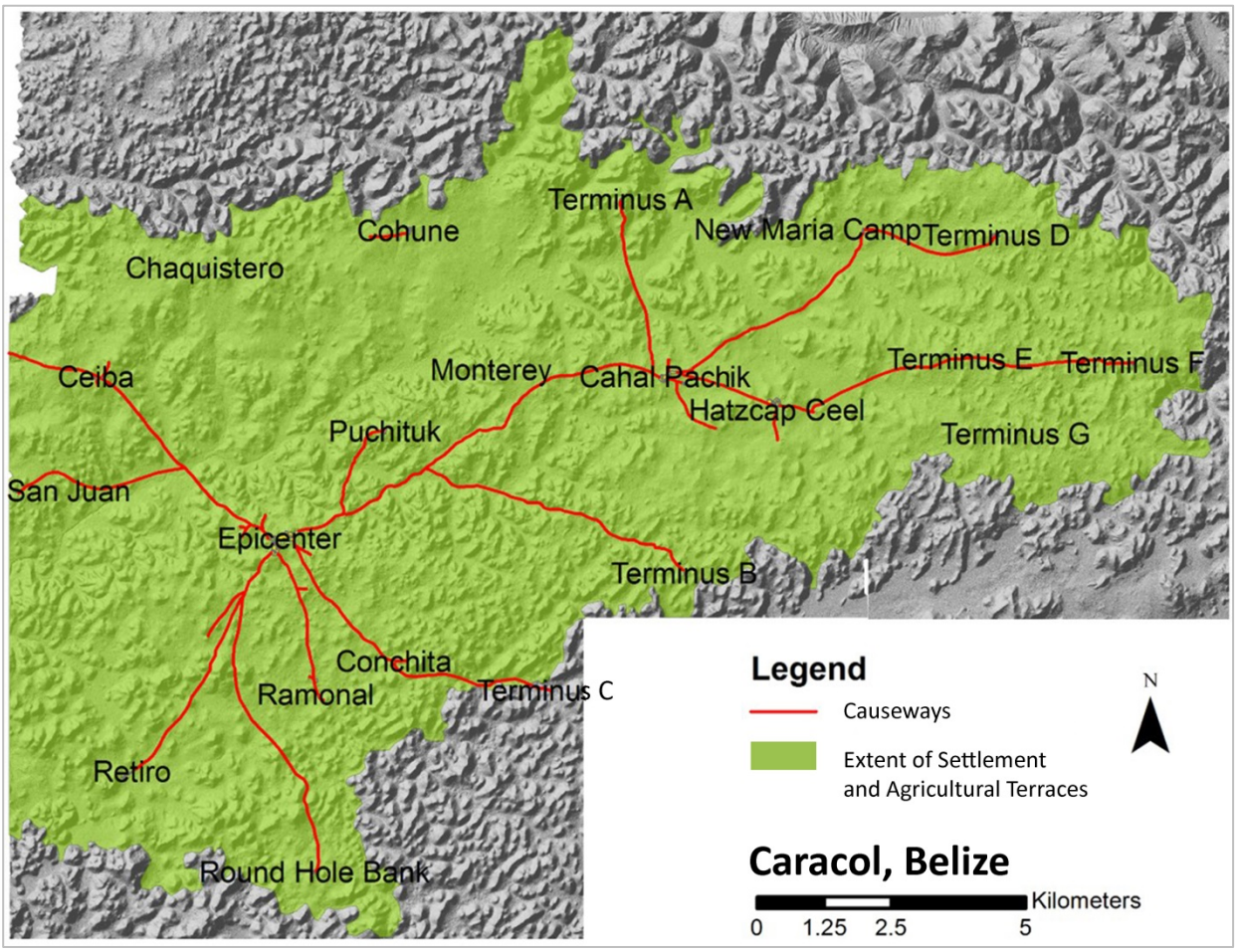

Figure 1. The ancient city of Caracol, Belize showing its causeway system and maximum extent of the urban spread as defined by its termini groups, settlement, and agricultural terraces (courtesy of ASZ Chase).

multiple ways in which the ancient Maya organized space but also suggest that there is still significant regional variability to be encountered and defined.

Long-term archaeological research at Caracol, Belize contextualizes the LiDAR data and demonstrates that the ancient Maya that resided in this part of central Belize were urban and that the arrangement of their settlement on the landscape of the Vaca Plateau does indeed constitute a city. Perhaps the earliest expression of this urban environment were the 12 m wide causeways that connected together three previously distinct centers with E Groups. Even after their incorporation into metropolitan Caracol, the E Groups at Cahal Pichik and Hatzcap Ceel remained unchanged and still comprise the most massive architecture at those locales. However, the E Group in the Caracol epicenter was not only rebuilt but another epicentral plaza (Caana) was constructed to house the royal palace (A. Chase and D. Chase 2001b, 2006). The city was subsequently more fully integrated by a dendritic series of roads that connected the center of the city to a series of formal plazas that functioned as administrative and market locations during the Late Classic Period (C.E. 550-900). These same roadways permitted access to these administrative and market locations by the city's inhabitants and provided a ready form of communication.

Caracol's residential groups were generally composed of a series of structures arranged on the cardinal directions around rectangular plazas with an eastern structure in each plaza reserved for mortuary ritual (A. Chase and D. Chase 1994). However, Caracol's

many residential groups were not homogeneous. Rather, there was variation in status, as indicated by both plazuela size and dietary differences. Households produced different items for distribution in markets. Also, in contrast to many contemporary neighborhoods in which status levels are approximately the same (Blanton 2015:4), ancient Caracol neighborhoods housed a population of mixed statuses (A. Chase and D. Chase 2014).

Most households had access to constructed reservoirs within a short distance of their residential group that would have supplied their water. The Caracol Maya also had the ability to gather water off the roofs of their buildings when it rained, probably in large ceramic basins. While it is clear from reservoir distribution that these constructed features were controlled by households (A.S.Z. Chase 2012), in periods of low rainfall, they would have been able to get water from larger reservoirs associated with the dispersed public architectural nodes at Caracol or from the occasional spring or even the rivers, using Caracol's causeway system.

Caracol's urban environment was truly "green." Settlement and agriculture were fully intermixed, something that was probably found at most other Maya cities as well (Isendahl and Smith 2013) – at least within the Southern Maya lowlands (see discussion below). The extensive stone-lined and soil-filled terrace systems at Caracol attest to the investments placed on agricultural production. Households generally had proximate access to some 2.2 hectares of land that could be used for gardens and crops, meaning that these residential groups were likely self-sustaining (for similar comparative figures see Lemonnier and Vanniere 2013). At least for Caracol, subsistence activities on the agricultural terracing adjacent to households also dictated the spacing of residential settlement, effectively implementing a "building code" where households were generally 100-150 m apart (D. Chase and A. Chase 2014b). Besides ensuring the agricultural sustainability of the site's residential groups (e.g. Drennan 1988), this less concentrated spacing would have also helped ensure healthier urban residents (e.g., Netting 1977; Storey 1992). However, while able to produce needed agricultural products, these same households did not create all the goods and services that were needed to survive; rather, there was interdependency among households at the site (A Chase and D. Chase 2015).

Beyond basic subsistence and water, most of Caracol's residents were dependent on the goods and services that were produced by other households and that were available at the public market areas located within the cityscape (A. Chase et al. 2015). As the managed landscape both expanded in size and was infilled with residential groups and agricultural fields (D. Chase and A. Chase 2014b), this public infrastructure was crucial to supplying pottery, lithics, ritual materials, foreign food items, and presumably a series of crafts to the bulk of Caracol's population. Each household appears to have specialized in the manufacture of specific craft items that served as that household's form of currency for participation within the market system (A. Chase and D. Chase 2015). By the Late Classic Period, markets were clearly key to the functioning of many Maya cities and polities – and the infrastructure dependency that markets fostered is one of the hallmarks of urbanization.

At Caracol, the natural landscape was completely refashioned by the ancient Maya. Where agricultural terraces occur, the land was often cleared to bedrock and then rebuilt (A. Chase and D. Chase 1998). Rock and soil was removed for construction activity; quarries were covered with agricultural terraces. A byproduct of this activity was that the ancient Maya were able to moderate and manage water-flow over the landscape (A.S.Z. Chase and Weishampel 2016). They recycled some of their garbage into these terraces and refuse was also recycled into building efforts as structures and plazas were increasingly expanded and elevated. Excavation has shown that the Caracol Maya also practiced urban renewal in which an existing residential group was entirely removed and building started anew, sometimes on a flattened fill platform and sometimes from bedrock.

Broader Settlement Issues

Any understanding of ancient Maya settlement is ultimately tied to determining how past populations were distributed over their

landscape. Ancient demographic reconstructions are in turn tied to interpretations of social organization and the relationships of families and family size as reflected on the ground in residential units, cities, and polities. While such considerations are fundamental to building models of past Maya societies, they are fraught with pitfalls to be negotiated. For instance, how many individuals lived in a house? How many houses are there in Maya residential groups? How many houses and residential groups are there in any one site? How big is a given site? How do sites relate to each other in a given region? Were all the remains that are viewable today on the landscape occupied contemporaneously?

As archaeologists, we often extrapolate our interpretations from a limited sample of recorded and excavated data using simple conventional methods to establish plausible population numbers. A long contentious debate has resulted in the general association of 5 people as being resident in each Maya house (see Culbert and Rice 1990). But, this number does not help establish the contemporaneity of houses, nor the number of houses within a given Maya residential unit, nor how many houses or residential units are found at any one site. There remains supposition involved not only in associations of numbers of people per household, but also in what actually defines a household – a structure or a residential group. Because past Maya settlement work of necessity covered only limited samples of any site, it has been extremely difficult to define the size, edges, or boundaries of any site. Intra-site population density has been another problematic factor. Residential density varies within different portions of the same site; and, transect surveys between sites have shown that Maya residential groups are unevenly distributed in areas between centers, but that population is still present (and can be relatively dense). One transect survey done between Tikal and Uaxactun (Puleston 1983) revealed an average "rural" settlement density of 32 structures per sq km; another done between Yaxha and Tikal (Ford 1990) had an average density of 65 structures per sq km (corrected to 110 structures per sq km with removal of bajos). The implications of these numbers will need to be re-considered as our inter-site settlement sample grows.

In spite of past issues, settlement work undertaken in the last 25 years (since the publication of Culbert and Rice in 1990) and LiDAR have begun to provide us with a better understanding of the structure of ancient Maya settlement. First, it is not uniform. Just as there are architectural differences between the Puuc area, the Rio Bec Region, and the Peten of Guatemala, so too are there differences in city structure and household composition across the Maya area. In the past, we focused on household counts in order to make population estimates, but investigations of Maya residential groups have revealed that special purpose structures also comprise any household in numbers larger than was previously thought (e.g, A. Chase and D. Chase 2014). Thus, the residential group itself is probably a better unit for undertaking population estimates at any given site. Unfortunately, this is easier said than done because of issues of scale, mapping, and potential inconsistences in the number of household residents; however, LiDAR should make it possible to provide more systematic counts of these units.

Maya cultural and political affiliations also can be seen in the variations among residential groups that are evident in different portions of the Maya lowlands. For instance, the walled residential groups of Coba (Garduno 1979) and of Chunchucmil (Hutson 2015, Hutson et al. 2008) in the Northern lowlands are indicative of one specific residential tradition focused on dense occupation without major inter-household agriculture that permitted a successful adaptation to a difficult environment. This residential tradition is also seen in Postclassic sites in the Northern lowlands, such as at Mayapan (Hare et al. 2014) and Tulum (Sanders 1960). Other traditions see a more dispersed pattern for residential units that were less focused on plazuela residential groups, such as at Dzibilchaltun, Mexico (Stuart 1979) or on a pattern of agglutinated residential plazas, such as at Copan, Honduras (Fash 2001). Lemonnier and Vanniere (2013) have argued that the Rio Bec region is populated with intermixed residential groups of different statuses that exist outside of any formal urban centers. LiDAR

data for Yaxnohcah, Mexico demonstrates a proliferation of residential units that resemble enclosed plaza courtyards with long low rectangular buildings on most sides of the plaza (Reese-Taylor, personal communication 2016). This contrasts with residential groups in the Southern lowlands where distinct mounded buildings are usually centered on the sides of plazas with varied external access points. While Caracol and Tikal share this latter arrangement for their residential plazas, there are distinct differences between the two sites; many of Caracol's residential groups are situated on elevated platforms while those of Tikal are not; only 6% of Tikal's mapped groups have a focus on an eastern shrine building while over 70% of Caracol's groups focus on an eastern shrine (A. Chase and D. Chase 2014). These residential variations are likely useful indicators of cultural and political units.

While Maya cultural and political associations may be reflected in the kinds of residential units that occur at a given site, density figures for Maya sites and settlements also are reflective of their societies. In a note for his 1990 paper, Turner (1990:314-315) suggested that density figures in "rural" areas strongly differed between Tikal and Rio Bec, but the implications of this statement could not be fully contextualized because there were few comparative samples. Since this time, significant work has been undertaken at sites like Caracol (Figure 2) and Chunchucmil (Figure 3), which further demonstrate differences in both density and scale across the Maya lowlands. For Chunchucmil, Dahlin and his colleagues (2005) showed that the population was too dense and the soil too poor for the city to have grown all its necessary food within the immediate region. Thus, while Chunchucmil may have had kitchen gardens within the urban confines, its agricultural fields would have been located outside of its urban area or food stuffs would have needed to be imported into the city (this is similar to what Sanders et al. [1979] describe for Teotihuacan in the Valley of Mexico). However, it appears that Chunchucmil is reflective of general settlement patterns found elsewhere in the Northern lowlands (Table 1). When taken in aggregate for this area, it strongly suggests that agriculture

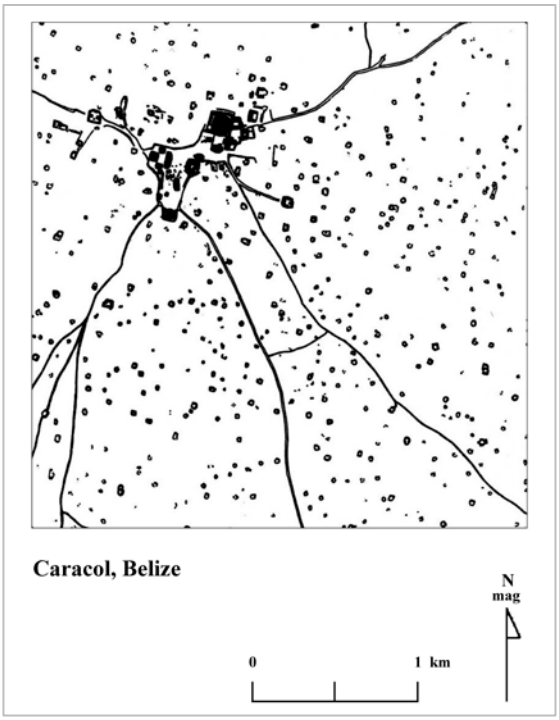

Figure 2. Central 9 sq km of settlement at Caracol, Belize showing the rather evenly spaced distribution of the site's residential groups.

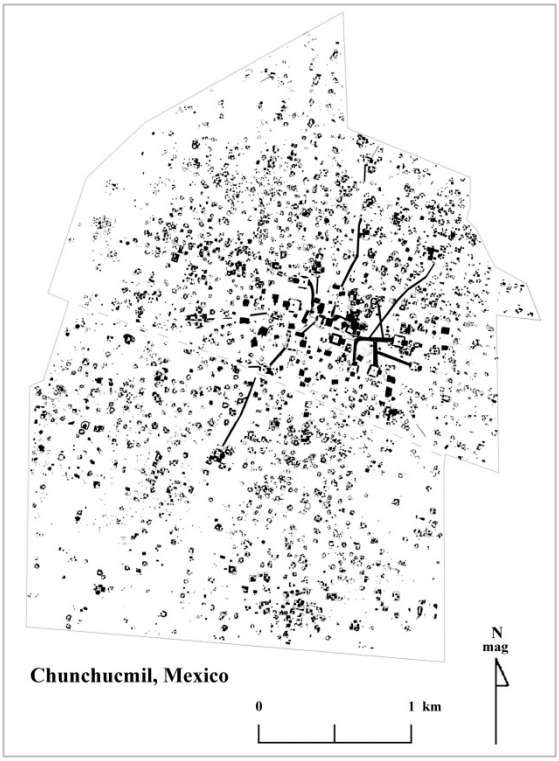

Figure 3. Central 9.4 sq km of settlement at Chunchucmil, Mexico showing a more compact and dense settlement focused on the site's central architecture (after Hutson et al. 2008).

Table 1. Population Estimates of Maya Cities.

Site	Size	Estimated Population	Density per sq km
NORTHERN AND WESTERN LOWLANDS			
Palenque, MX	2.2 sq km	4147-6200 individuals	1,885-2,818 indvs./sq km
Sayil, MX	ca. 5 sq km	10,000 individuals	2,000 indvs./sq km
Dzibilchaltun, MX	19 sq km	23,292 individuals	1,231 indvs./sq km
Chunchucmil, MX	20-25 sq km	40-42,500 individuals	1,700-2,125 indvs./sq km
Coba, MX	80 sq km	50,000 individuals	1400 indvs./sq
Mayapan, MX	4.2 sq km	12,000 individuals	2,857 indvs./sq km
SOUTHERN LOWLANDS			
Tikal, GUAT	120 sq km	62,240 individuals	517 indvs./sq km
Caracol, BZ	200 sq km	100,000 individuals	500 indvs./sq km
Tayasal, GUAT	54 sq km	27,000 individuals	500 indvs./sq km

Site sizes and estimated populations are derived from the following sources: Barnhart 2005; A. Chase 1990; A. Chase et al. 2011, 2014a; Culbert et al. 1990; Folan et al. 1983; Hare et al. 2014; Hudson 2016; Sabloff and Tourtellot 1991; Stuart 1979.

undertaken within the urban confines of most sites in the Northern lowlands was insufficient to sustain these communities. However, the residential density for the Southern lowlands is quite different (see Table 1). Comparisons to contemporary studies of land productivity suggest that the areas immediately adjacent to residential units in cities like Tikal and Caracol could have been sufficient to provide for agricultural sustainability within their urban areas (e.g., Netting 1977; see also Sanders et al. 1979).

Thus, for the broader Maya area, referring to everything as a "low density agrarian city" (Fletcher 2009; Isendahl and Smith 2013) masks significant differences in urban sustainability mechanisms. Most Maya cities can be classified as "green," to use modern terminology (e.g., Campbell 1996; see also Graham 1999), but there appears to have been at least two different kinds of Maya urban development (Figure 4). Colloquially, we can refer to these ancient Maya cities as being either (1) agriculturally non-self-sustainable or (2) agriculturally self-sustainable. Most sustainable Maya cities were located in the Southern lowlands and were more dispersed over their landscapes than their counterparts in the Northern lowlands, which had a much higher settlement density (Table 1). Sustainable cities, like Caracol, could come in different sizes, but could grow to become sprawling "suburban" metropoli with intensive, presumably maintainable, agriculture within their urban limits. Non-sustainable cities, like Chuchucmil or Palenque, were often more compact and denser than the sustainable community cities, taking up less spatial area. While they were also "green" in that they likely had kitchen gardens associated with each residential unit, the overall urban footprint was often smaller and these cities were dependent on extensive agriculture beyond their urban boundaries. One or more

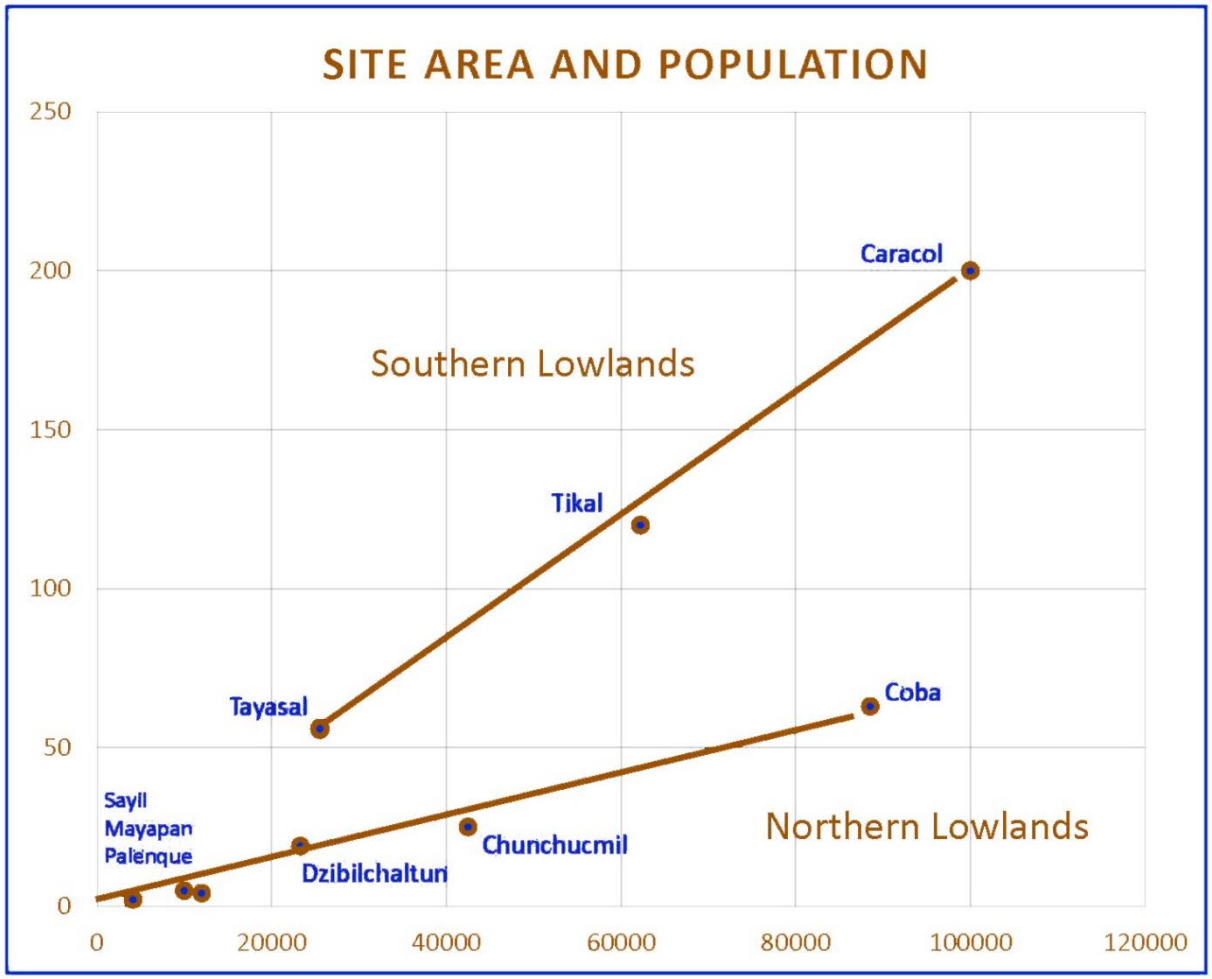

Figure 4. Graph showing a comparison of ancient Maya cities of the Southern Lowlands that could practice sustainable agriculture within their urban boundaries and ancient Maya cities of the Northern Lowlands that could not practice sustainable agriculture within their urban boundaries.

members of each household would have had to have maintained agricultural fields outside of city limits. Of the two kinds of cities, archaeology suggests that Classic Period agriculturally self-sustainable cities of the Southern lowlands have longer stratigraphic and development sequences and may have been more resilient than the agriculturally non-self-sustainable cities of the Northern lowlands, perhaps because of the proximity of food resources. Yet, in an ironic twist, only "transplanted" non-sustainable cities like Mayapan and Santa Rita Corozal (D. Chase and A. Chase 1988) survived or regenerated following the Classic Maya collapse.

Our view of Maya cities has advanced beyond our understanding of 25 years ago and even beyond the relatively recent characterization of them as "low density agrarian cities" (Fletcher 2009, 2012). While we have previously categorized Maya cities in terms of concentric and sector organization (Marcus 1983; Marcus and Sabloff 2008), changes in our understanding of the Maya economy confirm that contemporary urban models – such as Burgess's (1923) "concentric city," Garreau's (1991) "edge city," or Gottmann's (1961) "megalopolis" or "edgeless city" – have applicability to the ancient Maya (A. Chase and D. Chase 2007; A. Chase et al. 2001; D. Chase et al. 1990). Importantly, the variability found in Maya urban centers also moves us beyond comparing a uniform, generalized Maya city to other early low-density

cities in Cambodia, Indonesia, and Sri Lanka (e.g., Lucero et al. 2015) that were based on different social principles, agricultural products, and agricultural practices, including an irrigated landscape.

Conclusion

Maya urbanism can generally be referred to as "green" not only because of the subtropical environment in which it existed but also because the residential units within the larger centers generally incorporated either kitchen gardens alone or kitchen gardens and inter-residential group self-sustainable agriculture within the urban confines. Maya urbanism was not monolithic; at a minimum, it came in two different forms and scales. The relationship between Maya urbanism and agriculture during the Classic Period was strongly correlated. For the two basic kinds of Maya cities defined here – agriculturally self-sustainable and agriculturally non-self-sustainable – it is suspected that different developmental paths were followed because of their different relationships between urban settlement and agriculture. Sustainable cities were focused on agricultural self-sufficiency, even to the point of path-dependence (D. Chase and A. Chase 2014b); when they reached their maximum scale, more hierarchical control was necessary to make the whole system work. In contrast, non-sustainable cities presumably required an external focus to agricultural productivity because they could not sustain themselves solely within their urban boundaries; their denser residential clustering and smaller size may have resulted, at least in certain times, in a more heterarchical society. In general, Maya urbanism took on its own distinctive form because of its technology and crops; the New World plants (maize) differed significantly from Old World plants (rice, millet, taro, and yams) and Maya agriculture did not have the same focus on irrigation that occurred in the low-density settlements of Southeast Asia. Thus, Maya cities are generally not as compact or densely occupied as the planned urban cities found in many Old World societies. Nevertheless, there are striking differences in subtropical urbanism, even within the Maya lowlands. These variant urban forms, developed over almost a millennium, constituted successful adaptations to the world's subtropical environments and should be added to the dataset for world urbanism.

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2 DISTRICTING AND URBAN SERVICES AT CARACOL, BELIZE: INTRA-SITE BOUNDARIES IN AN EVOLVING MAYA CITYSCAPE

Adrian S.Z. Chase

Urban research in the Maya area often focuses on either the city as a whole, individual house groups, or neighborhoods as clusters of house groups; however, administrative districts provide another level of urban analysis. Administrative district identification rests on the assumption that specific architectural features and civic planning can be used as proxies for administrative services provided by the city and, as such, can be used to identify districts. With this simplification in mind: formal plazas served as spaces for markets and other large gatherings; ballcourts allowed spectators to watch ballgames; formal reservoirs stored rainwater runoff; and, E Groups provided ceremonial and ritual services. Each of these architectural features provided a service to city residents, occurs exclusively within nodes of monumental architecture often integrated by the causeway systems, and are easily distinguished and identified within the maps and LiDAR derived DEM datasets of Caracol, Belize. This investigation demonstrates that four of these features exhibit a strict scaling relationship. At Caracol, any node of monumental architecture with an E Group or a formal reservoir possessed a ballcourt, and all centers with ballcourts possessed formal plazas. The converse of the above statement does not hold. Thus, using feature distribution and two allocation methods, this paper identifies potential political or economic districts at Caracol.

Introduction

The cities of the ancient Maya have long proved difficult to understand, as highlighted by the inability of V. Gordon Childe's (1950:9) comparative definition of urbanism to reconcile both Mesopotamian and Maya urban traditions. Once thought to be vacant ceremonial centers (Vogt 1961; 1964), we now recognize these sites as cities, some with large populations (A. Chase and D. Chase 1994; A. Chase et al. 2011). The Maya interspersed households within agricultural areas (Healy et al. 1983; A. Chase and D. Chase 1998) with a density characteristic of modern suburban settlement. Maya cities are classic examples of what has been termed "low-density urbanism" (Fletcher 2012; Isendahl and Smith 2012). While a cursory examination of this concept insinuates something barely urban, it also applies to contemporary cities and their greater urban areas, such as Boston and Philadelphia (Table 1). Unlike more "typical" urban centers like New York, London, or Paris – these cities possess urban sprawl and low overall population densities; however, with the inclusion of greater city areas, downtowns and their outlying suburbs, even some of these contemporary cities have the density of low-density urban settlements (Gober 2005:107-108 and Table 2).

More recently, in order to advance comparative urban studies, some researchers have begun to investigate the underlying features of urban organization including sprawl, sustainability, longevity, resilience, and inequality (Barthel and Isendahl 2013; Stanley et al. 2015; Smith 2010a, 2012; Smith et al. 2012; York et al. 2011). Others have created comparative typologies of urban open spaces and their distribution throughout the cityscape (Stanley et al. 2012: Figure 1). This study emphasizes the idea that analysis of urban architectural features permits comparisons of urban forms, functions, and boundaries across time and space. As such it allows modern and archaeological cities to be compared (Stanley et al. 2015). Utilizing this comparative idea, this paper applies similar urban service methods in order to analyze a series of high-level replicative architectural features: formal plazas, ballcourts, formal reservoirs, and E Groups as centroids of urban services at the ancient city of Caracol in modern day Belize (Figure 1).

Caracol was occupied from roughly 600 BCE to 900 CE. It reached its peak population of over 100,000 people around 650 CE (A. Chase and D. Chase 1994:5). The lack of occupation for the region after the city's abandonment has preserved its palimpsest of archaeological significance under the rainforest canopy. The basic residential unit at Caracol, the *plazuela* group, consisted of four or more structures built surrounding a central plaza in which an extended family lived (D. Chase and A. Chase 2004; A. Chase and D. Chase 2014). Urban integration occurred through a network of causeways linking monumental architecture

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Table 1. Densities of Greater Metropolitan areas of modern cities (Gober 2005:107-108 and Table 2) juxtaposed with Caracol's population density near the epicenter.

City	Density (people per sq. km.)
Atlanta	~ 690
Boston	~ 890
Caracol (Near Epicenter)	**~ 940**
Philadelphia	~ 1100
Washington D.C.	~ 1310
Phoenix	~ 1400
Chicago	~ 1500
New York City	~ 2050

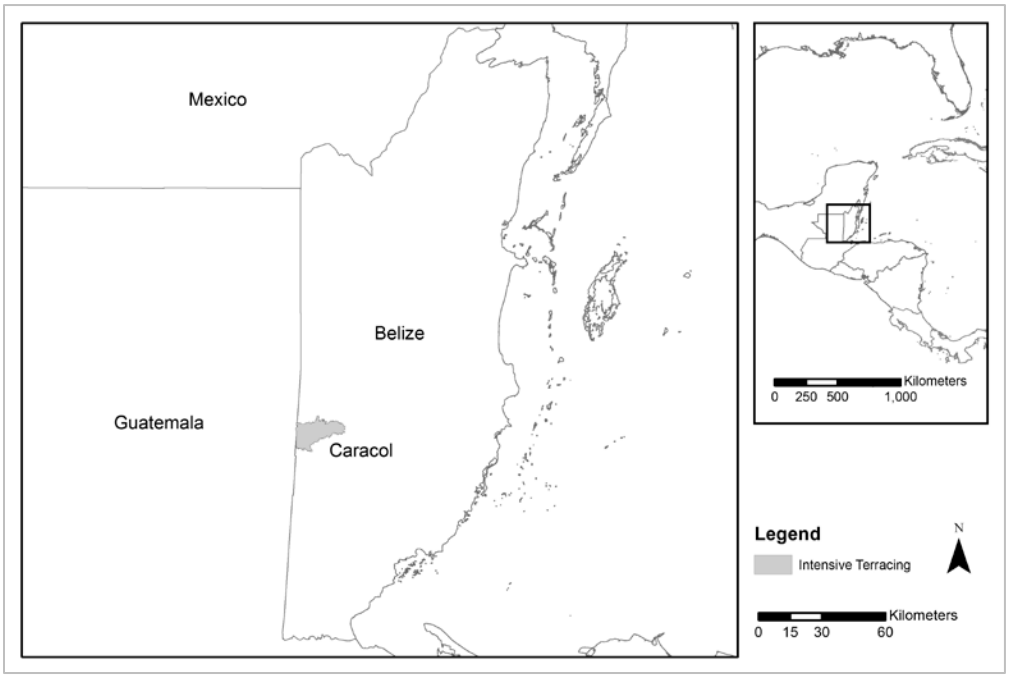

Figure 1. The location of Caracol and the extent of intensive terracing around the city. Terraces extend in valley bottoms beyond this boundary.

across the city (A. Chase and D. Chase 2001, A. Chase et al. 2011). The monumental architecture at the nodes of the causeway system incorporated exaggerated forms of the *plazuela* unit with much larger formal plazas, ballcourts, reservoirs, and ritual horizon-based astronomical observatories called E Groups.

Causeways link the epicenter, the city's central hub and the location with the largest concentration of monumental architecture, to outlying termini groups, locations with large formal plazas and additional monumental architecture. The people of Caracol constructed this monumental architecture exclusively in

specific nodes. The rest of the urban landscape consisted of residential *plazuelas*, agricultural terraces, and small reservoirs for rainwater storage. The causeways fully integrated these nodes within the agricultural and residential space of Caracol.

The uniformity of these house groups, terraces, and reservoirs provide no clear indication of diagnostically neighborhood-level architectural features. While some researchers use settlement clustering or other metrics to identify neighborhoods (see overviews in Robin 2003:330-331 and Smith and Novic 2012:11-12), districts provide an alternative unit of intermediate settlement analysis that is well-suited to the study of large-scale settlements (Smith 2010b; Smith and Novic 2012:4-5). Districts provide for the administrative needs of the governing system and divide the city into sub-units comprised of multiple neighborhood groups. The top-down nature of this sub-division requires the construction of specialized spaces for administrative functions to take place.

As such, the uniqueness and repetitive occurrences of architectural features exclusively in the epicenter and monumental nodes of architecture is used to argue for potential services that could have been provided. Christaller's Central Place Theory (1966) and Fletcher's "Limits of Settlement Growth" (1995) both provide the theoretical basis for analyzing formal plazas, ballcourts, large reservoirs, and E Groups as features that provided services and allow us to identify potential intra-site boundaries at Caracol based on service areas and potential administrative districts.

The Theory of Urban Services

Central Place Theory (Christaller 1966) attempts to explain the distribution of goods and services in modern cities based on two essential but opposing forces. First, consumers will travel different distances for different types of services. For instance, people travel farther to buy a car than to buy bread. Second, service providers naturally tend toward centralization to maximize the economy of scale. Consumers "pull" services toward themselves based on willingness to travel specific distances, and the service providers "pull" services away from consumers through their desire for centralization. The resulting balance determines the locations of service features according to this model (Krugman 1996:13-15).

Fletcher's (1995) model of city size focuses on factors determining the limits of settlement instead of service features. In his model, two limiting factors determine the ultimate extent of an urban settlement's size. The communication limit (C-limit) restricts settlement size based on the communication technology available and the interaction limit (I-limit) represents the mental capacity and associated costs for social interaction based on the built environment of the settlement, for example through the construction of walls. Following Fletcher, these two limiting factors can only be exceeded or altered by introducing new technologies thereby increasing the distance of communication, or through cultural changes reducing the cost or frequency of social interaction. While these factors can be used to describe the maximum extent of most cities, low-density urban cities ignore these limits (A. Chase et al. 2011, Fletcher 1995 Figure 5.12, and Figure 2), and exceed Fletcher's one-hundred square kilometer urban limit on pre-industrial settlement (Fletcher 1995:93-94).

Finally, following Smith (2010b:140) I use the administrative districts concept to investigate urban structure of a zone with management functions that aggregates smaller neighborhood-level organization. Districts provide for administrative subdivision of primarily residential urban areas and may have unique architectural features. Often these areas have unique social identities and consolidate multiple neighborhood groups together (Smith 2010b:140). One product of district research is the urban open spaces model created by Stanley, Stark, Johnson, and Smith (2012). This model creates a system for discussing open space urban features – transport facilities, streets, plazas, recreational space, incidental space, parks and gardens, and food production – some of which provide urban services at different scales: citywide, intermediate, and residential (Stanley et al. 2012: Figure 1). While many of the specific features within this application are not present or easily identifiable for the ancient Maya, the open spaces approach provides

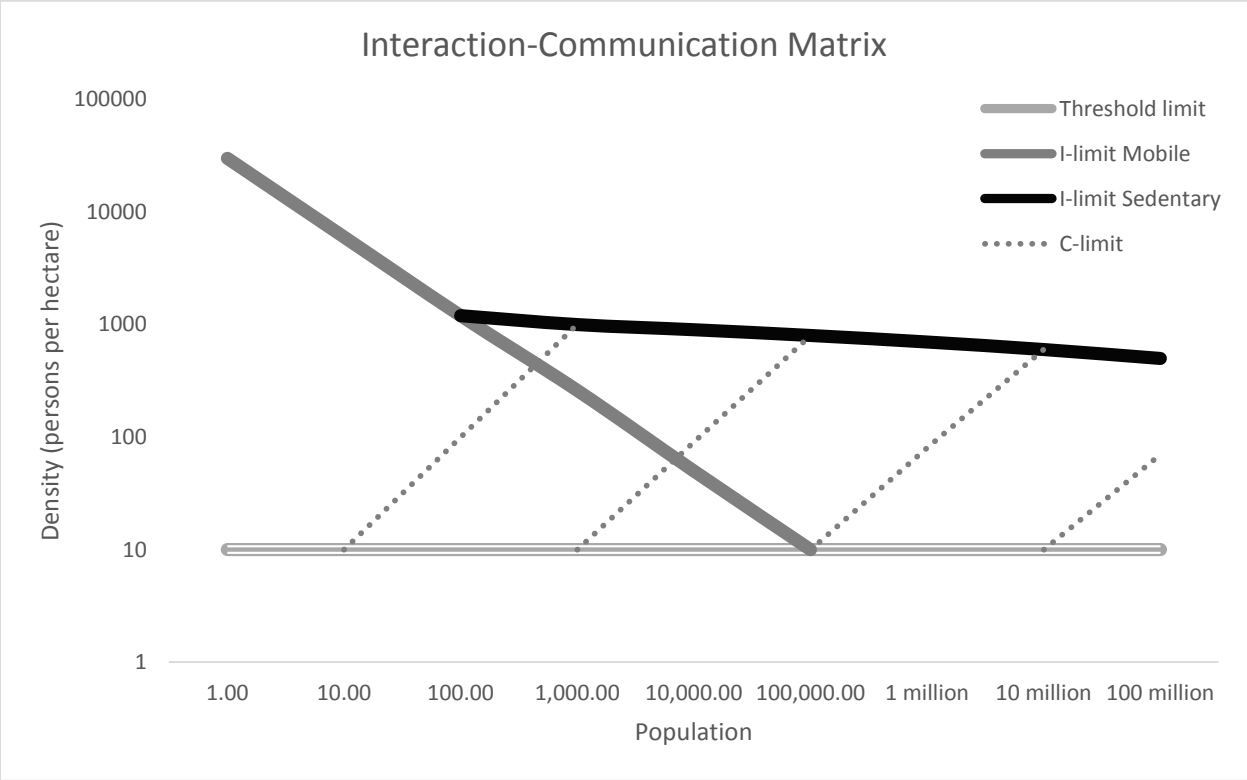

Figure 2. Re-creation of the graph of settlement trajectories after The Limits of Settlement Growth (Fletcher 1995: Figure 7.5). Low-density urbanism falls under the threshold limit and thus slips underneath the interaction and communication boundaries that would ordinarily limit settlement size.

archaeologists with a basic framework for investigating potential urban services.

Open Spaces Model of Ancient Caracol

Three types of open spaces can be identified at Caracol: causeways, plazas, and terraces; the first two of these features provided urban services. The streets of Caracol, the *sacbeob*, connected all of the termini groups to the city center. There are a few causeways at Caracol which act as spurs that attach households or potential neighborhoods to the main road system (A. Chase and D. Chase 2001). The causeways do not connect every household into the larger road system. While routes from the houses to other houses, to terraced fields, or to the main road system must have existed, such informal paths have long since been erased by time.

Two types of plazas occur at Caracol with no easily identifiable intermediate level. Large, formal plazas exist in the epicenter and at nodes of monumental architecture (see Figure 3), while small residential plazas exist within the basic *plazuela* unit. There are no mid-range plazas, which may have served as neighborhood-level plazas, and there are insufficient formal plazas for those locations to have served as neighborhood-level features. Thus, the number and distribution of formal plazas may be used to subdivide Caracol into potential administrative or economic districts (Figures 4, 5).

The final open feature at Caracol, which is easily seen but difficult to measure, is the agricultural terrace system (A. Chase and D. Chase 1998; Murtha 2002). Given their extent at the site, their role in maintaining site population, and the labor that would have been required to build and maintain them, an argument that they likely served a city-level open-space function would not be unjustified (A. Chase and D. Chase 1998:73). Even so, insufficient evidence exists to attribute terraces to a citywide, district, neighborhood, or household scale without additional data, excavation, and computational pattern matching.

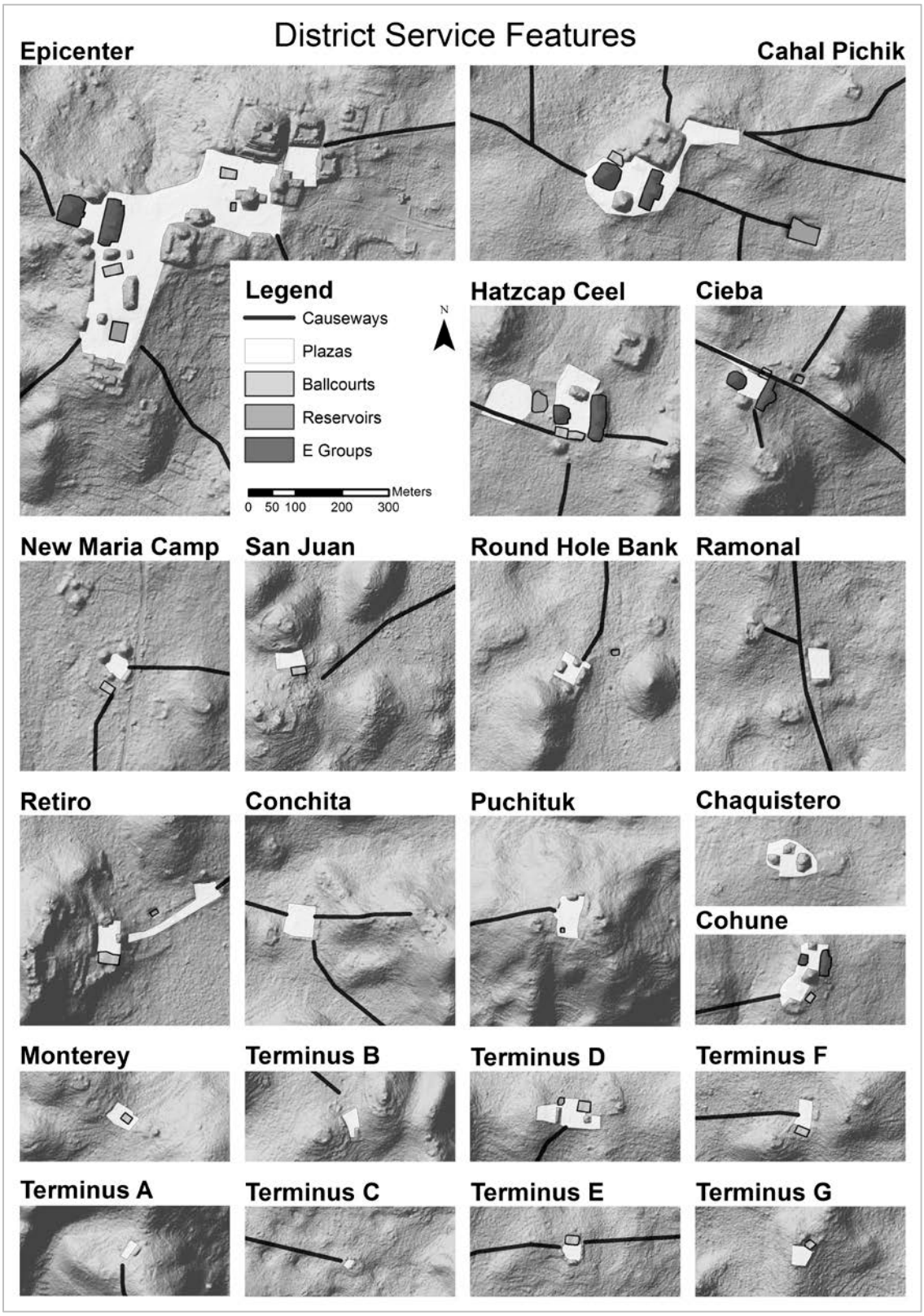

Figure 3. Service features at Caracol's epicenter and monumental groups to the same scale.

Figure 4. Service areas represented by Voronoi diagrams (Thiessen polygons) of architectural features present at the monumental groups. The edges are bounded by the extent of either intensive terracing or the 2013 LiDAR dataset.

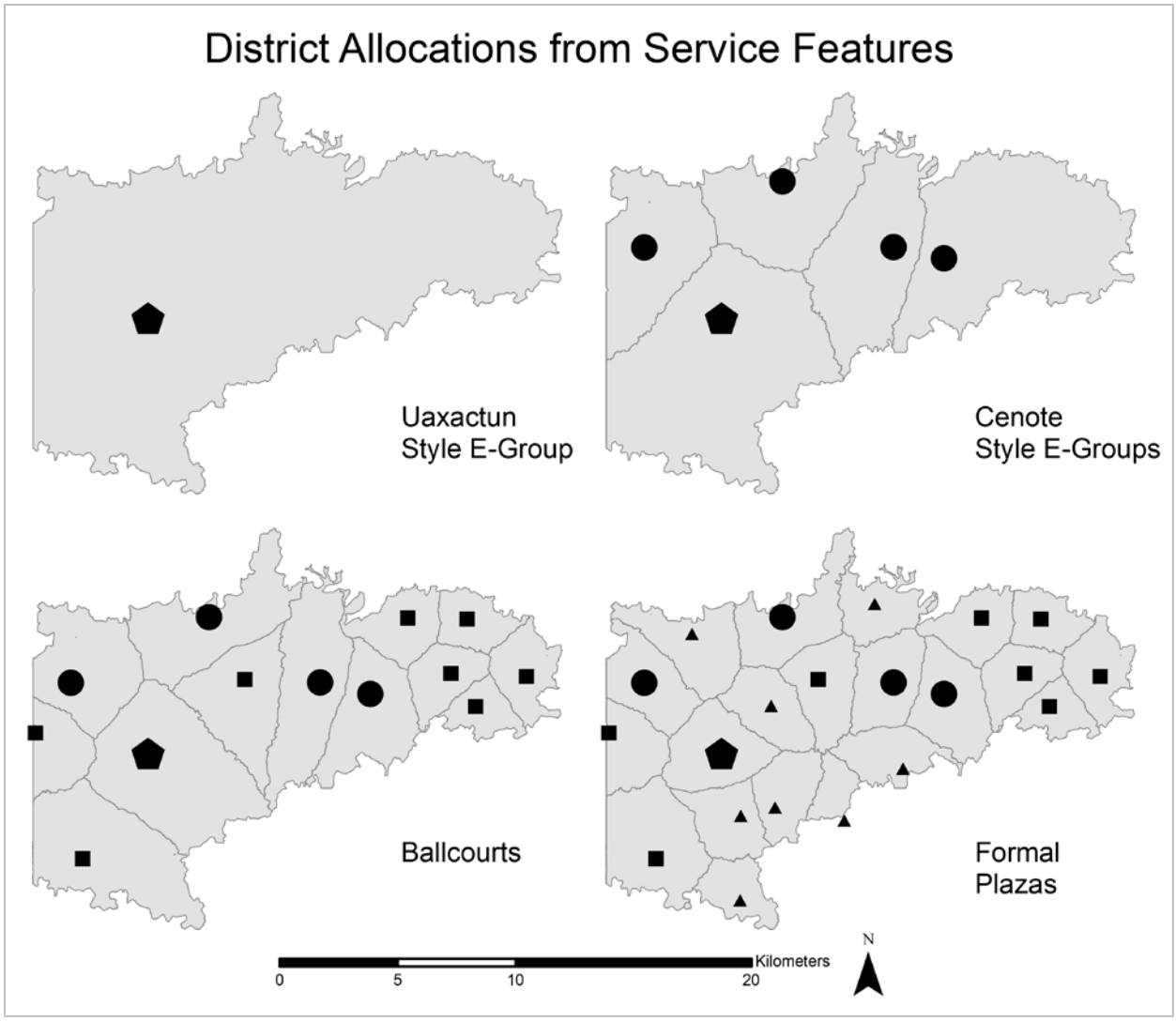

Figure 5. Service areas represented by the least cost path allocation of architectural features present at the monumental groups. The friction surface was generated from applying Tobler's hiking function on slope. The edges are bounded by the extent of either intensive terracing or the 2013 LiDAR dataset.

Additionally, terraces do not act as an urban service facility and, as such, they are not part of this analysis.

The resulting dichotomy of either district or household level features from application of the Stanley et al (2012) open spaces model demonstrates the lack of permanent neighborhood-level architectural, open-space features. The service features that are present – causeways and plazas – seem to exist predominantly at either the residential or the city scale. Intermediate scale neighborhood open space architectural features cannot be confidently identified based on existing survey data or the Digital Elevation Model (DEM) derived from the LiDAR dataset (A. Chase et. al 2011). This is not used to argue against the existence of neighborhoods at Caracol or that neighborhood groups could not be identified through household clustering, local topography, or similar artifact assemblages. Instead, there appears to be a lack of any preserved formal structure indicating a neighborhood-level administrative function. The lack of neighborhood-level intermediate features may indicate that the spacing of the households at the residential scale and the spacing of the nodes of monumental architecture at the city level scale helped the site exceed the potential integration and communication limits (Fletcher 1995) on

settlement growth. Alternatively, intermediate level neighborhood features may have been constructed out of perishable materials that have not been preserved.

Urban Service Features

An identification of urban surface features provides additional specificity to the determination of mid-level organizational districts. Four specific architectural features characteristic of the Caracol epicenter and nodes of monumental architecture are used in this analysis because of scholarship linking these features to urban services and because they can be identified in the mapping and DEM datasets. Each feature is briefly introduced here and detailed further in the following paragraphs. Large, formal plazas existed at all of these nodes and, as large open spaces, these gathering places were likely used for multiple purposes as markets, ceremonial spaces, political theaters, and locations of social events. The pan-Mesoamerican ballgame necessitated the presence of ballcourts; ballcourts at Caracol existed at the epicenter or in nodes of monumental architecture. While residential reservoirs existed throughout the landscape, large formal reservoirs only occurred at the epicenter and nodes of monumental architecture. Finally, E Groups were also highly spatially restricted; they may have been important in social, political, ceremonial, or economic interactions – as well as in the integration of the city. Each of these architectural features can be located in both the site maps and the LiDAR-derived DEM of Caracol through sky-view factor (Kokalj et al. 2011; Zakšek et al. 2011) and local relief model (A.S.Z. Chase 2012:42-45; Hesse 2010) visualizations.

Plazas are flat open spaces covered with lime-plaster and usually raised above the surrounding landscape. While every residential *plazuela* group has a tiny plaza at its center, only monumental architectural nodes, including those in epicenter and monumental groups, contain large, formal plazas. These large, formally defined spaces may have been utilized as marketplaces (A. Chase and D. Chase 2004:121; A. Chase et al. 2015), as the locations for political taxation and control (D. Chase and A. Chase 2014:240), as spaces for community-building rituals and ceremonies (Inomata 2014:19-33), or as a multi-purpose space for all these needs and others that may have arisen. While a wide variation in plaza size exists (Table 2), even the smallest formal plaza is twice as large as a residential plaza, and the largest plazas are orders of magnitude larger still.

Ballcourts are common across Mesoamerica. The shapes and sizes of ballcourts change over time and across space, and there are a variety of theories about ballcourts and their use in the New World (Scarborough and Wilcox 1991). At Caracol, ballcourts are clearly visible on the ground and in the DEM as parallel spaces between structures. When another structure's sidewall is utilized as one edge of the ballcourt, they are harder to identify, but all of the parallel narrowly spaced buildings at the site form ballcourts. They exhibit a semi-standard size for the playing area of roughly 120 through 150 square meters, but the sizes of the two side structures vary widely. In the Maya area, interpretations suggest that ballcourts had numerous ritual associations and that ballgames even ended with human sacrifice (e.g. Rice 2004:253). Hieroglyphic texts on the Caracol B Group ballcourt provide various references to accession (Helmke et al. 2006), suggesting the association of ballcourts with rites of rulership.

Reservoirs, rectilinear features excavated into or constructed above the landscape were lined with stone and then water-sealed with plaster or clay; they aided in the capture and storage of rainwater for human consumption and use. Reservoirs come in a variety of shapes and sizes, but this study focuses on the largest and most formally designed reservoirs, features often associated with elite control (Lucero 2006a, 2006b; Scarborough 1998, 2006). Because even the smallest formal reservoir is over seven and a half meters on its shortest side, they appear in the one meter resolution DEM visualizations and on survey maps. Rain feeds both the reservoirs and the agricultural terraces at Caracol. The plastered plazas often drained into reservoirs, providing additional surface area impervious to infiltration to aid in rainwater capture. Previous research has shown that residential reservoirs played a much larger part in the provisioning of

Table 2. This table shows surface areas (rounded to the nearest ten meters squared) and presence or absence for the service features in monumental nodes of architecture at Caracol.

Name	Formal Plaza Area m^2	Ballcourt & Structure Area m^2	Large Reservoir Area m^2	E Group Area m^2	Causeways Present
Service Feature Tier 1: Uaxactun E Group					
Epicenter	72,150	1,570	1,530	**6,920**	Yes
Service Feature Tier 2: Cenote E Groups					
Cahal Pichik	17,840	640	2,530	**5,240**	Yes
Hatzcap Ceel	15,900	1,140	1,230	**4,370**	Yes
Ceiba	3,960	450	260	**2,910**	Yes
Cohune	5,080	280	-	**1,530**	-
Service Feature Tier 3: Ballcourts					
Retiro	8,040	**1,050**	160	-	Yes
Terminus D	4,920	**590**	180	-	Yes
Terminus E	930	**550**	-	-	Yes
San Juan	2,100	**530**	-	-	Yes
New Maria Camp	1,730	**510**	-	-	Yes
Terminus F	1,920	**470**	-	-	Yes
Monterey	2,100	**320**	-	-	-
Terminus G	1,600	**290**	-	-	-
Service Feature Tier 4: Plazas					
Chaquistero	**4,820**	-	-	-	-
Conchita	**4,430**	-	-	-	Yes
Puchituk	**4,070**	-	70	-	Yes
Ramonal	**2,860**	-	-	-	Yes
Round Hole Bank	**2,190**	-	180	-	Yes
Terminus B	**1,380**	-	-	-	Yes
Terminus A	**560**	-	-	-	Yes
Terminus C	**280**	-	-	-	Yes

drinking water at the site (A.S.Z. Chase 2012:52-54). While the large formal reservoirs found at Caracol's epicenter and monumental nodes may not have been the primary source of elite power and control, they certainly suggested the clout of the elite to visitors and residents.

E Groups have intrigued Maya archaeologists since the first one was discovered at Uaxactun (Ricketson 1928: Ricketson and Ricketson 1937). These architectural groups occur as one of two stylistic types based on the site they were first identified at: Uaxactun or Cenote. Most theories focus on E Groups as horizon-based astronomical observatories (Aveni 2001: Figure 109). E Groups consist of two basic structures, a western pyramid and an elongated eastern structure. No other architectural configuration has this appearance. The Maya constructed these architectural complexes in the Middle Preclassic Period (prior to 300 BCE) with later construction and expansion continuing into the Early Classic Period (A. Chase and D. Chase 2012). The cosmological significance of these features has also been tied into Maize God iconography (Estrada-Belli 2006) with the power of the ruler being iconographically conflated with the Maize God (Saturno et al. 2005). Analysis of the

alignments of some of these structures suggests that they may not have been used as astronomical observatories (Aimers and Rice 2006). The limited spatial and temporal diversity (A. Chase and D. Chase 1995) suggests that they may have been tied to initial legitimization of the local elite.

As previously mentioned, all four feature groups possess distinctive architectural plans that facilitate confident remote identification. In addition, these forms can also be identified for unexcavated structures because of their unique spatial layouts and the manner in which they altered their landscapes. This is due in part to the ground-truthing provided by the survey maps for the remote identification.

Methods

This investigation required detailed analysis and expansion of the GIS database for Caracol. Survey maps were utilized to digitize architectural features in conjunction with the LiDAR-derived DEM visualization products (results visible in Figure 3). Only a few locations outside of the surveyed monumental nodes were added. For example, Terminus G has not been ground-truthed but the architectural signature for a formal plaza and ballcourt are very iconic and unique at this locus.

The analysis required GIS polygons to digitize each service feature to obtain surface area and a centroid. In order to analyze the spatial distribution of service features Voronoi diagrams, also known as Thiessen polygons, were created from these centroids (Figure 4). The areas under analysis were also limited to the extent of intensive terraced agriculture around the site. While settlement and terraces occur beyond this delineation, the intensive terracing seems to correspond well with the spatial extent of the monumental nodes of architecture.

While the Voronoi diagrams provide an easy-to-understand metric for spatial area, the desire to factor in the cost to traverse the landscape seemed appropriate given its rugged and hilly nature. Thus, I also computed the least cost path allocation from each of the service feature centroids (Figure 5). Application of Tobler's Hiking function (Tobler 1993: paper 1) to slope provided the friction surface for determining traversal costs in kilometers per hour (White 2015). While the friction surface on slope is anisotropic, the travel cost ignores differences in directionality, but still provides a better indicator of easiest travel to the closest district center than Voronoi diagrams can provide.

To complement the spatial distribution of features in site-wide maps, the surface area of each architectural feature was also calculated (Table 2). Analysis of the GIS polygon features provided these measurements. While they only show surface area without any sense of volume or depth, they do sufficiently provide a quick method for comparing the scale of architecture in the epicenter and monumental nodes.

These data illustrate the architectural scale and spatial extent of these service features; however, they only show a single snapshot of this landscape after its abandonment. The resulting survey and LiDAR data uncovered only the final phase of this city. Neither the survey nor the LiDAR alone incorporate the chronology of construction without the addition of archaeological excavation.

Insights from the Chronology at Caracol

The Maya built E Groups as early architectural forms, (A. Chase and D. Chase 1995, 2012) and archaeological evidence shows that at least the epicenter and two monumental nodes, Cahal Pichik and Hatzcap Ceel, began as independent polities. The epicenter later incorporated these polities into its urban area. This pattern can help explain why the E Groups occur where they do and how the political unification of these once independent units is reflected in Caracol's epicentre. The epicenter contains the only Uaxactun-style E Group at Caracol and underneath its façade sits a previously constructed Cenote-style E Group. Possibly after urban integration, the city only needed one E Group with the others providing redundant services.

Investigating the construction of monumental nodes helps explain their location and scale. The nodes of Puchituk, Ramonal, and Conchita were all constructed in the same timespan (early Late Classic Period, ca. CE 500-600) and exist in the densely populated areas to the south, southeast, and northeast of the epicenter. The smallest monumental nodes,

Terminus A, Terminus B, and Terminus C, saw the latest construction at the site. They only possessed plazas. It appears that those three nodes might have resulted from an attempt to instigate new household settlements near the periphery. New Maria Camp very likely predates these latest monumental nodes as it has a ballcourt and connects Termini D into the site. As a whole this suggests that ballcourts may only have been required after the surrounding population reached certain density thresholds.

The Hierarchy of Urban Service Features

Central Place Theory predicts that services will exhibit a scaling relationship. Less frequent services will be more centralized while more frequently used services will be more widely distributed, but they will co-occur in strict hierarchies of use. Based on the surface areas and presence of service features (Table 2), a few significant breakpoints occur. The first two tiers includes those locations that have E Groups, ballcourts, and formal plazas; the third tier includes those locations that have ballcourts and formal plazas; and the fourth tier includes those locations that have only formal plazas. While this set of tiers aids in explaining the co-occurrence of service features, the feature sizes themselves do not neatly scale and may be based on surrounding population densities.

While the epicenter was larger with more service features than the other monumental nodes, the city focused on architectural features to provide integrative services and on built roads, *sacbeob*, to facilitate this integration, as can be seen in Figure 4. Additional excavation and computational analysis is required to help explain the patterns that emerge, especially in terms of establishing the role of time depth in service feature construction. However, from the distribution of architectural features, a strict hierarchy is evident. All districts required formal plazas; however, a smaller fraction had ballcourts with their formal plazas, and an even smaller fraction had formal reservoirs or E Groups along with their ballcourts and formal plazas. The distribution of features suggests that Caracol's residents were willing to walk substantially farther to see a ballgame than to go to a plaza. This follows Central Place Theory's model of service distribution with plazas providing services more necessary for daily life than ballcourts.

In terms of surface area, all of the termini and nodal monumental architecture groups pale in comparison to the epicenter's gigantic formal plaza spaces. However, the second tier also includes Cahal Pichik and Hatzcap Ceel which were once independent polities. Retiro is a bit of an outlier in terms of size, but fits relatively neatly with Ceiba, Cohune, Chaquistero, Conchita, and Puchituk. These monumental nodes are located among higher densities of settlement than the next tier of San Juan, New Maria Camp, Monterey, Ramonal, Round Hole Bank, and Termini D through E. The final set of plazas includes Termini A, B, and C and these are confirmed to be the latest monumental nodes at Caracol. While plaza size may have been conditioned by an element of time with older settlements possessing larger plazas, it may also have been related to the number of people that used these plazas, at least at the time of construction. Additional investigation will be required to determine the actual population associated with these features based on household counts near each plaza.

As with plazas, the epicenter is unique in regard to ballcourts. While only one ballcourt exists at any given terminus or monumental architecture node, the epicenter possesses two ballcourts. Every location with a ballcourt also contains a formal plaza. Ballcourts tend to be located in areas of greater population and centrality except for the ballcourts in New Maria Camp and Cohune (Figure 3). This aspect could mean that ballcourt construction is related to the surrounding population density, length of establishment, or specific temporal windows when they were constructed. Since ballcourts tend to be associated with the ruling elite, the widespread distribution around the site could be related to local elites vying for socio-political power or, alternatively, to the central elite demonstrating their power throughout the city.

The epicenter possessed two formal reservoirs while other locations with a formal reservoir only possessed a single large reservoir. The largest reservoir (surface area only) occurred at Cahal Pichik (Table 2). Reservoirs tend to be located near the causeways and adjacent to the plazas in highly visible locations.

This placement within locations of high visibility may have been a means to showcase the power of the elite, or it may have been utilized as the water source for additional construction at these places. While some theories base elite power on the redistribution of water from these formal reservoirs (Lucero 2006a, 2006b and Scarborough 1998), the lack of these features at every monumental group may suggest that distribution of water by the elite was not the primary strategy for socio-political control at Caracol (see A.S.Z. Chase 2012 for information on residential reservoirs). These reservoirs also likely provided water for lime-plaster construction; if so, then Cohune, Chaquistero, and Conchita seem out of place as these groups lack a reservoir but contain over 4,000 square meters of plastered plaza surfaces.

E Groups, like the large formal reservoirs, only occur at five groups. Even though there are five E Groups at the site, the only Uaxactun style E Group at the site exists at the epicenter (A. Chase and D. Chase 1995). Excavation has revealed that the epicentral E Group was converted into a Uaxactun-style E Group over time. Initially it was an E Group that was the same size and shape of the E Groups at the other monumental groups, a variation on the earlier Cenote-style E Group. This additional construction and build-up of the epicentral E Group may indicate that over time only one E Group was needed to provide services, or that this E Group gained preeminence and special significance. The E Group distribution reinforces the theme of both the centralized organization and the uniqueness of the epicenter over the other monumental nodes in a fourth feature category.

Conclusion

In sum, this analysis describes the spatial extent and scale of four different urban services as represented by the architecture these services required representing potential districts and intra-site boundaries. The resulting features demonstrate a strict scaling relationship. Formal plazas are commonplace concurrent with all locations of monumental architecture; larger more centralized monumental nodes possessed ballcourts; and, only that subset of locations with ballcourts had formal reservoirs or E Groups. Correspondingly, E Groups could serve a larger segment of the population than ballcourts and people were willing to travel further to a ballcourt than to a formal plaza. This strict scale of features follows the expectations of using Central Place Theory on urban services. The idea that these structures were "efficiently" placed will, however, require additional analysis to test.

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3 LIDAR AT LAS CUEVAS: SETTLEMENT SURROUNDING AN ANCIENT MAYA PILGRIMAGE SITE

Holley Moyes, Pedro Carvajal, and Shane Montgomery

In this paper we explore the LiDAR (Light Detection and Ranging) imagery for the site of Las Cuevas and its surrounds. The LiDAR data, collected in a 2013 aerial survey, were part of the Western Belize LiDAR Consortium that covered 1,057 km2 of the Vaca Plateau and Belize Valley. From the 222km^2 portion of the LiDAR imagery surrounding Las Cuevas, we were able to detect natural features such as ridges, hills, valleys, aguadas, sinkholes, and cave openings as well as anthropogenic features such as structures, modern and ancient roads, and terraces. These data allowed us to examine settlement patterns around the site and better understand ancient population density. We found that population estimates were low, even in the most populated areas at Las Cuevas, as compared with urban population densities at Caracol. This suggests to us that the economies of the two sites differed and that low population estimates at Las Cuevas support an economic model appropriate to a place of pilgrimage.

Introduction

Slow and laborious travel, a hot, humid climate, swarms of insects, and prevalence of tropical diseases have greatly retarded exploration of the Maya country. Even in such parts of it as can be reached the traveler is so buried in the "bush," so shut in and engulfed by the mere weight of vegetation that he can literally never see more than a few feet or yards and so is almost totally in the dark as to the topography of the regions he is examining…without detailed information as to such vitally significant environmental factors it is manifestly impossible to gain a true understanding of the people whose history they must have played so large a part in molding (Ricketson and Kidder 1930:178).

These words resonate with any archaeologist conducting pedestrian survey in the Maya forest today. This dilemma led Oliver Ricketson and A. V. Kidder to partner with aviator Charles Lindbergh, who touched down in Belize in 1929. During his flight, he realized that ancient Maya pyramids could be seen from the air, which inspired the collaboration. The team flew over the Cockscomb Mountains and through the Mountain Pine Ridge then north to Benque Viejo in the first aerial archaeological survey of Belize. It was the opening chapter in a long history of remote sensing studies in the Maya lowlands that has included aerial or satellite imagery, most of which is impaired by the inability to "see" through jungle canopy (eg. King 1994; Pope and Dahlin 1985; Saturno et al. 2007; Sever and Irwin 2003). The most recent innovation in such studies is the use of airborne LiDAR (Light Detection and Ranging). For the first time there is a survey method that enables us to view ground surfaces from the air, allowing for regional coverage of large areas without requiring painstaking treks through rough terrain. For some, LiDAR survey is regarded as "revolutionary" (Chase et al. 2014) and the largest methodological advance in archaeology since the invention of radio-carbon dating.

Originally employed on a relatively small scale throughout portions of Europe (Sittler 2004), LiDAR-derived ground relief models have been generated for some of the largest and best known archaeological sites, including Stonehenge (Bewley et al. 2005), Caracol (Chase et al. 2010), and Angkor Wat (Evans et al. 2013). LiDAR imaging has proven most effective in areas of thick vegetation—such as the humid tropics—where traditional pedestrian survey methods are intensive and time-consuming (Gallagher and Josephs 2008; Hofton et al. 2002; Weishampel et al. 2000a; 2000b). The ability of the technology to produce bare-earth surfaces in these regions has led to increased identification of archaeological features throughout the landscape.

The principles of its use are simple though the physics are complex. To produce a LiDAR scan, instruments that emit arrays of light are fitted to aircraft. Images are produced using reflected light pulses from a laser emitted at an angle, making it possible to scan vertical or sloped topography. Some light bounces off of the canopy and vegetation, but some will rebound from the earth's surface. The light returning from the surfaces is recorded as point data so that physical models of the ground

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surface may be derived from those returned points. The data are then classified and displayed as 3D point clouds that can be further manipulated to create relief models of the earth's surface or bare earth models from which both anthropogenic and natural features within a landscape may be detected. LiDAR scan be adversely affected by dense vegetation regrowth in disturbed areas that have been recently cleared for farming, because so few points actually hit the ground (Prufer et al. 2015). But in forest reserves with high tree canopy and sparse undergrowth, such as in parks and reserves, the higher number of ground returns produce a more detailed and clearer result. As in all LiDAR imagery, some large features such as temples and palaces are quite obvious, whereas small or low features such as house mounds or small cave openings may best be viewed as cross sections or using local relief models (Moyes and Montgomery, n.d.).

In this paper we demonstrate the utility of LiDAR imagery and describe our methods for visualization and analyses. These data allow us to view a large area and enable us to locate natural features as well as anthropogenic structures. Although we have benefited by the topographic clarity of our LiDAR imagery due to the old forest growth in our area, it is still necessary to ground-truth our data. LiDAR-assisted survey helps to target specific features and areas of interest so that pedestrian survey no longer relies completely on random sampling or local knowledge for site discovery. Our data have helped us to locate potential cave sites, produce preliminary population estimates, and better understand settlement patterns. Our findings provide a basis for developing data-informed hypothetical models that can be confirmed, modified, or discounted based on future in-field ground-truthing.

Las Cuevas- A Late Classic Pilgrimage Site

Las Cuevas is a mid-sized center dating to the later part of the Late Classic period (Kosakowsky 2013, Moyes et al. 2015), located in western Belize in the Chiquibul Forest Reserve 14km southeast of the mammoth polity of Caracol (Figure 1). From 2011-2014, we recorded 26 structures built around two plazas (Plazas A and B), including temples, range

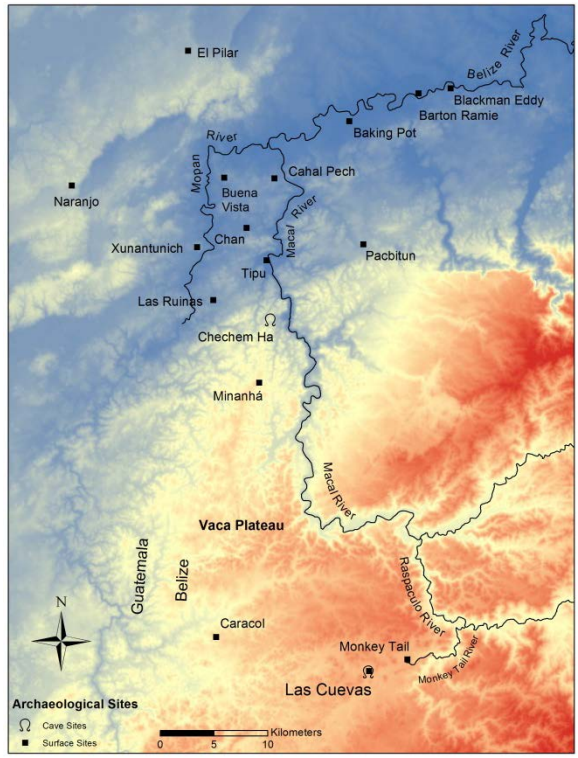

Figure 1. DEM of Belize showing location of sites mentioned in text. (Courtesy of the LCAR).

structures, low linear structures, a ballcourt, and a sacbe leading onto a hillside (Figure 2). To the north of Plaza A behind western Structure 4, an elite *plazuela* group sits on a terraced platform. The surface architecture is situated around a 15m deep dry *cenote* (sinkhole) with a gaping cave entrance at its base on the west side directly beneath Structure 1, the eastern temple in Plaza A. A 335m cave system runs beneath the plaza underlying Structures 1, 3, and 4 as well as the *plazuela* group. While it is not unusual for Maya sites to be associated with caves, we rarely see such a direct connection or such an extensive tunnel system beneath a site core (Moyes and Brady 2012). This is important because caves were used by both the ancient and modern Maya people as ritual spaces and were often employed in agricultural rites and rain making rituals (Christenson 2008, Brady and Prufer 2005, Moyes and Brady 2012, Moyes et al. 2009).

The Entrance Chamber of the Las Cuevas cave is architecturally modified with plastered platforms, terraces, and stairways that potentially accommodated over 500 participants (Moyes et al. 2015). In the center of the

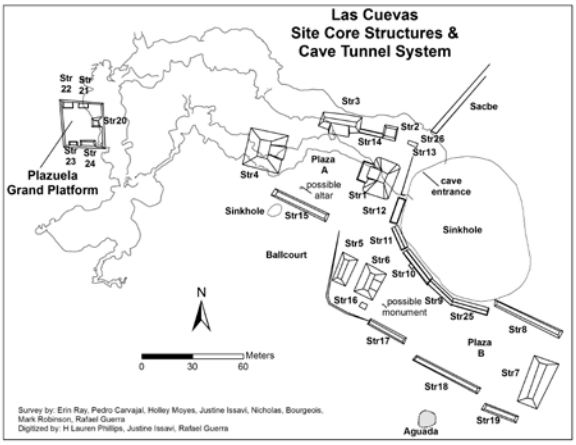

Figure 2. Base map of the Las Cuevas site core showing cave underlying Plaza A Structures 1, 3, and 4. (Courtesy of the LCAR).

chamber is a sinkhole containing a flowing river at its base, which forms a focal point from which the architecture ascends creating an amphitheater-like space. Because this large-scale performance space is located within the cave, Moyes and her colleagues (Moyes 2012; Moyes et al. 2015) have argued elsewhere that state-level rites conducted within the space were sanctified by the backdrop of natural landscape features, reifying Maya cosmological principles of an idealized sacred landscape and the mountain/cave/water complex (Brady and Ashmore 1999; García-Zambrano 1994; Vogt and Stuart 2005). This, coupled with the fact that the site was built away from any large population center, and that ceramics were imported from far and wide (Kosakowsky 2013), suggests to us that Las Cuevas functioned as a Location of High Devotional Expression (LHDE) such as a pilgrimage or cult center established during the Late Classic period (Moyes et al. 2015).

As a cult center, Moyes suspects that the site was founded by a charismatic leader. Such a leader would have had the capacity to mobilize labor yet may not have overtly wielded political power. This sort of leader could have exercised power and influence by promoting ideologies without controlling an army or trade network. This in turn suggests that sustaining populations for the site would be small and devoted to local subsistence and the support of travelers during pilgrimages. The influx of material offerings by pilgrims would periodically have bolstered the economy eliminating the need for surplus production necessary to sustain the leader and his retinue of religious practitioners. Therefore, in modeling settlements in a pilgrimage landscape, we would expect low densities among the sustaining populations as compared with other types of economies. With this in mind, we examine patterns in our LiDAR data, comparing our population and settlement densities to the neighboring site of Caracol. This is a compelling comparison because we know that Caracol was a major political power and economic center throughout the Classic period, the home to Maya kings, and a participant in large-scale warfare (D. Chase et al. 2014). Therefore, we can gauge the costs of supporting these programs based on Caracol's population size and density. Because of Caracol's close proximity to Las Cuevas, we are able to control for variation in ecological conditions and argue that differences between the sustaining populations of the two sites are due to socio/political factors that imply variation in their economic strategies not only for subsistence needs but for maintaining the site leadership.

LiDAR at Las Cuevas

LiDAR data for the west-central portion of Belize was acquired by the National Center for Airborne Laser Mapping (NCALM) in April and May of 2013 through a collaborative effort between multiple archaeological researchers. The campaign covered approximately 1050 km² (105,000 hectares) within the Vaca Plateau and along the Belize River Valley. NCALM used an Optech Gemini Airborne Terrain Mapper (ALTM) mounted on a twin-engine Cessna 337 aircraft, flying at 600 m AGL and a ground speed of 60 m per second. Three hundred and twenty-five north-south survey flight lines were flown spaced approximately 137m apart, which resulted in triple swath overlap. The laser was operated at a pulse rate of 125kHz with a beam divergence of 0.8mRad and a scan frequency of 55Hz. The nominal scan angle was 18 degrees with an edge cutoff of 1 degree. NCALM post-processed the data to remove modern structures and delivered point cloud data to us as .LAS files containing three dimensional *x*, *y*, and *z* values.

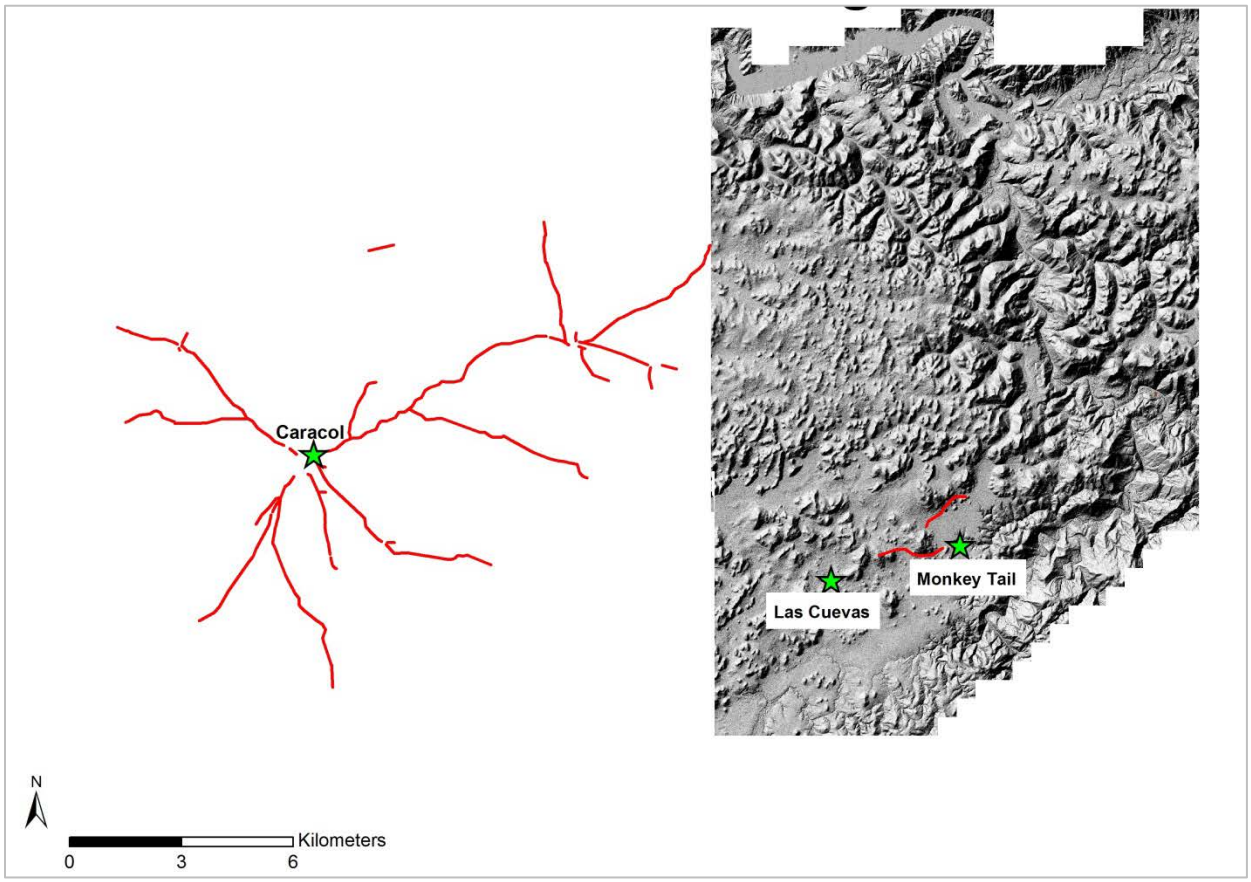

Figure 3. Map illustrates the relationship between Las Cuevas and Caracol. LiDAR image for Las Cuevas on right (courtesy of the LCAR).

Our analyses are based on a 222 km^2 area surrounding Las Cuevas, a region spanning both sides of the Monkey Tail Branch of the Macal River (Figure 3). Data analysis was conducted using ESRI ArcGIS 10.2 and QCoherent's LP360. This began with the creation of a meter-resolution LiDAR-derived digital elevation model (DEM) based off identified ground-return points (.LAS files). DEMs are rasterized (gridded) models that process and smooth the point data by averaging points within each grid cell (Bonham-Carter 1994:25). Hillshades are the most common representations used to look at LiDAR derived data. To accentuate the area's topography, hillshades were generated and displayed using ArcMap 10.2. The advantage of hillshading is that it produces a 3-dimensional effect, casting light from a single direction. The illumination angle can be changed so that features are highlighted or suppressed (Bonham-Carter 1994:129-132). Figure 4 above is an example of a hillshade map for the Las Cuevas site core. The disadvantage of hillshades is that they are technically a 2.5 dimensional model that do not allow us to directly measure features in the image, though each rasterized cell has a coded elevation. This elevation averages the points within that cell as a single value but does not account for the variation between single points. Measurements for *z* values (elevation) are best taken directly from the point cloud itself because those values are definitive for each point. Additionally, it is sometimes difficult for the eye to distinguish positive vs. negative relief structures in hillshade models. Therefore it is prudent to consult other models to interpret LiDAR points.

As a second means of modeling our data, we used LP360 software. In this model we created Triangular Irregular Networks (TINs) using the ground return points to create adjoining irregular polygons with the points as

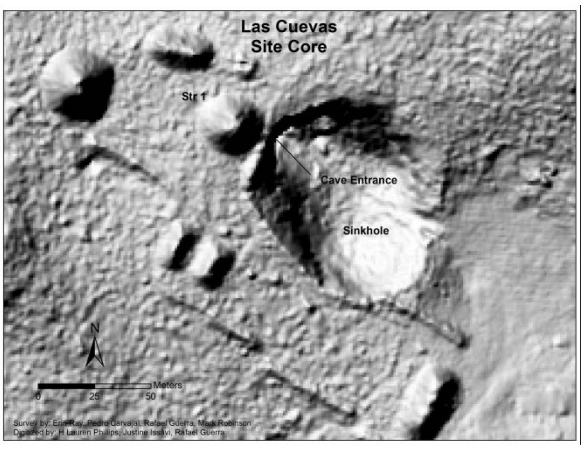

Figure 4. Hillshade model showing the site core of Las Cuevas (courtesy of the LCAR).

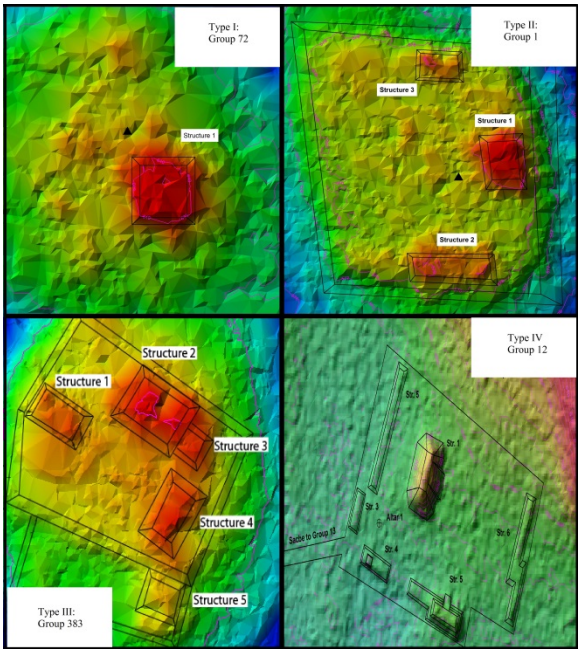

Figure 5. Group types for Las Cuevas displayed using LP360 TINs. Field mapped structures superimposed over TINs (courtesy of the LCAR).

corners. This method takes all points into account and connects them using the *x*, *y*, and *z* values. In areas in which there are many ground return points the triangles are smaller and in areas of less coverage, they are larger. This model has many advantages and we found the program to be a good supplement to ArcGIS 10.2 hillshade maps because we were able to generate higher resolution images, sometimes less than 1m based on the number of ground returns available in the point cloud. Also, TINs have low storage costs and can be easily manipulated and viewed. Additionally, LP360 generates color maps based on *z* values (elevations) that enhance visualization of 3D imagery. Figure 5 illustrates examples of 4 settlement types rendered in LP360. Point clouds can also be visualized as vertical profiles of features on the landscape such as vegetation and can also facilitate the potential identification of smaller structures. This is particularly useful in instances where the presence of a structure may be questionable, and can be an important accessory in finding caves (Moyes and Montgomery, n.d.). This is illustrated in Figure 6(a), a profile view of the Plaza A at Las Cuevas showing the cave beneath Str. 1 and the sinkhole entrance.

To locate potential cave sites we used Local Relief Modeling (LRM) tool developed by Novák (2014). The meter-resolution LiDAR-derived digital elevation model (DEM) of the Las Cuevas region was segmented and processed through the LRM Toolbox in ArcMap 10.2. The resulting data highlighted the variation of positive (convex) and negative (concave) features across the landscape on a more discrete, local level. Major negative relief features indicating probable cave openings were selected for further examination, both within ArcMap and through LiDAR point cloud analysis in LP360. Spatial attributes (opening height, width, depth), remote sensing qualities (number of ground returns, cave probability), and topographic values (cave classification, distance to nearest major settlement) were generated through the two programs. The resulting data revealed 377 potential cave features within the 222 km^2 study area shown in Figure 7. All known cave sites in the area were detected by our model, which is encouraging, but all potential cave sites require ground-truthing (Moyes and Montgomery, n.d.).

Typological Scheme for Settlement Groups

Using our LiDAR-derived models, we were able to generate maps of individual structures and settlement groups that allow us to examine the distribution of settlement in our area, evaluate settlement density, and create preliminary population estimates based on these remotely sensed data. Although there are many ways to classify the variation found in ancient

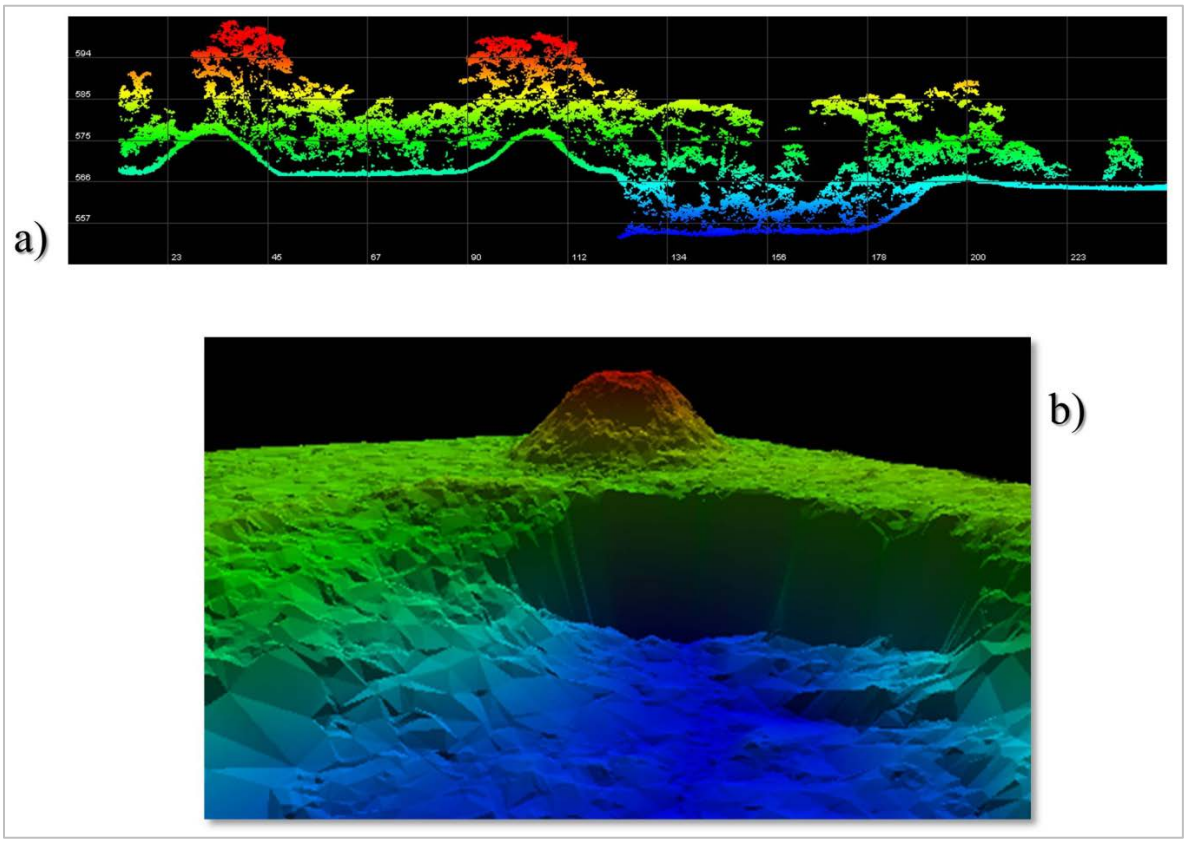

Figure 6. Las Cuevas site core rendered in LP360: a) profile illustrating location of the cave entrance and sinkhole, b) TIN model of relationship of Str. 1 and sinkhole (courtesy of the LCAR).

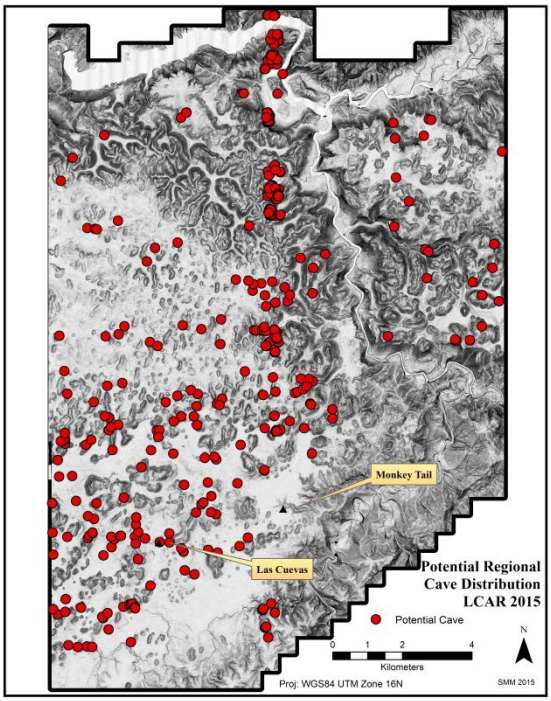

Figure 7. Map of locations of 377 potential cave sites found on the Las Cuevas LiDAR (courtesy of the LCAR).

Maya house compounds or other structural groups, we chose to use a modified version of the classification scheme proposed by Timothy Murtha (2002) for his work at Caracol so that our analyses would be comparable and compatible. In his study of the Cohune Ridge, an urban area located 5 km north of the site core, Murtha surveyed a 4.1km^2 area representative of Caracol's urban population and settlement dispersal. We compare the Caracol settlement density data as well as his projected high and low population estimates of this area to those at Las Cuevas. Murtha categorized his residential settlements into 4 categories for his pedestrian survey (2002:115):

> *Type I.* Single or multiple structures constructed around an open space without a formally constructed plaza.
> *Type II.* Single or multiple structures constructed around a formally constructed or modified plaza.

Type III. Multiple structures constructed around multiple formally constructed or modified plazas.
Type IV. Large multiple structures constructed around a series of large formally constructed plazas. This type varies from previous groups as these units required more labor in their construction. These units often contain causeways, ball courts, or monuments, typically associated with elite architecture in the lowlands.

Because we are using remotely-sensed data we modified our types to be roughly commensurate with Murtha's. For instance, Murtha specifies whether plazas are "formally" or not formally constructed, but from remotely-sensed data this is impossible to determine. Therefore, our typology is based on what can be viewed in the LiDAR:

Type I. Single structures.
Type II. Multiple structures constructed around a plaza.
Type III. Multiple structures constructed around more than one plaza.
Type IV. Large (>3.5m) in height constructed around a series of plazas that may contain causeways, ball courts, or monuments.

Figure 5 above illustrates each type at Las Cuevas displayed using LP360 TINs. Each of these representative types were ground-truthed and mapped in the 2013 field season (Robinson et al. 2014). The mapped structures are superimposed over the TINs.

Settlement Dispersal Based on Las Cuevas LiDAR

A total of 607 clusters Types I-IV were located on the Las Cuevas LiDAR and are illustrated in Figure 8(a). We conducted a density analysis of the groups using ArcMap's Kernel Density tool. This analysis examines the density of chosen features around each output raster cell based on a predetermined neighborhood size area. In the case of the Las Cuevas data, the density magnitude was established to reflect the normal value over any given 50 square meter area. Density analyses were run on one shapefile containing the location of all sites found on the Las Cuevas LiDAR data. The density model was displayed employing a manual classification scheme that highlighted both moderate and high concentrations throughout the landscape. Results illustrated in Figure 8(b) show two distinct area of higher settlement density (shown in yellow and red), one to the north and one to the south. A karstic ridge running from east to west divides the two areas and create a natural boundary between the two.

To further explore these data, a set of Thiessen polygons were constructed. This analysis creates polygons from a set of sample points to define area boundaries or an area of influence around selected sample points, so that any location inside the polygon is closer to that point than to any of the other sample points. They are mathematically defined by the perpendicular bisectors of the lines between all points. In this case, we wanted to examine the relationship of Type IV, the largest sites found on the Cuevas LiDAR, to each other. While Thiessen polygons cannot precisely tell us exactly where the sphere of influence of each Type IV site starts and ends, it does allow us to examine the relative borders between sites. The Thiessen tool found in ArcGIS 10.2, generated seven polygons for the Cuevas LiDAR area (Figure 9). Note that the polygon boundaries reiterate the density analyses in that the east/west ridge forms a clear boundary between the northern and southern polygon sets. Our conclusion is that the ridge acts as a physical boundary separating the sphere of influences of the type IV sites. Compounded with the data from the kernel density, the ridgeline north of Las Cuevas appears to be a natural border between Las Cuevas and its related sites and the northern settlements. When we juxtapose the Caracol polity and its known causeways with our model, it appears that the northern polygons are close to Caracol's boundaries and may therefore be part of the Caracol sphere. In our model, we suggest that the five polygons to the north of the ridge are part of the Caracol sphere of influence, whereas the two polygons to the south are likely to represent a separate political unit.

We also explored the relationship of the Cohune Ridge group types with those in the northern and southern areas of the Las Cuevas LiDAR (Table 1). To begin, we compared the

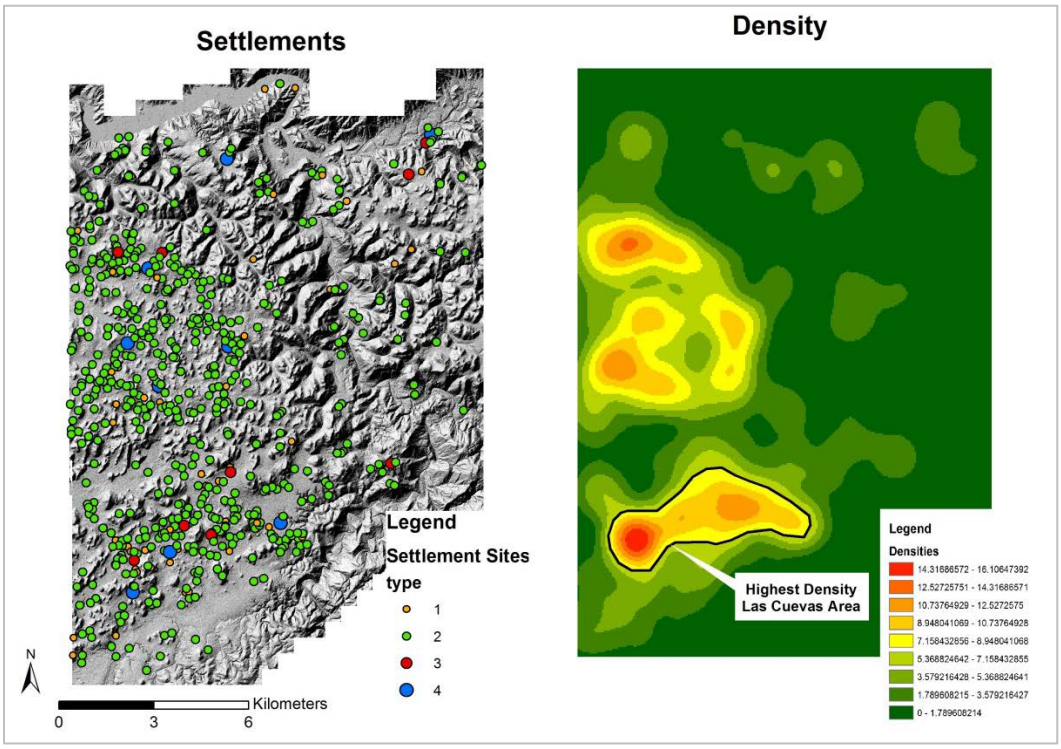

Figure 8. (a) Hillshade model showing clusters Types I-IV located on the Las Cuevas LiDAR, (b) results of Kernel Density analysis showing division between the north and south areas (courtesy of the LCAR).

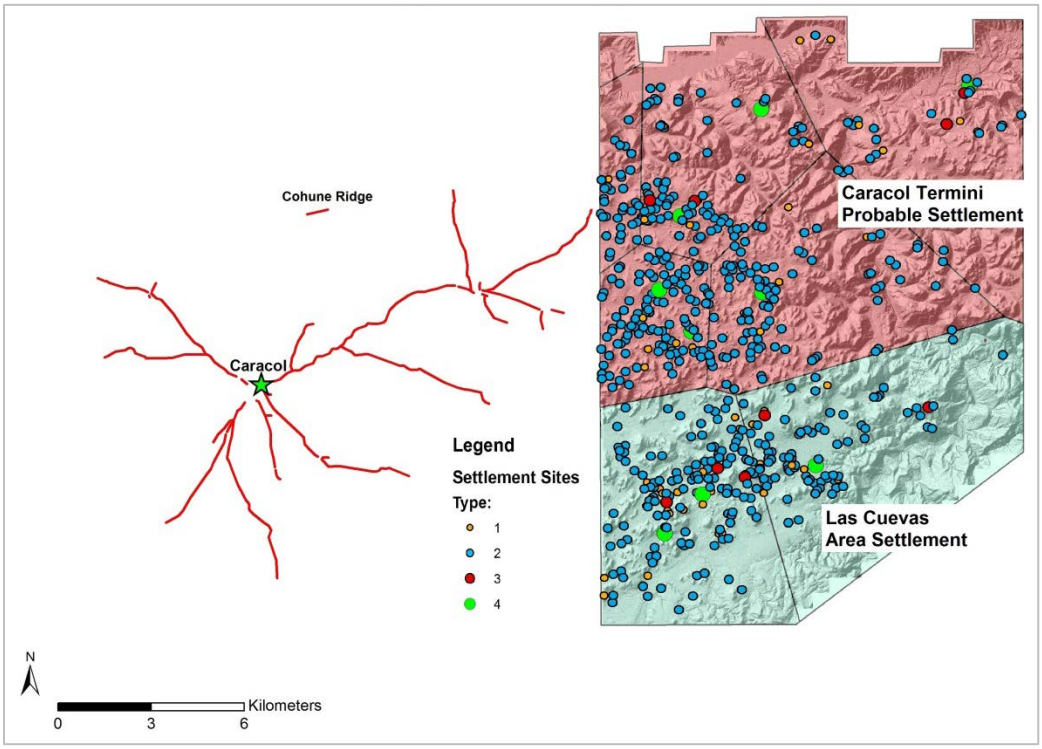

Figure 9. Map showing results of Theissen Polygon analysis. The division between the north and south areas is defines by polygon boundaries that follow a natural east/west oriented karstic ridge (courtesy of the LCAR).

Table 1. Comparative data of residential site types for the Las Cuevas LiDAR and Timothy Murtha's (2002:116, Table 4.2) survey on the Cohune Ridge area of Caracol.

Settlement Type	Area km^2	Number Found Total	Percent of Total
All Clusters	219km^2	n=607	
Type I		55	9%
Type II		532	88%
Type III		13	2%
Type IV		7	1%
Northern Clusters	135km^2	n=357	
Type I		27	8%
Type II		319	89%
Type III		7	2%
Type IV		4	1%
Southern Clusters	84km^2	n=250	
Type I		28	11%
Type II		213	85%
Type III		6	3%
Type IV		3	1%
Cohune Ridge Survey Clusters	4.1km^2	n=103	
Type I		22	22%
Type II		78	75%
Type III		1	1%
Type IV		2	2%

Table 2. Table showing the highest population estimates for the Las Cuevas surrounds and the Cohune Ridge area of Caracol (Murtha 2002:132).

	Low Population Estimate Surrounding Las Cuevas (3 persons per structure)	**High Population Estimate Surrounding Las Cuevas (5 persons per structure)**	**Low Population Estimate for Cohune Ridge (3 persons per structure)**	**High Population Estimate for Cohune Ridge (5 persons per structure)**
Number of People	972	1620	805	1345
Number of Structures	432	432	358	358
Number of Structures -25%	324	324	269	269
Area (km^2)	28	28	4.1	4.1
Population Density / km^2	35	58	196	328

northern and southern groups of the Cuevas LiDAR to each other by conducting a Chi Square test to explore the likelihood that differences between the two groups were due to chance. The Chi Square value was 2.5 with a *p* value of .46 demonstrating that the data sets differed significantly and was not likely due to chance. The comparison of the northern area to the Cohune Ridge using the same test, resulted in a Chi Square value of 16.87 and a *p* value of .0007, suggesting that the two areas were quite similar. However, when the southern area was compared to the Cohune Ridge, the test produced a Chi Square value of 7.1 and a *p* value of .067 which suggests that these two data sets are dissimilar and it is somewhat unlikely that this is due to chance. Therefore, the distributions of group types support our hypothesis that the northern area of the Cuevas LiDAR is more similar to the Caracol pattern of urban settlement and differs significantly from the southern area surrounding Las Cuevas.

Comparative Population Densities

The final stage of our analyses compares the population estimates between a 28 km^2 area surrounding the site core at Las Cuevas (See Figure 8b), which is our highest area of density and to the 4.1km^2 population estimates for the Cohune Ridge. Note here, that we are comparing our area of highest density area to one of Caracol's areas of lowest density. Populations directly surrounding Caracol's site core would be expected to be much higher than the Cohune ridge urban population. Population estimates for both the Las Cuevas and Cohune Ridge data sets were computed by assuming that between 3 (low estimate) and 5 (high estimate) numbers of people occupied each house structure. Table 2 details the comparative results. For the Cohune Ridge population estimate Murtha (2002:135-135, Table 4.4) counted all structures in the area (358), reduced that number by 25% (268), and multiplied that number by 3 persons for a low estimate (805) and 5 persons for a high estimate (1345). By dividing the total number of persons by the area (4.1km^2) we estimate a population density of 196 people per square kilometer on the low side and 328 on the high side.

In the area surrounding Las Cuevas there were 123 settlement groups that contained a total of 432 structures, which reduced by 25% for purposes of the analyses totals 324. Assuming 5 people per structure, there were 1620 people occupying the 28 km^2 area and assuming only 3 people per structure there were 972. By dividing the number of people by the area, this leaves us with a low population density of 35 persons per square kilometer and a high density of 58 persons. This is considerably lower than that of the urban area of Caracol.

Discussion and Conclusion

The Las Cuevas LiDAR has been instrumental in helping us to better understand how the site is embedded in its surrounding landscape. The high number of ground returns for our area was important to our success in remotely modeling both natural and anthropogenic features so that we are able to locate a large sample of structures and examine their distributions. Our data model and analyses suggest that Las Cuevas is physically bounded to the north by a karst ridge that separates the Cuevas area of influence from that of its larger neighbor Caracol. Additionally, our data also illustrates that Las Cuevas and its surrounds differ from Caracol in terms of population densities.

This supports previous research at Las Cuevas that has been unable to establish any direct connections to Caracol, despite Las Cuevas' proximity to the larger site. Caracol has an extensive road system radiating from the site core, yet there is no road to Cuevas. Unlike Caracol's Late Classic satellite Hatzcap Ceel (Mountain Cow), a mid-sized civic/ceremonial center located to the east (Morris 2004), there are no stelae at Las Cuevas proclaiming a relationship to or control by the larger city. Building techniques differ as well. The mosaic-style construction at Las Cuevas is inconsistent with masonry styles at Caracol (Robinson et al. 2014). Additionally, Caracol is known for its burials and caches discovered in large eastern or western structures, yet despite extensive excavations in Plaza A, none have been found at Las Cuevas (Carpenter 2014).

In this paper we suggested that we might expect a very different political economy in a

site that functioned as a pilgrimage place or LHDE. We hypothesized that the economy of a religious site would differ in that it would require less support from the local populace, a typical polity that sustained a royal household that engaged in political competition or warfare. This could manifest in the settlement pattern as a low density population base. Our analysis demonstrates that Las Cuevas had a low population density as compared with its larger neighbor Caracol, an important and powerful polity throughout the Classic Period. Our densest population is 5 to 6 times lower that of the Cohune Ridge, an area of low-density urban settlement in the Caracol region. These exploratory data support our hypothesis that Las Cuevas was a special purpose site with a very different economic base.

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4 EARLY MAYA MONUMENTAL ARCHITECTURE IN THE BELIZE RIVER VALLEY: RECENT ARCHAEOLOGICAL INVESTIGATIONS OF EL QUEMADO AT PACBITUN

George J. Micheletti, Terry G. Powis, Sheldon Skaggs, and Norbert Stanchly

In the Middle Preclassic (900-300 BC), physical evidence of the increasing complexity of Maya society can be found in the form of monumental public architecture. However, the origins of temple building are poorly understood during this time period, especially in the Belize Valley. At the site of Pacbitun we have been exploring the initial purpose of public architecture as constructions to bring likeminded communities together for ritual, ceremonial, and/or social functions. Archaeological investigations by the Pacbitun Regional Archaeological Project (PRAP) have recently unearthed a large, radial pyramid (dubbed El Quemado) buried beneath Plaza A in the site center. El Quemado is very reminiscent of Str. E-VII-Sub at Uaxactun and our excavation of this sub-plaza temple may shed new light on the evolution of the E Group located in Plaza A as well as on the foundation, nature, and development of the site's early social and political structure. This paper will summarize our research to date, including a look at other architectural complexes in the Belize Valley that were involved in early public activities similar to what we have identified at Pacbitun.

Introduction

The installation and development of Preclassic monumental architecture is a subject that is poorly represented in the Belize River Valley. In large part, this is owed to the fact that early structures often lie below several layers of sequential architecture making it difficult to locate. Even when large Preclassic structures are located and identified, excavations often only provide a small glimpse of the building; the exposure of the building is too limited to investigate its architectural features. Therefore, a well preserved Preclassic monumental structure that can be relatively easily exposed would be a rare find in the Belize Valley and could greatly enhance our knowledge and understanding of the subject. Fortunately, such a structure has been discovered at the ancient Maya site of Pacbitun.

Pacbitun is a medium-sized site located in the southern periphery of the Belize River Valley region (Figure 1). Although much of the surface architecture found in each of the five main plazas at Pacbitun date to the Classic period, excavations have revealed that the site was occupied much earlier. Over the years, excavations into its plazas have led to several Preclassic discoveries. Although early investigations of the range structures in Plaza B suggested that this was a residential area, exploration beneath the plaza surface revealed that this area's residential function goes as far back as 800 BC. Remnants of several residential

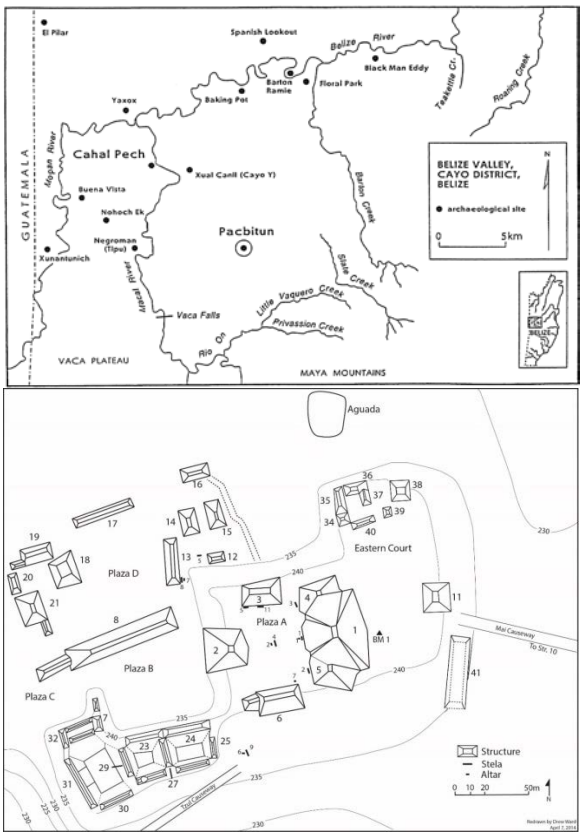

Figure 1. (top) The Belize River Valley and Pacbitun; (bottom) The site core of Pacbitun.

structures were located meters beneath the modern day Plaza B surface (Figure 2). By the late Mai phase (600 – 300 BC), the structures had become slightly more elaborate and were laden with evidence of craft specialization involving the production of marine shell beads

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Figure 2. A photo of a rectangular structure (Structure 2) in Plaza B at Pacbitun dating to the Middle Preclassic (600-400 BC) with beads, drills, and shell detritus found embedded in the floor.

Figure 3. A photo of a task unit wall found in Plaza A at Pacbitun used to build up the plaza in the early Late Preclassic.

implying the early prominence of the site (Healy et al. 2004; Hohmann 2012; Powis et al. 2009). Interestingly, early excavations into the site's E Group complex in Plaza A, the site's ceremonial heart, revealed that construction may have begun shortly after the abandonment of the early Plaza B structures (Healy 1990; Healy et al. 2004). However, like Plaza B, investigations beneath the Plaza A surface in 2012 revealed that Pacbitun's ceremonial history goes back much further and supports the site's early importance.

El Quemado

Since the mid-1980s, archaeologists have walked over and probed into Plaza A, narrowly missing what lay centimeters beneath. Prior to excavations in the summer of 2013, geophysical survey using ground penetrating radar (GPR) was conducted in Plaza A resulting in the discovery of several anomalies beneath the plaza floor (Skaggs and Powis 2014). Test units were set up to investigate these anomalies. One set of four 1 m by 1 m units located in the northern portion of Plaza A unearthed a portion of a task unit. Cut stones (possibly stone robbed from previous architecture) were stacked several courses high to form a construction pen that likely served to divide labor into manageable segments across Plaza A (Loten and Pendergast 1984:15). Task units have been found in several areas beneath the Plaza A surface and are thought to run across the entire area to support the massive build-up of Plaza A in the early Late Preclassic (Figure 3). What was interesting about this plaza unit, however, was not the cut stones of the task unit but what these stones were set upon. Here, at a depth of approximately one meter, a well preserved plaster surface that nearly spanned the entire 4 m by 1 m unit was discovered. Additionally, the plaster curved down like a step in one portion. After exposing 11 meters east-west by 7 meters north-south, it was obvious by the end of the 2013 field season that we had discovered a large sub-plaza temple. In 2014 and 2015, the Pacbitun Regional Archaeological Project (PRAP) continued to uncover the massive platform, now dubbed El Quemado, or "Q" for short, meaning "the burned one" due to extensive burning on much of its plaster surface (Figure 4).

Radiocarbon samples taken from a test unit exploring the structure's presumed midpoint corresponds with the ceramic evidence and confirms a Middle Preclassic (ca. 700-400 BC) date. This test unit into Q also found no earlier architecture suggesting that the platform may have been built as a single construction effort. The excavation of Q, currently measuring 25 meters east-west, almost spans the width of Plaza A. Twelve meters have been uncovered north-south almost completely exposing the southern face of the building. Lining the southern central axis of the platform, seven stairs run from its presumed base to its summit. Flanking the southern central stairs are four armatures, two on each side encasing the ascending stairs. The top two armatures extend out to the south from a long east-west platform near the summit of the building. This platform also has narrow side stairs that descend down the east and west sides of the building. Finally, just

Figure 4. The first photo (top) is of El Quemado after the excavation of 2015; the second photo (bottom) shows one of many heavily burned areas on the surface of Q; this area in particular was found centered on the upper armature platform.

Figure 5. A photo of the stucco debris piled directly in front of the broken armatures on Q's south face.

before reaching the summit, set onto the armature platform and on axis with the side stairs, a small central landing is flanked to the east and west by two smaller raised rectangular platforms. Excavations of the summit have yet to produce any evidence of postholes; thus, without a superstructure, Q would most accurately be termed a platform structure.

Although the preservation of Q is quite good, there are several areas that appear to have been purposefully destroyed. The summit of Q, which stands approximately 3 m tall, is the least well preserved and also exhibits the most extensive burning. The armatures that line the southern stairs also appear to have been purposefully destroyed (Figure 5). In this case, however, the stucco debris was not discarded but was left piled in front of each armature where it had been chopped. Although heavily eroded, we propose that the stucco piles found are likely remnants of masks that adorned each armature. Additionally, two more sets of partially destroyed stairs were also found lining the outer edges of the southern armatures. These narrow stairs were likely destroyed prior to the placement of the task unit stones. Leading up to the top armature platform, the broken southern stairs meet and share a landing with the east and west side stairs (Figure 6). The poor condition of the stairs is likely a consequence of the destruction of the southeast and southwest corners of the building. Q appears to have once had corners composed of three or more terraces set between and linking each corner stair.

To date, no comparable architecture has been found in the Belize River Valley. At the moment, Q is the largest and most elaborate Middle Preclassic structure found in the region. Aside from the structure's architectural uniqueness, what further distinguishes Q from other architecture in the Belize Valley is the method of its abandonment. Evidence suggests that Q was abandoned around 400 BC. Rather than razing and incorporating elements of Q as

Figure 6. An aerial photo of the south side of Q; the southeast and southwest stairs and shared landings are circled in red.

core within a later building construction, a common practice throughout Mesoamerica, the inhabitants of Pacbitun decided to bury this monumental building virtually intact to start anew. Evidence such as chopped corners, extensive burning, ceramic offerings, and the possible destruction of masks suggest that the platform may have been ritually terminated. The platform was then covered in a thick layer of muck aiding in its preservation. Task units were set to build up and enlarge the plaza to its maximum extent, ultimately covering the massive early platform with a floor just above its summit, thereby sealing Q below what became the main plaza during Pacbitun's subsequent Classic period apogee. Now, with the building exposed once again, our goal has been to determine the architectural shape, style, and orientation. Understanding Q's architecture may help to identify its form and function and possibly reveal an early plaza scheme that may involve other Plaza A structures.

Plaza A Configurations

To better understand El Quemado's significance at Pacbitun, it is important to reconfigure the architectural dimensions and features to identify the platform's orientation and plaza scheme. Unfortunately, the large scale excavations in Plaza A have yet to uncover enough of Q to take precise measurements. Moreover, the destruction of the corners of Q has also made it difficult to determine the structural dimensions of the platform. However, looking at the platform's exposed dimensions, architectural style, and plaza location has allowed us to postulate Q's appearance and its possible plaza configurations. Using these indicators, we believe Q could either be an east-west oriented northern structure or a radial pyramid.

If Q is oriented east-west, it is likely the northern structure of a much earlier Plaza A layout; the old plaza seemingly sharing a similar concept of directionality and orientation with its replacement. Not only does Q sit within the

Figure 7. A recreation of Tikal's Mundo Perdido or Lost World Pyramid.

northern portion of the plaza but its north-south central axis appears to align with Plaza A's current northern (Structure 3) and southern (Structure 6) buildings. Q's east-west axis is also closely aligned with Structure 4, the eastern triad's northern structure not likely in existence at this time. Interestingly, early versions of Structure 1 and Structure 2, both dating to around the late Middle Preclassic, may fit into Q's plaza scheme (Healy et al 2004:209-210). However, more investigation is necessary to confirm this architectural relationship.

On the other hand, the current dimensions of the summit and the location and symmetry of the armature platforms and corner stairs may suggest that Q was a radial temple. If this is correct, with the southern half exposed, the northern half of the platform would still lie beneath Structure 3 to the north. Excavations during the 2013 field season did locate earlier architecture beneath Structure 3 (designated as Structure 3-2nd) that may be associated with Q (Micheletti and Stanchly 2013:52). If future testing can confirm that the architecture beneath Structure 3 belongs to Q and that the platform is truly radial, its architectural design would bear a striking resemblance to Tikal's Lost World Pyramid (Figure 7) and Uaxactun's E-VII sub (Figure 8), although at a smaller scale. Both of these structures are radial in formation and share a similar architectural style with Q. Both structures were also adorned by stucco masks; another feature thought to be present on Q. Interestingly, the Lost World Pyramid and E-VII sub had earlier buildings within them dating back to the Middle and Late Preclassic periods

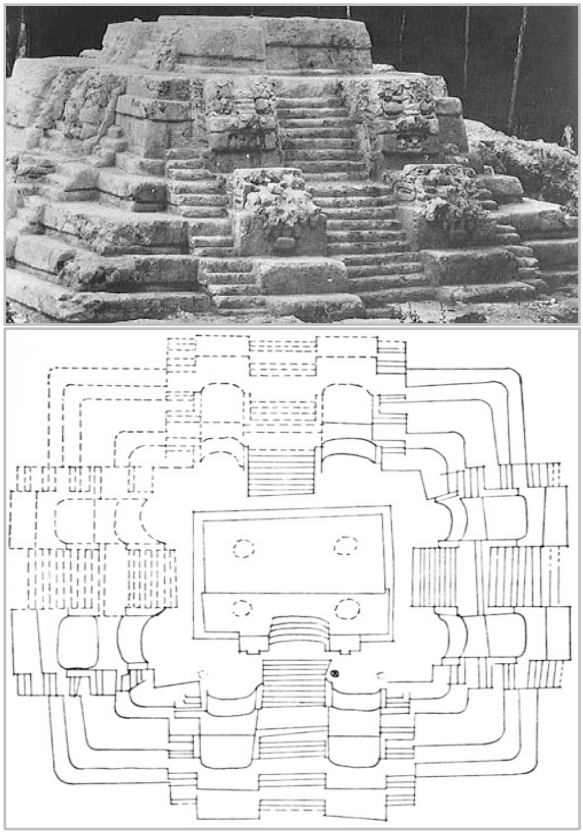

Figure 8. (top) A photo of Uaxactun's E-VII sub platform; (bottom) a plan view of E-VII sub indicating each stair and terrace of the platform.

(Laporte and Fialko 1994:336; Ricketson and Ricketson 1937; Chase and Chase 1995:92), which look like Q in some way. This suggests to us that perhaps the form of Q may have been similar to Preclassic precursors of the Tikal and Uaxactun buildings.

Radial pyramids are often associated with two types of architectural layouts. This includes the Twin Pyramid complex and the E Group complex. However, the Twin Pyramid complex was not initiated until sometime in the Classic period (AD 600 – 800) making this explanation less likely (Cohodas 1980:214). Alternatively, the E Group complex was a common plaza scheme in the Preclassic period (Chase and Chase 1995). The radial pyramid in an E Group configuration is centrally positioned on the western border of a plaza and is paired with a long, low, north-south oriented eastern plaza platform that can support one or three structures. Both the Lost World Pyramid and E-VII sub are western structures of E Group complexes.

Could Q have been an early western structure of an E Group complex?

Pacbitun's Plaza A is actually home to an E Group complex; however, the E Group configuration was completed long after El Quemado was buried. Q's northern plaza position and close proximity to the three eastern buildings also argues against it ever functioning as an early western structure for the current eastern triad in Plaza A. If Q ever functioned as an E Group's western structure, its eastern counterpart would have to be positioned to the northeast of the eastern triad's current location. A closer look at the elevation of the site core at Pacbitun may actually support this claim.

As previously mentioned, Q was buried sometime in the Late Preclassic beneath Plaza A's surface. The event that buried Q simultaneously raised the entire plaza surface several meters. This is evident when examining the contour map of the main plaza in the site core (Figure 9). Curiously, the elevation of Plaza A remains consistent to the northeast of the plaza, as indicated by the orange contour line in Figure 9, possibly suggesting that this area was also built up to bury architecture. If this is correct, Q and the architecture covered by this elevated area would be in a more appropriate E Group east-west alignment. Unfortunately, only limited investigations have been conducted in this area of the site. However, excavations carried out in 2010 in Pacbitun's Eastern Court went down several meters into plaza space and recovered Preclassic materials similar to the Plaza A fill (Cheong 2013). Future exploration into Plaza A and the elevated region at Pacbitun will need to be conducted to reveal whether Q was accompanied by an eastern counterpart. Until then, it remains unclear whether other monumental structures, constructed above or hidden below the plaza surfaces, ever coexisted with Q.

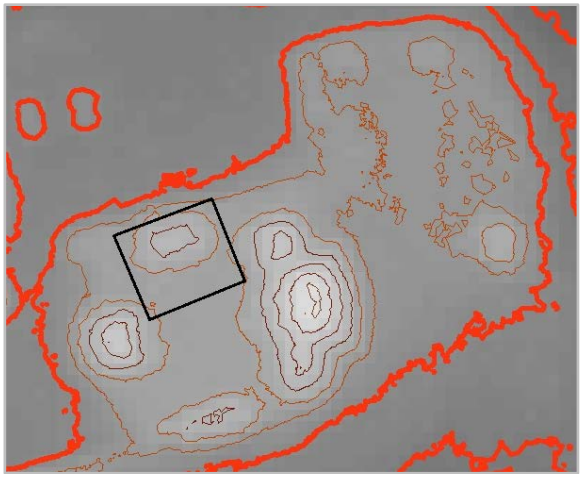

Figure 9. A contour map of Plaza A and the elevated area at Pacbitun; the black square represents El Quemado's proposed dimensions and position in the plaza and the orange contour line illustrates the elevated area of Pacbitun built up during the early Late Preclassic.

Questions for the Future

Although our current excavation progress of El Quemado has significantly broadened our understanding of the early ceremonial center at Pacbitun, more research is necessary to fully understand Q and its relationship with the other structures in Plaza A. Its discovery, not unlike any other major archaeological discovery, has brought about dozens of questions. For example, what is Q's true architectural shape and plaza orientation? Did Q ever coexist with current Plaza A architecture? Are more structures buried beneath the elevated surface at Pacbitun? If so, what was their architectural relationship to Q? Answering these questions will help us to better understand the early occupation at Pacbitun. What we have established is that the presence of Q in Plaza A confirms an even larger and more complex community at the site of Pacbitun than previously known; a community that is not only focused on shell bead production in the residential setting of Plaza B but also largely invested in ritual/ceremonial performance in Plaza A. The activities occurring in both plazas suggest a division of labor; a clear sign of social stratification. More investigation into each plaza may help to identify early status markers.

Finally, our understanding of Pacbitun's early community as a whole may also, one day, provide clues to the site's early socio-political standing within the Belize River Valley. The mass production of exchange goods (shell beads) and construction of public ritual/ceremonial architecture both suggest the early significance of Pacbitun. Intriguingly, if Pacbitun is as significant as it seems, what could have transpired at the site during the early Late Preclassic that caused such a drastic

transformation? Why was Q methodically destroyed (or terminated) and then hidden beneath the main plaza floor during the Late Preclassic Plaza A expansion? What sociopolitical factors led to a major Late Preclassic reconfiguration of Plaza A? These are some of questions we hope to address with further excavations of El Quemado and Pacbitun.

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5 A TALE OF TWO CITIES: LIDAR SURVEY AND NEW DISCOVERIES AT XUNANTUNICH

M. Kathryn Brown, Jason Yaeger, and Bernadette Cap

New Light Detection and Ranging (LiDAR) survey data documented the existence of two monumental centers at Xunantunich, Belize, which for the purpose of this paper, we have dubbed Early Xunantunich and Classic Xunantunich. The latter site is well known and has been investigated by archaeologists for over a century. Although Preclassic buildings had been previously documented 800 m to the east of the Classic Xunantunich site core, a small segment of the landscape in this area had remained unmapped. An extensive LiDAR survey in 2013 (Chase et al. 2014) documented architectural features in this zone and these data conclusively show two separate ceremonial cores. On-going investigations at the newly defined Preclassic ceremonial center (Early Xunantunich) by the Mopan Valley Preclassic Project has shown that this location was founded by the early Middle Preclassic and abandoned at the end of the Late Preclassic, prior to the construction of Classic Xunantunich suggesting a lack of historical continuity between these two centers. In this chapter we highlight these surprising new findings and show how the relatively new LiDAR survey technique has contributed significantly to our understanding of the rise and fall of centers within the Belize River valley.

Introduction

It seems unlikely that a large Preclassic ceremonial center could remain hidden in plain view from researchers working in a heavily populated and intensively studied region. However, this was just the case at Xunantunich, Belize. New Light Detection and Ranging (LiDAR) survey data documented the existence of two monumental centers, less than 1 km apart, which we have dubbed Early Xunantunich and Classic Xunantunich for the purpose of this paper. The latter site is well known (e.g., LeCount and Yaeger 2010), but while Preclassic buildings had been documented at Early Xunantunich, the extent of the site and its formal layout were unknown prior to the LiDAR survey in 2013 (Chase et al. 2014). In this chapter we highlight these surprising new findings and show how the relatively new LiDAR survey technique has contributed significantly to our understanding of the rise and fall of centers within the Belize River valley.

The use of the revolutionary remote sensing technique of LiDAR has made a tremendous impact on archaeology, especially to settlement studies in heavily forested regions like the Maya lowlands. In a groundbreaking article, Chase and colleagues (2012:12916) liken LiDAR to the radiocarbon revolution in archaeology: "[M]uch as radio-carbon dating that half a century ago moved archaeology forward by grounding archaeological remains in time, LiDAR is proving to be a catalyst for an improved spatial understanding of the past." The initial use of LiDAR at Caracol left no doubt of the impact that this technique would have on research in the Maya lowlands (Chase et al. 2010; Chase et al. 2011).

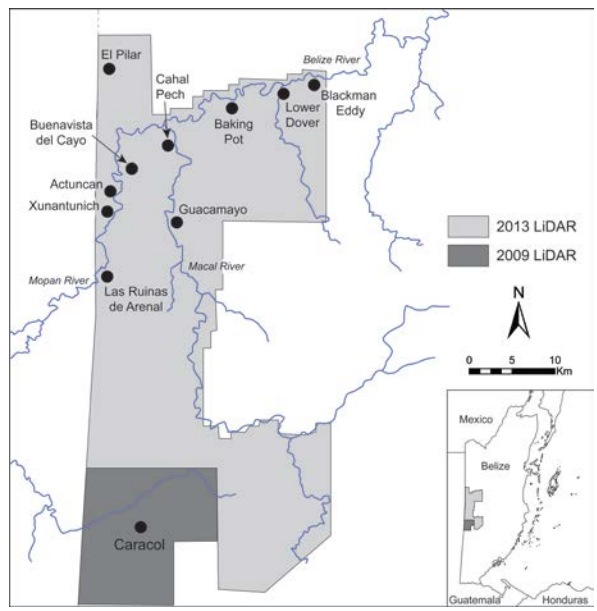

Figure 1. Map of the 2013 LiDAR survey, showing the location of Xunantunich and other major centers.

The results of this first study prompted archaeologists working in western Belize to form a consortium to undertake major LiDAR survey of a large area of west-central Belize in order to examine the distribution of sites and settlement across this diverse landscape. In 2013, with generous funding from the Alphawood Foundation, the consortium contracted the National Center for Airborne Laser Mapping

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(NCALM) to survey 1,057 km^2 that encompassed the Belize River valley and Vaca Plateau (Figure 1), making this one of the largest LiDAR surveys in Mesoamerica (Chase et al. 2014). Although the analysis of this impressive LiDAR data is on-going—and will be for decades—our initial results are pushing us to rethink many of the "ingrained concepts of Maya spatial organization and polity size that were developed prior to the advent of LiDAR" (Chase et al. 2014:8688).

On a broad scale, the west-central Belize LiDAR survey is proving to be extremely valuable to our understanding of settlement distribution across the Belize Valley and Vaca Plateau allowing us to analyze patterns that were unknown or only partially understood even in regions with long histories of archaeological investigation. This has proven true for understanding not only the Classic period, but earlier periods as well. We were skeptical that LiDAR would prove to be a true game changer for archaeologists studying the Preclassic period, as Preclassic occupation can be hard to detect because it is often deeply buried or obscured by Classic-period constructions.

The senior author's main interest in LiDAR was to identify Preclassic architectural signatures across the landscape, such as E-Groups, triadic complexes, and large flat-topped platforms. Triadic complexes are well known as Late Preclassic architectural forms, and certain E-Group forms are typical of the Preclassic period. Additionally, we are just beginning to recognize that large, flat-topped, square or rectangular platforms may represent a distinctive Middle Preclassic architectural form. Presumably of public function (Rawski and Brown 2016), these early monumental platforms are more widespread than previously realized, and they are now being recognized in different regions across the Maya lowlands. These platforms were often heavily modified and formed the foundation of Classic period monumental architectural groups, obscuring our view of the Preclassic landscape. The analysis of LiDAR survey data, however, may prove useful in identifying distinguishing patterns, such as slight variations in slope and orientation that may hint at Preclassic architectural foundations, as we discuss for Buenavista. Additionally, the examination of site plans can give some insight into the presence of early architectural features. For example, Wendy Ashmore (1998) notes an emphasis on east-west orientation during the Preclassic in contrast to a North/South focus during the Classic period. Essentially, site plans can reveal the presence of significant buried Preclassic foundations that shaped how a site grew over time and thus can still be perceived in the later site plan.

Previous Investigations at Xunantunich

Xunantunich has witnessed a long history of archaeological investigations (Leventhal et al. 2010), most of which have focused on Group A, the sector of the site with the largest structures, including the 39-m high El Castillo acropolis (Figure 2). Investigations began in the 1890's with early exploratory work by Dr. Thomas Gann. Teobert Maler of Harvard's Peabody Museum conducted limited investigations of the site at the turn of the century and mapped some of the architectural features. Further work by Dr. Gann in 1924 resulted in exploration of several monumental structures within the site core. Investigations of Xunantunich continued in 1938 when Sir J. Eric Thompson focused excavations on Group B, a small residential group located to the west of the site core. A number of other archaeologists conducted archaeological investigations at the site, including Euan Mackie, A.H. Anderson, and Peter Schmidt, providing a platform for a more intensive archaeological study of the site.

The most intensive research has happened in the last few decades. Much of what we know about the site, however, comes from the Xunantunich Archaeological Project (XAP), directed by Richard Leventhal and the Xunantunich Settlement Survey (XSS) directed by Wendy Ashmore in the 1990's (Leventhal et al. 2010). These two programs worked together as part of a broader project and incorporated a holistic approach that coupled investigations in the Classic-period site core with intensive settlement survey, resulting in a solid understanding of the site's dynamic history during the Late and Terminal Classic periods. Furthermore, the extensive settlement survey conducted showed a densely occupied landscape within the Mopan Valley region. The results of this project provided a firm foundation for further

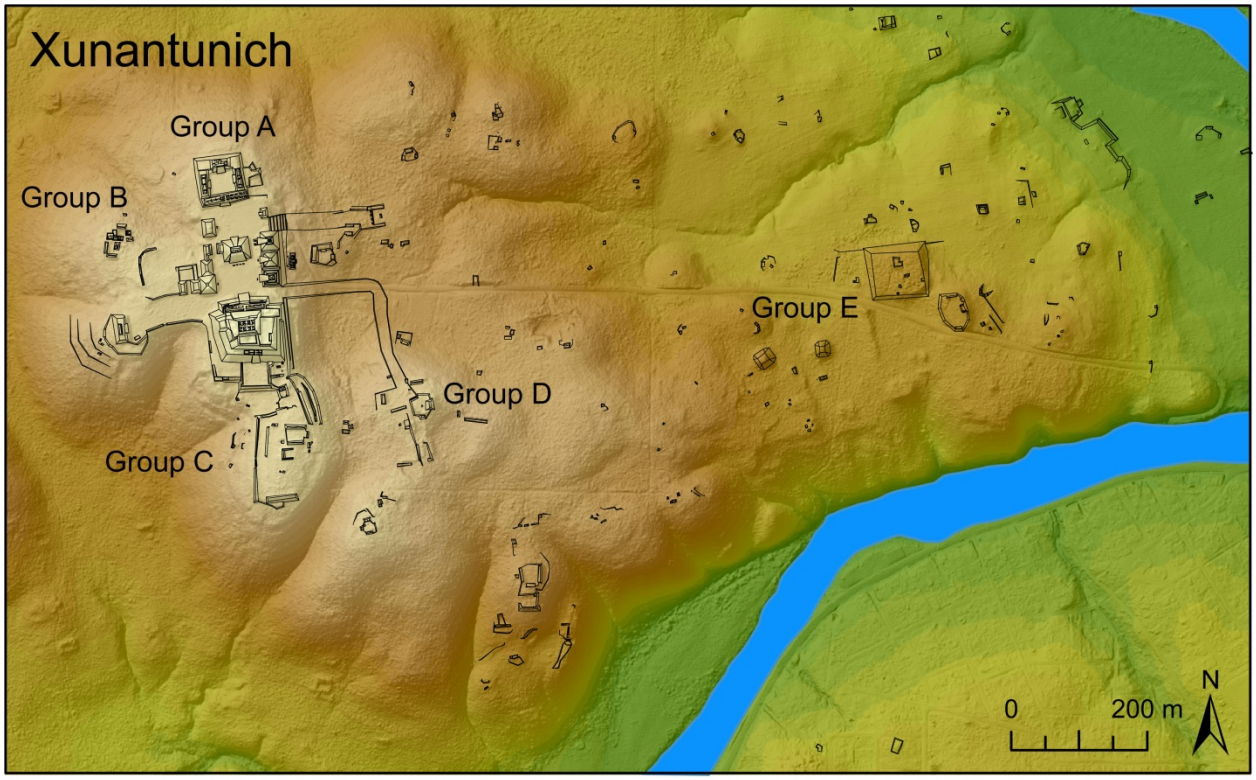

Figure 2. LiDAR image of Xunantunich, overlaid with structures mapped by XAP and XSS.

investigations, and XSS provided data from pedestrian survey that we can compare with the LiDAR survey data. Following on the heels of the Xunantunich Archaeological Project, the Tourism Development Project directed by Jaime Awe and Allan Moore and the Xunantunich Palace Excavations directed by Jason Yaeger (Yaeger 2010) focused within Classic Xunantunich targeting, several ceremonial structures and the Late Classic palace.

Little, however, was known about the Preclassic at Xunantunich, aside from tunnel excavations below El Castillo and scattered deposits found in testing around the main site core (LeCount and Yaeger 2010) and a few test pits at a relatively small group 800 meters east of the site core (Robin et al. 1994). This group was designated Group E, and the original map documented two small pyramids and a large northern platform. Initial testing suggested that these structures dated predominately to the Middle Preclassic (Robin et al. 1994). Although XAP conducted extensive settlement survey around Xunantunich, the project did not have landowner permission to survey the area east and south of Group E, which left unmapped a tract of forested land south of the modern Xunantunich road.

In order to better understand the landscape of the Middle Preclassic in the Belize Valley, the senior author initiated the Mopan Valley Preclassic Project (MVPP) and began investigations at Xunantunich in 2008, targeting Group A, Group D, Group E, and the hinterland site of San Lorenzo. Our work over the past eight years has revealed that Xunantunich had a significant Preclassic occupation centered at Group E. We confirmed that the constructions tested by XAP did have Middle Preclassic components, but that at least some of these were not abandoned until the end of the Late Preclassic (Brown et al. 2011). Additionally, we documented that the twin pyramids at this location were actually part of an early E-Group complex (Brown 2013). Our recent investigations at Group D (Figure 2), a Late Classic elite residential group with an ancestor shrine connected to Group A by a causeway

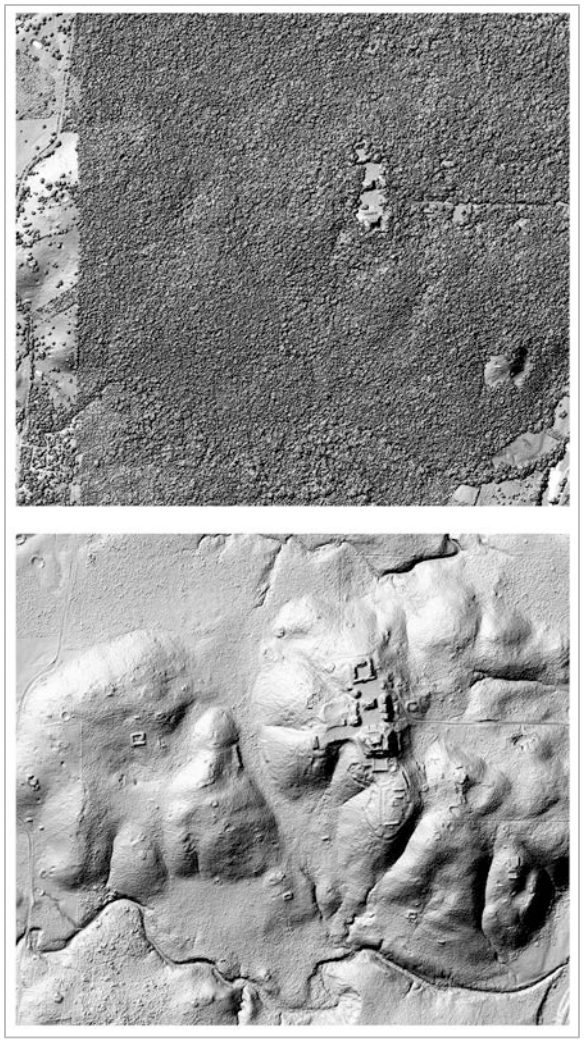

Figure 3. Hillshade visualizations of LiDAR data around Xunantunich: all point returns (top) and bare earth returns (bottom).

(Braswell 2010) demonstrate that this location also saw its first construction during the Late Preclassic with a possible abandonment period during the Early Classic. Ongoing research will assess the possibility that this location was a hilltop shrine for Early Xunantunich in the Preclassic (Lytle 2016). Additionally, investigations within the hinterland settlement of San Lorenzo have encountered a Middle Preclassic collapsed chultun filled with Savana Orange ceramic material, as well as a Late Preclassic round platform (Ingalls 2016). Interestingly, little evidence of Early Classic settlement is present, suggesting that the San Lorenzo area may have also been abandoned during this period.

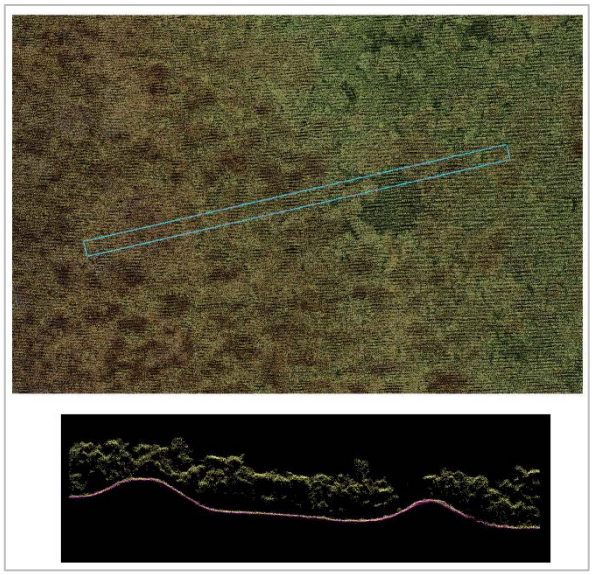

Figure 4. LiDAR point cloud around Early Xunantunich: birds-eye view (top) and cross-section of the rectangle outlined in blue showing points classified as canopy and ground (bottom).

The 2013 LiDAR Survey

The 2013 LiDAR survey of west-central Belize included the site core and settlement zone of Xunantunich (Figure 1). The LiDAR survey recorded an average of 15 returns per square meter. The points in the resulting point cloud were classified with an algorithm developed by NCALM. Some were classified as canopy and others as ground returns. Ground returns averaged 2.8 per square meter.

We expected few surprises in this area, as Xunantunich and its settlement had been intensively studied for over a century. Nonetheless, much of the area immediately surrounding Xunantunich is heavily forested, in contrast to nearby areas that have been cleared for agriculture and grazing, such as the San Lorenzo settlement zone. The forest cover can be seen clearly in LiDAR image showing the top returns, most of which bounce off leaves and branches in the canopy (Figure 3, top).

Figure 4 illustrates the effect of the algorithm that classifies the points collected during LiDAR survey. The top image shows a birds-eye view of a segment of survey area, showing all of the points in the point cloud. The lower image shows a cross-section of the points included in the blue rectangle in the top image, differentiating canopy returns (in green) and

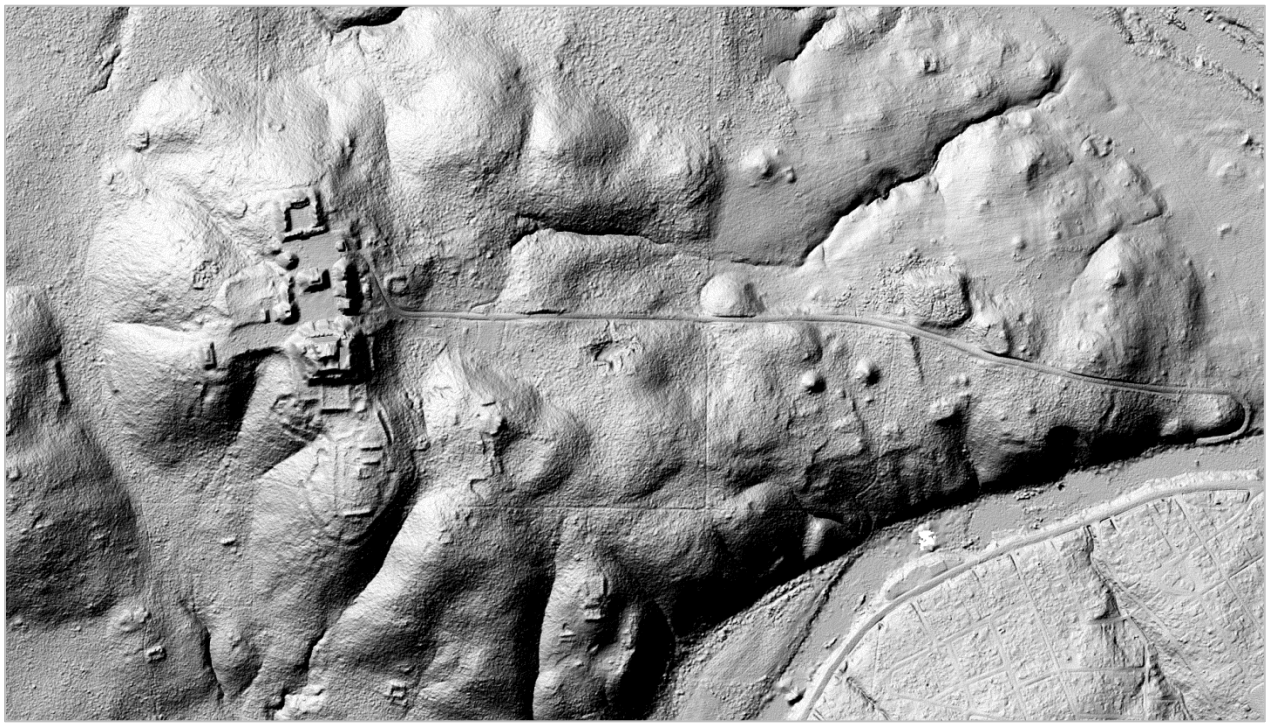

Figure 5. Bare earth hillshade of LiDAR data showing Classic Xunantunich and Early Xunantunich.

ground returns (in pink). The branches of the trees in the canopy are clearly revealed, as are the contours of two pyramids, Structures E-1 and E-2 at Early Xunantunich. Point classification allows us to create bare earth models, visualizations made only with returns that were classified as ground surface (Figure 3, bottom).

The bare earth model of the LiDAR around Xunantunich clearly indicates two spatially discrete architectural groups centered on plaza spaces (Figure 5), conclusively revealing two distinct site cores. Although, we had suspected that Group E was part of a larger Preclassic ceremonial center, we had not anticipated that the areal extent of the Preclassic center would be as large as Classic Xunantunich. LiDAR revealed that Early Xunantunich was composed of three plaza areas framed with mounded features, including large platforms located in the north and east (Figure 6). The E-Group makes up the westernmost plaza group. The overall site plan emphasizes an east-west alignment which, as discussed above, is a common pattern for Preclassic ceremonial centers. Classic Xunantunich, on the other hand, emphasizes a north-south alignment.

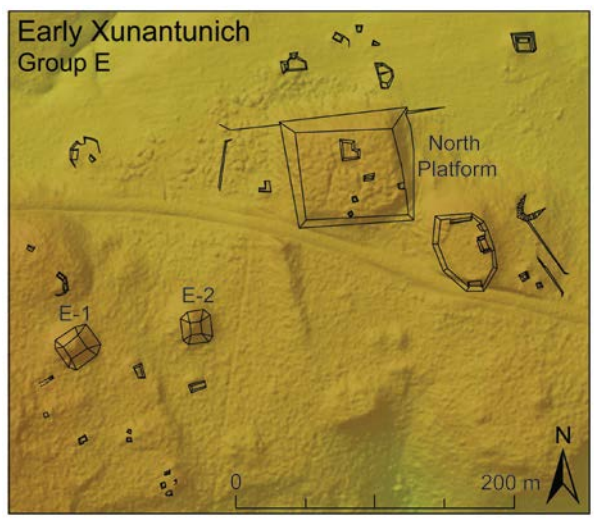

Figure 6. LiDAR image of Early Xunantunich, overlaid with structures mapped by XAP and XSS.

Early Xunantunich appears to have been abandoned by the end of the Late Preclassic period, as our investigations have only encountered a few scattered Late Classic house mounds in the area (Brown et al. 2011; Sword 2014). Thus, the site provides a rare opportunity to investigate a Preclassic ceremonial center that was not obscured or erased by extensive Classic-

period construction and modification. Additionally, Early Xunantunich appears to have been abandoned prior to the construction of Classic Xunantunich, raising the possibility that these two centers may have been unrelated.

LiDAR, although it may be a game changer, is not a magic wand for archaeology. As Chase et al. (2014:8688) suggest, to "fully contextualize and understand ancient Maya settlement, the LiDAR data must be conjoined with on-the-ground excavation data." Furthermore, although architectural patterns and site plans can suggest a Preclassic occupation, excavation is necessary to confirm this and to elucidate the temporal dimension of the landscape. In other words, what you see on the surface is only part of the picture. Below, we highlight some of our recent excavation data from Early Xunantunich to illustrate this point.

As we mentioned before, the westernmost plaza group at Early Xunantunich is dominated by two Preclassic pyramids, framing the western and eastern sides of what appears to be a sloping plaza (Figure 4, bottom). Excavations on the eastern structure, Structure E-2, have revealed that it was built in at least three construction phases, the earliest two dating to the Middle Preclassic (Brown 2013). The earliest phase, Structure E-2-3rd has been only partially investigated to date. It appears to be a low, broad, rectangular platform. It was completely encased by Structure E-2-2nd. Our excavations have documented that this phase was a two-tiered pyramid set on top of a low platform with extended wings to the north and south (Figure 7). This form resembles the eastern arrangement of a Cenote style E-Group, a type first documented by Arlen and Diane Chase (1995). Because these wings have been buried under sediment deposited over the centuries and thus invisible on the ground surface, the diagnostic features of the Cenote-style E-Group were not detected by the LiDAR.

E-Groups have their origin in the early Middle Preclassic in the Maya lowlands and have been suggested to be locations for public ritual (Estrada-Belli 2011; Inomata et al. 2013). The area between eastern and western structures of E-Groups is often presumed to be an area of ritual space, a gathering place for participation and observation. Therefore, we concentrated much

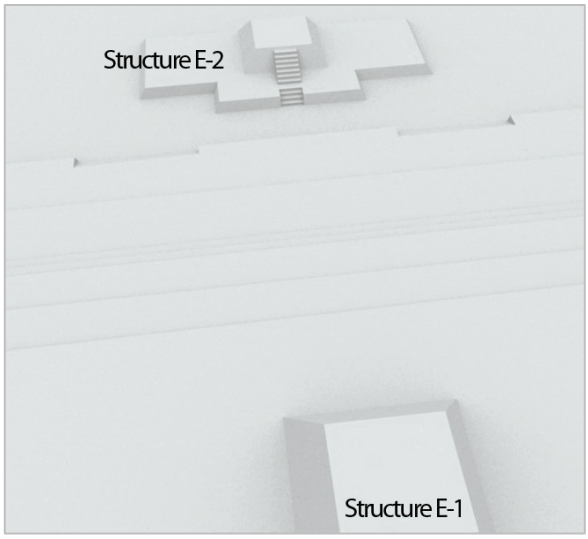

Figure 7. Reconstruction of Structures E-1 and E-2-2nd (illustration by Leah McCurdy).

Figure 8. Paved ramp inset into platform.

of our excavations in this area to search for evidence of ritual activity. Our investigations revealed that the plaza area was heavily modified and contained formally constructed walkways, quite possibly for ritual processions (Brown 2013). This is evidenced by the construction of a wide terraced platform structure, west of Structure E-2, with paved ramps over 6 m wide located to the north and south of the platform's centerline (Figure 8). It is also interesting to note that we encountered a series of post holes in the plaza directly on centerline in front of the steps of the eastern pyramid. Brown (2013) has interpreted the posthole features elsewhere as a wooden altar or *mesa* (Figure 9). The presence of a wooden altar in the plaza directly in front of the central eastern pyramid is suggestive of public ritual activities.

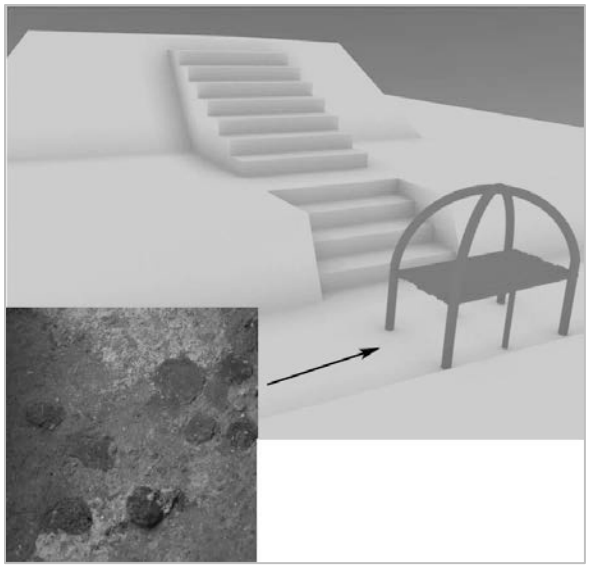

Figure 9. Reconstruction of Structure E-2-2nd with altar (illustration by Leah McCurdy); inset shows postholes in plaster surface in front Structure E-2-2nd.

To date, all our excavations have indicated that, at least this portion of Early Xunantunich, was abandoned at the end of the Late Preclassic (Brown 2013). Our limited testing on the larger northern platform indicates a similar construction history, with some Late Classic resettlement and use of the platform for residential purposes. Zoe Rawski's excavations on the central staircase of this enormous platform have revealed two Preclassic construction phases, and we anticipate additional phases (Rawski and Brown 2016). Our current working hypothesis is that Early Xunantunich was founded during the Middle Preclassic and abandoned at the end of the Late Preclassic, possibly eclipsed by the nearby center of Actuncan.

It is interesting to note that new data from Group D provides support for this scenario as well. Group D is a Late Classic elite residential unit with an eastern ancestor shrine connected to Classic Xunantunich by a causeway (Figure 2). This group was intensively studied by Jennifer Braswell (1998) for her dissertation. Whitney Lytle's excavations there have revealed ritual architecture dating to the Late Preclassic period (Lytle 2016), which may have functioned as a hilltop shrine associated with Early Xunantunich. This location was abandoned at the end of the Late Preclassic and was not reoccupied until the Late Classic, leaving a significant gap in occupation (Lytle 2016). This occupation history correlates nicely with the abandonment of Early Xunantunich and the founding of Classic Xunantunich, further suggesting a lack of historical continuity between these two sites.

While the LiDAR survey data allowed us to document the presence of a separate Preclassic ceremonial center at Early Xunantunich, it also revealed some unexpected findings at Classic Xunantunich, notably a possible defensive feature at the southern end of Xunantunich, encircling the platforms of Group C (Figure 2). Located at the top of the ridge, their morphology suggests that they are ditch-and-berm features constructed to enclose a vulnerable section of the site core (Figure 5). Although this section of the site had been previously mapped, as shown on Figure 2, these features were not recognized because they are extremely low and irregular and thus appear to be natural during foot survey. The LiDAR was able to detect these features, and the broader overview it provides made the interrelationships and articulations between these irregular features obvious.

Identifying a Preclassic E-Group at Buenavista del Cayo

A close examination of the LiDAR survey from Buenavista del Cayo (hereafter simply Buenavista) suggests the presence of a Preclassic E-Group there, as well. Buenavista lies 5 km north of Xunantunich (Figure 1). It was first documented by Joseph Ball and Jennifer Taschek (2004), who directed extensive excavations there in the 1980s and 1990s. As described above for Xunantunich, earlier site maps of Buenavista convey the site's layout and major features, but the broader view and georectified precision provided by LiDAR data provide additional insights. This is particularly true for the East Plaza, where Bernadette Cap (2015) documented the site's Late Classic marketplace. LiDAR data revealed two characteristics of the East Plaza that lead us to suggest that the East Plaza was a Preclassic E-Group prior to becoming the site's marketplace in the Late Classic period.

First, the plaza's eastern structure, Structure 16, is a long, linear mound with a central outset staircase or ramp off the backside (Figure 10). When paired with the western pyramid, this architectural form is characteristic

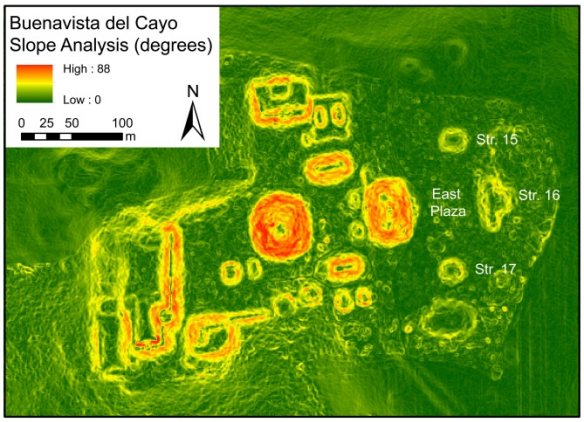

Figure 10. Slope analysis of LiDAR data from Buenavista del Cayo; brightness indicates areas with steeper slope.

of early E-Groups (as discussed above). Second, three of the mounds framing the East Plaza—Structures 15, 16, and 17—have significantly gentler slopes than the rest of the site's mounds. This is likely due to an additional millennium of erosion that Late Classic structures did not undergo.

Further supporting an early date for these structures, visual inspection of Structures 15 and 17 and testing of Structure 16 indicates that the platforms were made with clay fill rather than limestone rubble, and few masonry facing stones are in evidence today. We initially interpreted these as structures that were begun late in the site's history and never finished. We now believe they were Preclassic structures that were not rebuilt in later times and perhaps used as a source of facing stones by later builders.

Their association in an E-Group layout, however, suggests a Preclassic date. Furthermore, the use of clay and marl fills is typical of Middle Preclassic construction techniques in the Mopan valley, while rubble cores predominate in later times. Consistent with an early date of construction, Cap's excavations in the East Plaza documented occupation beginning in the Middle Preclassic period (Cap 2015), and Christie Kokel-Rodriquez's test excavation of Structure 16 revealed a large Late Preclassic construction component. Further excavations are needed to confirm and refine these data, but we now believe that the East Plaza began its history as an E-Group. Structures 1 and 3 in the Central Plaza also seem to form an E-Group (Ball and Taschek 2004), raising the possibility that this architectural complex and associated rituals shifted from the East Plaza to the Central Plaza at some point in the site's history.

Conclusions

Recent LiDAR survey data from western Belize demonstrates the importance and utility of this remote sensing technique in archaeology, especially in heavily forested regions. As Chase et al. (2012:12916) suggest, "LiDAR is changing the nature of archaeological research fundamentally." This can be seen in the data presented here. LiDAR survey showed that the site of Xunantunich was actually two spatially distinct centers, and our excavations demonstrate they are chronologically distinct as well. Although we are still assessing the relationship between Early Xunantunich and Classic Xunantunich, we now realize we must examine the origin and development of these two places on the landscape separately. LiDAR has also allowed us to identify possible defensive features at Classic Xunantunich that went undocumented for over a century with traditional archaeological survey techniques. LiDAR has shaved away decades of pedestrian survey and mapping in the Mopan and Macal River valleys, while paving the way for ground-truthing and excavation efforts that will amount to decades of work. As Chase et al. (2014:8688) stated, "The 2013 West-central Belize LiDAR campaign has provided data that will be mined for years to come."

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6 BUILDING XUNANTUNICH: INVESTIGATIONS OF PUBLIC BUILDING IN THE XUNANTUNICH COMMUNITY

Leah McCurdy

Many archaeologists have documented the long construction history of the Castillo acropolis at Xunantunich. This research makes important contributions to our understanding of elite politics and Xunantunich's political relationships across the Mopan valley and beyond. There is also a well-developed 'community' emphasis in many archaeological studies concentrated on Xunantunich settlement and nearby sites. This paper focuses on my dissertation research conducted at the Castillo as an extension of both these research trajectories and as a new perspective to reconstruct relationships between monumental contexts and settlement communities. Approaching labour investment and architectural energetics from a new angle, I propose that the concept of "public building," understood broadly and as a widely inclusive activity, can guide innovative investigations of communities, like those that once surrounded Xunantunich. Particularly, this research focuses on the public, or communal, creation of shared and significant built environments and how those practices impacted the people involved at all levels. I describe virtual reconstructions, architectural energetics, and labour analysis conducted to address these questions and to highlight the building labourers of the Xunantunich community.

Introduction

This paper concerns several major themes of my dissertation research centered on the Castillo acropolis of Xunantunich (Fig. 1). I report findings of excavations, architectural energetics, and labour analysis conducted as part of the Mopan Valley Preclassic Project (MVPP) under the direction of Dr. M. Kathryn Brown. My dissertation research aims to better understand the social impact of building an acropolis like the Castillo over time. Overall, this is an application of a proposed cross-cultural approach to exploring ancient buildings and building as an activity.

In general, this research is predicated on an interest in the underlying, or mundane in some eyes, aspects of monumental buildings and city centres. Along with the traditional perspective, monumental buildings can be viewed as a record of construction processes and the people involved in that work. I propose the term public building as the set of actions undertaken by a group of people to produce architectural features with public significance and as part of public life. The public, as people, coordinate to construct important buildings as a facet of being part of a society, large or small.

Despite material, technique, or chronological differences, the common factor in public building is collective work. We often characterize and simplify this collective work and effort under the heading of labour. Labour is a useful overarching concept but it can also obscure the complexity of organization, the tasks involved, and the people that make it up. Labour becomes a monolithic feature of past societies and can be dehumanized. Labour can be viewed solely as a resource rather than actions that people actually carried out and something that impacted many lives. For public building labour, I am unpacking this monolith by conducting architectural energetics analysis (i.e. Abrams 1994) beyond its core use for labour cost and control estimates that can privilege the elite perspective. I use energetics as a way to explore work organization, labour dynamics over time, and perhaps glean insights into social impact and even labourer motivations. Overall, I am interested in getting a better sense of what it was like to be part of building monumental structures: cutting stones, laying fill, and making plaster.

Figure 1. North façade of the Castillo acropolis, Xunantunich, Belize.

Research Reports in Belizean Archaeology, Vol. 13, 2016, pp. 61-70.

As a broader implication of this and my overall dissertation research, I hope to make the case that while monumental buildings and central places are important to understanding powerful people and privileged lives, they are also records of labour. More precisely, they are records of activities conducted by many everyday folks working towards a common building goal. I see this as an opportunity to use a monumental context for the investigation of people considered to live outside the elite sphere and think about linkages between the often divorced realms of central/monumental and hinterland/settlement. Recognizing the constituents of public building labour is a way to delve deeper into an important aspect of public life and take a look at how people, typically associated with settlement areas, had physical and personal associations with monumental areas, through their own contributions to public building labour.

Architectural Energetics of Public Building

A review of Elliot Abrams' (1984; 1994) well known study of architectural energetics will serve as an illustration of a traditional approach to the study of ancient Maya construction. Abrams concentrated his study on the centre and settlement area of Copán, Honduras and particularly Structure 10L-22, a centrally located elite residence with a high degree of architectural elaboration but a relatively compact footprint (Fig. 2). Abrams (1994) analyzed the "energy expenditure" required to construct such a building and how that expenditure compared to other residential structures, elite and non-elite, around Copán.

There are two basic things required to develop architectural energetics results: 1) some measure of the feature that was built which typically comes via volumetrics including surface areas of masonry walls and volumes of fill; 2) the rates at which such walls and volumes of fill can be constructed. With these datasets at hand, all energetic analyses are recognized as estimates. Volumetrics are approximations and often based on hypothetical reconstructions that may be archaeologically evidenced to greater or lesser degrees depending on preservation. Further, it is very difficult to fully reconstruct the variability and complexity of work rates

Figure 2. View towards Structure 10L-22 of Copán, Honduras showing the substructure and semi-preserved superstructure.

without precise and well-provenanced texts. Some Old World contexts offer documents that imply or detail construction work rates in a manner that they can be directly used in energetics calculations (e.g. DeLaine 1997; Pakkanen 2013). In the case of Maya architectural energetics, labour rates often derive from replication experiments estimating the time it takes a modern individual to shape a coarsely quarried block of limestone into a prepared finish ashlar, for example. Erasmus (1965) and Abrams (1987) conducted many of the relevant replication experiments.

Combining data about the amount of fill to be accumulated and the rate at which fill may have been installed, in addition to all the other tasks involved, results in developing an approximation of the 'cost' of building. The units to describe these costs can vary from calories, minutes, hours, and perhaps even hypothetical units of emotional stress. The standard measure based on Abrams (1994) and previous work is the "person-day," or the amount of work (on a given task) one person can conduct over a typical work day. Based on Abrams' (1994) estimates (see Table 1), quarrying all the tuff stone that went into constructing Structure 10L-22 would 'cost' the labourers approximately 2,000 person-days. Further, Abrams (1994) estimates that the entire project to build the superstructure and its platform would require approximately 25,000 person-days. In a comparative analysis of distinct residential contexts, he argues that the energy expenditure in building is a quantifiable measure of labour control disparities amongst distinct status groups in the centre and outlying

Table 1. Reconstructed Energetics Estimates for Structure 10L-22 per Abrams (1994).

Processes and Materials	Volumetrics	Units	Work rates	Conversion	Calculated person-days
Procurement					
Tuff	795.8	m^3	750kg (quarried) / p-d	1482575.4	1977
Earth	1290.6	m^3	2.6 m^3 / p-d	n/a	496
Cobbles	772.9	m^3	7200kg / p-d	1439912.7	200
Transport					
Tuff	795.8	m^3	m^3 / p-d = Q x 1/ (L/V + L/V') x H	n/a	2971
Earth	1290.6	m^3	m^3 / p-d = Q x 1/ (L/V + L/V') x H	n/a	1721
Cobbles	772.9	m^3	m^3 / p-d = Q x 1/ (L/V + L/V') x H	n/a	2885
Plaster	595.0	m^3	m^3 / p-d = Q x 1/ (L/V + L/V') x H	n/a	1587
Manufacture					
Masonry	444.0	m^3	1m^3 / 11.6 p-d	n/a	5150
Sculpture (simple)	0.0	m^2	321cm^2 / p-h	0	0
Sculpture (complex)	2.2	m^2	89cm^2 / p-h	216	2403
Plaster	111.0	m^3	1m^3 / 43.9 p-d	n/a	4873
Construction					
Dressed masonry	312.1	m^2	0.8m^2 / p-d	n/a	390
Interior fill	801.6	m^3	4.8m^3 / p-d	n/a	167
Cobble subflooring	433.9	m^2	9.6 m^2 / p-d	n/a	45
Plastering	1944.0	m^2	80m^2 / p-d	n/a	24
			Total Person-days		**24890**

settlement areas around Copán (Abrams 1984, 1994).

This total energetic figure of 25,000 person-days does not directly implicate duration without a more digestible measure of time. A sound argument has been made by Abrams (1994) based partially on Erasmus (1965) that building would have taken place in the agricultural off-season, what we refer to as the dry season, as a more conducive time to carry out tasks such as quarrying, shaping stone, and allowing for drying of mortars, plasters, and stuccoes. Abrams (1994) projects a 100-day annual building season based on current understandings of paleoclimate and agricultural practices among the Maya. If taken as the duration for expending the 25,000 person-days to build Structure 10L-22, then we may project that 250 people could manage the project over 100 days. Further, detailed analyses of the substructure of 10L-22 may reveal that it was built over more than one season and thus we may project that 125 people (recruited separately or as a consistent group) could have seen to that amount of work over two seasons. It is important to recognize that despite how detailed or precise these energetic results can appear, they are models and hypotheses to make better contextualized interpretations about labour and monumental buildings, in the absence of more precise measures of expenditure and work time, such as documented construction events.

Building the Castillo

In applying energetic analyses to the Castillo at Xunantunich, I expand the original

methodology described above by virtually reconstructing the phases of Castillo construction. This allows for the visualization of descriptions and interpretations offered for each phase over many decades of research at the Castillo (see LeCount and Yaeger 2010). Further, the virtual reconstruction model and its accompanying virtual dataset allows for a speedy process of volumetric calculations. I also refine some of the labour rates presented by Abrams (1984; 1994) and Erasmus (1965) for the Xunantunich context. For example, Abrams (1984) projects estimates of masonry construction with local Copán tuff, which is much less dense and easier to quarry and work than local Mopan Valley limestone (see Table 1 and 2 to compare work rates).

The virtual reconstructions of each architectural phase of the Castillo are based on 75 years of excavations as well as the surveys and excavations I have conducted since 2011. The phasing is principally indebted to Richard Leventhal's (2010) synthesis of work on the Castillo as part of the Xunantunich Archaeological Project (XAP). A full discussion of the phasing, including new addendums and alterations based on recent investigations, can be found in my dissertation.

For this discussion, I focus on one phase of Castillo construction, referred to as the Samal phase, or Late Classic I, ranging from approximately 600-670 CE (LeCount and Yaeger 2010). Figure 3 depicts a preliminary virtual reconstruction of the Samal phase north façade, showing three main terraces, central building (Structure A-6-3rd), and two flanking structures referred to as Quetzal West and Quetzal East. Conducting energetics analysis in the same manner as Abrams (1994) indicates that the Samal phase of the Castillo is 96% more energetically expensive than Structure 10L-22. The total energetic estimate for Samal phase building is approximately 559,129 person-days (see Table 2). We could project that approximately 5,600 people could construct the Samal features over one 100-day building season. This very large scalar jump indicates that these assessments should be approached differently for features on the high end of the monumentality spectrum.

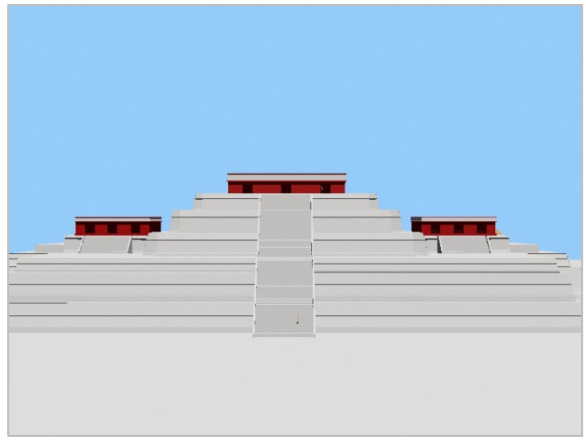

Figure 3. Virtual reconstruction of the Samal phase Castillo acropolis showing the north façade of the substructural terraces, Structure A-6-3rd, and the Quetzal Buildings.

By the nature of traditional energetics analysis, these estimates assume that all features are constructed simultaneously. In the case of Samal Castillo features, the basal-most terrace would be constructed (starting from day 1 to day 100 of the building period) at the same time as the roof of Structure A-6-3rd (starting at day 1 through day 100). With a much smaller building such as Structure 10L-22, the margin of error associated with these sorts of assumptions does not create a material difference. The exponential increase in energetic expenditure for the Castillo would implicate a much more significant margin of error.

To assess the underestimation resulting from these assumptions of construction simultaneity, I hypothesize a logical sequence of construction for the Samal phase upon which to base energetic estimates for segmented construction. Samal building likely began with the three substructural terraces in succession, proceeded by the A-6-3rd substructure and superstructure, and finally with the Quetzal buildings in the east and west. Segmented construction energetic analysis (see Table 3) projects a range of 6,000 – 7,800 labourers throughout the building process with an average of 6,700 people over a 100-day building season. This is a more realistic estimate of the labour population required to build these features in a segmented manner and has implications for exploring the social impacts of public building

Table 2. Person-day Energetic Estimates for Samal Phase Castillo – Un-segmented.

Based On Abrams 1994: 44 Unless Cited	Volumetrics	Units	Work Rates	Conversion	Calculated P-D
Removal					
[1] Previous building m^3	0.00	m^3	2.6 m^3 / p-d	n/a	0
Procurement					
[2] Limestone	32553.87	m^2	1200kg (quarried) / p-d	33999261	28333
Earth	32757.74	m^3	2.6 m^3 / p-d	n/a	12599
Cobbles	102672.49	m^3	7200kg / p-d	191278856	26567
Transport					
Limestone	32553.87	m^2	m^3 / p-d = Q x 1/ (L/V + L/V') x H	13022	34724
Earth	32757.74	m^3	m^3 / p-d = Q x 1/ (L/V + L/V') x H	n/a	43677
Cobbles	102672.49	m^3	m^3 / p-d = Q x 1/ (L/V + L/V') x H	n/a	273793
Manufacture					
Finish Masonry	10610.15	m^2	1m^3 / 11.6 p-d	2653	30769
[3] Decorative Stucco	0.00	m^2	321cm^2 / p-h	0	0
Plaster	993.88	m^3	1m^3 / 43.9 p-d	n/a	43631
Construction					
Core masonry surface	10610.15	m^2	3.5m3 / p-d (Murakami 2015)	2653	758
[4] Finish masonry surface	10610.15	m^2	1.06m^3 / p-d (Murakami 2015)	2653	2502
[5] Constr. Pins (cobbles)	185294.78	m^2	3.2m^2 / p-d (Abrams 1994: 51)	n/a	57905
[6] Interior fill	2246.62	m^3	4.8m^3 / p-d	225	47
Cobble subflooring	29114.47	m^2	9.6 m2 / p-d	n/a	3033
Plastering	39755.22	m^2	80m^2 / p-d	n/a	497
Wattle & Daub Superstr.	168.00	m^3	p-d = -13.838 + 1.832 (m^2)	n/a	294
			TOTAL PERSON-DAYS		**559129**

[1] No data available. Earth procurement (Abrams 1994: 44) used as proxy.
[2] Based on estimates from Erasmus (1965) experiments with limestone (rather than Copan tuff). Assumed to include that for plaster production (as is transport cost).

[3] No data available. Sculpture (simple) calculations used as proxy.

[4] Surfaces including substructures, walls, benches, stairs, upper façade, and roof

[5] Substructural fill deposition is not included as construction cost is likely subsumed in transport cost (Abrams 1994).

[6] Only includes "fine" fill of superstructural walls, vaults, and roof. Derived as m^2 of vertical/battered finished surfaces.

Table 3. Person-day Energetic Estimates for Samal Phase Castillo – Segmented.

Segment	P-d total	Percentage of total	# of days (based on % of work)	Calculated stage p-d
Uck 2 - Medial Terrace	167061	29.88%	29.00	7651
Uck 1 - Medial Terrace	180291	32.24%	32.00	7484
Lopez - Medial Terrace	89628	16.03%	16.00	7474
A-6-3rd Moon Substructure	37110	6.64%	6.50	7496
A-6-3rd Cloud Substructure	23722	4.24%	4.00	7736
A-6-3rd Sky Substructure	15744	2.82%	3.00	6842
A-6-3rd plinth	1022	0.18%	0.25	5590
A-6-3rd walls	7511	1.34%	1.50	6076
A-6-3rd benches	452	0.08%	0.25	2225
A-6-3rd roof	7283	1.30%	1.50	6001
Quetzal West Platform	8047	1.44%	1.50	6748
Quetzal West Plinth	533	0.10%	0.25	2856
Quetzal West walls	3252	0.58%	0.50	7897
Quetzal West benches	166	0.03%	0.25	815
Quetzal West roof	2508	0.45%	0.50	6204
Quetzal East Platform	8047	1.44%	1.50	6748
Quetzal East Plinth	533	0.10%	0.25	2856
Quetzal East walls	3252	0.58%	0.50	7897
Quetzal East benches	166	0.03%	0.25	815
Quetzal East roof	2508	0.45%	0.50	6204
Thatched Sunken Court Strs.	294	0.05%	0.25	131
Total person-days	**559130**		**AVG segment p-d**	**6682**

in and around Xunantunich during the Samal period.

Social Impact of Castillo Public Building

Labour population hypotheses can be compared to full population estimates to explore how impactful, and perhaps even feasible, Samal construction at the Castillo may have been for the labourers themselves. How often would an individual be contributing? Population density estimates for the Xunantunich polity area are projected by Yaeger (2000) and Neff (2010) as part of the XAP settlement investigations. Using these densities and hypothetical settlement radii projected based on XAP surveys (Jason Yaeger personal communication 2015), Table 4 summaries the diachronic change in populations around Xunantunich. I emphasize that these estimates were derived via a simplified process and deserve a much more detailed study. Using these simple approximations as a preliminary gauge, the Samal phase population may have numbered in the range of 23,000 throughout the Xunantunich settlement. Considering traditional projections of five-person nuclear families (father, mother, and three children) for the ancient Maya (Neff 2010), this Samal population may have included approximately 4,500 males of age and capability to perform building tasks.[1] The estimate of 6,700 folks to build the Samal features over one season overreaches the projected population capacity (see Table 4). Further, this hypothetical scenario involved projecting upwards of 100, 120, and 150 masons working to construct the finish masonry of the A-6-3rd and Quetzal Building superstructures. That amount of masons working shoulder to shoulder in that

Table 4. Xunantunich Polity Diachronic Population Estimates.

Phase	Density Estimates[1]		Density Estimate AVG		Projected Settlement Radius		Projected Polity area[2]		Total Population estimate	Able-bodied males[3]
Ak'ab	117	persons / km^2	121	persons / km^2	3	km	28.26	km^2	3419	684
Early Classic ~ AD 300-600	125	persons / km^2								
Samal	284	persons / km^2	290	persons / km^2	5	km	78.5	km^2	22726	4545
Late Classic I AD 600-670	295	persons / km^2								
Hats' Chaak	524	persons / km^2	432	persons / km^2	7	km	153.86	km^2	66468	13294
Late Classic II AD 670-780	340	persons / km^2								
Tsak'	153	persons / km^2	136	persons / km^2	4	km	50.24	km^2	6833	1367
Terminal Classic AD 780-890	119	persons / km^2								

[1] Density estimates from Yaeger (2000) and Neff (2010)

[2] Polity area projected based on known extent of hinterland affiliations and changing relationships with neighbouring centres
Ak'ab: Due to the prominence of Actuncan and Buenavista in earlier phases, Xunantunich settlement radius is taken at 3 km.
Samal: 5 km radius of settlement is projected due to the documented settlement expansion in this phase.
Hats' Chaak: The farthest hinterland site, Chaa Creek, is 6 km from the site core. 7 km is taken as an estimate for the radius extent.
Tsak': 4 km radius is projected as a figure less than the Samal phase due to heavy contraction during the Terminal Classic period.

[3] Neff's (2010) density estimates were based on household size of 5, accounting for one able-bodied male per household.

Table 5. Samal Phase Castillo Public Building Labour Impact (pop. est. 4500).

Building duration	Segmented Construction Labourer Range	Labourer AVG per season	% of Estimated Available Workforce	Personal Impact (possible interpretations)
1 season	6000 - 7800	6700	147%	Everyone affected with additional source of labour (outside polity limits or bigger than projected).
2 seasons	3000 - 3900	3350	74%	Large majority affected over 2 seasons every 20 years.
3 seasons	2000 - 2600	2233	49%	Every 1 in 2 people committed over 3 seasons every 15-20 years.
4 seasons	1500 - 2000	1675	37%	A third of population committed over 4 seasons every 15 years.
7 seasons		1000	22%	Clusters of neighbouring communities affected every 10 years.
70 seasons	85-115	96	2%	Labour commitment once or twice in 50 years - or - building "staff" for site core

amount of space (in addition to those projected to be quarrying, transporting, and shaping stones) is not feasible for any type of efficiency.

Table 5 synthesizes various possibilities of labour population and social impact by expanding the duration of building projects across multiple seasons. Over two seasons totalling 200 days of work, an average of 3350 labourers could have constructed the Samal phase. Estimates for extending work across three and four dry seasons are also provided. I also considered limiting the number of labourers to 1,000 and determining how many seasons it would take that labour population to construct the features. The results indicate at least seven seasons. Further, I considered a building duration of the entirety of the Samal phase, i.e. 70 years, to project a slow, very long-term type of public building that often is ignored as a possibility. Over 70 seasons, between 85 to 115 labourers, or fewer than 100 on average, could complete this work. Each possibility would

have distinct implications for the nature of public building labour recruitment and specialization. At the highest end of labouring populations, if completing construction over one building season, more people than we understand to have lived around Xunantunich would be contributing and impacted by this work. On the low end, it is conceivable that a small group of labourers worked at a steady pace to construct the Samal phase features throughout the period. This latter option opens up considerations of the potential significance of the building process itself and whether continual engagement in building could reflect qualities of a polity that were desirable to have on show as long and as often as possible.

Turning to the social impact of these projected Castillo labour populations in the lives of the labourers themselves, Table 5 includes hypotheses about the personal impact of the various scenarios. These scenarios tentatively include consideration of the other building projects evidenced in the Samal phase such as Group C buildings south of the Castillo as well as other structures of Group A. For a one season building duration, there likely would have been need for an additional source of labour outside the polity limits or this may implicate inaccuracies in our population estimates. For two seasons, a large majority of the population may have worked away from their immediate community to build at the central places every twenty years. Longer durations and smaller labour populations may have involved clusters of neighbouring communities coordinating to build every 10 years or so, perhaps on a rotating basis. Interestingly, if building continued on an ongoing basis with a very small contingent of workers, folks from surrounding communities may have contributed once in their lifetime. As an alternative, people may have contributed for shorter periods of time (such as a *uinal*) every decade. This smallest labourer projection could also represent a permanent building 'staff' of specialists or retainers continually employed in building tasks and maintenance, as mentioned above. Further, these scenarios also implicate how communities may have been impacted in terms of their subsistence production, to greater or lesser degrees depending on the frequency and requirements of public building.

Looking forward to the subsequent Hats' Chaak phase (670-780 CE) at the Castillo and Xunantunich as a whole, surveys indicate a large population boom. Further, the Hats' Chaak period features increased evidence of elevated elite status in artefacts and some of the most ostentatious status statements at the site, in the form of the monumental stucco frieze encircling the upper reaches of Structure A-6-2nd. While these features are noteworthy and packed with data regarding elite dynamics in this period, the architectural data suggest that most of the building conducted in this period added to or modified the features erected in the Samal phase. The analysis of Hats' Chaak phase Castillo architecture is still ongoing. Initial projections including Castillo and other constructions in the site core indicate that 15% or at most 30% of the burgeoning population may have contributed labour each building season. Further, the Hats' Chaak is a longer period than the Samal. This indicates that labour contributions from the personal perspective of labourers or their local communities would have decreased during this time.

Additional Investigations, Implications, and Conclusions

Another component of this research involves the exploration of the potential on-site implications of labour population estimates in terms of labour organization and planning. In brief, I base this organizational analysis on the "operations management" approaches taken by Abrams and colleague Thomas Bolland (1999) as well as Richard Smailes (2011) working on Chimú adobe brick structures in Peru. Figure 4 illustrates a scheduling model of an entire phase of segmented construction, specifically the Samal phase scheduling scenario gamma. Figure 5 illustrates the processes involved in the production of one of those segments, specifically Uck 2 Terrace in scheduling scenario beta. These are exercises in hypothesizing about how these possible construction scenarios could have unfolded. How many labourers were in distinct production areas and at what point in the process? I included the 20-day *uinal* month as a sub-unit in the 100-day building season to consider how construction could be segmented temporally and to refine understanding of the

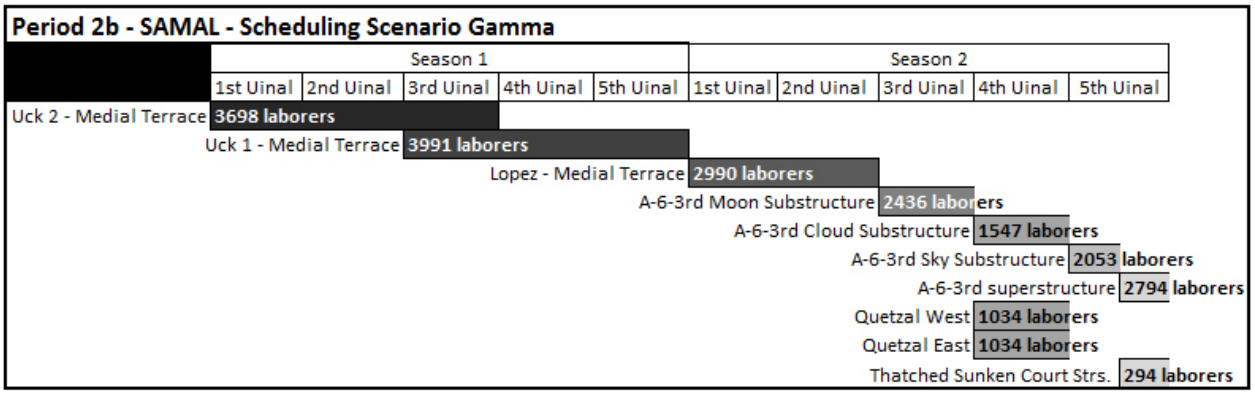

Figure 4. Labour scheduling model (gamma scenario) for Samal phase Castillo construction showing segments and labour estimates.

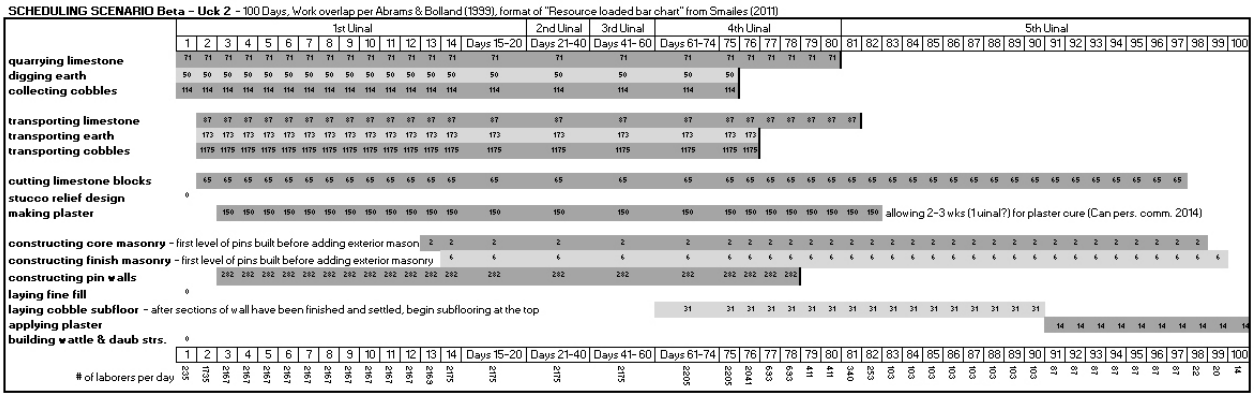

Figure 5. Labour scheduling model (beta scenario) for Samal phase Castillo construction focusing on Uck 2 Terrace segment showing the distribution and organization of labourers.

long-term retention and/or fluctuation of labouring groups.

There are implications such as the simultaneity of segment construction and planning as well as considerations of how seasonal breaks may have been managed. For example, temporary structures may have been built atop substructures prior to the initiation of erecting a superstructure in the following season. Further, there are interesting considerations regarding dedicatory rituals and how they may have fit into the overall building scheduling. These models are also the foundation for simulating workgroup compositions and developing hypotheses about the extent and coverage of supervisory positions. This work is informed by my ethnoarchaeological work with Jorge Can of the Institute of Archaeology and Belizean conservation specialists, whose expertise and labour dynamics I suggest can serve as a useful model for ancient Maya construction labourers (McCurdy 2015).

Models of the on-site dynamics, the at-home impact, and the community-wide extent of building projects like those over time at the Castillo provide insight about how public building resonated in peoples' lives over *uinals*, seasons, and even political eras. Through these and refined means to estimate the 'costs' of monumental buildings, we can re-humanize labour and perhaps build inferential bridges between monumental, central places and hinterlands.

[1] BAAS 2015 audience members (particularly Dr. Shawn Morton and Dr. Meaghan Perumaki-Brown) rightly questioned whether this distillation of the building population to "able-bodied males" is appropriate. I use this subset of the population based on traditional understandings of who would be involved in building within Maya society. I address this topic and the possible diverse nature of laborer populations in my dissertation.

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7 COMMUNITY PRACTICES OUTSIDE THE HOUSE: RESULTS OF MAGNETIC ANOMALY GROUND-TRUTHING EXCAVATIONS AT ACTUNCAN, BELIZE

Lisa J. LeCount, Ted C. Nelson, and Jane E. Millar

This article presents the results of ground-truthing excavations undertaken to test the reliability of a gradiometer survey conducted by Chester Walker in the Northern Settlement Zone and Plaza H at Actuncan. More than 140 magnetic signatures were identified on the gradiometer map that may indicate buried natural or cultural features. To test them, we grouped signatures by form into three broad categories: 1) zones of enhanced magnetism, 2) rectilinear, and 3) amorphous. Zones of enhanced magnetism correspond to patio-focused groups visible from the ground surface, and we hypothesized that those without visible architecture were buried domestic groups. Rectilinear signatures were considered to signal buried constructions, while amorphous signatures might be more isolated features. Twenty test excavations sampled anomaly types and confirmed, to some extent, our hypotheses. However, our generalized types did not predict specific archaeological remains. Within each type, excavations revealed a wide range of constructions and features. Nonetheless, one important result of the project was the recognition that while many activities took place on patio-focused groups, specialized activities, such as crafting and intensive gardening, occurred on the edges of the settlement zone on low constructions invisible from the ground surface.

Introduction

The organization of urban settlements has recently become a focus of debate as archaeologists examine the kinds of relationships and practices that bound people together into social and spatial units in Mesoamerican cities (Arnauld et al. 2012; Smith 2010, 2011). Although some Maya cities were densely populated and complexly organized (Feinman and Nicholas 2012; Masson and Peraza Lope 2014), many are notable for their low densities and lack of recognizable neighborhoods. Attempts to reconstruct the organization of urban settlements, however, must be mindful of the fact that what is visible above ground does not "represent the sum total of the settlement at any given point in time" (Hendon 2012:161). Over the years, archaeologists have discovered many Preclassic houses completely buried by Classic-period urban renewal projects at Cuello (Hammond 2009), Cahal Pech (Awe 1992; Healy et al. 2004), Pacbitun (Powis et al. 2009), and other sites (Rosenswig and Kennett 2008). Outside civic centers, domestic mounds and other settlement features also can be buried by colluviation, alluviation and bioturbation, particularly in upland tropical environments (Johnston 2002). Particularly vulnerable are low agricultural terraces, water management features, houselot walls, and small platforms that are important features for understanding the organization of settlements. At Actuncan, we initiated an archaeogeophysical program that will allow us to reconstruct a more complete picture of the urban settlement and its development.

Archaeogeophysical survey programs are "methods of ground-based remote sensing that allow the detection, imaging, and mapping of subsurface features over large areas in potentially great detail" (Kvamme 2003:435). This definition distinguishes ground-based techniques, including gradiometer, magnetometer, and ground-penetrating radar (GPR) from multi-spectral satellite imagery, LiDAR, and aerial photography that map the surface of forested landscapes from the air. In some parts of the world, archaeogeophysics are used to map entire archaeological landscapes providing an image of buried settlements (Gaffney 2008; Kvamme 2003).

The Actuncan Archaeological Project attempted two ground-based remote sensing techniques in different locations—gradiometer in the Northern Settlement Zone and GPR in Plazas F and H—but only had success with the gradiometer (Walker 2012). A gradiometer is a non-intrusive device that measures slight variations in soil magnetism. They have become the primary tool employed by archaeogeophysicists because data can be collected and processed rapidly and efficiently. When soil conditions are right, gradiometers

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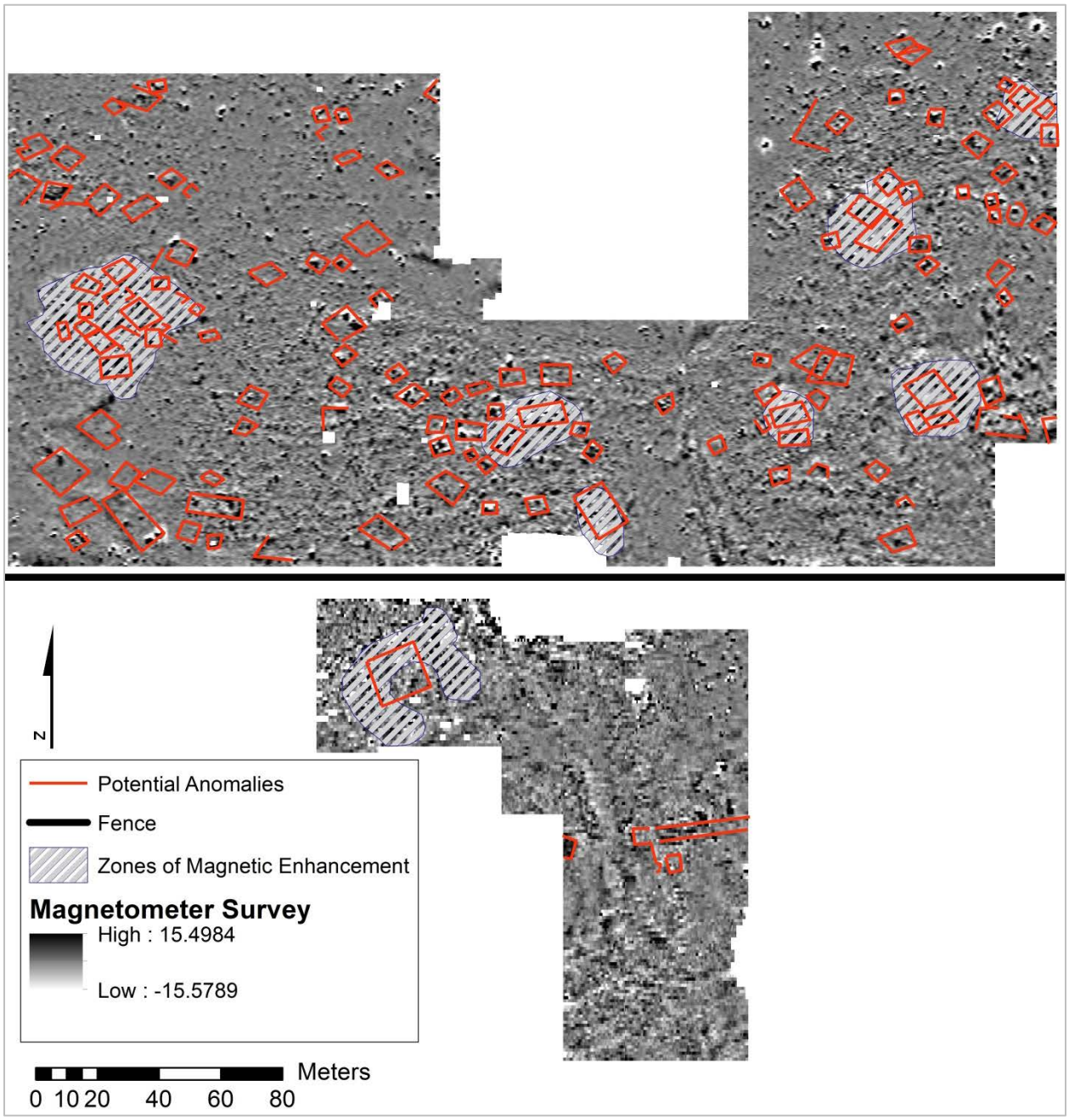

Figure 1. Actuncan's magnetic gradient map overlain with anomalies and zones of magnetic enhancement.

have proven useful in locating cut-and-fill cultural features such as pits, post holes and wall trenches, as well as thermally altered features such as fire hearths and burned structures (Gaffney et al. 2000; Kvamme 2006). In regions that have benefitted from extensive geophysical surveys, magnetic signatures are correlated with specific cultural features to such an extent that unexcavated anomalies can be identified as houses, pits, and hearths with a high degree of probability (Gaffney 2008; Kvamme 2006). However, in the Maya lowlands where remote sensing is still in the experimental stage, ground-truthing excavations are required to identify buried remains. Survey data alone cannot confirm the presence of anthropogenic features, and ground-truthing excavation is necessary to correlate magnetic anomalies with their cultural

manifestations. Overall, surveys in the Maya lowlands have yielded mixed results due to water-logged soils, dense forests, and complex site stratigraphy that impede or confound remote sensing signals (Haley 2006; Halperin 2007; Sweely 1995). Nevertheless, at Actuncan, a gradiometer survey of the Northern Settlement Zone has proved successful in predicting the location of cultural features. Our success is due to the fact that cultural features were cut into the blocky clay substrate of the T3 terrace on which Actuncan sits. The contrast between the low magnetism of the clay substrata and higher magnetic gradients associated with cut-and-fill features or objects that have been thermally altered produce recognizable anomalies.

Gradiometer Survey and Sampling Procedures at Actuncan

At Actuncan, Chester Walker surveyed two areas using a Fluxgate gradiometer: a northern collection area of 48,246m² (11.9 acres) and a southern area of 12,375m^2 (3.1 acres) for a total of 60,621m^2 (15 acres). Walker and Nelson used the resulting magnetic gradient map to identify 141 magnetic anomalies and eight zones of magnetic enhancement (Figure 1). Most zones of magnetic enhancement are associated with patio-focused groups, but some are found in areas with single mounds or lacking visible mounds altogether (Figure 2). Given the close association between zones of enhanced magnetism and patio-focused groups, we hypothesize that zones of enhanced magnetism without substantial architecture represent buried patio-focused groups. Isolated magnetic anomalies are more problematic to interpret because they could represent a wide range of cultural or natural features, although those that are linear or rectangular in shape may be buried platforms or other architectural features. Our ground-truthing program aims to confirm whether or not these areas of interest represent buried archaeological remains.

Currently, we have ground-truthed 20 magnetic signatures over two field seasons (Figure 3). In 2011, nine anomaly locations were chosen for ground-truthing based on anomaly shape and magnetic amplitude (Blitz et al. 2012). Anomalies selected included linear dipoles, complex dipoles, and weak positive

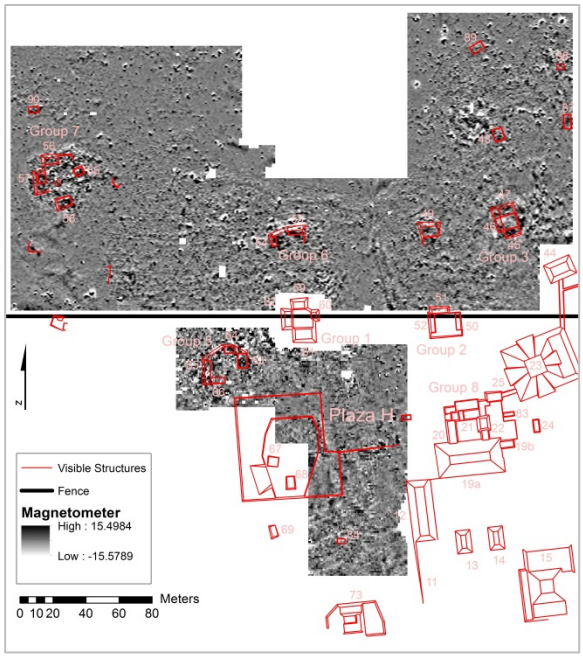

Figure 2. The magnetic gradient map overlain with visible architecture.

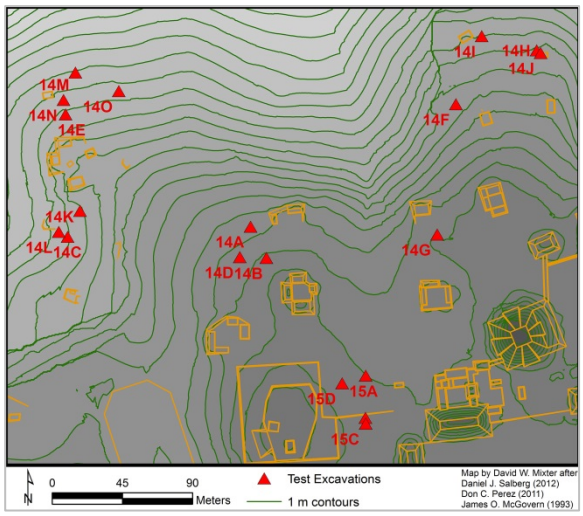

Figure 3. The location of ground-truthing excavations. Map courtesy of David Mixter.

magnetic rectangular patterns with low magnetic centers highlighted by Walker as possible buried structures. In addition, two "quiet" areas with low magnetic gradients were selected for test pitting to serve as control units for comparison. In 2015, we specifically targeted large rectangular patterns. Eight test units were concentrated in the eastern and western sections of the Northern Settlement Zone (Millar 2016). Results of these excavations are summarized

Table 1. Ground-truthing results by unit.

Unit	Anomaly Type	Archaeological Remains	Probable Source	Interpretation
14A	Complex dipoles	Small semi-circular area of wood (pine) charcoal.	Thermal feature	Natural feature.
14B	Complex dipoles	Three layers of Late Classic fill containing refuse and burnt limestone.	Cut and fill event	Probable platform and / or occupation surfaces.
14C	Weak positive rectangular pattern	Burnt Late Classic remains within a fill layer.	Thermal event	Probable agricultural plot.
14D	Complex dipoles	Same as 14B.	Cut and fill event	Probable platform and / or occupation surfaces.
14E	Control unit	Nothing discovered that would be expected to create an anomaly.	None	Minor modification of ancient surface(s).
14F	Area of enhanced magnetism	Classic-period occupation surface resting on fill above a Late to Terminal Preclassic pit dug into sterile clay.	Cut and fill event	Domestic platform associated with Str. 48.
14G	Linear dipoles	Late Classic platform fill layers and possible walls of limestone and chert cobbles.	Cut and fill event	Domestic platform associated with Str. 49.
14H, 14J	Area of enhanced magnetism	Late Classic platform with occupation layer rich in chert and obsidian debris.	Cut and fill event	Non-domestic platform associated with Str. 88.
14I	Weak negative linear dipoles	Two floors and associated features including a red pigment filled pit, postmolds and wall trench.	Cut and fill event	Non-domestic platform associated with Str. 89.
14K	Weak positive rectangular pattern	Terraformed natural white clay strata.	Cut and fill event	Probable agricultural plot.
14L	Weak positive rectangular pattern	No convincing source of anomaly reached after 2 m of excavation through deposits in drainage bottom.	Unknown	Possible agricultural plot.
14M	Weak positive rectangular pattern	Terraformed natural white clay strata.	Cut and fill event	Probable agricultural plot.
14N	Linear dipoles	Sloped wall retaining fill and floor.	Cut and fill event	Terrace between two structures.
14O	Weak positive U-shaped pattern	Burnt daub feature and tree root.	Thermal event	Modern burning and possible disturbed cultural feature.
15A	Control unit	Nothing discovered that would be expected to create an anomaly.	None	Minor modification of ancient surface(s).
15B, 15C	Linear dipoles	Two plaza fill layers and collapsed cobble stone wall.	Differential magnetic susceptibility	Wall construction under civic plaza(s).
15D	Weak positive rectangular pattern	Two plaza fill layers, plaster floor and cobble stone cluster.	Differential magnetic susceptibility	Wall construction under civic plaza(s).
15E	Weak positive rectangular pattern	Late Classic platform with several building stages.	Differential magnetic susceptibility	Str. 93 platform construction.

below and in Table 1. For more details see the Actuncan Archaeological Project's annual reports, all of which can be found on-line at http://llecount.people.ua.edu.

Results of Ground-truthing Excavations

Ground-truthing excavations are summarized below based on location to evaluate the effectiveness of the survey in different segments of the built environment. Plaza H is assumed to have been more complexly stratified than the Northern Settlement Zone which, based on previous excavations, has yet to reveal a plaza surface. Further, different sections of the settlement may correlate with particular kinds of activity areas containing specific architectural features or cultural features.

Plaza H

Given its close proximity to both settlement and civic zones, we hypothesized that Plaza H may contain buried domestic structures. Five 1-x-1m test excavations (Units 15A-E) were dug, none of which yielded evidence of domestic structures. We found that the plaza is covered by a 20 to 30cm thick, black mollisol that has developed since its final use in the Late to Terminal Classic periods (Keller 2012:43). The terminal plaza surface was highly eroded, appearing as dispersed pebble ballast and patches of plaster. It is located at the base of the mollisol, where a structurally recognizable B horizon has developed between the mollisol and underlying cultural layers. Most cultural features rest on earlier plaza surfaces and are not associated with the terminal plaza surface.

Unit 15A was a control unit. Seven strata were uncovered in more than 100cm^3 of matrix, but few artifacts were recovered. Underneath Stratum A (the mollisol) five fill layers were found sitting on two layers of natural soil containing a few Middle and Late Preclassic sherds. As anticipated, there was no indication of anything that would show a magnetic signature in a magnetometer survey.

Units 15B and C were contiguous units placed to intersect a linear-dipole anomaly. Excavations revealed two layers of Late Classic plaza fill underneath the mollisol. These fills sit on a thin layer of compact clay with white mottling that represents a penultimate plaza

Figure 4. Unit 15D's west profile.

surface. Underneath it, we encountered two more layers of fill, the top one containing a cluster of large undressed limestone pieces in the eastern corner of Unit 15B, possibly associated with a collapsed wall. The source of the anomaly is likely due to the cluster of limestone that is oriented in the same direction as the linear-dipole anomaly.

Unit 15D tested a weak positive rectangular pattern. Four visible strata were encountered in 100cm^3 of matrix. Under the mollisol were two plaza fill layers, possibly dating to the Late (top layer) and Early (bottom layer) Classic periods. These rested on a 7cm thick plaster floor, probably Late Preclassic in date. The floor extended across the entire unit, and below it was 30cm of clay fill containing jutes, lithics, some carbon, and ceramics that date to the Middle and Late Preclassic periods. Moderate-sized cobbles were located along the northern portion of the unit in the fill, possibly associated with collapse of a wall (Figure 4). The cobbles are likely the source of the anomaly.

Unit 15E was placed on a platform visible from the ground surface. It was tested because this area was composed of linear dipoles prominently seen on the gradiometer map. As expected, the stratification was quite complex. Six strata were encountered (Figure 5). Beneath the mollisol, we encountered a surface made from limestone cobbles and plaster dating to the Late Classic period. Below it were two fill layers containing jutes, lithics, and redeposited ceramics dating the Terminal Preclassic period. These rested on a plaster floor and associated cobble fill. Below the fill, another thin layer of

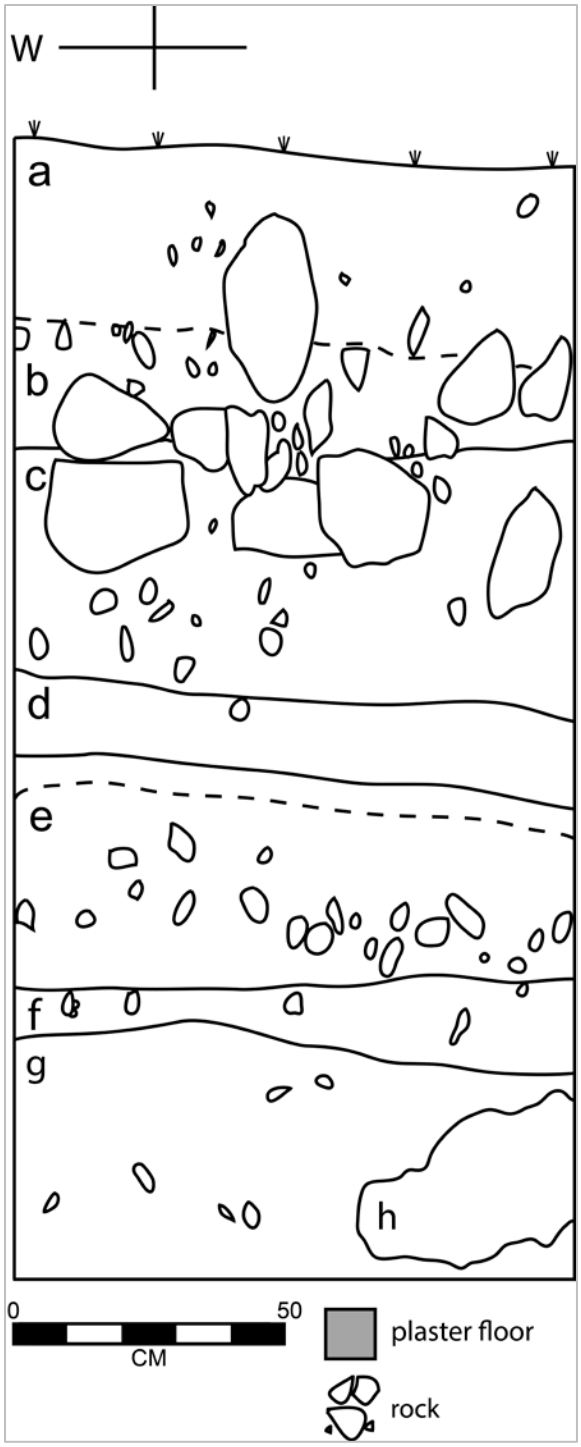

Figure 5. Unit 15E's north profile.

fill was found resting on mottled yellowish clay interspersed with grey silty clay of uncertain origin. Although these lower strata contained Middle Preclassic sherds, they were likely disturbed natural soils. It is unclear what the

Figure 6. Unit 14A showing Feature 1, a modern burnt tree trunk.

source of the anomaly is since we did not encounter any retaining walls or platform facades. It is likely that the cultural feature was not precisely located because linear anomalies can appear as shadows of nearby features (Kenneth Kvamme, personal communication 2015).

Northern Settlement Zone: The Central Portion

Three 1-x-1m units were placed on small amorphous anomalies in the interstitial areas between Groups 1, 5 and 6. In general, excavations in this area encountered a thin layer of dark clay loam humus (Strata A) covering clayey occupation or fill layers that are associated with the leveling and use of this heavily modified section of the Northern Settlement Zone.

Unit 14A sampled a complex dipole signature and was excavated to a depth of 78cmbd. Stratum A, a 5cm thick humus layer, contained a few non-diagnostic sherds. Beneath it, we encountered two clayey strata that contained sherds, lithics, obsidian, charcoal, and fired clay that we interpret as occupation surfaces. Feature 1 was found in the first stratum and consisted of charcoal and fired clay (Figure 6). Feature 1 is certainly the anomaly detected by the magnetometer. Unfortunately, it appears to be a recently burned tree trunk.

Unit 14B sampled a complex dipole signature. The unit was excavated to a depth of 90cmbd and encountered four layers of fill containing ceramics, lithics, jutes and burned limestone. The lowest fill layer had the largest quantity of ceramics, which date to the Late

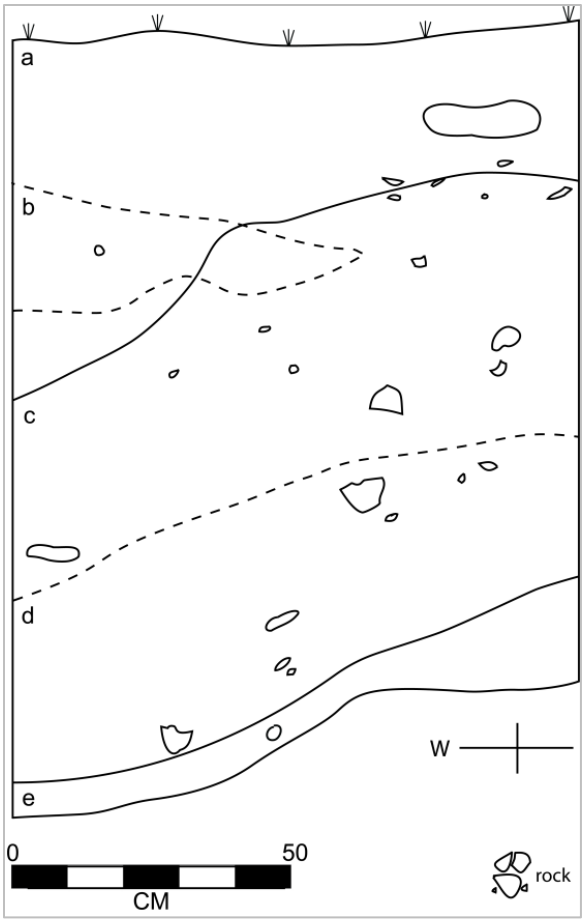

Figure 7. Unit 14F's north profile.

Classic period. Because the lowest fill layer cut into the sterile clay, we interpret the magnetic signature as representing a cut-and-fill event.

Unit 14D sampled a complex dipole signature. Two strata were excavated to 100cmbd. The first layer was a clayey fill containing lithics and Late Classic ceramics, while the second layer contained only five sherds, none diagnostic. A clear color change was noticed between the two layers. The fill stratum may be a continuation of the cut-and-fill event found in Unit B and a possible source of the anomaly.

Northern Settlement Zone: The Eastern Portion

The eastern side of the Northern Settlement Zone is relatively level with a gentle slope to the northwest. In 2011, Dan Salberg and Angela Keller surveyed this area looking for low structures after the pasture was severely burned to the ground. Three new platforms were identified (Structures 87, 88, and 89) north and east of Structure 48 (Salberg 2012). All were quite low, but identifiable as lines of cobble stones forming small rectangles. Five 1-x-1m excavation units (14F-J) were placed on large rectangular-shaped anomalies near isolated structures. The goal of these excavations was to confirm the presence of buried structures.

Unit 14F was placed to intersect a large set of linear and complex dipoles within a zone of enhanced magnetism. We postulated that the enhanced magnetism may be the buried remains of a patio-focused group associated with Structure 48. The unit was excavated to a depth of 155 to 177cmbd and encountered five cultural layers associated with a Terminal Preclassic platform and pit feature (Figure 7).

Stratum A, the humus root zone, extended from roughly 35cmbd at ground surface to 102cmbd in the northwest corner of the unit. It yielded high amounts of lithics relative to ceramics (dating to the Late Preclassic period), as well as daub and very small amounts of jute and obsidian. Keller noted that the lithic assemblage was quite generalized and postulated that it was lithic production debris possibly washed downslope from Structure 48. Stratum B, a small deposit of refuse, contained Late Preclassic ceramics, lithics and jutes, as well as smaller amounts of obsidian, daub, quartz and slate. Below it was clay fill that was a lighter color than the layer above it and contained limestone gravel inclusions, redeposited artifacts (ceramics, lithics, jute, daub, etc.) and a golf ball-sized lump of charcoal. At the base of the lot in the northeast corner, we encountered a cluster of Sierra Red sherds sitting on top sterile clay (Feature 3), while in the northwest corner we encountered the top of a pit feature (Feature 4) dug directly into sterile clay. Feature 4 extended down roughly 25cm until it terminated at stiff mottled yellow clay (Figure 8). Ceramics within the pit were tentatively dated to the Terminal Preclassic period. We have little doubt that the magnetic anomaly was caused by the contrasting soils produced by Feature 4. Given the quantity and diversity of artifacts, we hypothesize that this sequence of strata represents a buried domestic structure and cultural features.

Figure 8. Unit 14F, Feature 4, a Terminal Preclassic period pit.

Figure 9. Unit 14J showing a buried platform.

Unit 14G was chosen to ground truth a large complex dipole signature southeast of Structure 49. Three strata were encountered. Stratum A, the humus root zone, was surprisingly deep at a depth of 25cm. Below it was a thin layer of yellowish-brown clay fill containing small limestone inclusions. Along the eastern side of the unit, a cluster of medium-sized undressed limestone and chert cobbles was found within the fill. Ceramics date the fill to the Late Classic period. This fill and possible wall sat on another Late Classic fill layer containing brown clay, small limestone gravels, limestone and chert cobbles, and large amounts of trash. Several medium-sized chert and limestone cobbles, some burnt, were found clustered in the northeast corner of the unit similar in location to the cluster above it. Although the excavation was terminated before sterile soil was encountered, the fill layers and cobble clusters are indicative of a platform edge. The cause for this magnetic anomaly is a construction event, perhaps associated with a buried domestic structure.

Units 14H and J were 1-x-2m units placed to investigate a large strongly positive dipole signature just off Structure 88. Unit 14H excavations revealed four strata. Stratum A, a thin layer of humus, transitioned to lighter brown clay containing uncut limestone, chert, daub, ceramics, and lithic debitage. We interpret this layer to be an occupation surface due to the moderate density of cultural material including six obsidian blades, a relatively high count when compared to finds in other settlement areas of the site. The only possible architectural element discovered was a low pile of limestone and chert cobbles (Feature 9) sitting at the base of the occupation surface on yellow-clay fill. The unit was excavated another 40cm into hard, mottled, and friable natural clay.

Unit 14J was opened closer to Structure 88 to better understand the source of the obsidian blades and the articulation between the structure and subsurface remains found in Unit 14H. A 1-x-1 m baulk was left between the two units. Just below the surface, the outer edge of a platform was revealed as a single row of large undressed limestone fragments and chert cobbles (Figure 9). Another, smaller retaining wall lay behind the platform's façade. The fills contained mostly lithic materials, but a small concentration of ceramics was found including a large Late Classic rim fragment of a jar. The platform sat on the same occupation layer encountered in Unit 14H, but in 14J, the surface followed the natural topography, sloping gently down to the west. Underneath the occupation surface lay yellow clay with a much lower artifact density. Only three small sherds were recovered in the 15cm thick lot. Artifact densities in the first two strata were much higher, with ceramics, a wide variety of lithic, several jutes, seven more obsidian blades, and other material remains. Overall, the high proportion of chipped stone to ceramics in Units 14H and J indicates lithic workshop activities located on a low platform. The relationship of this low platform to Structure 88 is currently unknown, but given their proximity they were likely attached.

Unit 14I was a 1-x-2m unit about 10 m northeast of Structure 89. Although this area is magnetically quieter than those to the south, LeCount chose to ground truth a weak linear

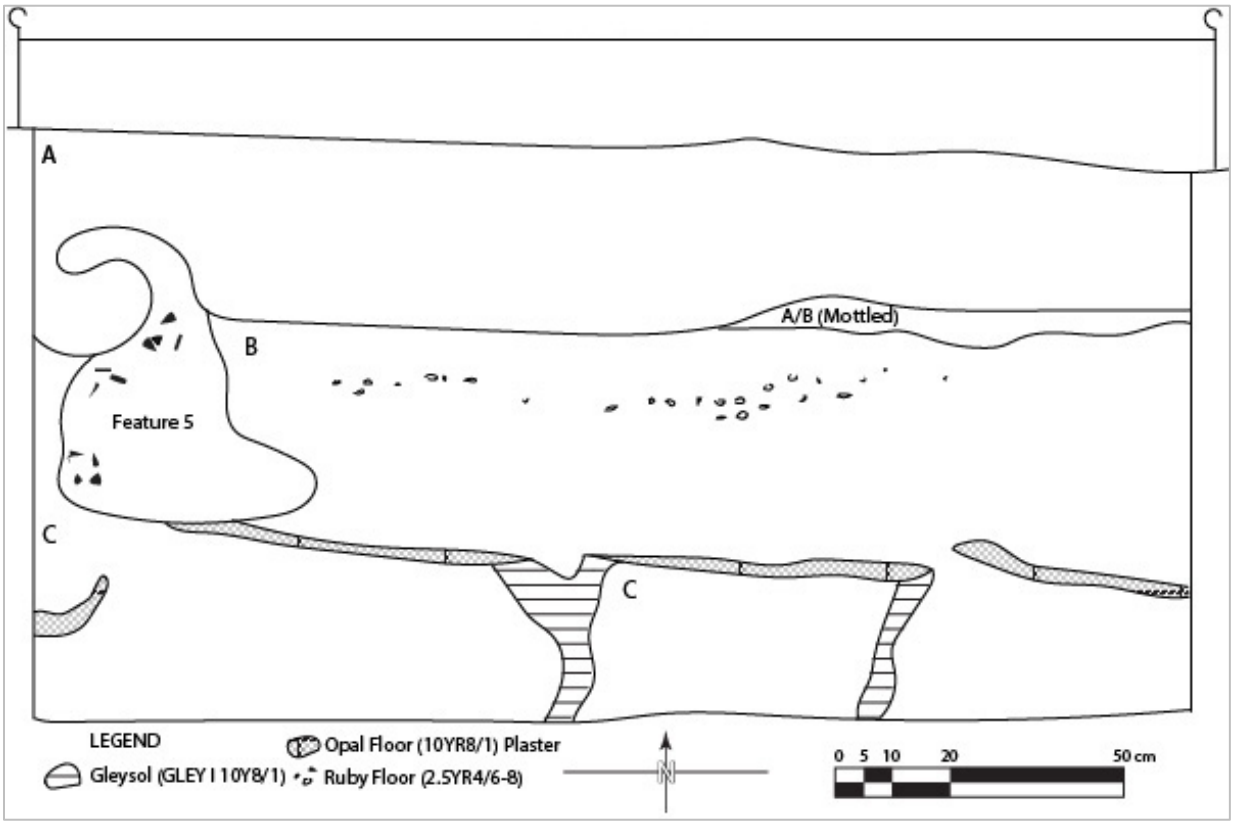

Figure 10. Unit 14I's north profile.

Figure 11. Unit 14I showing Feature 5, a pit filled with red matrix.

anomaly running northeast to southwest from Structure 89. Excavations revealed a more complex stratigraphy than expected (Figure 10). After a 30 to 40cm deep layer of humus and dark brown clay, Stratum A transitioned to yellow clay. As the transition began, Feature 5 appeared. This roughly 50cm deep pit contained red (2.5YR 6/8) clay and charcoal (Figure 11). The feature was analyzed by Tawny Tibbets *in situ* using a pXRF, and based on the instrument readings, the red matrix is probably a locally sourced iron oxide, possibly used for making red paint for stucco or ceramic slip. The upper section of Feature 5 was disturbed by bioturbation. Two possible postholes (Features 6 and 7) and a dark linear stain (Feature 8) were found running northeast-southwest across the center of the excavation. Feature 8 is a shallow trench-like feature that also appeared just below the transition to Stratum B. These features are associated with a compacted clay surface called Ruby Floor and, taken together, may be the remains of a perishable structure. Ruby Floor was poorly defined throughout the unit. The surface was either an intentionally prepared clay floor disturbed by postdepositional processes or

merely spilled pigment unintentionally compacted underfoot. No ballast underlay Ruby Floor, only a thick 30 to 50cm brownish-yellow clay fill was found. This fill capped Opal Floor, which consisted of several layers of plaster. The plaster was 2 to 5cm thick and extended throughout the entire unit, forming a solid but uneven surface. The profile revealed two distinct layers of plaster in places, but postdepositional processes related to groundwater distorted most of the original surfaces. Interestingly, the base of Feature 5, the red pit, sat on Opal Floor, indicating the pit was dug into fill until it reached the plastered surface. No artifacts were found on or in association with the floor surface. Opal Floor has been badly affected by the formation of gley, a sticky grey clay resulting from waterlogged deposits. Across the center of the unit, the floor was broken by a long shear and slump event. Soil below Opal Floor was hard, friable natural clay with reddish mottling (Stratum C). Excavation ceased at 100 to 110cmbs. Artifact density was quite low throughout the unit, especially in fill strata that contained the usual assemblage of eroded ceramics and lithics. A single piece of obsidian was found near Feature 5.

The shear and slump event seems the likeliest source of the magnetic anomaly tested in Unit 14I, although Feature 8 may also account for it. Both cross-cut the unit and are oriented in the same direction as the magnetic signature on the map. Like the buried platform off Structure 88, we think this area was likely used as a workshop, probably for the making of red pigment in the later version of the platform. However, more extensive excavations are needed to test this interpretation.

Ground-truth Excavations in the Far Western Section of the Northern Settlement Area

The western side of the Northern Settlement Zone is more topographically varied than the eastern side. Its most prominent feature is the southeast to northwest trending drainage that originates at the aguada and runs into an unnamed creek that forms the boundary between the Galvez and Requena properties. Christian Wells (personal communication to Lisa LeCount, 2014) noted that the aguada was constructed by damming this drainage. Groups 5 and 7 sit above this drainage on the east. Given the area's exposure and proximity to residential groups, it is likely that the slope was heavily modified to promote drainage and cultivation. LeCount hypothesized that many of the magnetic signatures found in the area may be agricultural features. One particular intriguing set of magnetic signatures can be seen situated south of Group 7. There, weak positive rectangular signatures appear to form an interconnected "field" system of large features running perpendicular to the slope. Interestingly, these magnetic signatures are fuzzier than most, due either to the magnetic subtlety of the features responsible for them or their significant depth below surface. North of Group 7 is another set of complex magnetic features. A linear anomaly runs between Structure 90 and a complex dipole of similar size and magnetic signature, likely another buried structure or platform. Finally, there are many isolated magnetic features that do not appear to be associated with visible structural groups. To test these anomalies, seven units were placed on six magnetic features to determine if the magnetic patterns are associated with agricultural terracing or other non-domestic features.

Units 14C, K and L were positioned to intersect two large rectangular anomalies associated with the proposed field system south of Group 7. In these units, the excavations were deep and we never encountered retaining walls indicative of rock terraces. However, the natural soils of the slope were terraformed, which may account for the fuzzy magnetic signatures in this area.

The most productive unit was Unit 14K, a 1-x-2m unit placed to investigate one of the weak positive magnetic rectangular patterns that make up the proposed field system. There, Millar found that Stratum A transitioned to lighter, more compacted yellow clay around 25cmbs. At about 50cmbs 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 in the lab. In a Spanish dictionary, yeso is defined as 1) plaster material for finishing walls, 2) material used for making plaster casts, 3) a geological

term for gypsum, and 4) chalk. As seen in the south profile (Figure 12), 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 blocky and mottled yellowish-brown in color.

Modifications to the natural clays by cut-and-fill events could explain the source of the magnetic signature. Artifacts in the upper strata included highly weathered ceramics most likely washed down from Group 7 above, along with lithics and a single piece of obsidian. No artifacts were in the white clay.

In Unit 14C, Nelson excavated to a final depth of 140cmbd and five strata were identified. There, he found that Stratum A, the mollisol, was deep. It contained clay loam with small specks of red mottling interspersed throughout the matrix. Stratum B was the same color but without the red-mottled soil. Stratum C represented a soil color change and contained burned limestone, small limestone inclusions, fired clay and Late Classic sherds. Stratum D was similar but slightly different in color. The last stratum, E, was clay containing only a few small sherds. Due to the lack of artifacts at this depth and time constraints in 2011, the excavation was terminated. The source of the magnetic signal is ambiguous. A close inspection of the magnetic signature map shows that the unit tested the center of the rectangular magnetic signature; therefore, we did not placed the unit on the edge of this anomaly.

In 2015, we returned to this large anomaly by opening up a 1-x-2m unit on the edge of the rectangular feature to try to determine the source of the anomaly. Unit 14L was located near the base of the slope therefore it was highly susceptible to flooding, filling and draining rapidly with runoff after each rain. 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.

Stratum A transitioned to lighter and more compacted clay (Stratum B) rich in natural and anthropogenic inclusions. Most artifacts were very small and eroded, probably washed downslope from the structures uphill. Like Unit 14C excavated by Nelson, Stratum B in Unit

Figure 12. Unit 14K's south profile showing the cut-and-filling of natural white clay (yeso).

14L revealed small specks of red mottling interspersed throughout the matrix along with burned limestone, fired clay, and small sherds. At the time, the red mottling seemed to be due to a burning event, but it continued to appear in each lot as we excavated downward, fading out entirely around 100cmbs. Stratum C sloped to the west with the natural topography and grew noticeably denser with depth. At nearly 2m below surface, occasional eroded ceramics and lithics continued to appear, but the unit was closed in the interest of moving on to test other anomalies. The white clay at the base of nearby units was never reached, and no convincing source of the rectangular magnetic signature was discovered. It is possible that the white clay was very deeply buried within this upper portion of the drainage.

North of Group 7, we tested 3 rectilinear magnetic signatures that may represent terracing. Unit 14M lay 20m northeast of Structure 90 on a gentle slope north. This 1-x-2 unit was placed to investigate a weakly positive rectilinear magnetic signature. Stratum A, the dark brown clay and humus zone, was 20 to 25cm thick. It transitioned to lighter yellow clay (Stratum B). Excavations struck greyish-white clay or yeso (Stratum D) at varying levels throughout the unit. It first appeared just 35cmbs in the northeast corner, but in areas of the south it lay as deep as 55 to 60cmbs. This dense, impermeable stratum appears to have been cut and redeposited. The morphology is best defined in the west side wall, which shows a swale filled with mottled white and yellow clay (Stratum C) and a berm of solid white clay (Stratum D) with no inclusions (Figure 13). The latter was easily identifiable from the

Figure 13. Unit 14M's west profile showing the terraforming of natural white clay (yeso).

Figure 14. Unit 14N, Cedar Wall. Note the slope of the wall and its construction.

surrounding natural soil by its homogeneity and clear profile morphology, which contrasted with the mottled, blocky sterile clays found in other excavations nearby. Dense, sticky gley soils (Stratum E) appeared around 90cmbs, and excavation ceased at 130cmbs because similar strata proved sterile in other units.

Artifacts in upper strata included ceramic, lithic, obsidian, and jute, probably washed down from the structures uphill. Once the excavations encountered yeso, only a single utilized flake was recovered. The manipulation of the yeso could account for the magnetic anomaly.

Unit 14N was a 1-x-1m unit laid to investigate a linear dipole signature running between Structure 90 and a strong positive rectangular magnetic signature. The signature ran east to west perpendicular to the slope, and we hypothesized that it represented a wall between the two structures.

Below the 20 to 25cm thick humus and dark brown clay zone (Stratum A) lay compacted and mottled clay rich in natural and anthropogenic inclusions (Stratum B). Stratum B, a possible occupation surface, was only 5 to 15cm thick, and beneath it soil transitioned to yellow fill (Stratum C). Just below the transition between Strata B and C, a zone of reddish mottled fill, possibly representing a burning event or occupation surface (Stratum D) appeared in the north and east. Strata A, B, and the top 20cm 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). 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 and was constructed of one to three courses of stone stacked end-to-end so that their largest faces created the wall façade (Figure 14). A small patch of tamped sascab named Pearl Floor (Stratum D) lay on the south side of the wall. The floor was 7cm thick at most, with another 3cm of darker soil underneath, but no discernable ballast. A single obsidian blade was recovered. The excavation ceased when sterile, friable greyish-white clay was 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 14O was a 1-x-1m unit laid to investigate an inverted U-shape in the gradiometer map. A concentration of daub, burned clay, and charcoal appeared within Stratum A. The layer of daub extended downward through Stratum A in the form of an oval-shaped feature (Feature 18). Excavators sectioned it, revealing a burned root running out the base of Feature 18. Inclusion-rich mottled brown clay (Stratum C) extended 30 to 40cmbs throughout the unit. It transitioned to mottled white and yellow clay (Stratum D), which grew denser and lighter in color with depth, making the gradual transition to natural mottled white clay (Stratum D) around 105 to 125cmbs. Excavation ceased about 130cmbs in the natural clay. Artifact densities decreased dramatically after the first two strata. The burnt feature is the most likely source of a magnetic anomaly. Further investigation would be needed to see if it extends further and could account for the entire U-shaped anomaly, of which Unit 14O merely caught the northeast corner.

Unit 14E was a 1-x-1m unit located 10 m north of Group 7. It was excavated as a control unit for ground truthing an area with normal magnetism. Stratum A was a relatively undisturbed humus layer of dark grayish brown clay loam contained typical amounts of artifacts for an off-structure context at Actuncan. The layer's slope reflects the general topography of the hillside. Stratum B was a 20cm deep layer of brownish-yellow clay matrix with small limestone gravel-sized inclusions, ceramics, lithics and jute. The slope of the stratum suggests these materials may have washed down slope from Group 7. No diagnostic ceramics were recovered from this stratum. Stratum C consisted of white sterile clay (yeso), with the exception of a single sherd. This stratum was excavated to a depth of roughly 92cmbd. The findings in Unit 14E are consistent with the magnetometer data and nothing recovered here would be expected to create a magnetic anomaly.

Conclusions

Overall, the magnetic gradient map was more reliable in predicting buried deposits in the Northern Settlement Zone than Plaza H. In the settlement, platforms and features were dug into the clay of the ridgetop and created magnetic anomalies of variable sizes, shapes and intensities. Plaza H, on the other hand, was raised more than 100cm above the natural clay by both cultural and natural processes. Plaster floors were laid down to raise and level the plaza, and most features rest upon them or fill layers. Therefore, Plaza H features do not cut-and-fill sterile clays that are the source of differential magnetic gradients in the Northern Settlement Zone. In Plaza H, the platforms encountered do not appear to have been residential because they lacked trash and other domestic features.

A gradiometer survey can be considered reliable on a given site when extensive ground truthing results in a positive correlation between digitally mapped anomalies and the presence of burning events, architectural features, or cut-and-fill features that produce discrete magnetic signatures. Of the units tested, 12 were attributed to cut-and-fill events associated with ancient Maya constructions, three as burning events, and three were ambiguous (Table 1). Two control units discovered nothing that would be expected to create a magnetic anomaly. Taken together, Actuncan's ground-truthing has made a convincing case for the efficacy of magnetometer survey within its settlement zone. We found that 1) zones of enhanced magnetism correspond to patio-focused groups visible from the ground surface, 2) zones of enhanced magnetism not associated with visible patio-focused groups correspond to buried architecture and cultural features, 3) large rectangular patterns are often indicative of substantial cultural features such as low platforms or terracing, 4) strongly positive linear signatures are indicative of limestone and/or cobble stone walls, and 5) small amorphously shaped anomalies are highly variable and may be either natural or cultural features.

In Actuncan's Northern Settlement Zone, cultural features associated with magnetic signatures appear to be spatially patterned. Along the eastern edge of the settlement, large rectangular signatures were found to have been low platforms or occupational surfaces associated with relatively high quantities of

obsidian blades and a wide variety of lithic material indicative of workshops. In the case of Unit 14I, a red-clay pit possibly used in the production of red pigment for ceramic or plaster surface treatments also indicates specialized production activities. Close by, excavations into zones of enhanced magnetism yielded buried platforms and cultural features more indicative of domestic platforms, possibly associated with informal patio groups. On the other hand, excavations on the western side of the settlement revealed terraforming of natural white clay and an agricultural terrace that were likely used to control the movement of water on the hillside or retaining soil. Therefore, our data lend evidence to suggest that specialized activities, such as crafting and intensive gardening, occurred beyond patio groups in peripheral locations. These investigations hint at the organization of houselots and location of specialized activities at Actuncan, patterns that will be the focus of future excavations.

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8 UNEXPECTED DISCOVERY WITH LIDAR: UNCOVERING THE CITADEL AT EL PILAR IN THE CONTEXT OF THE MAYA FOREST GIS

Anabel Ford

With the LiDAR imagery for the El Pilar Archaeological Reserve for Maya Flora and Fauna, we discovered a new component of the site. Dubbed the "Citadel" for its hilltop location and appearance of fortification, the remains do not match any known site type of the Maya region. With ramparts encircling the hill, there are perched three plazas with two temples both about five meters high. This dramatic cultural complex is invisible from the air, but remarkably etched on the LiDAR imagery. The terrain is shaped into the hill with design and purpose. It shares nothing in common with Classic Maya centers: no clear open plaza, no cardinal structure orientation, and curiously no evident relationship to the major Classic site of El Pilar, only half a kilometer away. Here we present our initial investigations of this unique feature to identify the construction sequence and gain a perspective on its relationship to the surrounding area.

Introduction

Settlement patterns are enduring evidence of human occupation on the landscape. Locating and mapping the El Pilar Citadel was an experience that related to our move into the new survey strategy with LiDAR (Light Detection and Ranging). While our aim has always been to survey the whole of the ancient Maya city of El Pilar, this was being accomplished in steps and had focused on the east-west causeway system that connected major monumental compounds. The surprise of the LiDAR results and the identification of terra-formed ridge top constructions in 2013 opened up the attention to the wider areas of El Pilar. Here the survey, mapping, and examination of the Citadel is brought into the context of the long-term research at El Pilar and the Belize River area (Figure 1).

Early mapping of residential settlement and monumental architecture around El Pilar focused on the east-west connections as related to the causeway system linking the Nohol Pilar and Pilar Poniente (Figure 2). The annual surveys expanded the coverage, emphasizing the extension of the Late Classic configuration of the monuments. This focus built upon the development of the contiguous and binational protected area that was established in 1997-98. Working at one El Pilar in two nations has been the foundation of the research since 1994.

With the acquisition of LiDAR coverage in 2013, the understanding of the El Pilar Archaeological Reserve for Maya Flora and Fauna expanded. The LiDAR data included the entire 20 km^2 protected area of the site and its surroundings. From this coverage, new features were revealed. A most dramatic feature, dubbed the "Citadel," was identified in the LiDAR to the east of the core monuments of El Pilar, across a deep arroyo (Figure 3). This astonishing feature was notable for its hill top temples and enclosure ramparts surrounding the upper precinct. Out on its own and with a commanding eastern vista, there was no obvious association with the main

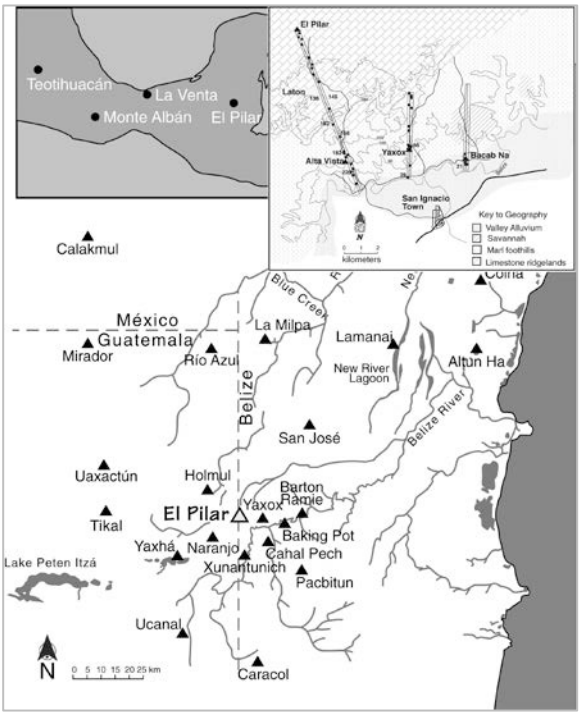

Figure 1. The Central Maya Lowlands and the Belize River Archeological Settlement Survey insert showing the transects and centers, including El Pilar.

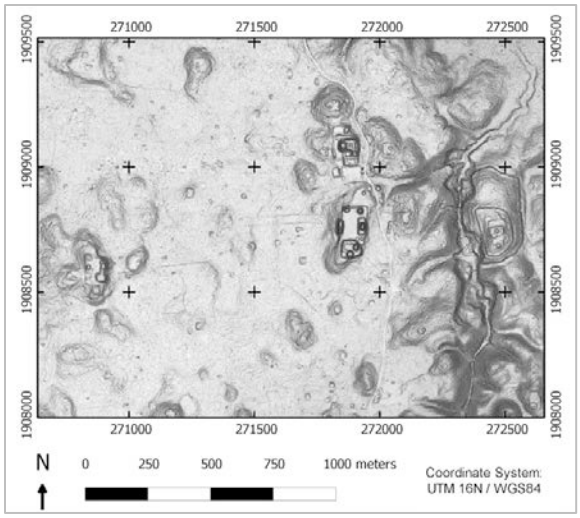

Figure 2. The Core Area of El Pilar with the Citadel on the East, the Eastern Nohol and Xaman complexes , and the Causeway System connecting to Poniente.

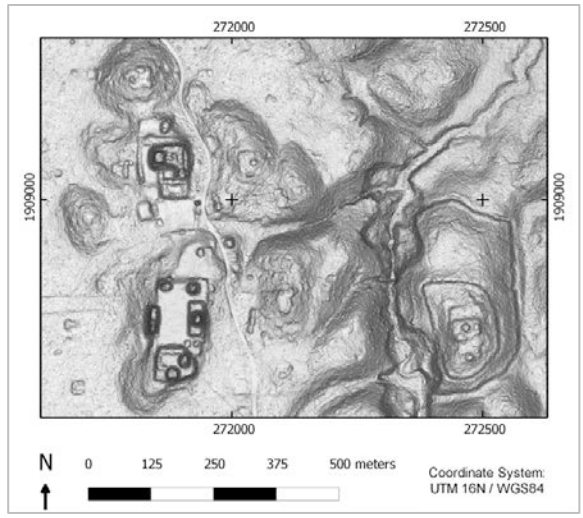

Figure 3. The Citadel has no connections to the main El Pilar Monuments to the West.

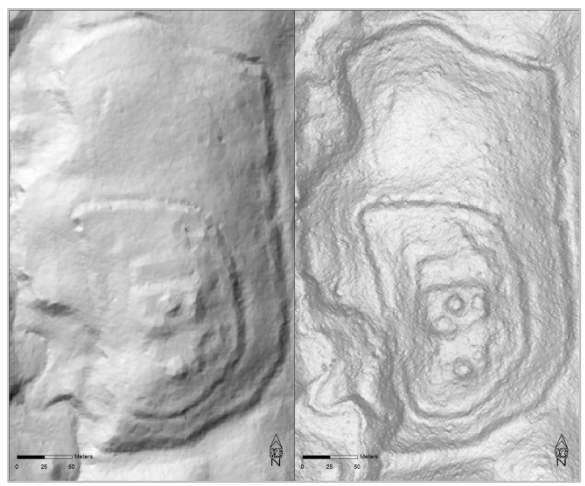

Figure 4. LiDAR Visualizations of the El Pilar Citadel with the right Bare Earth Image and Right Bonemap Image.

components of El Pilar. So close, only 500 meters in direct line, but distinct. Was it a Postclassic defensive location commanding the eastern front? Or was it a Preclassic outpost of the developing civilization? Or could it be a Classic retreat that was separate from the public central districts? These questions could only be addressed with specific attention to the site. The 2015 field season was designed to address these questions of the El Pilar Citadel and its significance on the local landscape.

LiDAR in the Context of the UCSB Maya Forest GIS

Over the course of the past decades, digital map data collection has been a specific aim of the UCSB Mays Forest GIS (Geographic Information System. The three scales of the UCSB Maya Forest GIS represent regional, local, and site-specific data focused on El Pilar and the Maya forest (Ford et al. 2014). The research context of Mesoamerica embraces the greater Maya forest of Belize, Guatemala, and Mexico at the scale of 250,000:1 and above. GIS layers of political boundaries, roads, place names, rivers, soil, and geographic character make up this large-scale data set. Our compilation includes the wider context within which the El Pilar data are set.

The detailed site-specific scale ranges around 10,000:1 and is the basis of compiling field data of maps, excavations, vegetation, and field observations. With the incorporation of the LiDAR, we now have a vast new data set that promotes a detailed interpretation of topography, water flow, and major cultural features. While our overall aim with the LiDAR is to develop a comprehensive map of all archaeological features, large and small, within the protected area, the major cultural features are of prime interest. Of these major features, the most dramatic is that of the Citadel.

The El Pilar Citadel

Astonishingly revealed in the LiDAR, our remote sensing of the site was based on the interpretation of ground point laser returns from the LiDAR coverage. Situated on a north-south

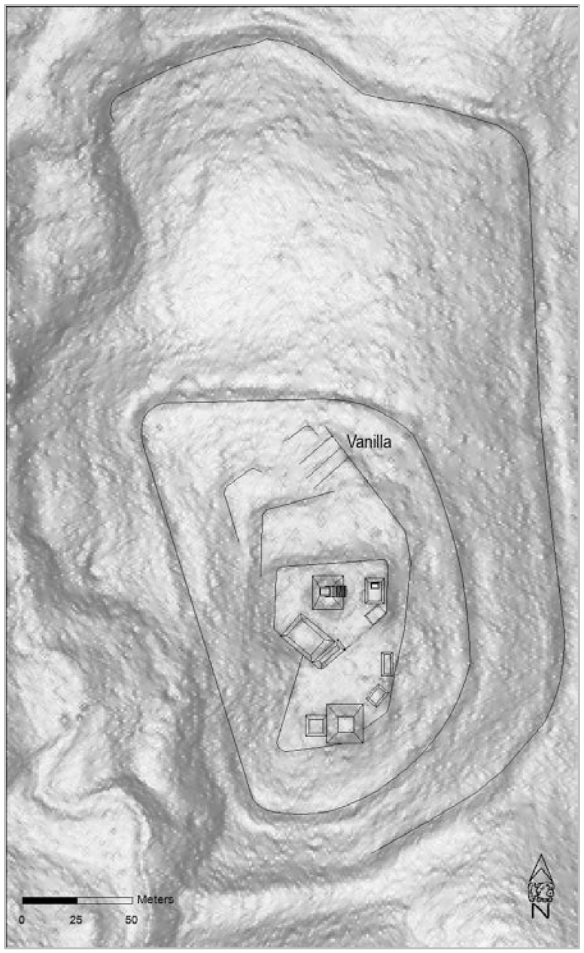

Figure 5. The map of the EL Pilar Citadel hilltop plazas with the Vanilla area indicated.

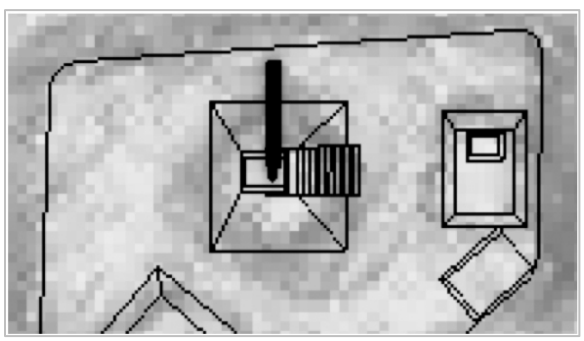

Figure 6. The Center Plaza Temple C1 with the looters trench on the North Side.

trending ridge of 380 meters long by 200 meters wide, the Citadel is imposing. Based on the LiDAR image, we could not identify any evident connection that would associate the Citadel to the Late Classic monuments of El Pilar. To make sense of the Citadel, we needed to initiate a target investigation. This was supported with the Koval Initiative.

Initial reconnaissance of the site in 2014 revealed that the hilltop of the Citadel was covered with dense second growth, including vines and shrubs choking the views of the structures. We were able to see the plazas where two looters trenches were identified (Ford 2014; Ford et al 2014). This foray provided the basis for initiating investigations of the hilltop architecture.

The 2015 investigations of the El Pilar Citadel, identified on our maps as 4E1-1, used the LiDAR imagery as a mapping base (Figure 4). Specific attention was given to the rampart features encircling the hill. In addition, we cleared the looters trenches identified in two temples. All the debris was screened through ½ inch mesh collecting all artifacts. Once the illegal excavations were cleared, profiles were made of the irregular sidewalls for construction sequences.

Our field investigations validated the architectural features of three in-line plazas from north to south along the hilltop (Figure 5). The northern plaza shows no evidence of superstructures, while the central and southern ones supported ancient buildings, each with one temple and several other platforms. The destructive excavations of central plaza structure penetrated over six meters whereas the southern plaza excavations were relatively shallow. All ceramics in both trenches surprisingly dated to the Late Preclassic.

Imaging, Field Validation and Mapping of the Citadel

Clearing Underbrush and Mapping Architecture 2015. To begin to adequately map the El Pilar Citadel, significant underbrushing was required to maneuver field and excavation equipment to the site. The task took two weeks to design, lay out, and execute.

Based on the LiDAR, we knew that the overall area of the Citadel was approximately 13 hectares from the hilltop to the limits of the lower ramparts. Relocating and mapping focused on the three upper plazas, the North Plaza, the Central Plaza, and the South Plaza. Further, the ramparts had to be linked to the

LiDAR observations. These facets were undertaken, sequencing the vegetation and looter's trench clearing with the Citadel and surrounding survey.

Developing and Interpreting Imagery. We have been developing an interpretation of the LiDAR imagery moving from the standard Bare Earth renditions to our new Bonemap visualization (Figure 4). The Bare Earth algorithm removes architectural features, confounding archaeological interpretation of the landscape. In collaboration with geographer Thomas Pingel, we have developed a new visualization for the El Pilar LiDAR (Pingel et al. 2015) designed to accentuate subtle architectural features of the landscape. Comparing the Bare Earth and Bonemap visualizations of the Citadel is instructive (Figure 4, 5); the Bonemap is more resolute as a base for the map of the Citadel.

We began defining the plaza edges and determining the number of structures. Three plazas included the North (60 by 20 m), Central (50 by 40m), and South (40 by 40m). To the north off the east corner of the North Plaza, we discovered stepped terraces with an abundance of vanilla orchids draping down off the tree canopy (Figure 5). Vanilla orchids have been found in other areas of El Pilar.

The Central Plaza, at an elevation of 238 m, was positioned at the top of the hill with one tall five-meter centrally located temple structure (C1), one platform to the south, and one to the east with a small appendage at its south end. Below the Central Plaza to the north, the lower North Plaza, at 233 m, showed no signs of structures, but has descending terraces adjacent towards the upper rampart at 224 m. There is no obvious means of access from the Central to the North Plaza. From the Central Plaza there is a ramp that communicates to the southeast onto the lower South Plaza, dropping down to a level at 235 m. The South Plaza has another five-meter temple on the south with an attached western platform. Two other small structures are located on the east side and a suggestion of a connection to the North Plaza providing an access among all plazas.

Significance of Ramparts. The rampart rings are the most distinguishing feature of the El Pilar Citadel, giving it an appearance of a bivallate European Hill Fort. The upper rampart, 14 meters below the Central Plaza at 224 m, encloses a 20,000 m^2 area and the lower, 38 meters below the Central Plaza at 200 m, encloses approximately an 68,000 m^2 area. The ramparts surround the upper plazas and the hill in two descending rings, partially destroyed by the arroyo to the west. Essentially excavated into the hillside as if quarried, these ramparts present 3-4 meter high vertical obstacles with no obvious entry points. If we assume a simple triangle area for the quarried ramparts and extend it the length of the features, in the case of only the upper rampart, we have a total length of approximately 550 meters and requiring the removal of 4,400 cubic meters. The lower rampart is incomplete and its estimated length is about 1000 m, while the known length is 650 m. The estimated volume removed would be a maximum of 8,000 cubic meters. The materials removed to create the ramparts might have served in the construction and building of the three plazas of the Citadel.

What is the significance of the ramparts? They justify an image of a hilltop fortification. Were they constructed to protect the interior from contemporary marauders or was it from later vandals? There is no question that these ramparts are deterrents to summiting the hill, but whether they were constructed at the same time as the plazas and temples or later is unknown. There is little way to determine when they were constructed.

Rescue Data from the Looter's Trenches

The two tall temple structures that were on the Central and South plazas were both looted. These trenches appeared to be similar center trenches, found all over the greater Maya Lowlands. As we got into the clearing, it became obvious that these trenches encountered significant architectural obstacles and each took on different strategies in the search for their quarry. We have drawn the conclusion that they were unsuccessful in reaping their loot, but in the process of their failure they significantly damaged the integrity of both temples.

Our objectives were to clear out the debris and clean out excavated areas, exposing the sidewalls of the illegal earth moving. The

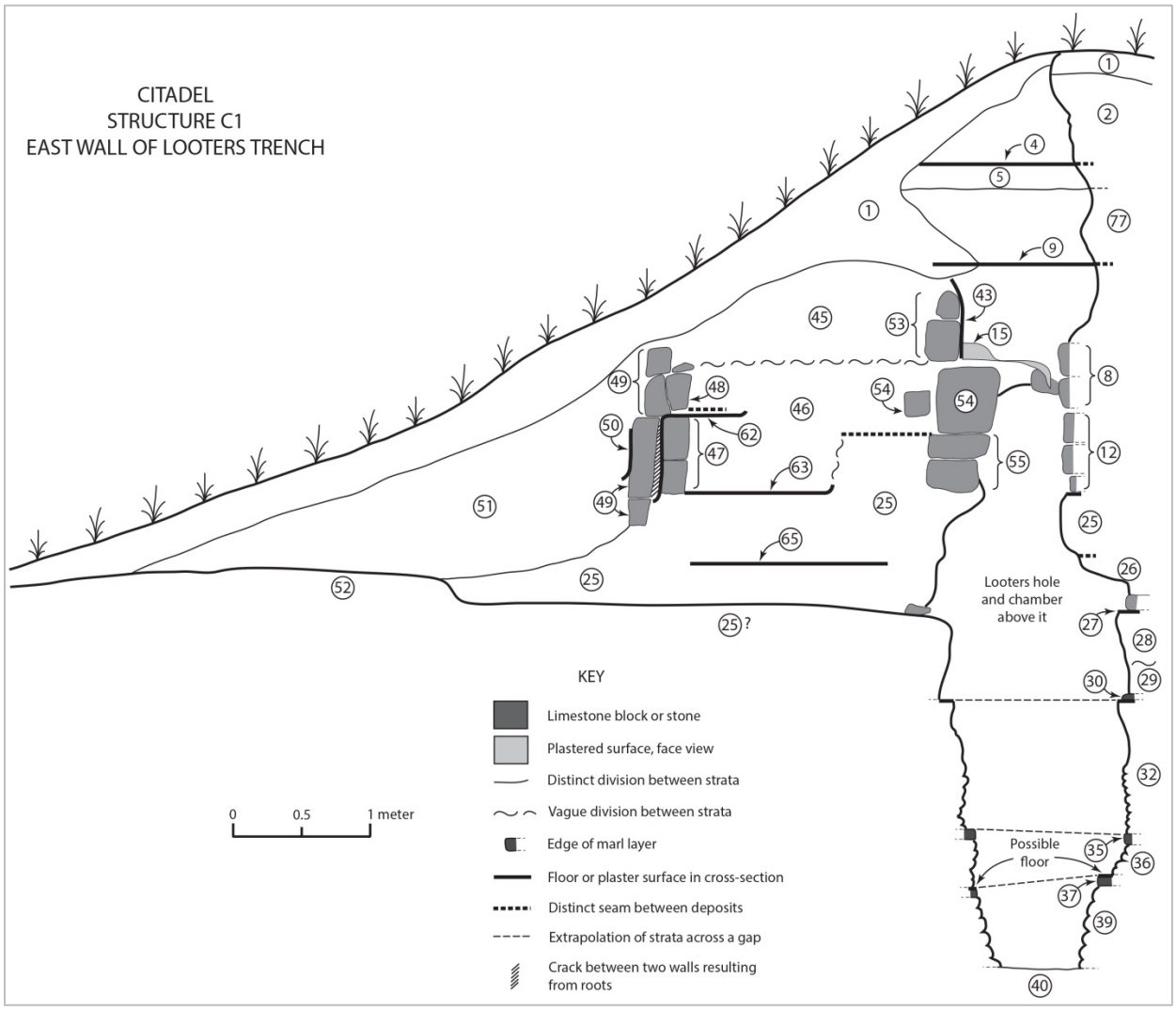

Figure 7. East Wall Profile C1 showing the initial looting entrance.

temple of the Central Plaza, C1, was damaged to a depth greater than six meters, nearly two meters below the level of the surrounding plaza. The temple of the South Plaza, S1, was not as industriously attacked and the damage only reached a maximum depth of about four meters, one meter above the plaza level. As we cleared the area of the loose and mixed debris, we screened all the backdirt though ½ inch mesh to recover artifacts churned up by the looters. Our aim was to define the visible strata, detail the construction histories of the two temples, and determine the general chronology.

Chronology. The materials gathered by screening the looter's backdirt was not obviously linked to any particular strata. It is nevertheless important that the ceramics gathered represented the Late Preclassic. Vessels of bowls, jars, and plates were formally consistent with the Preclassic. Slipped vessels were waxy and presented durable surfaces characteristic of the Preclassic. Curiously, there were a few pieces that might be considered Middle Preclassic. More significant, however, is that there was absolutely nothing to represent any of the later Classic periods. The El Pilar Citadel is firmly placed in the Late Preclassic and suggests a time frame around 250 BC would be probable, the same time the main monuments of El Pilar were expanding. Yet at the Citadel the constructions were left by c. 250 AD.

Citadel Temple C1 South and East Walls. The illegal excavations of Temple C1 began as a central trench from the north, penetrating into the right side of the structure (Figure 6). The central approach entered more than five meters into the construction and fill without locating any obvious pattern of dedications (Figure 7). At this point a terrace and stair feature was encountered (Figure 8) forcing a new looting strategy. A vertical shaft was excavated into the center of the temple (lower portion Figure 7), exposing fill and floor layers. The shaft base was 6.5 meters and may not have reached bedrock.

The temple construction of C1 was complex. We were able to recognize 71 discrete strata (Appendix 1), with 15 floors, 5 steps, 7 marl layers, and 7 major cobble fill layers visible in the profiles (Figures 7 and 8). The looters centered on the final structure contour, reaching a terrace and stair complex of an early façade. Diverting their attentions to the interior of the façade, the looters shaft exposed a series of horizontal layers.

From the construction evidence, we conclude that the early phases were focused on the establishment of the base platform rising approximately three meters creating the base of the temple superstructure. Both east and south wall exposures, initial and later amplifications of walls, terraces and steps are noted (Figures 7 and 8). These include major wall and plaster surfaces of the South profile (1st 14, 13, 78, 24; 2nd 15, 11, 12; 3rd 20, 8, 11, 12, 17, 18). Other amplifications that must be related are recognized in the East Profile (1st 43, 15; 2nd 53, 54; 3rd 49, 48; 4th 62, 47; 5th 49, 50). The last phase of construction related to enlargements revealed in floors that traverse the entire summit (Floor 4 and Floor 9) of the temple Structure C1.

In summary, the central temple C1 reveals three major construction phases in the looters exposures. The earliest and latest are divided with the major vertical constructions related to the western façade of an early building. The first phase involved about five fill events of cobbles, each rising about ½ meter and capped with marl like floors. The later phase, after the vertical terrace/steps, show two large episodes of fill of approximately a meter each and related to floors.

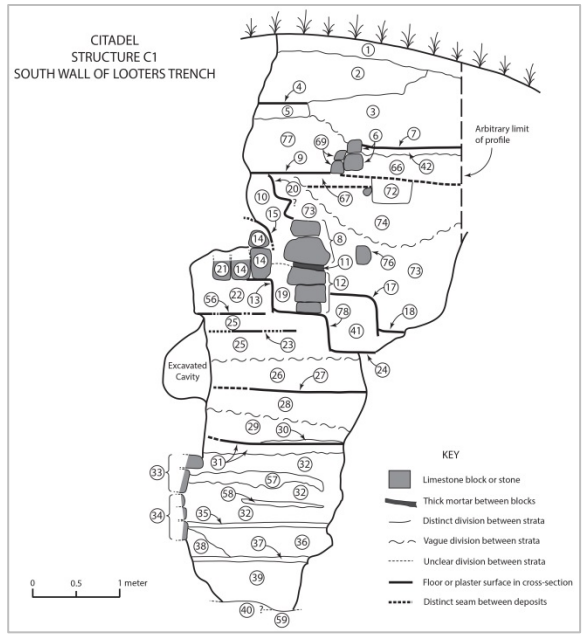

Figure 8. South Wall Profile C1 showing the stair/terrace feature and the deep shaft.

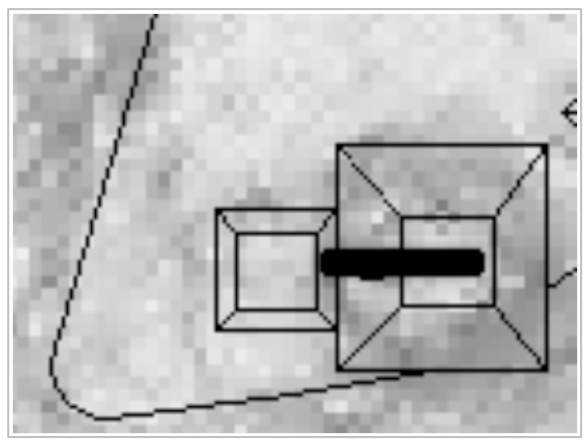

Figure 9. The South Plaza Temple S1 with the looters trench on the West Side.

Citadel Temple S1 South and North Walls. The illegal excavations of temple structure S1 began as a central trench from the west, into the right side of the structure (Figure 9). The looting entered approximately five meters initially following a major 25-30 cm thick floor that defines the excavated room above and fill below (Figure 10 and 11). To aid in the looting, they found a means of breaking below the floor (Figure 12 and 10), abandoning the excavation when loose fill was encountered. Further looting involved removing facing stones to explore the fill beyond, uncovering a step (Figure 13),

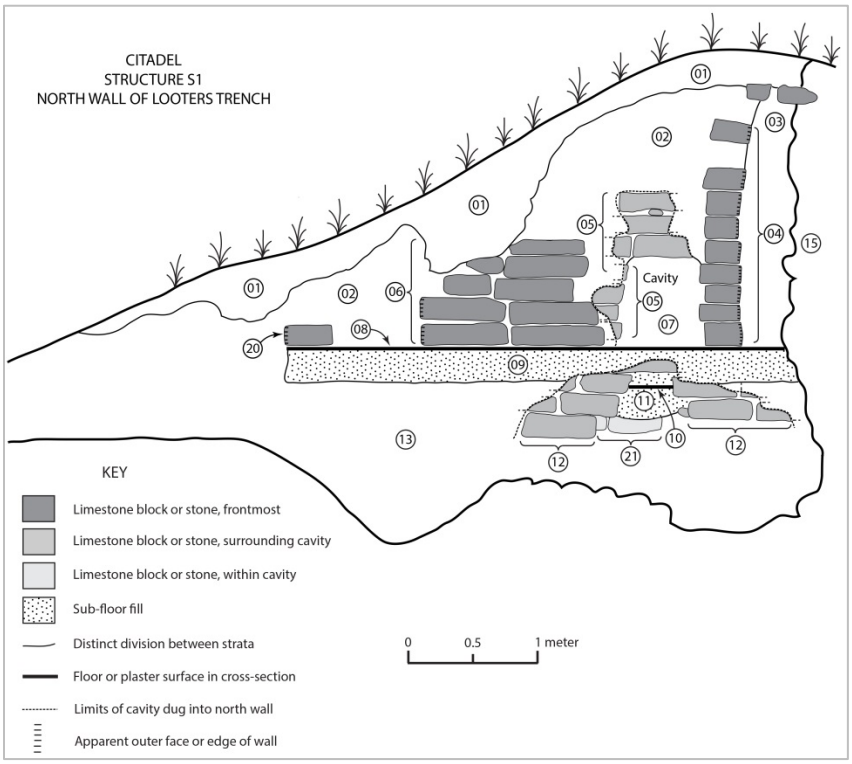

Figure 10. North Wall Profile S1 showing the thick floor 8, which divides the exposure.

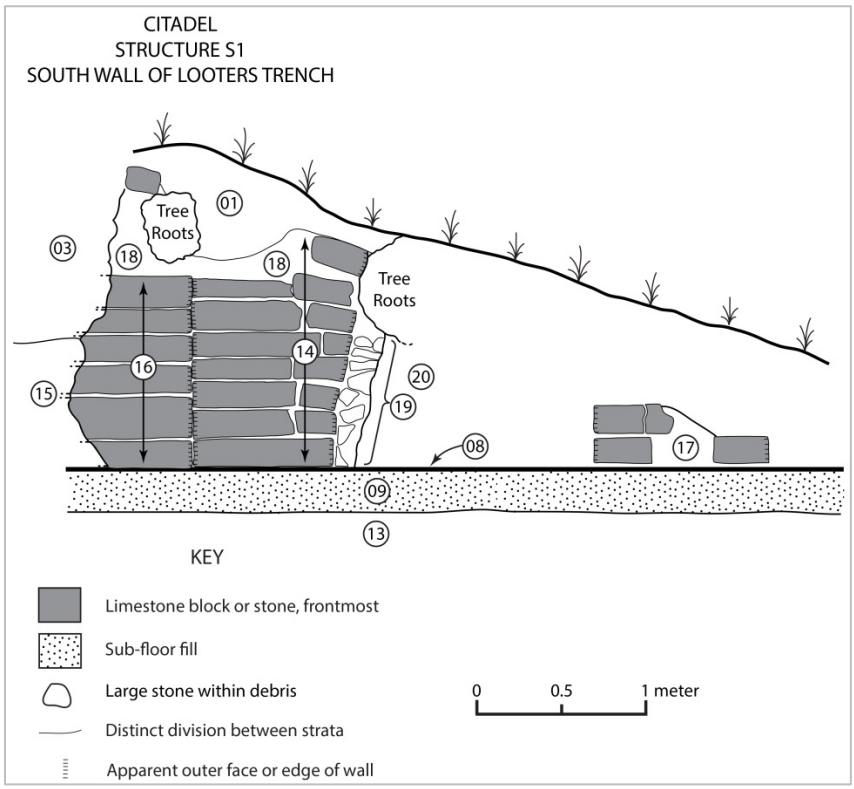

Figure 11. South Wall Profile S1 with complex of walls above floor 8.

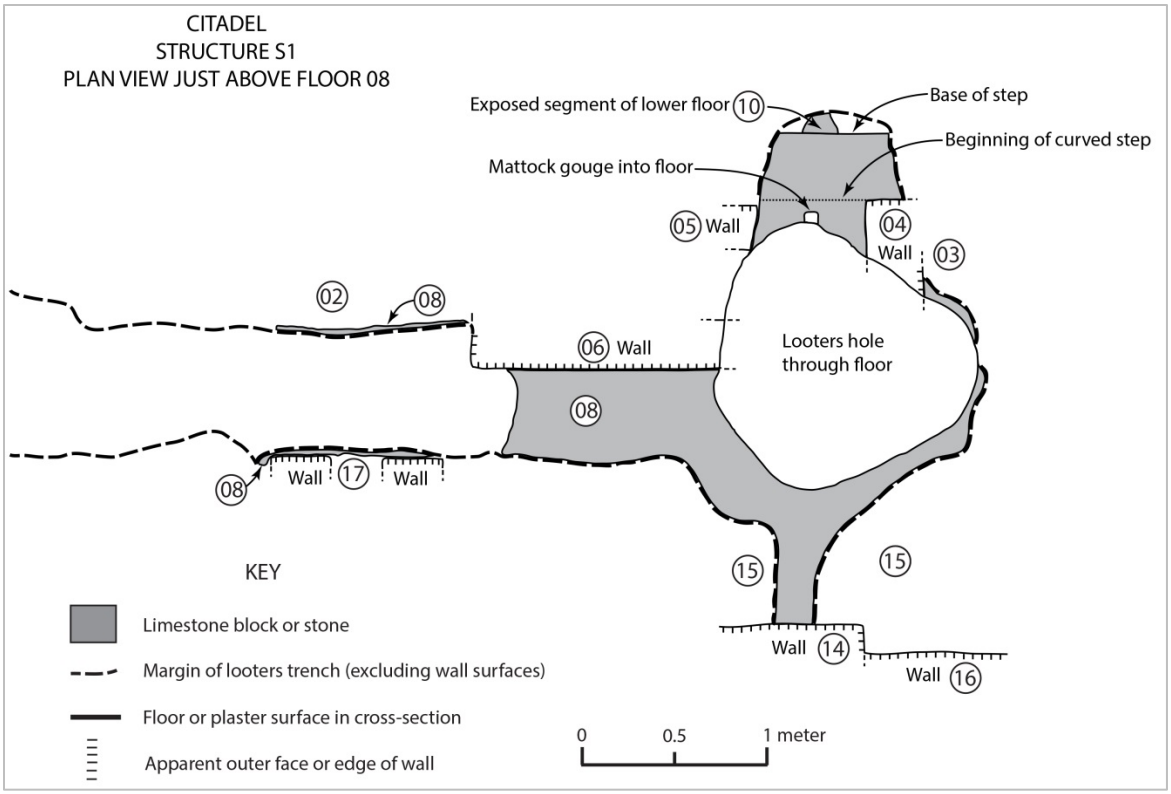

Figure 12. Plan view of looting exposure of floor 8.

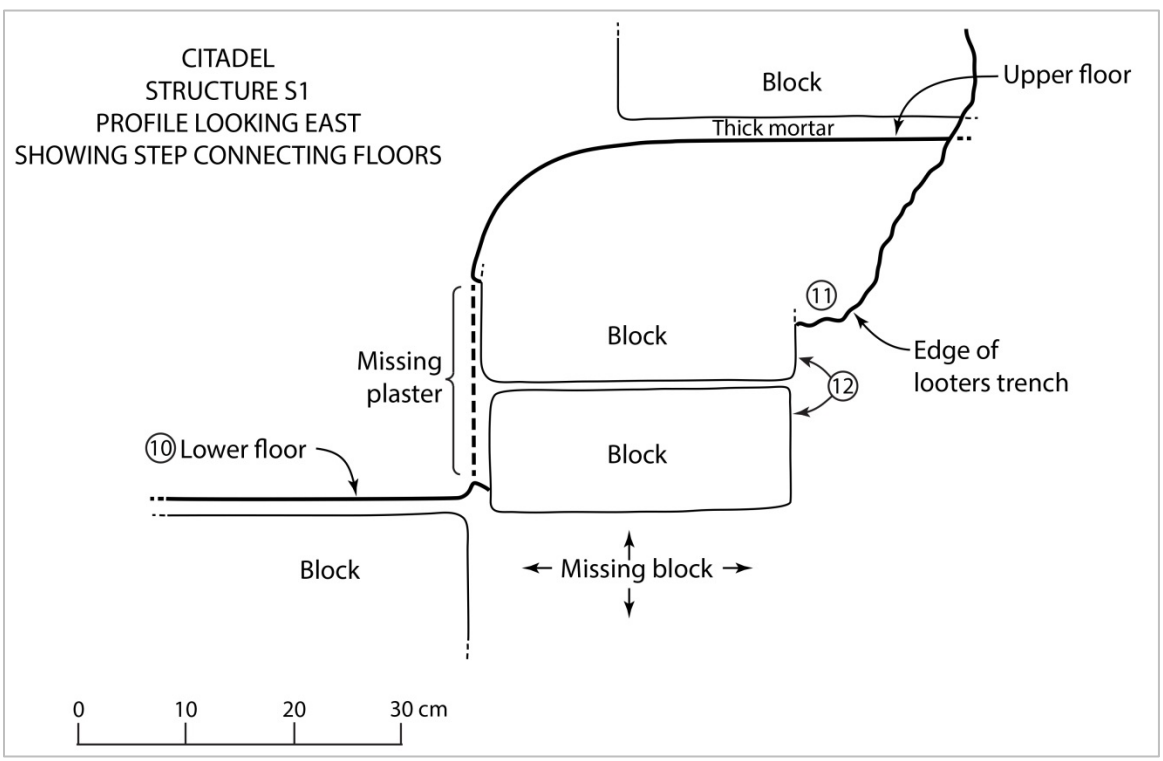

Figure 13. Profile showing step connecting upper floor 8 with lower floor 10.

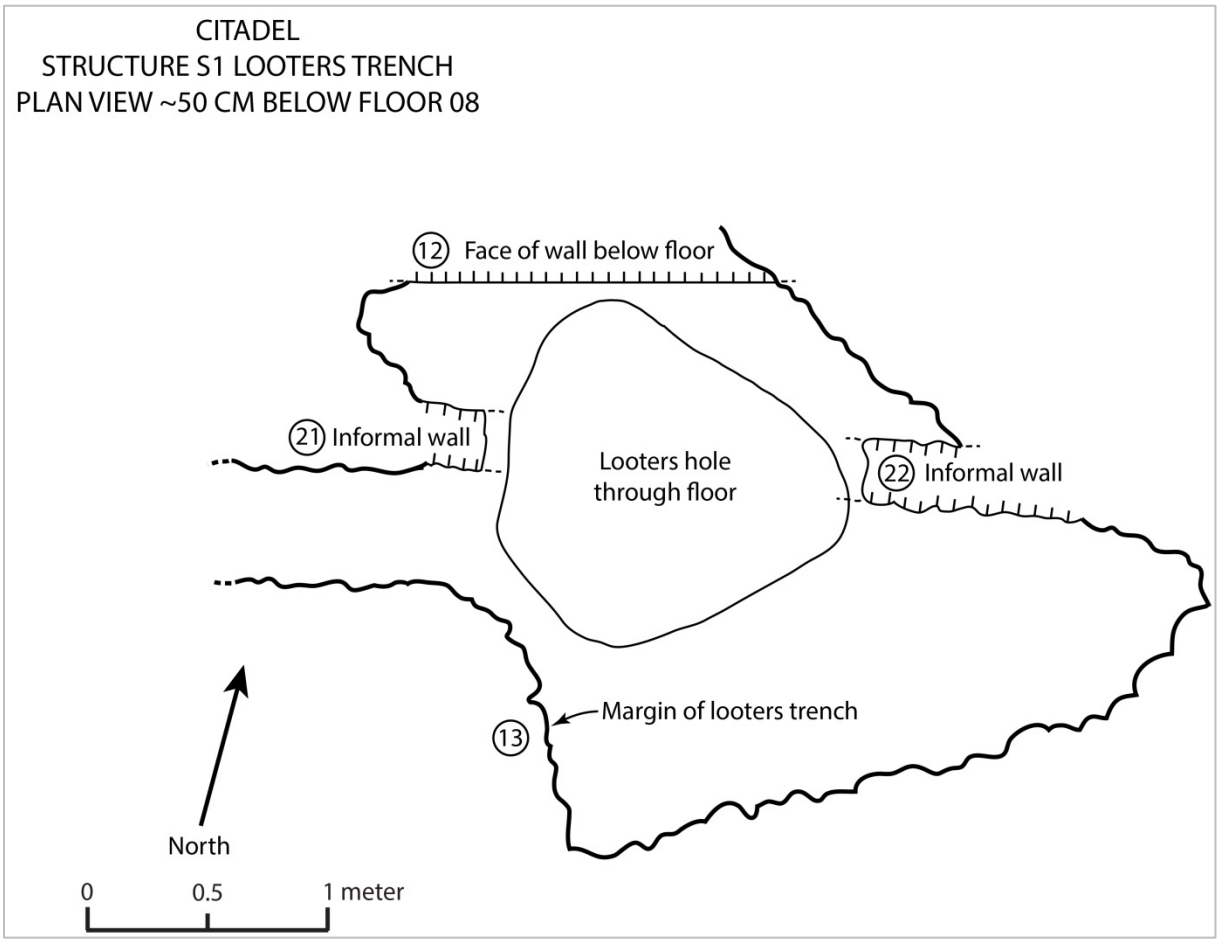

Figure 14. Plan view below floor 8 showing informal retaining walls.

possibly related to facing stones noted below the floor (Figure 10). Below the floor, simple informal walls were visible and were likely construction bins (Figure 14).

The South Plaza Temple S1 presents a simpler setting, yet complexities are evident and relationships, as with the case of the Center Plaza CI temple, are left unresolved. We were able to identify 22 distinct strata (Appendix 1) that included 2 floors and 12 walls identified in the north and south exposures (Figure 10 and 11). As can be seen in the plan view (Figure 12), the looters exposed a substantial floor (Fl 8). The looters did not spend the great effort damaging S1 compared to C1, giving up, perhaps because of the cobble fill of Stratum 13 encountered below the floor, in the lowest part of their excavations.

The construction exposures of S1 reveal essentially 3 phases, divided horizontally by Floor 8 and its massive subfloor. Below the floor is loose cobble fill and above the floor is superstructure construction. Above Floor 8, there is a complex of walls, wall modifications, construction fill, and specially laid fill, many of the relationships have regrettably been lost. On the north exposure (Figure 10), the floor extends out with several wall constructions and amplifications (Walls 4, 5, 6, 20). Similar wall constructions and modifications are noted on the south exposure Walls 16, 14, 17, 19). All these walls are in contact with expanse of Floor 8. A purposeful fill of large boulders (Stratum 15) were set on the east side of Floor 8. Interestingly, we discovered that Wall 19 might be a closed off exit. This is deduced given its informal contact to Wall 14.

In summary, the south temple S1 represents a distinctive aspect to the constructions strategies at the Citadel. The

earliest materials exposed by the looters show the standard bin construction and loose cobble fill of the Preclassic at Maya centers. The substantial floor represents considerable investment. There are a number of wall constructions and changes of S1 all are in contact with the massive floor.

Comparisons and Contrasts. The Citadel context and construction presents a novelty in the understanding of Maya civic architecture. Built on a hilltop separated from the main monuments of El Pilar with no obvious access between the sectors, the El Pilar Citadel stands apart. The two temples were severely damaged in the excavation, yet the exposures reveal novel stories. Preclassic in its entirety, these buildings were not expanded and overbuilt in the Classic period but left on their own, separate and removed from Classic Period elaborations that expanded at El Pilar.

When comparing the temples C1 and S1 we are struck by the how different they are. Both have essentially three construction phases separated with a major divide, vertically in the case of C1 and horizontal in the case of S1. Both are dated to the Late Preclassic. But there the common ground ends.

Structure C1 has many construction episodes both before the vertical divide and after, each increasing height and volume. Structure S1 exhibits the construction associated with a floor and then the multiple wall constructions on top of the same floor. Considering the limestone blocks, those forming walls of C1 vary considerably in size and most are elongated in shape whereas those of S1 are of similar sizes and typically are long and narrow rectangular in shape.

The mortar, floors, subfloors and plaster also differ where Structure C1 mortar is typically as hard as the adjacent limestone blocks, while those at Structure S1 is relatively soft, and color distinctions between blocks and mortar are obvious. Floors of Structure C1 tend to be soft, and segments often appear missing whereas the floors at Structure S1 are very hard and easy to discern. The treatment subflooring of Structure C1 is variable, while the main floor at Structure S1 is very hard with an obvious subfloor. The use of plaster is often seen on walls at Structure C1 and not on the walls at Structure S1. In conclusion, these two temples are constructed in entirely distinctive ways suggesting different builders and perhaps times across the Late Preclassic.

The Maya Citadel: Still a Mystery

The diagnostic feature of the El Pilar Citadel is the ramparts, reminiscent of hill-forts of Europe. But what kind of artifacts are they? Are they related to the construction of the Preclassic hilltop plazas or are they a subsequent feature designed to protect the site as an ancient treasure.

We have identified the construction of the looted temples as dating to the Late Preclassic. This puts the construction and use of the Citadel in line with the first major expansion of El Pilar's major monuments. While some materials were identified as Middle Preclassic, our context for collection is hardly the best. It is of importance, however, that no Late Classic materials were recovered in the looters trenches. This absence of construction in the Late Classic is distinct from the data of the monument at El Pilar, where the bulk of construction is dated to the Late Classic.

The evidence exposed in the looted temples above the ramparts present individual construction styles. The North Plaza has no visible architecture, the Central Plaza has a main temple in the center north of the plaza, and South Plaza has a main temple on the south. The Central Plaza temple C1 displays multiple constructions over the Late Preclassic period while the South Plaza temple S1 represents few construction phases. The expansions and modification of C1 emphasize vertical height of the temple with fill and plaster while S1 changes were horizontal extending walls with little use of fill and plaster.

Yet despite the differences in construction and the questions of construction chronology between the upper plazas and the encircling ramparts, it is clear that this hilltop location was not integrated into the Late Classic civic monuments of El Pilar. There is no link from the Citadel to the monuments of adjacent Nohol Pilar. And what of the ramparts? Were they to protect the temples when in use, or were they to

protect the place as a relic? At El Pilar we are still discovering.

Acknowledgements This study would not have been possible without the support of Anfield Nickel and the Koval Initiative of the Citadel Goodwill Project supported by Marshall Koval, Andy Carstensen, John P. Youle and Kathleen M. Hess, Pat and Cheryl Gochnour, Alan Dabbs, Adrian Juarez, Juan Pablo Carrasco, Kathryn Bondesen, and E. Dale Boub of MTB Project Management. Finding the Citadel was the result of LiDAR coverage donated by Anfield Nickel Corp. and the fieldwork was made possible with the Koval Initiative. The objective of the initiative was to unravel the mystery of the El Pilar Citadel and this we have begun. We also thank our collaborators in the field without whom we would be at a loss: Julia Longo, Jari Lopez, Scott Fedick, Kevin Vanderwend, Pete Wood, Aren Pageler, Peter Manzanero, Narciso Torres, Walter Padilla, and Edgar Padilla. Michael Glassow produced and finalized the profile and plan view drawings.

Appendix 1: Strata Summary for the El Pilar Citadel 4E1-1

Strata summary for 4E1-1: C1 LT

(C1) 01	Collapse, overlying whole mound
(C1) 02	Fill, high density
(C1) 03	Fill, variable densities, sm cavities
(C1) 04	Floor, segment
(C1) 05	Subfloor, marl & pebbles
(C1) 06	Wall, limestone blocks
(C1) 07	Floor, plaster
(C1) 08	Wall, irregular limestone
(C1) 09	Floor crosses S and E profile
(C1) 10	Fill, purposefully placed
(C1) 11	Floor, continuation of Str 10
(C1) 12	Wall, segment
(C1) 13	Floor, step associated with floor
(C1) 14	Wall, segment truncated
(C1) 15	Step, curve
(C1) 16	Step, relatively tall
(C1) 17	Step, curve surface
(C1) 18	Floor, surface rise to meet step 17
(C1) 19	Fill, strata 22 and 12, sm stones
(C1) 20	Step, plaster
(C1) 21	Wall, limestone block, inaccessible
(C1) 22	Fill, pebbles
(C1) 23	Floor, discontinuous surface
(C1) 24	Floor, rise slightly to meet Step 15
(C1) 25	Fill, relatively compact
(C1) 26	Fill, loose large and small stones
(C1) 27	Floor, not as smooth
(C1) 28	Fill, small stones and gravel
(C1) 29	Fill, loose, contain small voids
(C1) 30	Fill, distinct brown, humus
(C1) 31	Floor & fill, hard and smooth
(C1) 32	Fill, v. loose cobbles in sand matrix
(C1) 33	Wall, on informal wall, mortar
(C1) 34	Wall, informal ls blocks
(C1) 35	Fill, marl-like material
(C1) 36	Fill, very loose cobbles
(C1) 37	Fill, marl-like material compact
(C1) 38	Fill, cobble compact, no voids
(C1) 39	Fill, cobbles with voids
(C1) 40	Fill, marl-like, base of hole
(C1) 41	Fill, compact containing sm stones
(C1) 42	Fill, compact below Fl 07 w/stones
(C1) 43	Wall, vertical plaster on Wl 53
(C1) 44	UNUSED
(C1) 45	Fill, Loose deposit, humus?
(C1) 46	Fill, very compact deposit, stones
(C1) 47	Wall, limestone
(C1) 48	Wall, limestone block
(C1) 49	Wall, ls block, N element
(C1) 50	Wall, plaster
(C1) 51	Fill, humus, stones
(C1) 52	Fill, marl-like material below str 51
(C1) 53	Wall, limestone blocks
(C1) 54	Wall, large limestone blocks
(C1) 55	Wall, segment 2 blocks high
(C1) 56	Floor, segments of a floor surface
(C1) 57	Fill, distinct
(C1) 58	Fill, marl-like lens
(C1) 59	Fill, base of looters hole
(C1) 60	Floor, mortar, adhere Wl 49
(C1) 61	UNUSED
(C1) 62	Floor, over Wl 47
(C1) 63	Floor, before wall 47 to wall stub
(C1) 64	UNUSED
(C1) 65	Floor, representing early use level
(C1) 66	Marl under floor 7/42 to Wl 69
(C1) 67	Fill, cobble
(C1) 68	UNUSED
(C1) 69	Wall, stones, related to Wl 6
(C1) 70	UNUSED
(C1) 71	UNUSED
(C1) 72	Fill, compact pebbles below 66
(C1) 73	Fill, marl, covers Steps 20, 8,11, 18
(C1) 74	Fill, large cobble loose
(C1) 75	UNUSED
(C1) 76	Wall, eroded stone, w/in 73
(C1) 77	Fill, cobbles, over Floor 9, Wall 6
(C1) 78	Step over Str 2

Stratum Summary for 4E1-1: S1 LT

Strata List	Description
(S1) 01	Fill, humus
(S1) 02	Fill, sandy collapse
(S1) 03	Fill, cobbles
(S1) 04	Wall, limestone on Fl 08
(S1) 05	Wall, unclear relation Wl 4, Fl 8
(S1) 06	Wall, segment, collapsed
(S1) 07	Fill, distinct, soft texture
(S1) 08	Floor, smooth and well made
(S1) 09	Subfloor, foundation

(S1) 10 Floor embedded
(S1) 11 Subfloor of Floor 10
(S1) 12 Wall, obscured
(S1) 13 Fill, large cobbles
(S1) 14 Wall, outset dressed and finished 3 sides on Fl 8
(S1) 15 Fill, boulders over 08 and 03, Wl 16 above Fl 8
(S1) 16 Wall, setback abut Wl 14 on Fl 8
(S1) 17 Wall, rubble core on Fl 8
(S1) 18 Collapse over Wl 16, 14
(S1) 19 Rubble fill of door? On Fl 8
(S1) 20 Wall at W extreme of Fl 8
(S1) 21 Wall, informal W
(S1) 22 Wall, informal E

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9 PRIVATE OR PUBLIC SPACE: FORM AND FUNCTION OF STRUCTURE G-2 AT CAHAL PECH

Nancy Peniche May, Antonio Beardall, Jaime J. Awe and James J. Aimers

In the last 28 years, the Belize Valley Archaeological Reconnaissance project has focused considerable research attention on the rise of cultural complexity at the long-lived site of Cahal Pech. This complexity can be investigated not only through the monumentality of the buildings that compose the site core, but through the wide range of activities—private or public—conducted by the ancient inhabitants of the site. In an effort to accomplish this objective, multiple excavations have been carried out on buildings and beneath plazas located in the site core and periphery. In 2013-14, we focused our efforts on investigating Structure G-2, a large building that abuts the well-known Structure B-4. Based on excavations conducted in the 1990s, it was established that Structure G-2 underwent three construction phases during the Early, Late and Terminal Classic periods. Our investigations were designed to establish the form that Structure G-2 exhibited during its final construction phase dated to the Terminal Classic (A.D. 750-1050). Most importantly, we aimed to clarify the nature of the activities that were conducted in this building during the Late Classic and Terminal Classic and, consequently, to determine the function of this building.

Introduction

In much of the archaeological literature on Mesoamerican architecture, building form is generally, and consistently, assumed to be synonymous with building function. A quintessential example of the assumed relationship between form and function is the use of the term "palace." Traditionally, the term palace has been used to refer to large, masonry, multi-chamber structures with vaulted ceilings and elaborately decorated facades, standing on low platforms (Harrison and Andrews 2004:113; Webster 2001:133) that were used as residences for the highest authorities of a state-level society—its rulers and other high dignitaries (Inomata and Houston 2001; Webster and Inomata 2004). Buildings that meet these criteria are often automatically and uncritically called palaces.

Recently, however, some researchers (e.g., Demarest et al. 2003; Inomata and Houston 2001; Webster 2001) have questioned both the morphological attributes of palaces and their assumed functions. Others (Satterthwaite 1935 in Webster 2001) have argued that the vaulted, masonry, multi-chamber buildings did not actually serve residential purposes, but that they likely functioned solely as administrative places. In other cases, archaeologists have declined to attribute any function to this form of building, regarding them simply as a class of architecture of unknown function (Webster 2001:134). For this reason, Webster (1976) suggests that this building type should simply be referred to as "range-type buildings". In spite of these ongoing debates, some archaeologists continue to argue that this type of building served exclusively as residences of kings (i.e., Christie 2003). Other researchers prefer to define "palaces" in terms of their function, restricting the term to designate only the dwellings inhabited by the royal elite and other higher dignitaries, serving at the same time as the seat of government and administration (Inomata and Houston 2001; Webster and Inomata 2004). In this vein, not all palaces were vaulted, masonry, multi-chamber buildings (see Demarest et al. 2003). Current definitions of the traditional term "palace", consequently, tend to separate between the formal and functional aspects recognizing that, in order to infer function, it is necessary to rely on empirical evidence—particularly the range of activities conducted in a particular space (Flannery 1998). This separation between form and function also must be followed when investigating other types of buildings, such as the single-room structures that were constructed across the Maya Lowlands during the Late Classic, Terminal Classic and Postclassic periods. Based on investigations conducted in the Petexbatun area (Eberl 2007), the central Peten Lakes Region (Rice 1986), the Pasion River region (Tourtellot 1988) and the northern lowlands (Bey et al. 1997), the broad category of one-room structures has been divided into several subclasses of buildings. These subclasses differentiate among rooms defined by C-shaped walls, by C-shaped

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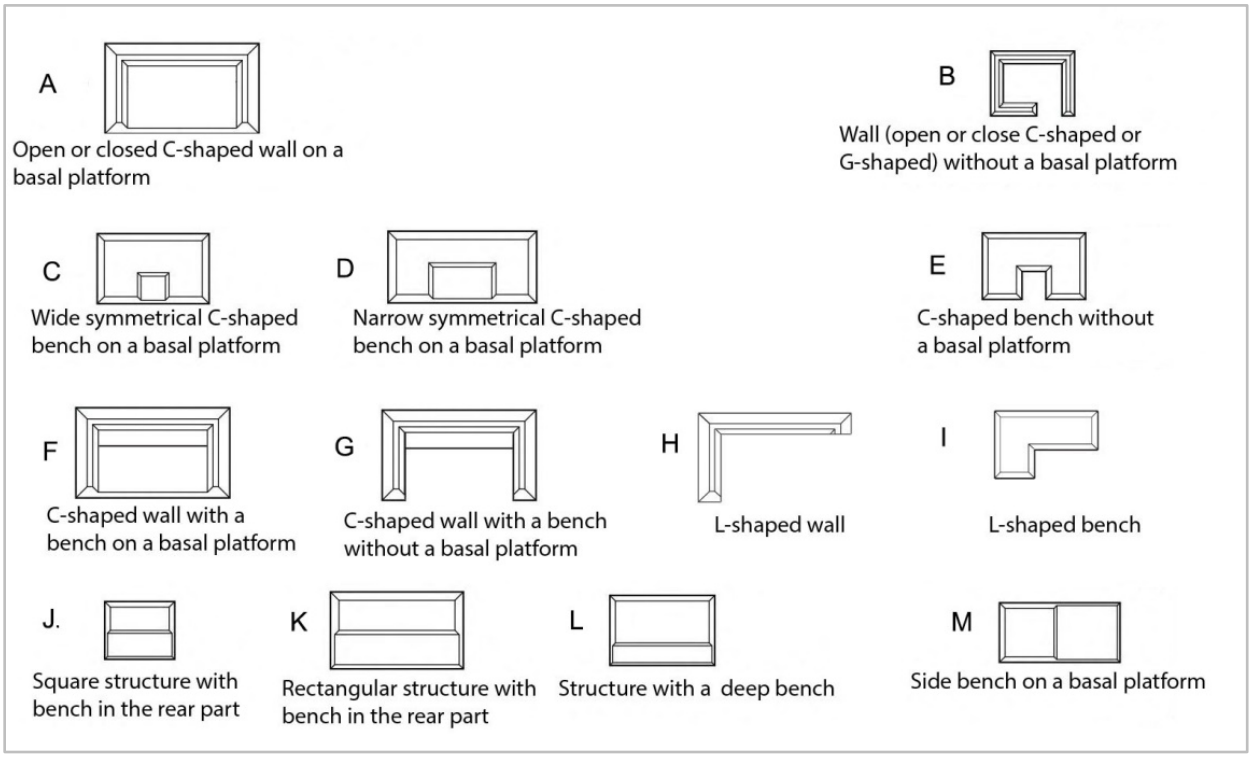

Figure 1. Subclasses of one-room structures (Modified from Eberl 2007:381-382; Rice 1986; Tourtellot 1988).

benches, by L-shaped benches, and by other types of benches (Bey et al. 1997; Eberl 2007:381-382; Rice 1986; Tourtellot 1988).

The first subclass of one-room structures consists of a basal platform supporting a wall delimiting a room on three sides (open C-shape) or on all four sides with a central entrance on one side (closed C-shape) (Eberl 2007; Figure 1A). The second subclass is represented by walls without basal platforms. The walls delineate rooms displaying an open C-shape (one open side), closed C-shape (a central entrance), or G-shape (a lateral entrance) (Eberl 2007; Rice 1986; Tourtellot 1988; Figure 1B). Neither of these two subclasses included benches. In contrast, the third subclass encompasses rooms defined by C-shaped benches resting on basal platforms (Figures 1C and 1D); while the next subclass includes rooms delimited by C-shaped benches without basal platforms (Bey et al. 1997; Eberl 2007; Tourtellot 1988; Figure 1E). The two following subclasses are a combination of the previous subtypes. They consisted of rooms delimited by C-shaped walls that also contain rear or C-shaped benches. Some rooms are resting on basal platforms (fifth subclass; Figure 1F) or they stand without basal platforms (sixth subclass; Figure 1G) (Bey et al. 1997:238-239). The category of one-room structures also includes rooms delimited by an L-shaped wall (Tourtellot 1988; Figure 1H), rooms containing L-shaped benches (Rice 1986; Figure 1I), rooms with benches at the back (Eberl 2007; Figures 1J-1L), and rooms with benches on the side (Eberl 2007; Figure 1M).

Most of the subclasses were present in the Petexbatun area during the Late Classic (Eberl 2007). The exceptions were the subclasses five through eight. At Seibal, in the Pasion River region, C-shaped and L-shaped plans also appeared during the Late Classic, although they were more common during the Terminal Classic (Tourtellot 1988). In the central Peten Lakes region, C-shaped and L-shaped were common during the Postclassic (Rice 1986). In the northern lowlands, the fifth and sixth subclasses were common, although L-shaped plans were also present. These subclasses made their

appearance during the Terminal Classic and continued during the Postclassic.

The functions of these buildings have been based primarily on their particular architectural plans. In the Petexbatun area, for example, one-room structures with benches were interpreted as houses, while C-shaped walls without basal platforms were considered as storerooms or work places (Eberl 2007). The larger C-shaped walls on basal platforms were considered public spaces because of their open entrance and lack of benches (Eberl 2007). At Seibal, the subclasses of C-shaped and L-shaped structures were interpreted as dwellings based on the presence of benches and associated artifact inventory (Tourtellot 1988). In the northern lowlands, Postclassic buildings containing L-shaped and C-shaped benches were interpreted as domestic structures, such as dwellings or kitchens (Smith 1962). Terminal Classic C-shaped structures have been interpreted as public spaces devoted to the administration of the polity based on their similarity to Council Houses from the Guatemalan Highlands and the absence of domestic artifact inventories (Bey et al. 1997; Bey and May Ciau 2014; see Wallace 1977). The function of one-room structures cannot, therefore, be established based solely on the architectural plan, particularly given the fact that similar architectural forms have been assigned both private and public functions. Clearly then, detailed analysis of associated artifacts is a critical step in our investigations of prehistoric buildings if we are to improve the accuracy of our functional interpretation of ancient Maya architecture.

Structure G2 at Cahal Pech

During the 2014 field season of the Belize Valley Archaeological Reconnaissance Project, investigations in the site core of Cahal Pech (Figure 2) focused particular attention on Str. G2. Previous test excavations of the building suggested that the platform likely supported a single room building, and that the last phase of construction dated to the Terminal Classic period (Awe 1992; Peniche May and Beardall 2015). The objectives of our 2014 investigations sought to confirm these preliminary findings, to determine the form that Structure G-2 exhibited during its final construction phase, and to

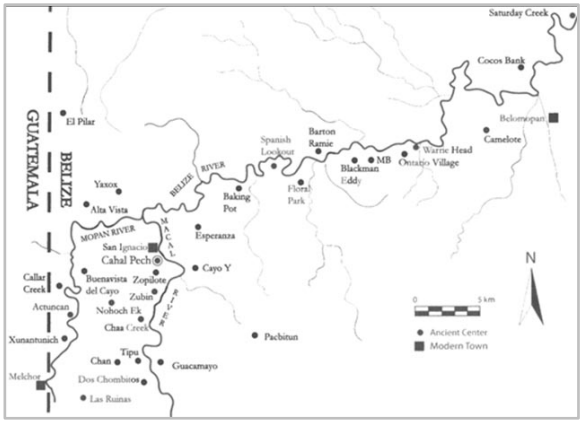

Figure 2. Map of the Belize Valley (Garber et al. 2004:2).

defining the nature of activities that were conducted in this locus of the site core. Together, the results of these objectives would help to elucidate the function of Structure G2, and allow us to make a more informed interpretation of the functions of prehistoric buildings at Cahal Pech.

Structure G-2: Construction sequence and formal attributes

Located within the Cahal Pech acropolis, on the eastern edge of Plaza G, Structure G-2 abuts Structure B-4, one of the earliest constructions at the site (Figure 3). According to Awe (1992), Structure G-2 measures approximately 15 m long, 10 m wide and 2 m high. Excavations conducted in 1989 revealed that this building underwent three major phases of construction associated with the Early Classic (G-2/1st), Late Classic (G-2/2nd) and Terminal Classic (G-2/3rd) respectively (Awe 1992:170). Recent research in 2013 and 2014 confirmed this construction sequence. The first two phases of architecture were not completely exposed, consequently, their morphological attributes remain unknown.

Representing the earliest architectural phase, G-2/1st was only investigated during the 1989 field season (Figure 4). It consisted of a raised platform supporting at least one masonry superstructure that was likely covered with a perishable roof. The discovery of a dedicatory cache containing five Hewlett Bank Unslipped bowls beneath the raised platform supported the Early Classic dating of the building (Awe 1992:170). The following construction phase,

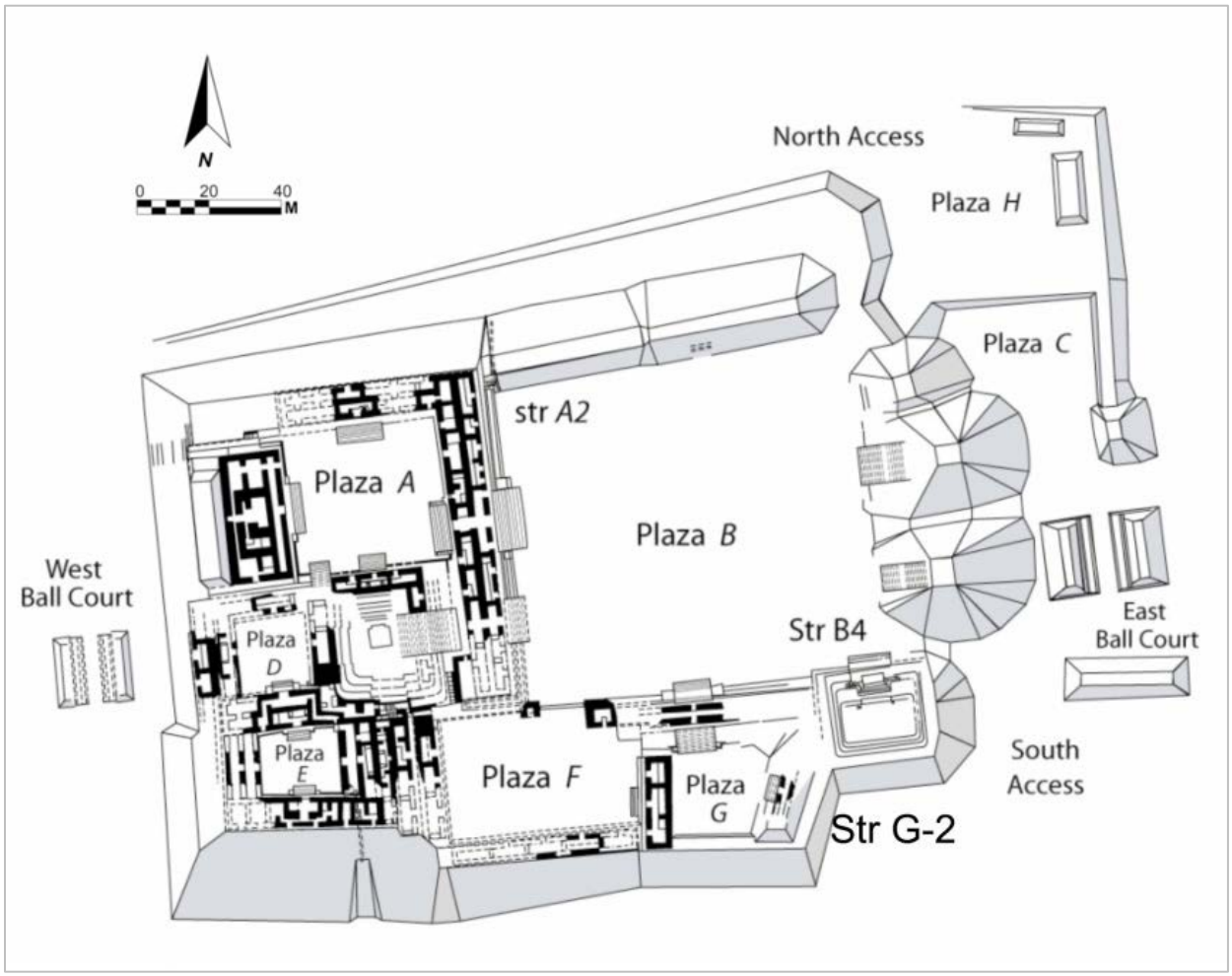

Figure 3. Map of Cahal Pech site core (Courtesy of the BVAR project).

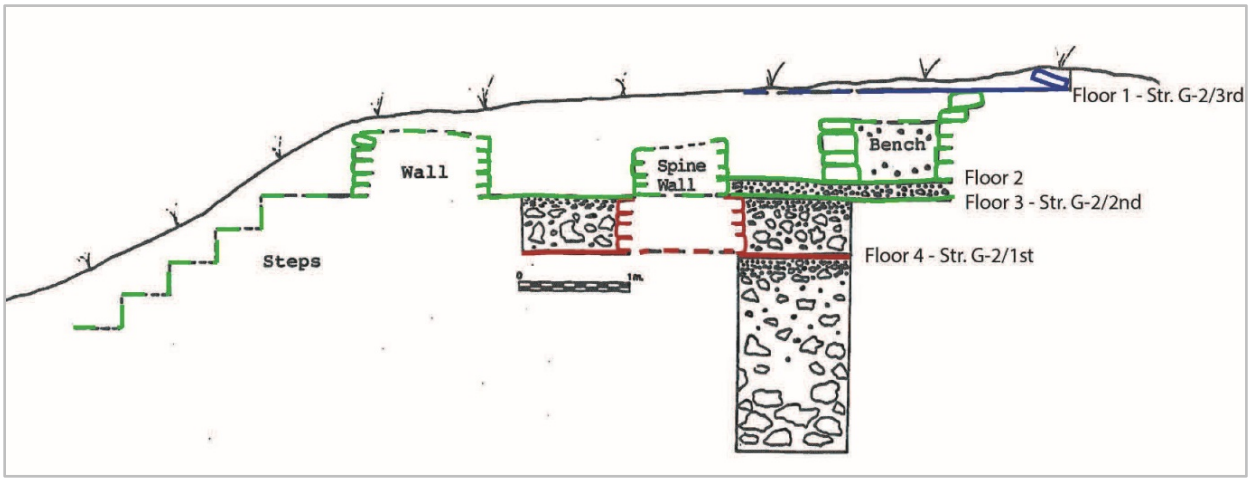

Figure 4. Profile of Structure G-2 showing three construction phases (Modified from Awe 1992).

G-2/2nd, consisted of a double-vaulted building set above a raised structure with a doorway that faced west and led down to Plaza G. Doorways through the walls of the rooms provided access from the western to the eastern side of the building. Sometime after the construction of the building, a second floor and a large bench were added to the eastern chamber (Awe 1992:172). More recent excavations by Peniche May and Beardall (2015) suggests that the basal platform of this building was rectangular in shape with a single inset and, at least on the southern side, it had three terraces. This basal platform measured 9m north-south by at least 3.5 m east-west and approximately 1.70 m high (Figure 5).

Structure G-2/3rd is the final architectural phase of the building. This building is better understood than its predecessors because, in addition to the late 1980s excavations, it has been the focus of recent explorations and horizontal excavations (Peniche May and Beardall 2015; Stanchly 2014). Based on pottery from beneath its plastered floor, it was established that Structure G-2/3rd was built between A.D. 750 and 850 (Awe 1992:172). Structure G-2/3rd consisted of a large rectangular basal platform supporting a super-structural platform (Figures 6 and 7). The basal platform was a two-terrace construction that measured 21 m north-south by at least 7.30 m east-west and elevated 1.70 m from the Plaza G floor. The lower terrace partially covered the basal platform of G-2/2nd as the upper terrace was achieved by reusing the uppermost section of this substructure. The stones of the lower terrace were quite diverse in their dimensions. In the northern section of the terrace, the stones ranged between 20 cm and 50 cm in length and between 10 cm to 40 cm in thickness. In contrast, in the southern section, the dimensions of the stones were fairly uniform, measuring 15-20 cm in length and 8-10 cm in thickness. The summit of the basal platform was accessed from Plaza G to the west, by way of a five-stepped staircase located at the center of the building. This staircase was attached to the lower terrace of G-2/3rd. It extended out 2.10 m and measured 5 m in width.

The large basal platform supported an L-shaped platform that measured at least 7.70 m north-south by 6 m east-west. Based on similar structures and the lack of collapse debris on the summit of the basal platform, we can suggest that the rear wall, lateral walls and roof were mainly made of perishable materials. The front was likely left open as there was no evidence of wall foundations or post holes. A single low step (26 cm in height) extended across the front and northern section, leading to a 90 cm-width access in the northernmost section. The access was flanked by two L-shaped walls made of four courses of well-cut stones, approximately 40 cm high. We have yet to determine where this access leads to.

G-2/3rd underwent minor modification in its final phase (Stanchly 2014). A north-south running wall was added to the southern end of the building with the goal of blocking access into Plaza G, between Structures G-1 and G-2. Although the time of this modification has not been established it is likely that it was carried out during the Terminal Classic. Most of the ceramics uncovered during the excavation of Structure G-2, in fact, were dated to the Terminal Classic period.

Structure G-2: Artifactual Evidence

Excavation of the northern section of Structure G-2/3rd yielded artifactual data that provides clues on the activities conducted by the people using the building during the Terminal Classic period. Much of the artifact assemblage consisted of substantial pottery deposits that were scattered across the plaza floor at the base of the building. These deposits were predominantly recovered on, or just above, the level of the final plastered floor, and represent remains associated with the final use of the building.

According to Aimers (2015), who analyzed the deposits from the north western flank of the stairway, the ceramics from this locus was typical of Late-to-Terminal Classic pottery from the Belize valley. The deposits included Belize Group ash-tempered serving vessels (i.e., Belize Red and Platon Punctated-Incised outflaring or outcurving dishes with simple incised lines near the rims and bases); Cayo Unslipped: Buff Variety jars (some jars exhibiting the elaborate exterior everted lips diagnostic of the Terminal Classic period); Mount Maloney Black large bowls with

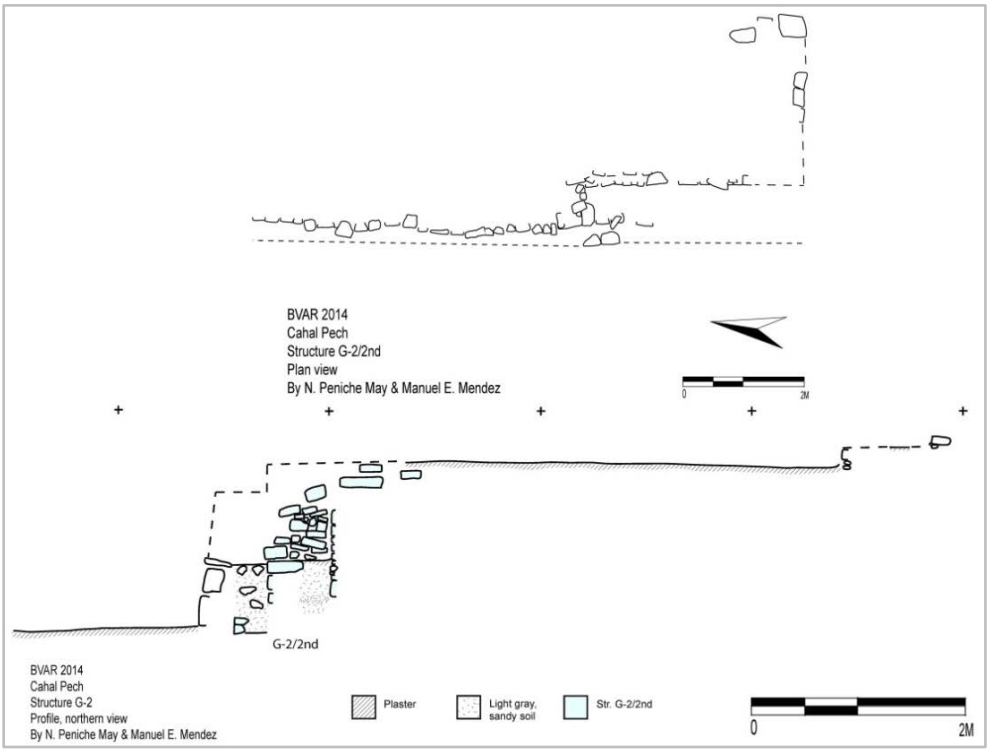

Figure 5. Plan view and profile of Structure G-2/2nd (Peniche May and Beardall 2015).

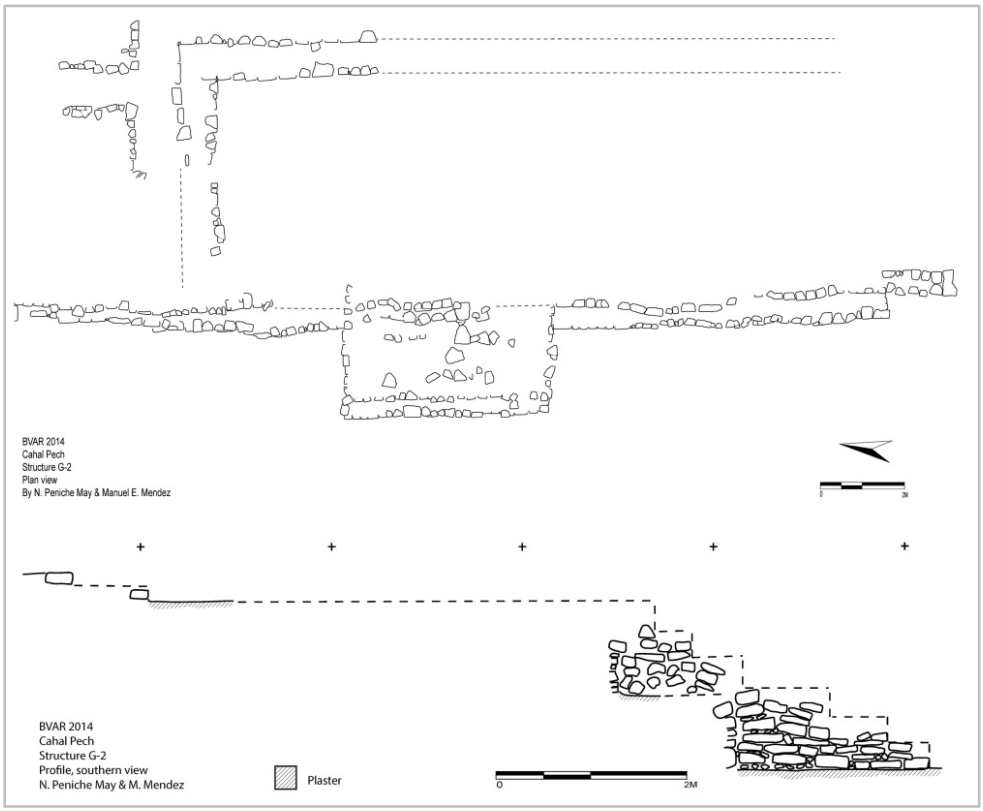

Figure 6. Plan view and profile of Structure G-2/3rd (Peniche May and Beardall 2015).

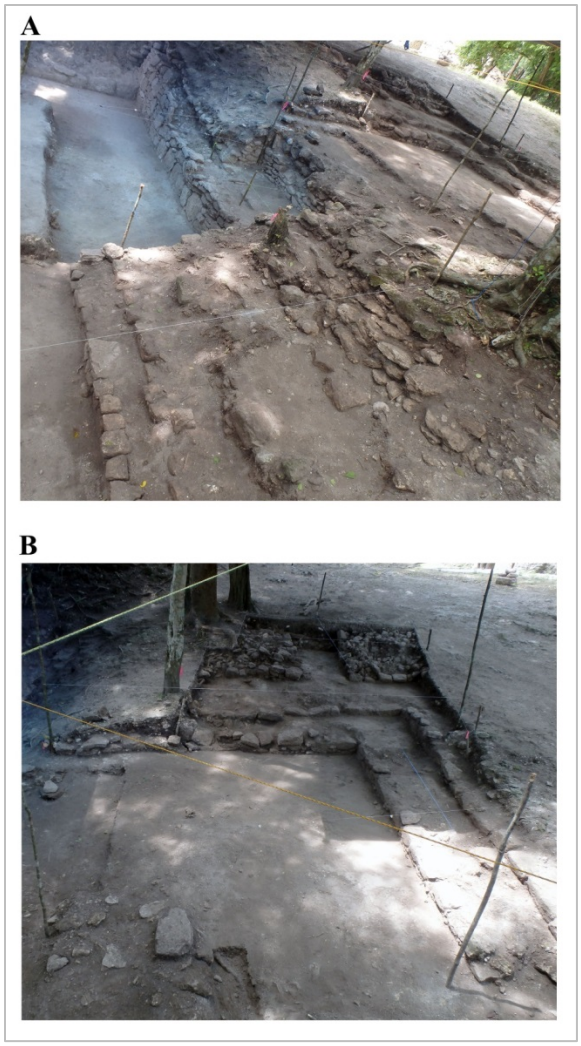

Figure 7. Structure G-2/3rd.

incurving rims, and small numbers of other Late Classic types like Dolphin Head Red (simple hemispherical bowls) and Garbutt Creek Red (medium to large incurving bowls with diagnostic beveled-in lips). Virtually all of the unslipped sherds were from Cayo Unslipped: Buff varieties jars. Aimers points out that few of the jar rims exhibited the elaborate exterior everted lips (piecrust rims) diagnostic of the Terminal Classic period. The deposit contained very few sherds from Roaring Creek Red outflaring dishes, another diagnostic of the Terminal Classic at Cahal Pech. Ceramic data suggest that this deposit goes back to the early facet of the Terminal Classic.

For the excavations on a whole, about 80% of the non-diagnostic body sherds were from Uaxactun Unslipped Ware jars (mainly) and bowls (rarely). This is the ordinary storage ware of the ancient Maya of Cahal Pech, especially for water. Striated vessels of Uaxactun Unslipped Ware (e.g., of the Tu-Tu Camp Ceramic Group), thought to be associated with water storage, were notably rare in the collection. The remaining approximately 20% of the non-diagnostic body sherds were from various carbonate tempered wares like Pine Ridge Carbonate Ware and Peten Gloss Ware but without slip and/or form even these ware-level distinctions cannot be made reliably.

The ceramic evidence suggests that Terminal Classic people were serving food and storing water. In fact, we recovered a small but significant amount of fresh water shell (i.e., *jute*) and some faunal remains. Most of the *jute* shells were concentrated in front of the access on the L-shaped platform. Activities focused on processing foods were not carried out in that space. Lithic evidence supports this statement as we did not recover any grinding tools, such as manos and metates. In fact, few tools were found during our excavations of the northern section of the building. Most chert artifacts consisted of expedient tools like casual flakes. The formal tools were restricted to a biface fragment (point) and a large biface (celt). The tool assemblage also included a smoother made of cobble—suggesting plaster work—and seven prismatic blades made of obsidian from El Chayal and Ixtepeque (Ebert 2015).

In addition to obsidian, the people using Structure G-2/3rd during the Terminal Classic had access to relatively rare, expensive and perhaps prestigious vessels. These goods were obtained by participating in exchange networks or, most likely, through gift-giving, as the percentages of high-quality vessels and obsidian prismatic blades were relatively low. The people from Structure G-2/3rd obtained Fine Orange Ware vessels from the Gulf Coast, high quality Peten Gloss Ware such as outcurving and outflaring dishes or bowls of Meditation Black and Molino Black ceramic types, and imitation slateware incurving bowls of the Yaha Creek Cream type. Interestingly, the Yaha Creek Cream vessel relates this locus to the Terminal Classic burials in Plaza A and Plaza H. The Terminal Classic people using this structure also obtained marine shells from the Caribbean.

Other possible prestigious goods include shell beads, worked shells and a slate pendant (Figure 8).

Evidence of ritual activity was also present. During the excavations, we recovered a complete Belize Red Group dish (Figure 9). This vessel was deposited on the floor in front of the access set on the L-shaped platform. It is likely that the vessel was deposited as part of a termination ritual, when the structure was abandoned at some point of the Terminal Classic.

Figure 8. Special finds recovered during the excavations of Structure G-2/3rd. They included a marine shell bead, a worked shell, a slate pendant, a smoother made of cobble, an obsidian prismatic blade, a chert biface fragment, and a large biface made of chert.

Figure 9. Red Belize vessels deposited as part of a termination ritual.

Final thoughts

Our investigations of Structure G-2/3rd indicate that in its final form, the building consisted of a basal platform that supported an L-shaped platform without any bench. Based on similar structures at other sites, we believe that the rear and lateral walls, as well as the roof, were made of perishable materials. The front of the building appears to have been either left open, or may have also been enclosed by perishable materials. If open, it would imply that this design was not meant to provide privacy for the activities conducted in this space. It is worth mentioning that further excavations at the southern section of the basal platform, which remains unexplored, may expose another feature, such as an east-west wall. If this were the case, the walls would define a C-shaped room, similar to the "open C-shaped wall on a basal platform" defined by Markus Eberl (2007:338) in the Petexbatun region. Further excavations also may expose a bench. If this were the case, then Structure G-2/3rd could have been the traditional "C-shaped platform" as defined by Bey and colleagues (1997:238-239), "the open C-shaped bench on a basal platform" as defined by Eberl (2007) or the Class K building identified by Tourtellot (1988).

For now, Structure G-2/3rd is considered to be L-shaped. The construction of this building represented a change in the architectural style from the Late Classic constructions. The superstructure was made of perishable materials and the basal platform was constructed with reutilized, or scavenged, cut stones. This phenomenon suggests that people from Plaza G did not have enough resources—economic and symbolic—to harness labor for monumental construction but they were still capable of building large architecture. The open design and lack of benches points towards a public function, perhaps for a variety of gatherings. The public function is partially supported by the absence of food-processing activities and the low presence of faunal remains. The ceramic evidence suggests that people using the Structure G-2/3rd were serving food and storing water.

The possible public function of the building may have continued throughout the Terminal Classic period. The Terminal Classic tool assemblage was limited but we observed a complete absence of the food-processing tools that one would expect at a building with a residential purpose. The presence of serving vessels and the architectural design of Structure

G2/3rd suggest that the construction was used for a variety of gatherings, perhaps overseen by elite people. The few high-quality ceramics, obsidian prismatic tools and ornaments suggest that people using the building during the Terminal Classic were able to acquire goods only accessible through long-distance exchange networks. However, they could have acquired those goods through gift-giving from other sites in the valley. Either way, the prestigious goods indicate that people using G-2/3rd during the Terminal Classic still enjoyed a certain level of affluence. The subsequent deposit of Terminal Classic materials on the floor of the building, and on the flanks of the stairway, however, suggests that Structure G2/3rd eventually fell into disrepair, and that these materials were likely left in these contexts during, or sometime after, the abandonment of the Cahal Pech site core.

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10 CLASSIC PERIOD MAYA WATER MANAGEMENT AND ECOLOGICAL ADAPTATION IN THE BELIZE RIVER VALLEY

Claire E. Ebert, Julie A. Hoggarth, and Jaime J. Awe

Archaeological research investigating prehistoric water management in the Maya lowlands has identified the diversity and complexity of ancient human adaptations to changing environments and socio-economic landscapes. Our research at the medium-sized Maya center of Baking Pot, located in the Belize River Valley, has explored a water management system composed of a lattice system of ditches located in the southwestern periphery of the site. In this paper, we report the results of spatial analyses of LiDAR remote sensing data that has helped to reveal the nature and extent of this ditch system. Field reconnaissance conducted in 2015 confirmed the presence of ~23.5 linear km of ditches. Residential mounds interspersed between ditched areas were also recorded, perhaps indicating that ditches may delineate spatially distinct settlement clusters. We suggest that water management at Baking Pot became increasingly important during the Late Classic Period (AD 600-900) in the face of population increase, anthropogenic degradation of the landscape, and climate change. Models of settlement and migration derived from human behavioral ecology may provide insights into the role of the ditch system as an adaption that allowed the inhabitants of Baking Pot become more resilient in the face of changing social and natural ecological systems.

Introduction

Water played an essential role in daily life in Classic Period (AD 250-900) Maya society. Archaeological data suggest that, at the most fundamental level, the availability of this important resource impacted the locations people chose to settle and their agricultural schedules. Reservoir systems located in the monumental site cores of major polities in the central Petén and western Belize (Tikal, Calakmul, Caracol), where perennial surface water is scarce across the karstic landscape, supported large populations by offsetting the seasonal availability of rainfall (Wyatt 2014). Water management also played a prominent role in the broader social, political, and ideological systems under which the ancient Maya lived (Barthel and Isendahl 2013; French et al. 2012; Scarborough 1998; Wyatt 2014; Helmke and Zralka 2013). Several researchers have suggested that elite control of water and performance of water rituals formed the foundation for political power and dynastic rulership at many large polities (e.g., Lucero 2002, 2006; Lucero et al. 2011; Scarborough 1998, 2003; Scarborough et al. 2012; Zralka and Koszkul 2015). The abandonment of civic and ceremonial spaces by elite Maya during the Terminal Classic Period "collapse" (~AD 750-900/1000) has been attributed in part to climatic variability and drought (e.g., Beach et al. 2009; Iannone 2014; Kennett et al. 2012; Webster et al. 2007), and perhaps shortages of vital water resources. Recent research from other regions of the Maya lowlands, where water is more abundant (e.g., northern Belize and Chiapas), is revealing the wide diversity and complexity of ecological adaptations that centered around Classic Period Maya water management systems. Water control features in these regions may have become more important through the Classic Period in the face of population increase, anthropogenic degradation of the landscape, and climate change (Beach et al. 2009; Beach and Luzzadder-Beach 2013; Kennett and Beach 2013; Luzzadder-Beach et al. 2012).

In this paper, we describe the role of water management in ecological and social adaptation during the Late Classic Period at the site of Baking Pot, a medium-sized Classic Period Maya center in the Belize River Valley (Figure 1). Settlement survey and excavation conducted at the site by the Belize Valley Archaeological Reconnaissance (BVAR) Project have previously explored a multi-component water management system composed of a drain system within the palace complex that directed water from courtyards into multiple *aguadas* (rain fed reservoirs) around the monumental site core (Audet 2005). Our research has focused on documenting a lattice system of ditches located southwest and uphill from the Baking Pot monumental site core (Awe et al. 2015). Recent airborne LiDAR remote sensing survey conducted in the Belize Valley as part of the West-central Belize LiDAR Survey (see Chase et al. 2014) has revealed the nature and spatial extent of this system, and has aided in mapping approximately 23.5 km of ditches (Ebert et al. 2015). Spatial analyses and ground-truthing survey also recorded the presence of several small house mounds interspersed between ditched areas,

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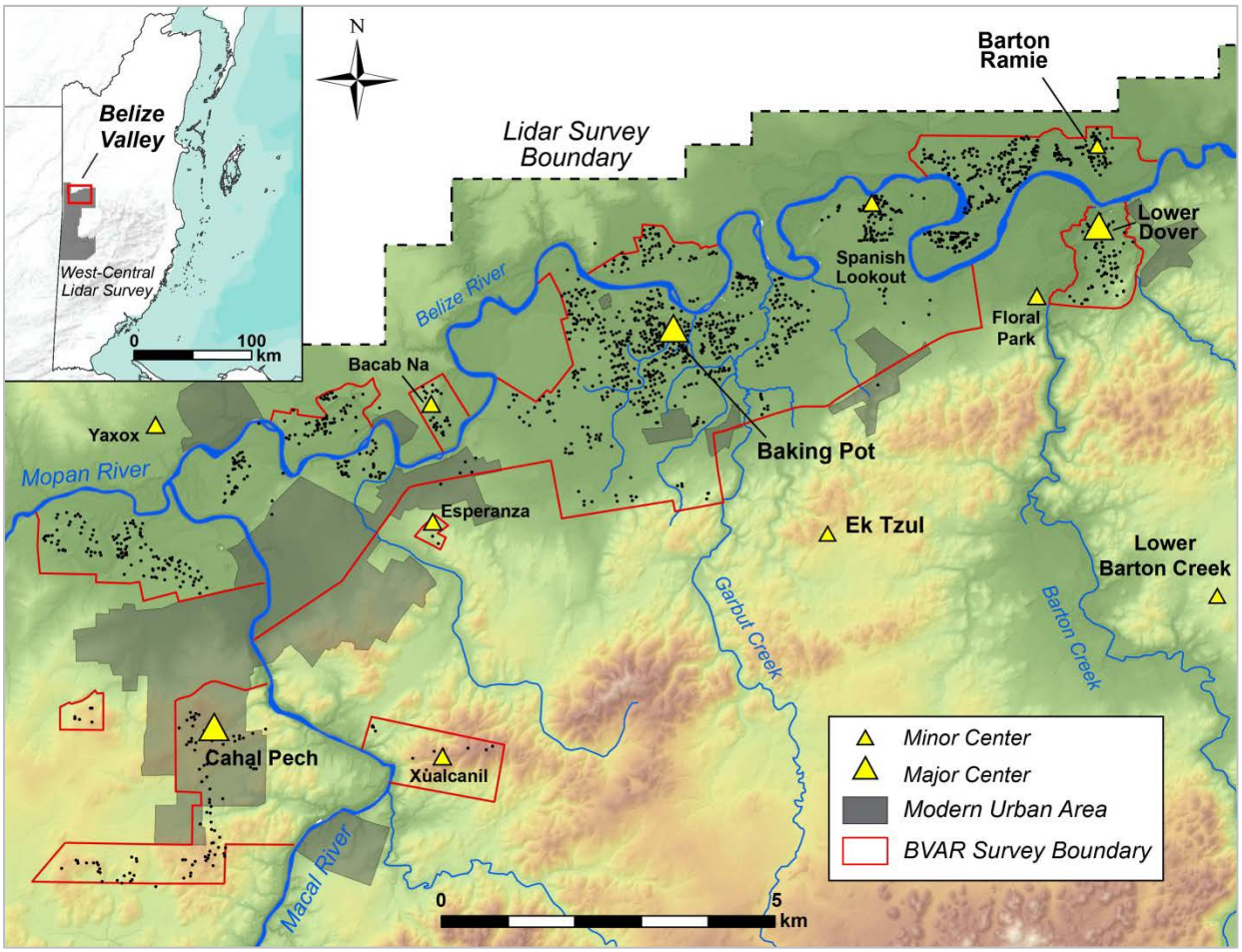

Figure 1. Map of Belize Valley Archaeological Reconnaissance (BVAR) Project survey area, showing location of Baking Pot.

perhaps delineating spatially distinct residential settlements (Awe et al. 2015; Ebert et al. 2015, n.d.). The ditch system is located in a flat, swampy area that often floods during the rainy season, and we suggest that its primary function was to drain water away from settlement located in this area. Additionally, we hypothesize that the ditch system may have been constructed and maintained through communal organization efforts. Models of habitat settlement derived from human behavioral ecology may help us to understand the role of water management as an adaption used by the Classic Period Maya living at Baking Pot to improve their access to ecological and social resources.

Water Management at Baking Pot

Baking Pot is located ~9.4km downriver of the modern town of San Ignacio, in the Cayo District of west-central Belize (Figure 2). Archaeological investigations by BVAR began at the site in 1992, and early research focused on excavations in the ceremonial center (Aimers 1997; Audet 2006, Cheetham 1995; Conlon 1996; Ferguson 1998). Research by BVAR also focused on mapping and test excavations within areas of residential settlements around Baking Pot (Conlon 1993, 1995; Conlon and Ehret 2000, 2001; Hoggarth 2012; Hoggarth et al. 2010). The results of radiocarbon dating indicates that Baking Pot was occupied as early as the Middle Preclassic Period, between 400-200 cal BC, and construction in Group A of the site core was initiated by the Late Preclassic Period (ca. 100 BC-AD 250; Hoggarth et al. 2014). Monumental construction is first documented during the Early Classic Period (ca. AD 250-600), with a peak in construction between AD 600-750 during the Late Classic Period corresponding with the growth of population around the site. The presence of a royal

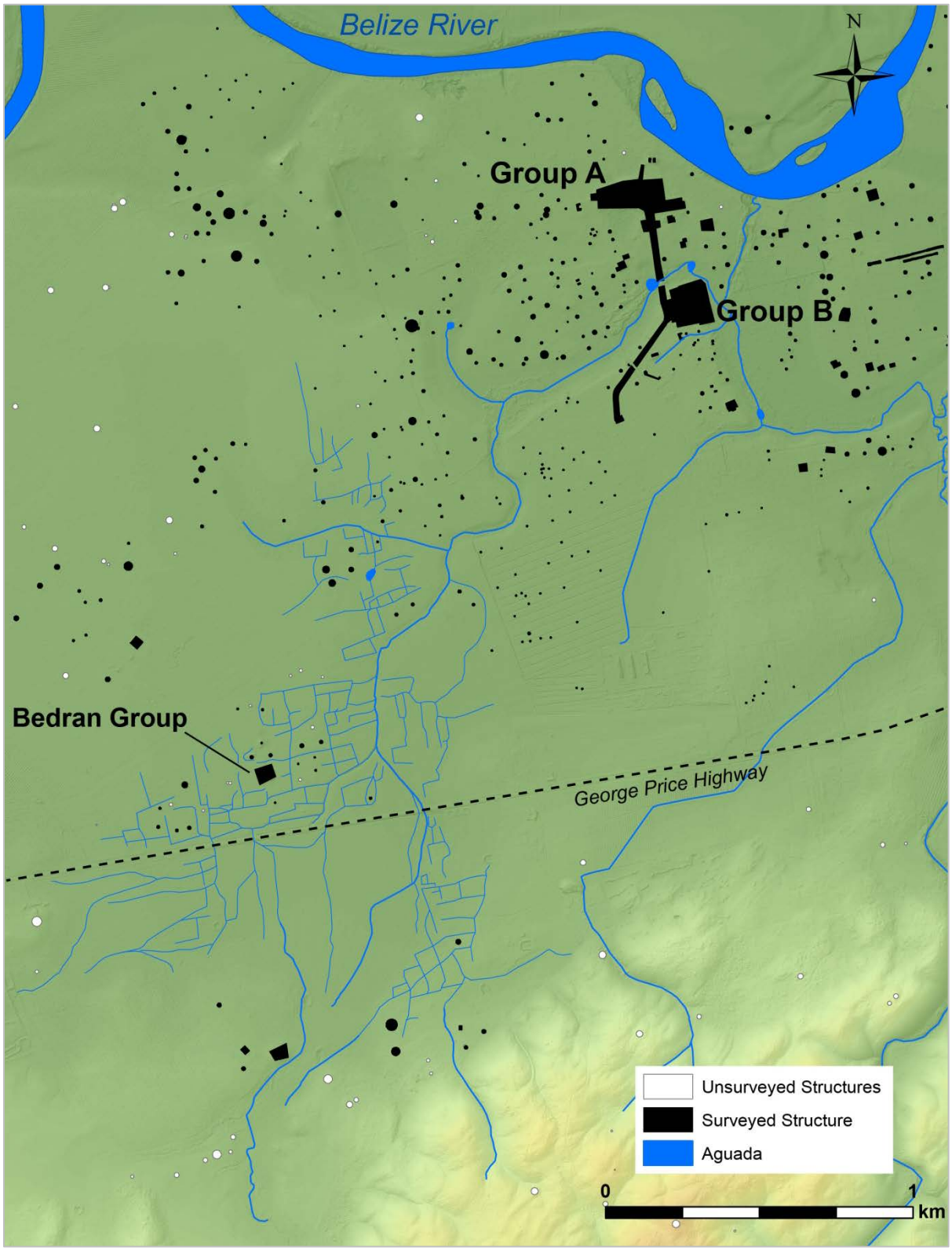

Figure 2. Map of Baking Pot monumental site core and portions of settlement. Ditches identified from LiDAR data are located in the southern portion of the settlement.

title, a possible emblem glyph, and rich elite burials at Baking Pot suggests that this site was ruled by a dynastic linage comparable other large Belize Valley polities (Helmke and Awe 2013).

Several lines of evidence indicate that water management was politically and ideologically important to the Classic Period rulers of Baking Pot. A cacao drinking vessel bearing a PSS from the high-status Bedran Group, located approximately 2km southwest of the site core, includes a place name for Baking Pot, which has been tentatively translated as "*Chan te' ha*," or "four water place" (Helmke and Awe 2008). The presence of four *aguadas* adjacent to the monumental groups at the site may offer support for this interpretation. Excavations in Courtyard 1 at Group B have also revealed evidence for a complex drainage system in place (Audet 2005). A drain in the northeast corner of Courtyard 1 in the palace complex of Group B drains water beneath a stairway and upper room into the system of seasonal streams that feeds into the *aguadas*. Survey data has also indicated that seasonal streams located around the site served to spatially delineate settlement clusters (Hoggarth 2012), and perhaps served symbolic purposes for political authority (Lucero 2002).

The water management system adjacent to the ceremonial center is connected to a more distant system located in Baking Pot's periphery through a series a natural seasonal streams that feed water downhill into the primary *aguadas*. Based on the analysis of aerial photographs and very limited ground reconnaissance, Kirke (1980) noted a lattice system of ditches concentrated around the Bedran Group in southwestern periphery of Baking Pot, which is also connected to these seasonal streams. The ditches were visually identified by contrasting vegetation patterns compared to the surrounding landscape. Based on his observations, Kirke proposed a three-type classification system ranging from narrow, shallow ditches (Type A) to steep-sided, meandering creeks (Type C). While his observations were focused on describing the system immediately around the Bedran Group, Kirke (1980:282) also suggests that the system extended 1km south towards the limestone foothills and drained towards the Belize River in the north.

Conlon and Awe (1995; see also Conlon and Powis 2004) revisited the area in 1994 as part of the BVAR Baking Pot settlement survey, during which time they produced a more detailed and expanded plan of the ditch system immediately around the Bedran Group. Elevations taken along the ditches indicate that the system flowed from south to north and from west to east towards the Belize River (Conlon and Awe 1995). They also conducted limited test excavations of the ditches, reporting that ceramics from those sections indicate that the ditches were constructed during the Late Classic Period (Conlon and Awe 1995; Conlon and Powis 2004:79). Based on those data, Conlon and Awe (1995: 66) argued that, "the ditched field system of the Bedran Settlement Cluster was a fully functioning irrigation system, not simply a drainage system, and should be referred to as ditched rather than drained since some systems sole function was drainage rather than managing a continual supply of water." Continued settlement survey around Baking Pot has documented some additional portions of the ditch system to the north of the Bedran Group (Hoggarth et al. 2008) indicating that the system was more extensive than initially documented by Kirke and other BVAR researchers.

Methods and Results

In 2014, BVAR integrated visual and quantitative spatial analysis of airborne light detection and ranging (LiDAR) data within the settlement survey program to identify archaeological features including house mounds, ditches, and agricultural terraces not previously documented (Awe et al. 2015; Ebert 2015; Ebert and Awe 2014; Ebert et al. n.d.). Accurate and high-resolution LiDAR data have become increasingly important over the past several years for the discovery and visualization of complete archaeological settlement systems in the densely vegetated Maya lowlands (Chase et al. 2014). We conducted spatial analysis of LiDAR recorded for Baking Pot using the Topographic Position Index (TPI), a method for classifying landscapes within a Geographic Information System (GIS) (Awe et al. 2015; Ebert et al. n.d.). TPI analysis has been applied to geospatial studies in geography and geology; landscape, forest, and animal ecology; and climatology (see De Rue et al. 2013). In archaeology, several researchers have used TPI

analysis to understand large-scale regional settlement patterns in relationship to landform classes. Here we use TPI analysis of LiDAR data to detect more discrete landscape features at smaller, local scales. TPI analysis was performed using an open-access extension for ArcGIS 10.3 following methods described by Awe and colleagues (2015; see also Ebert et al. n.d.). TPI values reflect the difference between the elevations in a particular cell on a 1m digital terrain model (DTM) derived from the LiDAR point cloud. Based on the TPI results, approximately 27km were digitized within GIS (Figure 3). TPI analyses also helped to distinguish several previously undocumented mounds and residential groups located in and around the ditch system (Awe et al. 2015).

Ground-truthing of the ditches and mounds was conducted in March of 2015, during which time we verified the presence of 23.5km of ditches within an area of ~2.45km^2 (see Figure 2). Reconnaissance found that some of the linear features identified by computer analyses were not prehistoric, but rather modern features along fence lines and around cattle corrals. Measurements of ditch depth and width were also recorded during ground truthing. Based on these data, we propose two classes of ditches. Type 1 ditches measure between 50cm to 1m wide, and Type 2 ditches are between 1m and 2m wide. All ditches recorded during the 2015 survey measured between 40cm to 80cm deep. While our proposed classes conform generally to Kirke's (1980) typology, we have eliminated his Type C ditches, which are naturally occurring waterways. The size and appearance of ditches recorded in the most recent survey are likely heavily altered because of increased grazing by cattle in the area. Several small residential mounds were also recorded interspersed between ditched areas, perhaps indicating plots between ditches that may have been associated with specific residential units.

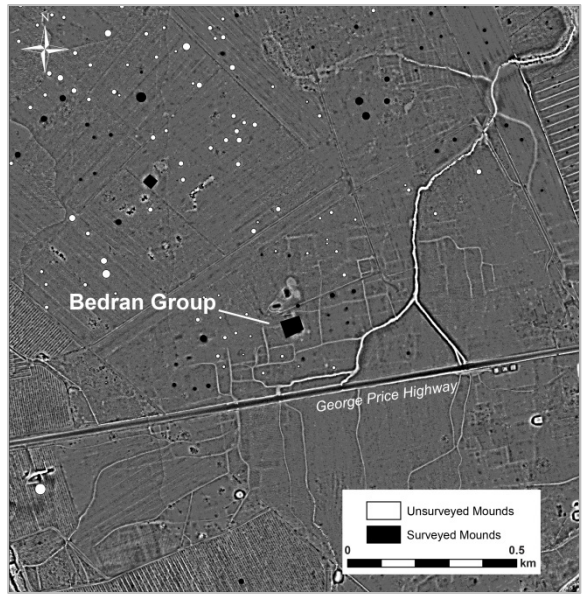

Figure 3. Map of ditched area around Bredan Group, showing results of TPI analyses. Ditches (negative TPI values) are highlighted in white.

Discussion

There is increasing amounts of archaeological and paleoecological evidence for ancient water management across the Maya lowlands, and recent applications of remote sensing are helping to reveal that these systems were more complex and widely distributed than previously believed. Paleoclimate reconstructions show anomalously high levels of rainfall at beginning of the Classic Period (ca. AD 440-660), which may have contributed to the exponential growth of populations recorded across the lowlands during this time (Kennett et al. 2012). Due in part to the infilling of the landscape, there is a growing body of evidence for varied adaptive responses by the Classic Maya to mitigate the impacts of ecological problems (Kennett and Beach 2013). In addition to water collection and storage features that guard against shortfalls during the dry season and longer unstable climatic periods, the Classic Maya developed water management systems to aid in drainage and flood control. At the site of Palenque, Chiapas, French and colleagues have described an extensive system of constructed underground aqueducts that was used to divert water flow through the site core as a form of flood management (French et al. 2013; French and Duffy 2014). Classic Maya communities in northern Belize used ditch and canal systems to drain waterlogged wetland areas, as well as to supply water to fields in the dry season (Beach et al. 2009; Luzzadder-Beach et al. 2012; Siemens and Puleston 1972; Turner and Harrison 1981).

Our investigations at the site of Baking Pot have focused on using LiDAR remote sensing data to document the extent of the Late Classic ditch

system. The system flows steadily downhill over 23.5km from karstic foothills north towards the Belize River, however the system has been heavily impacted by modern agricultural activities and was likely more extensive in the past. Previous researchers have hypothesized that the ditches may have been used for irrigation and functioned to bring water to raised fields as part of intensive agricultural production (Conlon and Awe 1995). Based on our preliminary analyses of LiDAR data and ground-truthing, we suggest that the primary function of the Baking Pot ditch system was for drainage. In modern times, the settlement around Baking Pot is prone to flooding, especially during the rainy season from June through December when average monthly rainfalls can reach an excess of 250mm (Figure 4; Webster et al. 2007). Drainage of this area would have allowed for settlement around the site as populations increased throughout Late Classic. While we have not yet found evidence that water was transported directly to facilitate irrigation agriculture, drainage of the area may have also functioned to create soils more suitable for maize agriculture or house lot gardens.

Large canal systems developed as ecological and social adaptation in tropical environments in other regions of the world, many of which relied on communal organization effort for their construction and maintenance. Perhaps the best known ethnographic example for communally organized complex canal systems comes from the island of Bali, Indonesia where extensive water management facilities were used for rice paddy irrigation (Geertz 1972; Scarborough et al. 1999; Scarborough 2008). Balinese canal systems were organized around water temples, or *subak*, which functioned to delineate collectively owned sections of canals and other associated water control features (e.g., check dams). The *subak* also served to bind people in the local community into a corporate group consisting of farmers using sections of canals through annual rituals (Geertz 1972; Lansing 2006). Each *subak* was responsible for coordinating labor scheduling for the maintenance of the section of canals, ensuring the smooth operation of the system. We hypothesize that the ditch system at Baking Pot, though it functioned in a different capacity from the Balinese canal systems, may have also been constructed and maintained through similar communal organization efforts. In modern Maya

Figure 4. Photo of Baking Pot ditches, located south of the George Price Highway, after rainstorm (June 29, 2015).

communities of southern Belize, large-scale construction projects are often carried out communally under the *fajina* system. *Fajina* tasks require all adult males in the community to work for one to two days on community service project including bridge maintenance, construction of community buildings, and clearing of waterways for irrigation and drainage (Wilk 1997).

One way to test this hypothesis is through applications of models of habitat settlement and migration developed in human behavioral ecology such as the Ideal Free Distribution (IFD). The central premise of the IFD is that habitats can be ranked in terms of suitability, including the resources that they possess and fitness those resources provide (Kennett 2005; Kennett and Winterhalder 2008; Winterhalder et al. 2010). The initial inhabitants will settle within the highest ranked habitats (i.e., most suitable) first based on the amount of available resources. The quality of a habitat is density-dependent and suitability declines because of competition as populations increase (Figure 5). Once the suitability of the best habitat is equal to that of the second best, individuals will begin to occupy the second-ranked habitat while population continues to slowly grow in the first. At Baking Pot, excavations and direct dating of human remains indicate that initial settlement took place by the Late Preclassic Period (ca. 400-250 cal BC; Hoggarth et al. 2014) in these locations within around the site core. This area was likely advantageous because of its close proximity to the Belize River. During the Early Classic and Late Classic periods, populations at Baking Pot expanded outwards to the west, east,

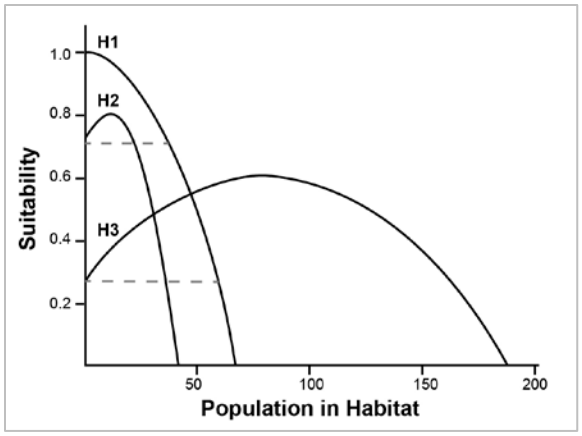

Figure 5. Example of the Ideal Free Distribution showing predicted suitability in three habitats (H1, H2, and H3) as a function of density for each habitat. Suitability in the highest-ranked habitat (H1) declines with population growth; suitability in the second (H2) and third-ranked habitat (H3) characterized by an Allee effect: at low densities, habitat suitability increases with increasing density (after Kennett and Winterhalder 2008: Figure 2).

and south of the site core, perhaps into habitats that were less desirable (i.e., lower ranked).

While the IFD provides a model to predict when individuals will settle or migrate into a new location, it also can provide insights into adaptations that people use to improve their access to resources and become more resilient (Kennett and Winterhalder 2008). Under the model, density-dependent effects (Allee effects) increase the suitability of a habitat by increasing certain components of fitness. In the case of Baking Pot, the construction of drainage ditches south of the site core may have served to offset the impact of increasing population during the Late Classic Period, either by providing an additional (and previously unsuitable) location where people could settle, or by improving upon that patch of land making it available for cultivation. While the small square plots formed by ditch segments may have delineated the house lots, the Baking Pot ditch system may have been organized in a similar fashion as the Balinese *subak*. Groups of households that were connected logistically through certain segments of ditches and/or socially through kinship or other types of communal rituals, may worked together in the maintenance of ditches and the smooth functioning of the system. Settlement survey and LiDAR data show several large, formally organized house groups, such as the Bedran Group, interspersed along this system (Figure 2). These groups may have served as the focus of local community activity, where high status individuals organized labor task groups and conducted rituals for the 'neighborhood'. This type of social organization, with a single large house group associated with spatially discrete residential clusters, has been identified within other areas of the settlement around Baking Pot (Hoggarth et al. n.d.). Through the construction and maintenance of the ditch system, the Baking Pot community adapted to the challenges posed by their natural and social environment.

Conclusions

Environmental changes associated with population expansion and climatic variability during the Late Classic Period in the Maya lowlands were varied spatially and temporally, as did the adaptive responses to mediate these impacts. Novel approaches to document these adaptations, such as LiDAR remote sensing, are beginning to reveal the complexity of these human-landscape interactions in the Belize Valley (Awe et al. 2015). We presented preliminary observations on the Baking Pot ditch system based on spatial analyses of LiDAR data and ground survey. Future research will focus on building an absolute chronology using high-resolution accelerator mass spectrometry (AMS) ^{14}C dating to understand the construction and use of the ditch system. Additionally geospatial analyses will also help us to understand the form, function, and water capacity of ditch systems through hydrological modeling that will integrate high-resolution climate records within a GIS platform. Ditches are easily visible in satellite and aerial imagery and analysis of this imagery from wet and dry seasons, as well as from years with extreme weather or climatic anomalies such as El Niño years, may provide additional insight into this ecological adaption. The region around Baking Pot possesses some of the most productive soils, at the widest extent of the valley floor, in the Belize River Valley. These attributes have led some scholars to argue that the site's wealth stemmed from its access to agricultural land (Audet 2006). Continued exploration of the vast expanse of ditches in Baking Pot's southwestern periphery, coupled with paleobotanical analyses will also be used to test the possible presence of agricultural

production, may offer additional evidence to test this hypothesis.

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11 REFINING MODELS OF ANCIENT MAYA AGRICULTURAL LANDSCAPE ARCHAEOLOGY IN THE BELIZE RIVER AREA: INITIAL RESULTS MAKING USE OF LIDAR IMAGERY

Scott L. Fedick, Keith C. Clarke, and Anabel Ford

Existing soil maps for the Belize River area are 1:50,000 scale. These maps were used by the Belize River Archaeological Settlement Survey to examine association between ancient Maya settlement and agricultural capability of soil types, with results demonstrating strong correlations. Predictive models were generated for settlement distribution and forms of land use. While useful, a limiting factor of these early studies was the scale of the published soil maps, which could distinguish soil units no smaller than approximately 10 ha. Ancient farmers likely evaluated landscapes at a finer resolution. Newly available remote sensing imagery using Light Detecting and Ranging (LiDAR) technology can now assist in refining soil mapping to scales more aligned with household-level decision making. This revised mapping will allow more refined modeling and testing of settlement decisions and how these decisions may have been influenced by local and regional political formations. The current test case makes use of approximately 2,000 ha of LiDAR coverage for the El Pilar Archaeological Reserve for Maya Flora and Fauna. It is anticipated that knowledge-based digital soil mapping can eventually be extended throughout the Belize River area as LiDAR imagery becomes available.

Introduction: The El Pilar LiDAR Mapping Project

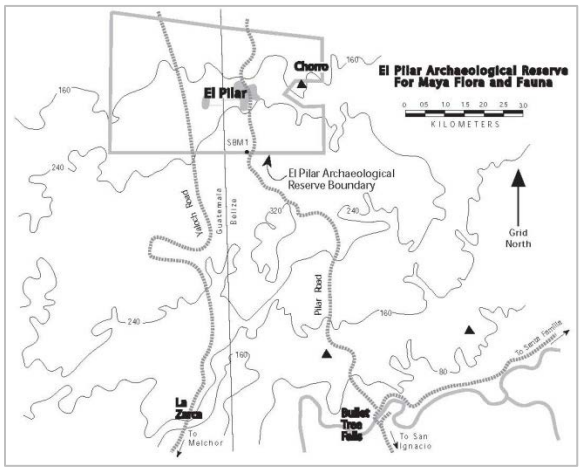

Figure 1. Location of the El Pilar Archaeological Reserve for Maya Flora and Fauna.

LiDAR (Light Detecting and Ranging) imagery has recently been obtained for the area of the El Pilar Archaeological Reserve for Maya Flora and Fauna, spanning the border of Belize and Guatemala (Figure 1). The LiDAR imagery covers a total area of approximately 2,000 ha. An ongoing project, under the direction of Anabel Ford, is conducting ground-truthing of topographic features revealed in the imagery. The vast majority of these features are being verified as ancient Maya domestic architectural remains, raised road beds, agricultural terraces, and reservoirs. As a supplement to the ground-truthing of archaeological features, a pilot season of soil investigations within the reserve was conducted in May through June of 2015, under the direction of Scott Fedick. The goal of the soil study is to assess the feasibility of using the LiDAR imagery to assist in refining existing soil maps, published at a scale of 1:50,000, to scales more aligned with household-level decision making. This revised mapping will allow more refined modeling and testing of settlement decisions and how these decisions may have been influenced by local and regional political formations. It is anticipated that knowledge-based digital soil mapping (e.g., Zhu et al. 2001) can eventually be extended throughout the Belize River area as LiDAR imagery becomes available.

Published Soil Maps of the Belize Valley

The soil maps that are used as a basis for the current project were produced as part of an agricultural development potential study of the Belize River Valley and adjacent foothills, conducted by the Land Resource Development Centre of the British Government (Jenkin et al. 1976). The study area ran from the Guatemalan border to the coast at the outskirts of Belize City. Fieldwork for the soil-study component of the British project was conducted from 1969 through 1971, and was published by Birchall and Jenkin in 1979. The published text of the soil study includes chemical and physical analyses,

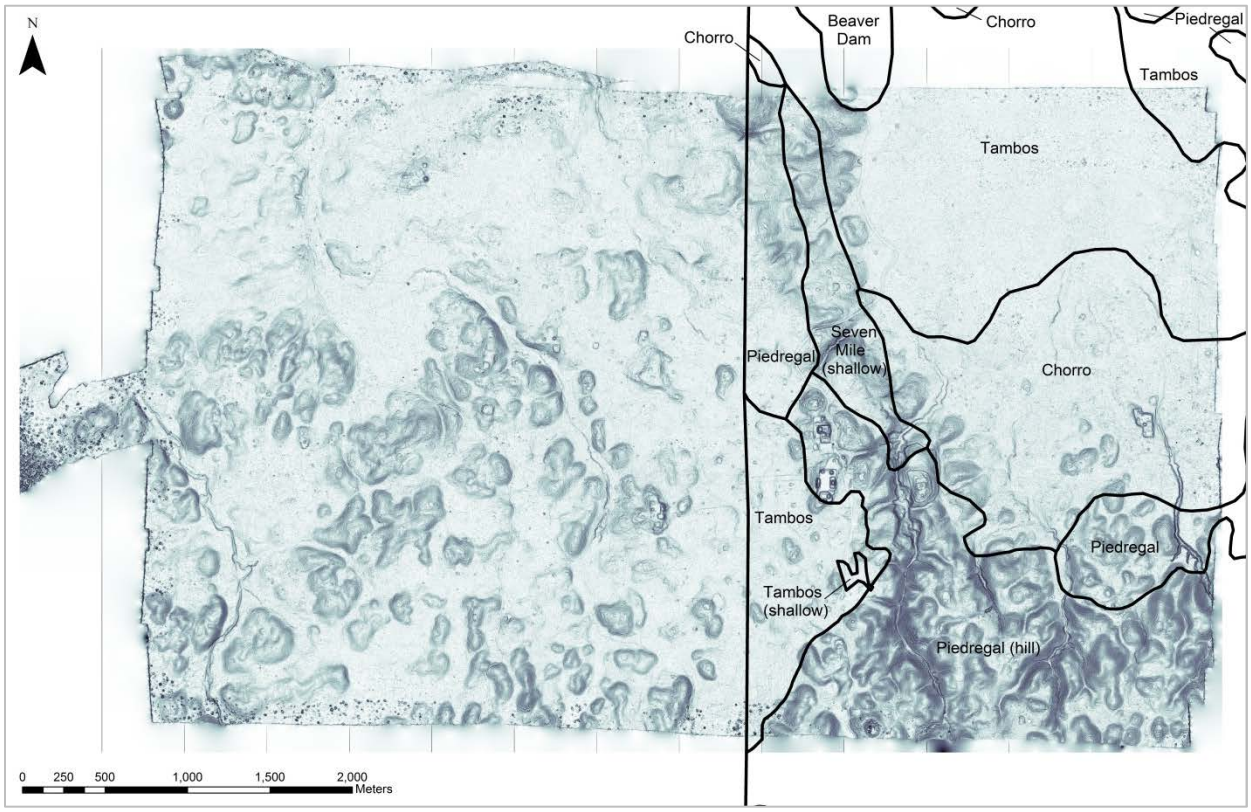

Figure 2. LiDAR image of the El Pilar Archaeological Reserve for Maya Flora and Fauna, with soil types for the Belize portion as delimited on 1:50,000 scale soil maps (Birchall and Jenkin 1979).

and example soil profile descriptions. The British soil mapping team used a hierarchical soil classification scheme that starts with the parent material that soil forms from, with finer distinctions based on properties of the topsoil; in a sense, a bottom-up approach to soil classification. Some revisions of the soil classification were published in 1993 (Baillie et al. 1993). The published soil maps were compiled at a scale of 1:50,000 (Birchall and Jenkin 1979), which allows minimum size delineation for mapping units of 10.1 ha; the area of land generalized as a single soil type (Davidson 1980:Table 2.1).

Previous Soil/Settlement Studies by the Belize River Archaeological Settlement Survey

During the initial phase of the Belize River Archaeological Settlement Survey (BRASS) in the 1980s (Ford and Fedick 1992), the British soil maps (Birchall and Jenkin 1979) were used as a basis for examining the relationship between ancient Maya settlement patterns and soils of varying agricultural capabilities. The mapping of soils included in the three BRASS archaeological survey transects was refined from the original 1:50,000 scale to a scale of about 1:20,000, distinguishing minimum size mapping units of 1.61 ha (Fedick 1988; see Davidson 1980:Table 2.1), much closer to medium-sized traditional Maya milpa fields of about 2.8 ha, or smaller intensively cultivated plots and homegardens, which range from 0.25 to 0.7 ha (Carter 1969; Gliessman 1990:382; Sanders 1979, 1981; see also Fedick 1996a). Strong associations were identified between the agricultural capability of soils, the density of ancient Maya settlement, and the distribution of agricultural terraces. These findings were generalized by Scott Fedick from the original archaeological survey transects to a larger study area that include the upper Belize River valley and foothills on the north side of the river (Fedick 1988, 1989, 1994, 1995, 1996b). Subsequent research by Anabel Ford made further use of the agricultural capability

classification developed by Scott Fedick, adding new layers of resource data and conducting Weights-of-Evidence analysis, to develop further predictive modeling of population distributions the upper valley, and extending the projections to the south side of the upper valley (Ford et al. 2009). Both Fedick and Ford find strong associations between settlement density and soil and geography of the Belize River area. It is important to repeat that these modeling studies of soils and settlement in the upper Belize River area were based on the original 1:50,000 scale maps that recognize minimum soil mapping units of 10.1 ha; a perspective that is significantly more generalized than that of traditional Maya farmers seeking locations for homes, gardens, and fields (see Fedick 1996a, 2010).

The original 1:50,000 scale soil maps for the entire Belize River area (Birchall and Jenkin 1979) have been digitized under the direction of Scott Fedick, who also conducted an agricultural capability analysis for all 35 soil types, both series and phases, identified in the region. These digitized data were updated with attribute tables and metadata for integration into the UCSB Maya Forest GIS stored at the MesoAmerican Research Center (Ford et al. 2014). The capability classification for soils of the upper Belize valley, on the north side of the river, is the only data that has been published so far (Fedick 1995). A document is being prepared by Scott Fedick that will present the capability classification for the entire Belize River area. Provisionally, an informal document on capability classification of the soils is available from Scott Fedick, and digitized versions of the soil maps are available from Anabel Ford.

Goals of the LiDAR Soil Mapping Project

The recent acquisition of LiDAR imagery for the El Pilar Archaeological Reserve for Maya Flora and Fauna (Figure 1) provides the opportunity to examine the relationship between ancient Maya settlement locations and the surrounding land resources at a scale of resolution comparable to the perspective of the ancient farmers. We suggest that the ideal scale of resolution to be about 1:10,000, allowing for recognition of uniform patches of land as small as 0.4 ha, about the area of an average-sized Maya home garden.

While LiDAR data cannot be used directly to distinguish soil types, it can be used to define areas of uniform slope. Degree of slope is an important factor in distinguishing among several of the soil types (Birchall and Jenkin 1979), and it is anticipated that high-resolution slope classification aided by LiDAR, and supplemented by field observations, will allow for knowledge-based digital soil mapping (e.g., Zhu et al. 2001) at a scale at or near 1:10,000.

Methods

The digitized 1:50,000 soil maps (Birchall and Jenkin 1979) cover only the eastern portion of the El Pilar Archaeological Reserve for Maya Flora and Fauna. Those digitized soil maps and the LiDAR imagery have been incorporated into the UCSB Maya Forest GIS database for the El Pilar reserve (Figure 2).

Prior to initiation of field studies, Keith Clarke conducted a slope classification based on the LiDAR terrain data of the El Pilar Archaeological Reserve. This procedure began with a bare-surface Digital Terrain Model generated by the Simple Morphological Filter (SMRF) following Pingel et al. (2013). The Digital Terrain Model was then converted to raster format using one m^2 cells through Nearest Neighbor interpolation, and assigning slope for each rater using the following degree-of-slope classes: slope class 1 = 0-5 percent slope; slope class 2 = 5.000000001-15 percent slope; slope class 3 = 15.00000001-25 percent slope; slope class 4 = 25.00000001-35 percent slope; slope class 5 = 35.00000001-100 percent slope. These slope classes were determined by the "susceptibility to erosion" factor used in the original land capability evaluation conducted by Scott Fedick (1988, 1995), adding a higher slope class 5, as derived from Birchall and Jenkin (1979) soil descriptions/classification. The resulting slope-classification map, compiled using one m^2 raster cells, is presented in Figure 3. To arrive at the objective scale of 1:10,000, the one m raster units were grouped into 63 m by 63 m cells, and a median slope was derived for each new, larger cell, and an appropriate slope class was assigned to each cell (Figure 4).

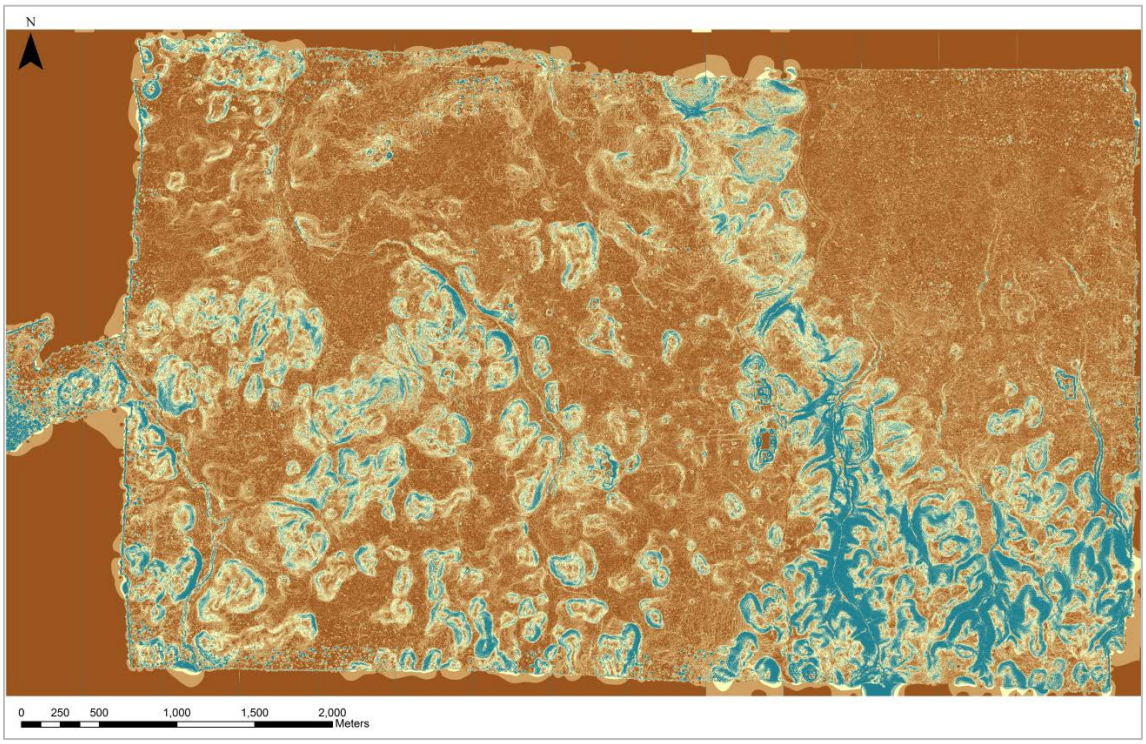

Figure 3. LiDAR image of the El Pilar Archaeological Reserve for Maya Flora and Fauna, with slope classification using 1 m^2 raster cells.

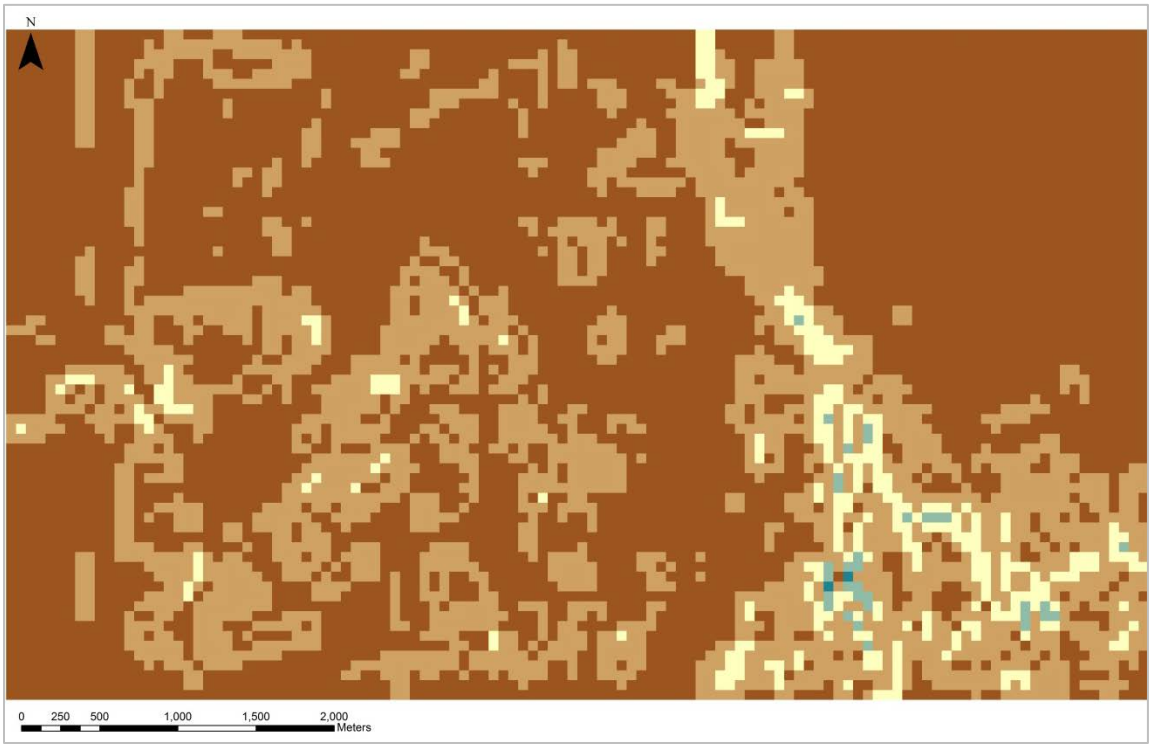

Figure 4. LiDAR image of the El Pilar Archaeological Reserve for Maya Flora and Fauna, with slope classification using 3,969 m2 (63 m x 63 m) raster cells, providing an objective scale of approximately 1:10,000.

Field investigations for the pilot soil-study were conducted in collaboration with the field crews doing ground-truthing of LiDAR features thought to represent features constructed by the ancient Maya (see Ford 2014). A total of 36 soil pits were excavated and described. Soil pits were generally situated at least 20 m from any associated ancient structures. Soil pits were also excavated away from architectural features and within various vegetation associations, and within terrain representing the defined slope classes (on-site slope was determine with the use of the clinometer of a Brunton Pocket Transit). Soil pits consisted of essentially auger samples excavated with a post-hole digger or a round-nose shovel. The pit was excavated to the C horizon; either bedrock, disintegrating bedrock, gravel or marl. In rare cases (within Tambos soils), the C horizon was too deep to reach with an auger pit. Soil samples for field description were taken from the A horizon at a depth of 15 cm for topsoil. In deeper soils, a second sample was taken below the topsoil, generally at about 30 cm, to document differences in the A horizon in color, texture, etc. Third samples/descriptions were taken at around 45 cm if differences were visible. The C horizon was noted but not described in detail. Forms, and a guide to soil description, were used to assure consistency in characterization. Methods for describing soil color, texture, structure, and consistence followed Olson (1981).

In addition to the soil-pitting program, several days were dedicated to walking trails and roads while noting changes in vegetation associations and soils. These walks were done with Narciso Torres, a local Master Maya farmer with exceptional knowledge of local plants and soils. Some soil pits were excavated during these walks.

Results

The following comments on refining the soil map refer to the eastern Belize half of the El Pilar study area covered by the existing 1:50,000 scale soil maps (Figure 2). The LiDAR slope classification and field investigations will assist in compiling a provisional soil map for the western half of the reserve. Some clear patterns are evident in how finer-scale soil mapping can proceed.

A large patch of land in the southeast mapped area is classified on the 1:50,000 map (Birchall and Jenkin 1979) as a complex of Chorro + Tambos soils. The Tambos soils encountered in the soil pits of this zone appear to all be the shallow phase of the Tambos series. The Chorro soils in this area seem to be a previously undefined shallow phase of the Chorro series, though an intergrade between Chorro and Tambos shallow may be the best characterization of this soil complex. Slight differences in local topography (and visible on the LiDAR slope-class map) are reflected in soil variation, with higher slope angles associated with soils closer to the Chorro series, and lower slopes associated with Tambos shallow. The more level, less-well drained areas (Tambos shallow) generally had a higher density of cohune palm. For the ancient settlement, there is a clear preference for situating architecture on slight rises; this would have provided a more stable and well-drained location for houses, immediately surrounded with desirable Chorro soils. It was also noted in several cases that structure-mounds were located on slight rises, immediately adjacent to Chorro/Tambos-shallow boundaries. It should be possible to remap this zone using the LiDAR slope classification combined with estimates of cohune palm density derived from the aerial photographs that were taken in tandem with the LiDAR imagery.

A large patch of Chorro soils is mapped in the central portion of the El Pilar Archaeological Reserve. This zone appears to be a complex dominated by Chorro soil with patches of Tambos shallow. The southern and western margins of the mapped area can be refined, as it currently includes bands of adjacent Piedregal and perhaps Seven Mile soils. The north of this zone probably includes more Tambos shallow, and perhaps Tambos (modal) soils. Structure-mounds are found in expanses of Chorro soil, or on slight rises within surrounding Tambos shallow soils. As with the previously discussed Chorro + Tambos zone, soil classes in this area can be refined with a combination of LiDAR slope classes and aerial photographs.

The large expanse of Piedregal and Piedregal hill-phase soils situated in the southern area of the mapped (Belize) zone appear to be consistent with the existing 1:50,000 scale

mapping, though differentiation of modal Piedregal and the hill phase soils should be easy to accomplish with the LiDAR slope classification. It appears that structure mounds are very consistently located on hilltops within both Piedregal and Piedregal hill-phase areas. It should be a simple matter to quantify this relationship.

In the northeast half of the mapped area there is a large soil patch mapped as Tambos. Investigations in this area were limited to walks on trails/roads along the north reserve boundary and within the eastern and western margins (including many informal shallow shovel-pits), and a single described soil pit. It does appear that the main portion of this zone is modal Tambos soil; very deep, heavy clay soils. While no structure-mounds are situated within the heart of this Tambos soil zone, it also appears that the western and eastern margins of this zone probably need to be re-classified as they include higher ground, likely associated with shallow phase Tambos or Chorro soils and some structure-mounds. These are aspects that the more detailed soil study draws out from the generalized 1:50,000 soil maps.

The most problematic soil area, in terms of classification, is the linear expanse of Seven Mile (shallow phase) soil mapped near the western margin of the Belize half of the El Pilar Archaeological Reserve. It is difficult to distinguish the Seven Mile soil from the associated Piedregal and Chorro soils. This distinction may not be significant for the goals of this study, as the agricultural capability of Chorro and Piedregal soils are similar, differing only slightly from the Seven Mile shallow soils. Use of the LiDAR slope data may show that these soils do not meet the slope characteristics of Seven Mile shallow phase soils, and should be reclassified as either Piedregal (which they are most similar to) or Chorro soils.

The patches of Beaver Dam and Chorro + Tambos mapped in the northeast zone were not investigated as they are outside of the El Pilar reserve boundary.

Conclusions and Suggestions for the Next Phase of Study

Most of the soil investigations undertaken during the 2015 season were conducted in tandem with an archaeological survey crew. It will be better in the future to have a more independent soil crew of three members (for research and safety purposes). Crews should always include a local Maya resident who is familiar with the vegetation and soils. This season, on days when Master Maya farmer Narciso Torres assisted Scott Fedick in the soil investigations, the study benefited greatly from the perspectives on the suitability of soils for various crops, identification of indicator species used to evaluate crop suitability, differences in seasonality for planting/harvesting, and methods for testing physical characteristics of the soils.

Some difficulty was experienced in differentiating soil types based only on the field descriptions. If more definitive classification is desired, it would be necessary to take samples for laboratory analysis.

The next step in this study will be to work with the LiDAR slope classification and aerial photographs to do a first-run mapping refinement. This should be straight-forward for the mapped Belize half of the reserve, but more problematic for the Guatemala half. The existing 1:250,000 scale soil maps for the Guatemala half will be useful. In working with the LiDAR slope data, it seems that the one m pixel data may be very useful in working on the re-classification, averaging these to attain a scale of 1:10,000. The next phase of fieldwork should involve systematic sampling across the revised version of the soil map that is currently under production.

Making further use of the LiDAR data, a refined soil map can be used to model cropping patterns, including identifying areas best suited to specific crops, seasonal differences for planting and harvesting, identifying sun exposure through aspect and hillside shading, and analyzing the locations of agricultural terraces. These will be among the objective of the future years research on soil and settlement patterns.

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12 ANCESTOR VENERATION IN PRACTICE: A REGIONAL MORTUARY ANALYSIS OF THE BELIZE RIVER VALLEY

Anna C. Novotny

Decades of excavation in the Belize River Valley have produced a sizable sample of human skeletal remains, and one of the largest samples of burials from non-elite contexts in the ancient Maya region; the "diversity of voices" (Chase 2004) working in the Belize Valley has precluded a thorough regional analysis. Regional mortuary analyses are preferable to smaller, site-specific analyses because larger patterns can emerge that are not visible at the level of an individual site. This paper presents a synthesis of mortuary data from the Belize River Valley and compares the mortuary treatment seen within eastern structures at mid-level sites to treatment of individuals interred at other sites and in other architectural contexts. It was expected that those individuals placed within eastern structures were considered ancestors by the ancient Maya and that they would have received extended mortuary rituals in the form of tomb re-entry and secondary interment more frequently than those in other contexts. Results show that within eastern structures at mid-level sites articulated skeletons were, in fact, more common than secondary, disarticulated or disturbed deposits. This suggests that ancestor veneration may have focused less on individual human bodies and more on the continued placement of bodies in one location on the landscape. A comparison of mortuary practices in other regions of the Maya realm shows distinct regional differences in mortuary treatment associated with ancestors.

Introduction

Diane Chase described the Belize River Valley as "one of the most intensively investigated areas in Mesoamerica" (D. Chase 2004: 345) in her conclusion to James Garber's (2004) edited volume. At that time this was the only volume to synthesize the extensive amount of research within the Belize Valley and surrounding areas. Recent contributions (LeCount and Yaeger, eds 2010) have made great strides in placing the Belize Valley within the greater ancient Maya world. While research foci vary, the Belize Valley is unique in lowland Maya archaeology in that a major component of research there has been concerned with settlement patterns and details of life at minor centers rather than at major centers (Hoggarth et al 2015; D. Chase 2004:335). Chase points out that although the amount of data available is impressive, broad syntheses are difficult to carry out because of the numerous projects and researchers working in this region. Each project has its' own questions, models, and theoretical perspectives and often act as "microcosms" (D. Chase 2004:348). This isolation presents a particular challenge to attempts at mortuary analysis since these types of analyses are most productive with a large sample and a regional perspective.

A regional mortuary analysis is of interest because mortuary data can speak to broader cultural, political, and economic fluctuations (Brown 1995:7) as well as regional integration of smaller settlements with larger cities (Clayton 2009). Mortuary behavior among the ancient Maya shows a great deal of variability at the regional level (Welsh 1988, Pereira 2013, Hutson et al 2014, Miller 2014, Chase and Chase 1994) and may be better explained by analyses that go beyond the level of the site, or geographically proximate sites. A proper, comprehensive analysis of mortuary patterns requires a large sample size ideally obtained from the breadth of contexts wherein human remains are found. It is well known that the ancient Maya interred the deceased in a variety of locations (Welsh 1988; Scherer 2015). As Brown (1995:22) explains, "To be successful, problems on such a regional level require multiple, intersecting arguments drawing from the widest range of principles".

This paper describes one set of results from a recent synthesis of mortuary data from the Belize River Valley (Novotny 2015). As mortuary behavior are influenced in part by belief systems (Carr 1995), the study applies a model of relational worldview in which ancestors were to be communicated with and cared for by the living in order to maintain balance in the universe (Astor Aguilera 2010). Mortuary behavior is also subject to social and economic changes (Binford 1971; Brown 1995). As such, I combine relational worldview with Patricia McAnany's thesis that ancestors provided a claim to land and resources (McAnany 2013[1995]). I make use of the material representations of ancestors set out in

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McAnany's work, particularly the placement of burials within eastern structures and the degree to which they receive alternative mortuary treatments, including tomb re-entry and extraction of skeletal elements or placement of multiple individuals within the same grave. The east is often associated with ancestors as is manipulation of skeletal remains (McAnany 2013[1995]; Weiss-Krejci 2003). I ask, specifically, how the presence of these structures and ancestors entombed within reflected the sociopolitical system in the Belize Valley.

Background

Ancient Maya worldview can be characterized as relational (Astor-Aguilera 2010). Humans are responsible for maintaining balance in the universe through correct action and behavior, which include maintaining relationships with humans and non-human persons through ritual acts. To neglect these interactions, by denying non-human beings the sustenance they require, materialized as human flesh, corn, alcohol, candles, and flowers, risked bringing bad fortune to one's home by disrupting the balance of the universe. Critical to this worldview is a sense of responsibility to the community, which includes deceased ancestors. John Monaghan (1995, 1996) describes this morality as a "covenant", wherein the humans are indebted to non-humans who provide corn, rain, and good health, and the non-humans are similarly indebted in this reciprocal relationship for the food and communication given them by the living.

Maintaining social relationships with all beings seems to have been a key element of the ancient Maya sociopolitical system. Drawing on epigraphic, archaeological, and iconographic data, Houston and Stuart (1996) describe a sense of duty and loyalty as part of the "moral authority" that underlay ancient Maya communities. Morality, they discuss, is a culturally specific value system that defines proper action (Houston and Inomata 2009:28). As described above, all participants in Maya society likely were responsible for maintaining relationships in the correct way, and this maintenance was most opulently carried out by ancient Maya kings (Fitzsimmons 2009). The foundation of ancient Maya royal power, then, was the shared belief by commoners and royals in the moral authority in the person of the king (Sharer and Traxler 2006:715; Houston and Inomata 2009:160-161; Houston and Stuart 1996:306-308).

The ancient Maya kings strove for economic control, particularly of long distance trade for exotic, sumptuary goods used in elaborate performances and maintained relationships with fellow kings and nobles in other cities (Demarest 1992). The rest of the Maya populace shared this worldview and thus acquiesced to their place in the social hierarchy. They may have felt an allegiance to a king and city through participation in construction in the city centers and by participating in ritual circuits that brought the king from the city to do rituals at secondary centers. While the kings did not seem to entirely control local food production, or water supply, both for drinking and irrigation, ritual was one means that the Maya kings may have wielded economic control over their realms. These were the centripedal forces the held together ancient Maya sociopolitical structure.

The above discussion presents a model of how ancient Maya sociopolitical dynamics and worldview likely functioned, but it is a top-down perspective. In this view, the masses of non-elite Maya play a passive role and it is one aim of this research to address the extent to which ideology was accessible and useful to non-elites. Data are lacking to inform on the role that the non-elites played in these performances, besides as spectators. Patricia McAnany's (2013[1995]) work best developed the role of non-elites in the broader sociopolitical system.

McAnany's thesis states that the veneration of ancestors was a practice done for generations by ancient Maya non-elite and that it was appropriated and politicized by emergent kings in the Late Preclassic period to "sanction elite power and authority" (McAnany 2013[1995]:127; see also Freidel and Schele 1988; Freidel 1992). Ancestors are defined as deceased progenitors who held a degree of sociopolitical power during life and, due to this power, with whom the living sought to maintain a relationship (McAnany 2013[1995]). As Houston and Stuart (1996: 309) describe, "the grafting of ever-changing ideas about political power on to more broadly held concepts about

the nature of the universe probably made those notions more compelling to royal subjects". However, Houston and Inomata (2009:63) acknowledge that it is unlikely the kings ever fully controlled or monopolized all contact with the ancestors. Archaeological data indicate that practices associated with ancestors – repeated interment of individuals of a particular age and sex within structures associated with the east, instruments of ancestral communication, like bloodletting implements, placed in graves, ceramics marked with the quadripartite motif, and manipulation of the bones of the deceased by the living – persisted at non-elite sites throughout Maya history.

Power was not strongly held by the state in ancient Maya society, and crucial to our understanding of the relationship between worldview, power, and sociopolitical organization is how institutions, like ancestor veneration, were used by non-royal social groups (Freidel and Schele 1988; McAnany 2013[1995]). This study explores how and in what ways mid-level sites[1], (see Novotny (2015) and Iannone (2004) for a more complete discussion and definition of mid-level sites) materialized ancestors and how these practices were different or similar to those at upper and lower level sites. Of particular interest was the way in which the bodies of the deceased ancestors were manipulated by the living. Bones represent a material aspect of the deceased ancestors and it was expected that locales associated with ancestors, eastern structures in particular, would show a higher incidence of disturbed skeletons or secondary deposits of skeletal remains. The following describes the methods used to analyze the Belize Valley mortuary data. More details are available in Novotny (2015).

Methods

Data were collected from reports and publications on the burials from the Belize River Valley. Variation in mortuary ritual is assessed using data from 28 sites and a total of 573 burials (Table 1). Variables recorded for the mortuary analysis were drawn from Sprague (2005) and Duday (2011). They are described in full in Novotny (2015, Appendix A).

Table 1. All sites and sample sizes used in the mortuary analysis.

Site	Count
Actuncan	7
Baking Pot	79
Barton Ramie	141
Bedran	14
Blackman Eddy	8
Buenavista	16
Cahal Pech	28
Cas Pek	11
Chaa Creek	17
Chan	26
Chan NE	10
Esperanza	6
Figueroa	5
Floral Park	10
Lower Dover	1
Ontario Village	1
Pacbitun	59
Pook's Hill	15
Rockville	6
San Lorenzo	3
Saturday Creek	12
Tolok	14
Tzinic	2
Tzotz	24
Xunantunich	35
Zopilote	4
Zubin	19
Total	573

To assess the degree of interaction the living sought with the remains of the dead, mortuary data were collected on degree of articulation, the form of disposal (primary or secondary), grave type, funerary space (whether the grave was filled with soil or not), number of individuals, and whether the grave was intrusive into existing architecture. Here, I will focus on results concerning the form of disposal and degree of articulation. It should be noted that articulated means that the bones were all in their anatomical position and joints were in place.

Table 2. Frequency of occurrence of degree of articulation and form of disposal for all sites and across time.

Variable	Variable State	Frequency	Percent
Articulation	Articulated	199	63.78
	Disarticulated	61	19.55
	Disturbed	52	16.67
	TOTAL	312	100
Disposal	Primary	266	88.67
	Secondary	34	11.33
	TOTAL	300	100

Table 3. Frequency and percent of primary and secondary burials at each site type when all time periods are taken into account.

Form of disposal	Lower	Mid	Upper
Primary	105 (95%)	90 (92%)	70 (78%)
Secondary	5 (5%)	7 (8%)	19 (21%)
TOTAL	110	97	89

Disarticulated means that the individual is reasonably complete but some elements are not in the correct anatomical position; the cause of the disarticulation is likely taphonomic but could be due to human intervention. Disturbed means that the individual is incomplete and the bones are not in anatomical order (Sprague 2005:29, 79-83). These data were analyzed for differences between eastern and non-eastern structures as well as between lower-level, mid-level, and upper-level sites.

Results

Form of Disposal

When all site-types are considered, the dominant form of disposal was primary (Table 2). At mid-level sites, secondary burials were found throughout time periods and they occurred predominantly in structures that had a ritual function (n = 7, 42%), including, but not limited to, eastern structures (Table 3). Secondary burials were most commonly found with multiple individual, primary interments at mid-level sites at a statistically significant level ($\chi^2 = 13.68$; $df = 1$; $p < 0.05$). However, the frequency of disarticulated and disturbed burials occurred in non-eastern, non-ritual contexts about equally.

At upper-level sites secondary burials were only found dating to the Late Classic period. The upper-level sites had secondary burials in a variety of ritual and non-ritual structures. Secondary burials were most commonly placed in eastern structures of upper-level sites when compared to other ritual locations (n=10, 70%). There were secondary burials at lower-level sites throughout time periods, although in general there were not many (n = 4). There are actually the most secondary burials in the Preclassic period (n = 3) and the least in the Late Classic (n = 1) at lower-level sites, although the sample size is quite low.

Degree of Articulation

The degree of articulation refers to how well-articulated the bones were when excavated. The vast majority of burials in the Belize Valley were articulated when recovered (63%; Table 1). At mid-level sites, the Preclassic period shows fewer articulated (n = 4) burials in relationship to disturbed (n = 5) and disarticulated (n = 7). In subsequent time periods articulated burials predominated (61% in the Late Classic period). In eastern structures there were always more articulated burials over time than disarticulated and disturbed at mid-level sites (Table 4).

Articulated burials always predominated through time at upper-level sites (Table 4). In eastern structures of upper-level sites during the Late/Terminal Classic there seems to have been a greater occurrence of disarticulated and disturbed burials compared to the other site types with eastern structures (Table 5). Articulated burials also predominated at lower-level sites (Table 4). Disturbed and disarticulated burials occurred less frequently than at the other site types.

In sum, articulated burials predominated at all site types over time. Mid-level sites had

Table 4. Frequency and percent of articulated, disarticulated, and disturbed burials at each site type when all time periods are taken into account.

Articulation	Lower	Mid	Upper
Articulated	102 (76%)	53 (56%)	44 (50%)
Disarticulated	12 (9%)	24 (25%)	24 (27%)
Disturbed	19 (14%)	16 (17%)	19 (21%)
TOTAL	133	93	87

Table 5. Frequency and percent of articulated, disarticulated, and disturbed burials during the Late Classic period in eastern structures at mid- and upper-level sites (there were no eastern structure at lower-level sites).

Articulation	Mid	Upper
Articulated	15 (65%)	9 (42%)
Disarticulated	7 (30%)	6 (28%)
Disturbed	1 (4%)	6 (28%)
TOTAL	23	21

fewer disarticulated or disturbed burials in eastern structures than expected. Disarticulated burials were more common in the Preclassic at mid-level sites. Eastern structures contained mostly articulated burials in all time periods at mid-level sites. This contrasts with upper-level sites, where in eastern structures there was a higher occurrence of disarticulated and disturbed interments when compared to other site types (Table 5). Disturbed and disarticulated burials occurred least frequently at lower-level sites.

Discussion and Conclusion

These variables reveal several interesting aspects of extended mortuary practice in the Belize Valley at mid-level sites. There are three main patterns. Firstly, not only were there more articulated skeletons found in eastern structures at mid-level sites than disarticulated or disturbed, interaction with skeletal remains was not limited to only eastern structures. Interaction focused on retrieval of skulls and re-opening of occupied graves to inter another individual or individuals. Secondly, secondary burials were not common. While some extraction of skeletal remains occurred, creating secondary burials for the purpose of display or veneration may not have been the apparent goal of mortuary practice in the Belize Valley. Instead, interaction involved retrieving skulls from a few individuals, perhaps opportunistically. This is supported by data on funerary space – graves were nearly always filled soon after the corpse was deposited so that it would have been difficult to access to the bones. Finally, not only were interments that were disarticulated/disturbed (i.e. showed evidence for having been re-entered by the living) found in non-eastern structures, but round structures in the Belize Valley also were the focus of multiple human interments, particularly in the Late/Terminal Classic period. A strict adherence to the model described above might indicate that ancestor veneration did not occur at these mid-level sites. Alternatively, interaction with remains may not have been the primary way that these relationships were maintained. The work of Trinkhaus (1984), for instance, demonstrates that the importance of ritual goes beyond what archaeologists can see in one grave space and should encompass all aspects of the mortuary ritual.

Archaeological research in the Maya region in the past 50 years has recovered thousands of human remains and a clearer picture of the regional variability of ancient Maya mortuary behavior is emerging. For instance, in the Río Bec region interments were all found within elite residences, rather than associated with eastern structures or even with public ceremonial architecture, and they were also characterized by a distinct age and sex profile (all adult males) and deposition (all primary). Pereira (2013:462-464) infers two different types of mortuary treatment based on body position and location and concludes that ancestor veneration was expressed quite differently in this region. He infers that rather than being a tool that built power, mortuary treatment was a more equalizing force in this region.

A slightly different pattern is seen at Chunchucmil where Hutson and colleagues (2004) recovered burials only within residential contexts, all of which were secondary deposits. The excavators interpret these deposits as those of ancestors whose remains were a crucial ritual resource used by their descendants, evidenced by their secondary burial location and fragmentary state. The bones may have been exhumed and moved many times. They encourage other researchers to consider deposits of this kind evidence of the mobilization of a network of relationships between the living and the dead enacted by the living to reproduce and realize principles of kinship and descent (Hutson et al 2004:89). I agree with the approach of these authors – that the ancient Maya emphasized networks of relationships that had to be actively maintained through extended mortuary rituals. How do we recognize this if there are not many secondary deposits?

Even though there is a dearth of evidence for regular interaction with human skeletal remains at mid-level sites in the sample from the Belize Valley, it is not absent entirely. The skull was targeted for removal in several clear cases (Zubin, Chan) (Iannone 1996; Novotny 2012). While the re-opening of graves for interment of sequential individuals may or may not have involved interacting with remains by removing elements from previous occupants, it indicates an emphasis on interment in a particular locale in a particular building. This may be an example of burials anchoring place within the built environment. The consistent return to place for the purpose of placing human burials may be akin to the philosophy that lent ancient Maya rulers their authority – that the kings increased their *k'uh* through repeated ritual action (Houston and Stuart 1996; Houston et al 2006). Not only did it demonstrate their power, correct performance built their inherent heat and vitality. This discursive relationship with power through ritual was perhaps represented through repeated mortuary ritual, within one structure or within one grave.

Perhaps the power in ancestors in the Belize River Valley was anchoring of a group and establishment of place rather than communication through human bone. The depositional history of the eastern structure at the Chan site certainly demonstrates a dedication to placing burials and caches within this particular locale for 1800 years (Novotny 2012).

In conclusion, there was less evidence than initially expected of interaction with skeletal remains within eastern structures by the living at mid-level sites in the Belize Valley. However, this does not mean that veneration or communication did not occur at all, but mid-level leaders may not have focused on human bone as a ritual object. Clearly there was a lot of variability in mortuary expression in ancestral contexts in Maya prehistory. Fitzsimmons' (2009) study of the mortuary practices of ancient Maya royalty suggested that interment served to mark a distinct place on the landscape, which rings true for non-elites at mid-level sites in the Belize Valley, as well. While re-entry may not have factored as strongly in these rituals, the continual placing of bodies within the built environment most likely established place in a discursive way for the occupants of mid-level sites.

Overall, it is difficult to identify individuals who may have been considered ancestral based on body treatment and burial location alone. The data are extremely diverse; the ancient Maya clearly did not follow a standard dogma when it came to mortuary treatment. Cultural norms and body treatment practices were applied differently, likely due to particular historical contingencies. Whether eastern structures or round structures or the center of a plaza, placing human remains anchored space and provided a place to return to over time. The archaeological signature of this worldview is complex. Given this variability, detailed and precise methodologies are crucial for future research.

[1]Mid-level sites, at one end of the continuum, are residential in nature but have, "at least one large nonresidential structure" (Iannone 2003: 280). At the other end of the continuum, mid-level sites are Bullard's Minor Ceremonial Centers, distinguished by their greater size, spatially and in structural volume, and site plan complexity with an increase in non-residential buildings (Iannone 2004:281). Mid-level sites have public plazas rather than private patios and structures like ancestral shrines (Iannone 2004:281). In some cases, mid-level sites have features like ballcourts, stela, altars, and causeways, features typically associated with upper-level settlement. To Iannone (2004:282; see also Connell 2000; Iannone and Connell ed. 2003) these

features imply a degree of autonomy, possibly semi-autonomy, in the developmental trajectory of mid-level sites.

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13 RIVERS, WETLANDS, CREEKS, AND ROADS: INVESTIGATING SETTLEMENT PATTERNS IN THE MIDDLE AND LOWER REACHES OF THE BELIZE WATERSHED

Eleanor Harrison-Buck, Marieka Brouwer Burg, Satoru Murata, Hugh Robinson, Adam Kaeding, and Alex Gantos

The Belize River East Archaeology (BREA) project has continued to focus on survey, mapping, and excavations of sites in the middle Belize Valley, but this season the BREA team also explored sites farther down river. Here, we present an overview of our work this past season, which included mapping the ancient Maya site of More Tomorrow. We also further investigated the site of Saturday Creek, exposing additional evidence of Spanish Contact in the context of another cache deposit in the Southwestern Plaza. Finally, our work in the second half of our season this year shifted to the lower reaches of the Belize Watershed where we performed an initial reconnaissance and mapped the site of Jabonche using a Total Station. We performed several test excavations at Jabonche that exposed middens with rich deposits of faunal remains, which shed light on the Late to Terminal Classic diet and use of neighboring wetland resources. Jabonche is a minor ceremonial center that contains a pyramid, ballcourt, and several sizeable plazas. One excavation placed in the center of the South Plaza exposed a portion of a columned building dating to the Terminal Classic period (ca. AD 800-900). Three substantial stone roads (sacbeob) radiate outward from the site and connect with outlying settlement. We discuss these and other scattered reports of sacbeob and suggest that roads in the low-lying coastal zone of northern Belize may be more common than has been previously thought.

Introduction

The eastern Belize River valley appears to have a long history that extends from the Formative period through Colonial times (Harrison-Buck, ed. 2011, 2013, 2015a, 2015b). Here, we report our most recent archaeological investigations carried out in 2015, which marks the fifth year of the Belize River East Archaeology (BREA) project. The BREA project study area encompasses the eastern Belize watershed between Belmopan and Belize City, a roughly 6000 sq. km area. Our investigations over the last five years have mostly focused on recording sites in the middle Belize Valley, which is an area of dense settlement, particularly along the main trunk of the Belize River (Figure 1). We have investigated a number of sites in the middle Belize Valley, which we have presented in previous issues of *Research Reports in Belizean Archaeology*. This past season in 2015 we mapped the ancient Maya site of More Tomorrow, a sizeable center with two major plaza groups containing pyramidal architecture (Figure 2).

In previous field seasons, we carried out investigations at the nearby site of Saturday Creek in the middle Belize Valley. We produced a detailed map of the Saturday Creek site core and carried out select test excavations

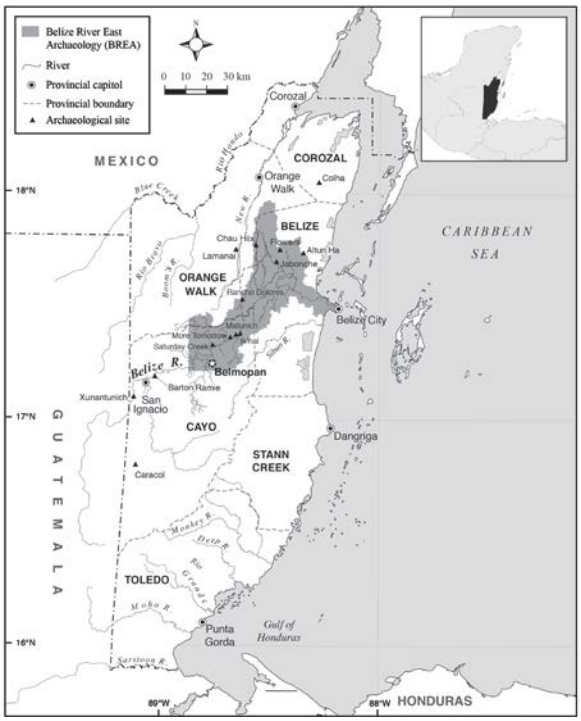

Figure 1. Map of Belize showing BREA study area (map prepared by M. Brouwer Burg).

at this site (Figure 3). During 2015, we continued our investigations at Saturday Creek and expanded our search for evidence of Spanish Contact. According to ethnohistoric accounts, a cluster of Contact period towns was located on the Belize River in the vicinity of Saturday

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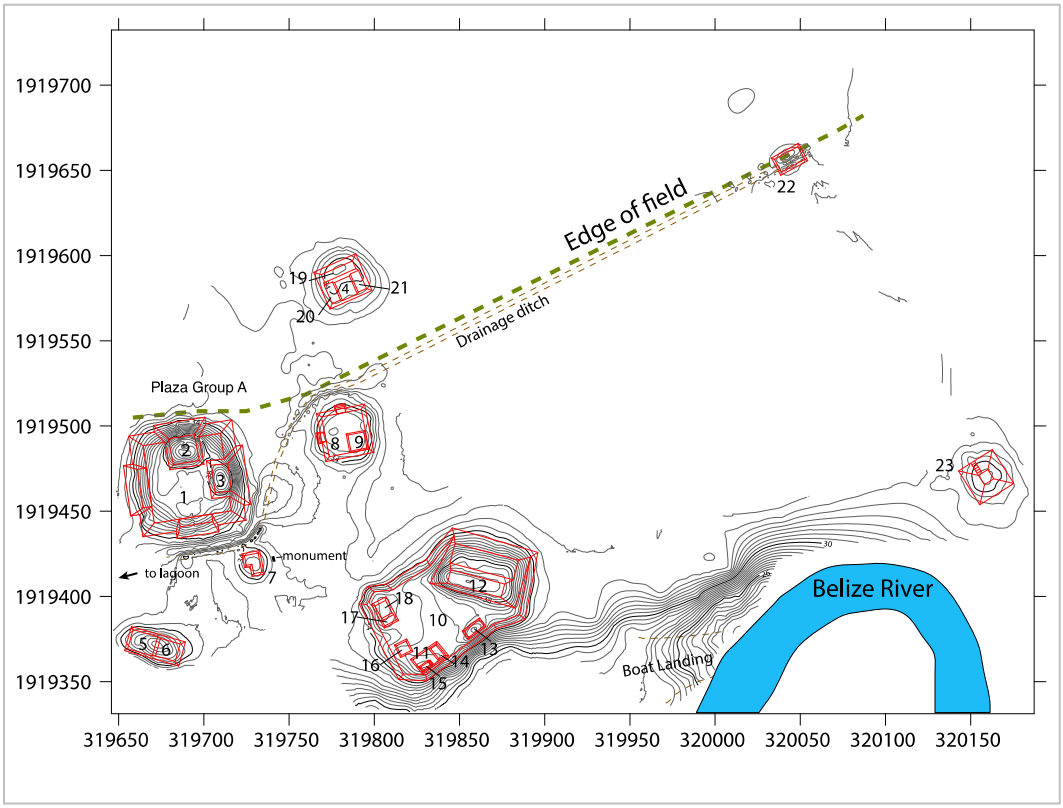

Figure 2. The site of More Tomorrow (map prepared by S. Murata and H. Robinson).

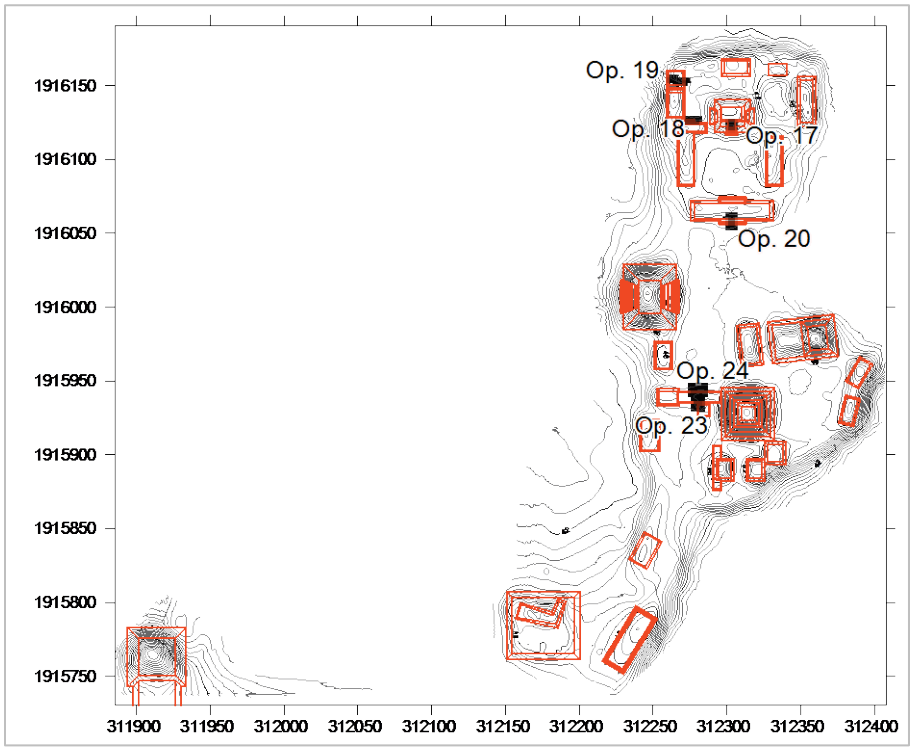

Figure 3. Location of Ops. 17-24 at Saturday Creek (map prepared by S. Murata and B. Houk).

Creek (Jones 1989). According to the Spanish accounts, they entered the middle Belize Valley during the early sixteenth century, traveling south from Chetumal down the New River where they docked their canoes at the headwaters and walked south over pinal – a stretch of pine savannah that runs south from here to Labouring Creek (Jones 1989:Map 2). The Spanish description of this north-south overland route, namely the strip of pine ridge forest, closely aligns to what we have observed along the route outlined in Figure 4. The Spanish describe crossing over Labouring Creek on a travertine bridge and walking through swamp toward an entry point on the Belize River that was named "literally, 'the hamlet where Chantome had been'" (Jones 1989:287-288). Elsewhere, I have suggested that Chantome may be the ancient Maya site of Saturday Creek, which was perhaps largely abandoned when the Spanish arrived in the early sixteenth century (Harrison-Buck 2010).

During January of 2015 we carried out further reconnaissance along this projected overland route between Saturday Creek and Labouring Creek to the north. Extensive clearing in this area has revealed a series of settlement clusters that all seem to trend north-northeast from Saturday Creek toward Labouring Creek and suggest a transportation corridor that leads to an area we refer to as Jaegar Wetlands (Gantos 2015). Here, we have identified in Google Earth imagery modified ditched and drained wetland fields (Harrison-Buck 2014). Based on the settlement distribution and the presence of wetland fields we suspected that a large center exists somewhere in this vicinity and our reconnaissance in the summer of 2015 was aimed at accessing this area around Jaegar Wetlands. Our survey team attempted to get to this spot from the south, but it proved incredibly challenging. We tried in vain to navigate through the thick masses of flooded mangrove swamp to the south of Labouring Creek in an attempt to get to these wetland fields, but after about 12 hours of all night paddling had to abort the mission. However, we are determined one way or another to get to this location as it was recently brought to our attention that the Program for Belize found a sizeable

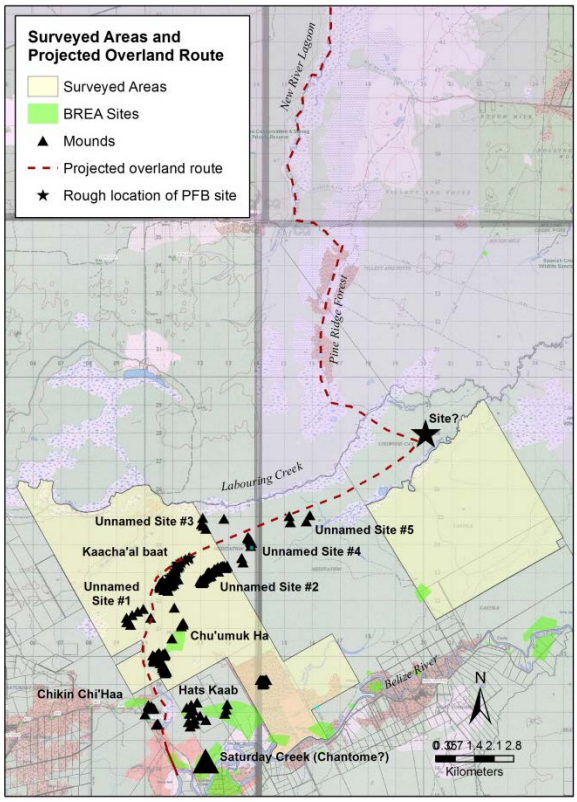

Figure 4. Projected overland route with sites shown trending north-north-east with rough location of large site identified in PfB survey. Note: areas in yellow have been recently cleared and to some extent surveyed archaeologically, but not comprehensively (map prepared by M. Brouwer Burg).

archaeological site in the tract of high ground just south of Jaegar Wetlands and north of White Water Lagoon (Program for Belize 2000 [Figure 4])[1]. There, PfB reported a series of mounds, including a sizeable pyramidal structure measuring roughly 13 meters in height (Program for Belize 2000:10). We will continue our efforts at reconnaissance in this area in future seasons.

Archaeological Investigations at Saturday Creek

If we are correct that Chantome was Saturday Creek it would suggest that Saturday Creek was no longer fully occupied in the sixteenth century, but was still recognized as an important point in the landscape. If so, we would expect to find evidence of pilgrimage to the site core during the Contact period. Last year our investigations in the Southwestern Plaza of Saturday Creek offered us some

exciting supporting evidence for this idea. Our excavations of Operation 23 exposed the southeastern edge of Str. 10, a long linear east-west platform. Our excavations in this area revealed the southeast corner of a cobble platform built on top of Structure 10. Here, in the southeast corner of this cobble platform we found a cache deposit (Figure 5 [Harrison-Buck et al. 2015; Harrison-Buck and Flanagan 2015]). The cache consisted of a high density of burned faunal remains (primarily marine shell) resting on an elaborately decorated Postclassic ceramic sherd. Sealed inside the concentration of burned bone and shell were three jade beads and a bone pendant, and, perhaps most significantly, a modified quartz crystal object (Figure 6). Though the nature of this cache context was clearly and undeniably Pre-Columbian, the quartz crystal object itself most closely resembles a broken bottle stopper – an undeniably post-Contact artifact. The artifact appears to be the top of a glass stopper and may have been brought here by the Spanish friars to hold communion wine or holy water for baptisms. These types of bottles have a long history and are still in use, as modern examples still sold today attest. In short, this is arguably our first clear evidence of Spanish Contact at Saturday Creek.

The find prompted us this season to further investigate this cobble platform on Structure 10. During the January 2015 season we opened up Operation 24 (Kaeding and Harrison-Buck 2015). Excavations carefully defined the surface of a cobble platform, which comprised a small, loosely square, cobble-filled platform measuring roughly 4-x-4 m with large roughly hewn boulders that was constructed over top of the eastern end of Structure 10. As archaeologists, we often appreciate how ritual deposits for the Maya are so strongly patterned. We figured that if there was a cache deposit in the southeast corner of the cobble platform, more than likely we would find another one in the northeast corner (Figure 5). Sure enough, we found a concentration of smashed ceramics on the surface of the cobble platform around the northeast corner, all of which appear to be Late Postclassic in date, including grater bowls, large amounts of flanged and appliqued vessels, and fragments of Chenmul Modeled censerwares. A

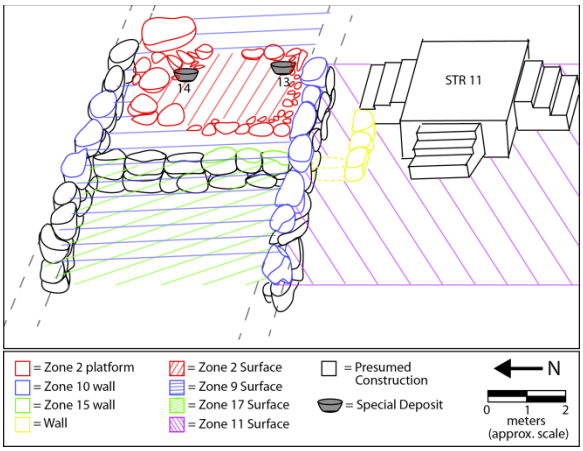

Figure 5. Idealized reconstruction of Structures 10 and 11 showing the locations of the special deposits (drawing by A. Kaeding).

Figure 6. Crystal historic objects found in corner caches at Saturday Creek (photos by E. Harrison-Buck).

cache deposit was found that appears to intrude into this ceramic deposit and into the cobble fill of the platform, suggesting the cache post-dates the ceramic deposit. The cache consists of a small Postclassic incised bowl containing four

Figure 7. Late Postclassic bowl with associated jade and crystal found in northeast corner cache at Saturday Creek (photos by E. Harrison-Buck).

jade beads and another piece of quartz crystal (Figures 6 and 7). This piece, fondly referred to as the "ice cube" is a large fragment of quartz crystal. It is too large to be part of the stopper, but it is clearly made of the same material. Because it has been chipped and the edges are worked its origin is difficult to ascertain, but it might possibly be part of the thick base of the bottle that was paired with the stopper.

Like the stopper, the selective incorporation of the ice cube that may have been part of a bottle that contained holy water or wine was likely one reason for its selective use in this special Maya deposit, but the association with other precious materials like jade and its ability to sparkle brightly in the sun (which it still does today) reflects indigenous values. Arguably, its sacred value as an object expresses native beliefs rather than Christian ones. Together, the two cache deposits found at Saturday Creek suggest a very early Colonial period Maya occupation in this portion of the site core involving Maya who by this time had encountered Europeans, likely Spanish missionaries looking to baptize them. However, Contact may have been more indirect and less sustained than at places like Tipu and Lamanai, where Spanish presence is characterized by a church and high densities of Spanish ceramics in association with elite residences. In contrast, the nature of the deposits and their context at Saturday Creek more closely resembles Contact period sites like Zacpeten documented by Timothy Pugh in Peten, Guatemala. Here, European artifacts were found restricted to ritual contexts such as caches deposited along the central lines of buildings and termination deposits that cap the upper levels of Pre-columbian architectural features (Pugh 2009). In this sense, the caches found at Saturday Creek resemble the indirect Contact context of Zacpeten, which also included a post-Contact cache containing a crystal object (Pugh 2009:381). Our future investigations at Saturday Creek will continue to investigate evidence of Spanish Contact at this site in the future, specifically looking at the western side of Structure 10.

BREA Survey and Mapping in the Lower Reaches

During the second half of our field season in 2015, we left the middle Belize Valley and moved downriver to the lower reaches of the Belize Watershed. Our reconnaissance team performed intensive reconnaissance in the eastern part of the Belize Watershed. In less than three weeks, our team identified roughly 1000 mounds, doubling the total number of mounds we had identified during our first four years of fieldwork in the BREA study area. Figure 8 shows a preliminary map of where the recon team focused their efforts in 2015. The sites in the lower reaches range in size, but generally consist of average size house mounds with pyramidal architecture being a rare occurrence. Sites range from single house mounds to groups of mounds, on average containing between 5-25 mounds. While these

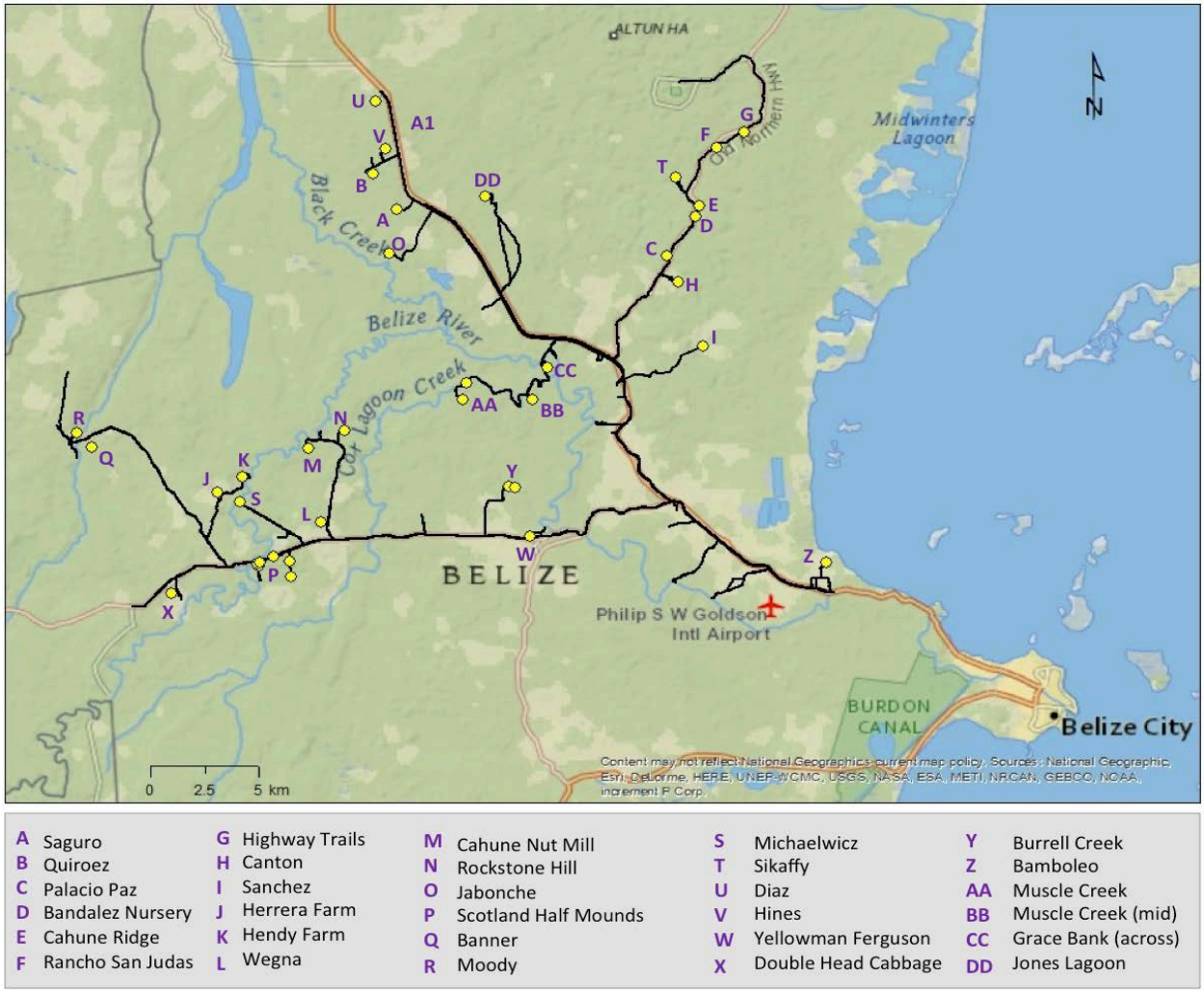

Figure 8. Map showing areas surveyed for sites in the lower part of the BREA study area (map prepared by J. Nigro and B. Norris).

sites do not tend to have large ceremonial complexes, there are a few sites that consist of dense settlement. Among the densest settled areas is the Canton site (Figure 9). Its size is likely due to its close proximity to Altun Ha, located several kilometers away along the Old Northern Highway that leads to Altun Ha. Over 385 mounds were identified primarily in open pasture on the Canton property.

In addition to documenting settlement in the hinterlands of Altun Ha, our survey team focused their attention on mapping the site center of Jabonche with a Total Station (Figure 10). Jabonche is located on the east side of Black Creek, just off the Northern Highway around the village of Biscayne. It is one of the largest centers within the area between Chau Hiix and Altun Ha. The center consists of several large, contiguous plaza groups, including a central plaza with a pyramid and ballcourt, large range structures, and a sizeable elite residential plaza to the south (Figure 10). Three *sacbeob* (stone roads) radiate out from the site center. One sacbe constructed of large stone slabs visible on the surface extends south from the southern plaza to the bank of Black Creek. Our last day in the field one of our workman informed us that there is another site they call Engine Hill located directly across the creek from where the sacbe terminates. The other two sacbes radiate out to the north and northeast of the site. Again, substantial stone slab

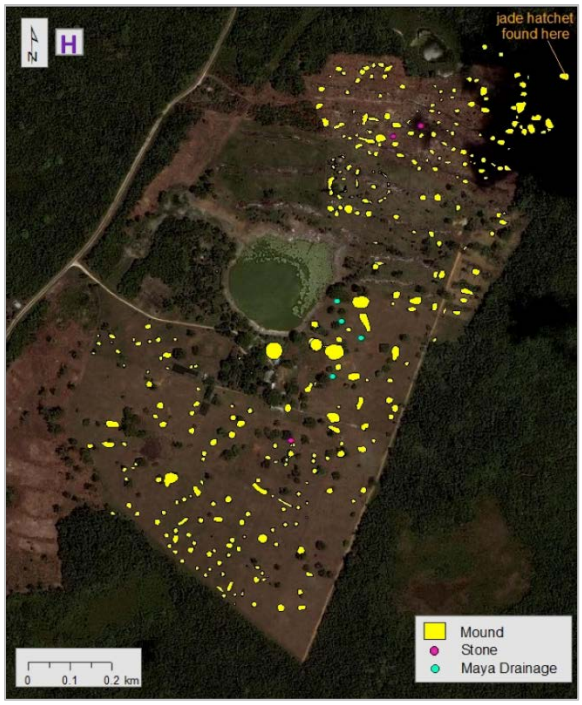

Figure 9. The Canton site with mounds shown in yellow (map prepared by J. Nigro and B. Norris).

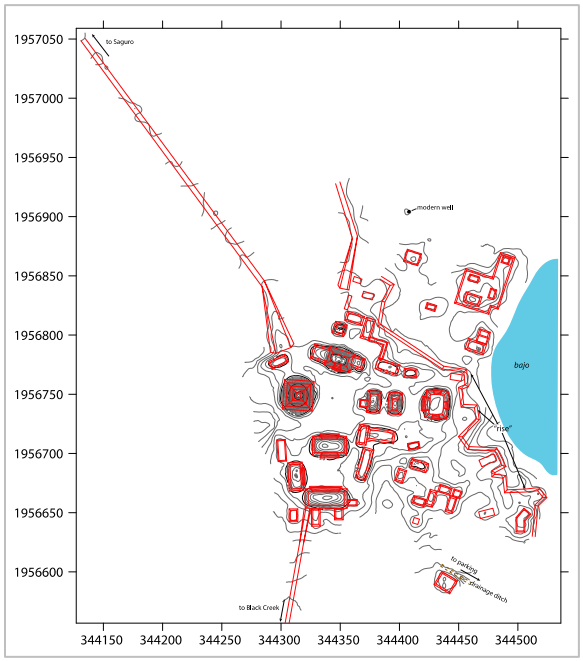

Figure 10. Topographic map of Jabonche (map prepared by S. Murata and H. Robinson).

construction made these relatively easy to follow out and our survey and mapping team at Jabonche followed the northwestern sacbe to the Saguro site a little over a kilometer and a half away (see Figure 8). Here, our recon team the week before recorded a total of 28 mounds at which time locals pointed out to them stone on the surface and described it as remnants of a sacbe, which turned out to be the ancient road that leads directly to Jabonche.

Time did not permit us to follow out the third sacbe, but the survey team noted that it takes a turn to the east-northeast. Knowing that Altun Ha was roughly 15km to the northeast of Jabonche, we projected a line from Jabonche in a northeasterly direction toward Altun Ha (Figure 11). The result was somewhat surprising. We found that the line runs through some fairly marginal environments where we might not expect to find settlement and crosses a narrow split in Jones Lagoon. Right at this exact spot is a berm feature and a series of 10-12 mounds that emerge from wet areas, nearby but not right on the lagoon. According to our local informants, Jones Lagoon is brackish and gets very salty in the middle of the dry season. It is possible the lagoon was used by the Maya for salt-making. Such an environment with similar mound formations devoid of stone have been found at the nearby site of Wits Cah Ak'al at Mile 12 on the Western Highway, where Satoru Murata documented a combination of both salt-making and ceramic production at this site (Murata 2011). As part of the reconnaissance team, Murata visited the mounds at Jones Lagoon and confirmed their resemblance. If Jones Lagoon is another Wits Cah Ak'al its location right between Altun Ha and Jabonche is significant and may suggest that as a production center it served the needs of both sites. Our plan in the future is to further investigate Jones Lagoon and the possibility of a sacbe connecting these locales. If so, it may have served not only a ritual but also a practical function for moving salt and ceramics between these centers.

Excavations at Jabonche: Operations 26, 27 and 28

Angela Keller (2009:154) and others have drawn attention to the small, low platform structures found alongside sacbes at the entrance to major plazas. At Jabonche, there are a number of these small platforms adjacent to the roadways, including Structure 24. Here and also at nearby Structure 26 we placed two 1-x-2 meter test units during the 2015 season, targeting

Figure 11. Google Earth map with projected route between Jabonche and Altun Ha.

midden or trash deposits (see Figure 10). Our excavation (Operation 28) adjacent to Structure 24 yielded a rich midden deposit heaped up against the eastern side of the platform's exterior retaining wall (Flanagan et al. 2015). The midden yielded a high density of faunal remains with lots of turtle. In the assemblage, our faunal specialist Lori Philips (personal communication, June 2015) also identified large quantities of parrot fish, a marine reef fish that most have surmised was probably salted on the coast and then brought inland. Elsewhere, Angela Keller (2009) argues that small platforms, similar to Structure 24, found adjacent to causeways may have served as resting places and key points of transition and may mark the junction or crossroads in the course of one's journey. This idea is intriguing when we consider the possibility of causeways connecting production sites and facilitating the overland movement of heavy loads of ceramics, salt, and perhaps salted fish, among other goods.

Importantly, the midden appears to date to the Terminal Classic period and includes diagnostics such as Roaring Creek Red, Belize Molded Carved, Sibun Red Neck jars and an unidentified unslipped jar that might be Tu Tu Camp. What was among our most exciting discoveries in this assemblage was the presence of tan slipped Northern Yucatec slatewares. The evidence may reflect increased interactions along coastal Yucatan and Belize during the Terminal Classic, possibly fueled by Itza incursions from Chichen Itza in northern Yucatan (for further discussion see Harrison-Buck 2007, 2012; Harrison-Buck and McAnany 2013; Harrison-Buck et al. 2013).

At Jabonche, we not only have evidence of northern slatewares, but also have identified a distinctive columned structure in the center of the Southern Plaza that appears to date to the Terminal Classic and may offer additional evidence of a northern presence in this area of Belize during this time. Structure 13 contains a series of large, finely carved columns that were visible on the surface prior to excavation. The columns are broken and none appear to be in situ with possibly the exception of one in Square A in the far western side of Op. 26 (Figure 12). The only intact walls of a platform that we could identify were on the opposite side of the unit to the east and seemingly unassociated with any of the columns. The walls appear to form a small platform measuring roughly 3-x-3 m that was in-filled with large cobble and boulders. The preservation was poor with few intact walls

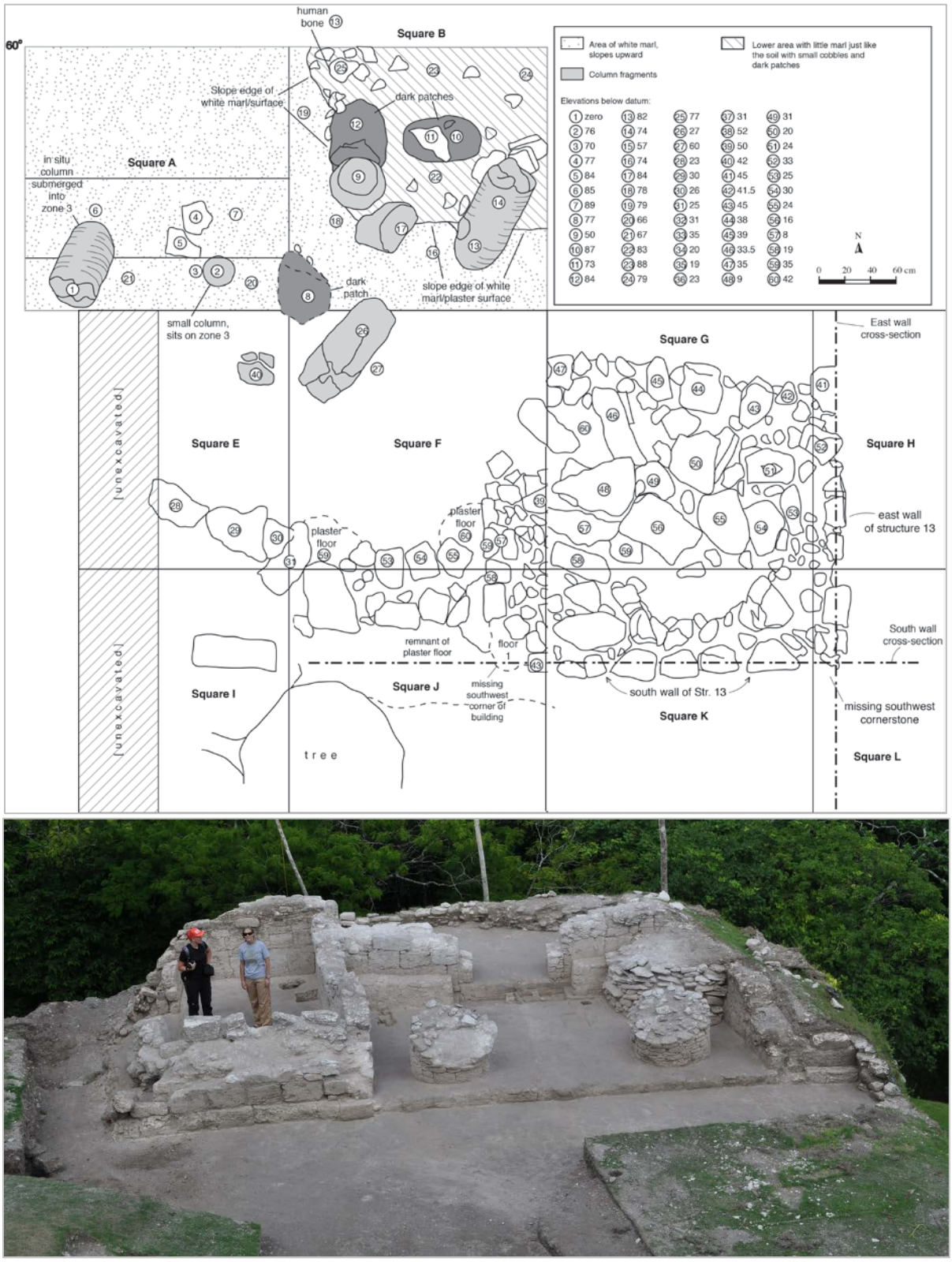

Figure 12. a. Planview of Structure 13 at Jabonche (drawn by E. Harrison-Buck; digitized by M. Brouwer Burg); b. Structure A20 at Xunantunich (photo courtesy of J. Awe).

suggesting the building was purposefully dismantled, the plaster floors were pitted, and the columns were broken and scattered in such a way that suggests purposeful destruction.

We are still trying to make sense of Structure 13, but certainly looking at more comparative examples of columned buildings might help to clarify what it originally looked like, such as one example from Xunantunich (Figure 12). It is also worth noting that Kip Anders (2009) reported a C-shaped columned structure at the nearby center of Chau Hiix (see Figure 1). Although the columns appear to have been wood not stone and did not preserve, the building appears to date to the same time period – Terminal Classic into the Early Postclassic. Preliminary analysis of the ceramic assemblage from Op. 26 suggests that the columned building at Jabonche was built in the Terminal Classic but may also have had an Early Postclassic component if the orange slipped types found are in fact Zakpah Orange Red. There may also be Rio Juan Unslipped and More Force Unslipped in this assemblage, which further suggests an Early Postclassic component. We hope that with further study the chronology as well as the layout of this distinctive building will become clear, along with the nature of a northern presence in this area beginning as early as the ninth century Terminal Classic.

Conclusions

In the BREA study area, we find that most of the ancient Maya settlement hugs the bank of the Belize River, likely because it served as the ancient "highway" between the coast and inland centers. Yet, the Belize Watershed comprises numerous creeks, like Black Creek where we find Jabonche, and a large expanse of wetlands to the north, such as Western Lagoon where we find the large center of Chau Hiix. These bodies of water formed a network of waterways that facilitated the movement of people and goods from Preclassic through colonial times. While waterways were critically important, our investigations are highlighting the central importance of potential overland routes and more formally constructed roads or sacbeob in the central part of Belize and there are others that have been previously reported. For instance, Shirley Mock reported a sacbe between NRL and Colha, connecting an inland center with the Caribbean coast where evidence of salt production has been found. The northern half of Belize east of the escarpment of the Three River's Region is a low-lying coastal zone and is filled with mangroves, creeks, lagoons, and wetlands and overall tends to get inundated in the rainy season. We know from our own personal experience that this part of Belize is difficult to navigate on foot, especially in the rainy season, without a raised walkway. Although Belize is an area that is usually not considered in discussions of roadways, I cannot help but wonder whether further ground-truthing and careful examination of site reports might reveal more evidence of sacbes in the northern half of Belize. While we might not totally understand the ritual and cosmological significance of ancient Maya sacbes, all of us who work in Belize in the rainy season can easily see the practical benefits of a raised causeway for facilitating the movement of goods and people across the landscape.

[1]I am grateful to Alex Gantos for pointing out this reference.

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14 THE FIRST FIVE YEARS OF THE CENTRAL BELIZE ARCHAEOLOGICAL SURVEY – POLITICAL AND ECONOMIC DEVELOPMENT

Shawn Morton, Gabriel Wrobel, Christopher Andres, Christophe Helmke, and Amy Michael

Since 2009, members of the Central Belize Archaeological Survey (CBAS) have engaged in a program of regional exploration between the Roaring Creek and Caves Branch River Valleys. This research has included epigraphic and architectural studies, settlement, paleoenvironmental and resource studies, speleoarchaeology, and bioarchaeology and other material studies. Through these avenues, CBAS has explored multiple aspects of growth and development in the economic and political realms, a topic that we discuss in this paper.

Introduction

2015 marked the fifth season of investigation by the Central Belize Archaeological Survey (CBAS) project. From its inception CBAS, through the various and complementary research interests of its members, has been dedicated to investigating the processes of development and change in the karstic area delineated by the Caves Branch and Roaring Creek River Valleys of Central Belize (Figure 1). While this program has predominantly focused on emergent Maya centres during the Late Classic (ca. AD 700-900)—their origins, florescence, and decline—in absolute terms, the material assemblage recovered spans a much broader period, from the Middle Formative through the Early Post-Classic periods (ca. 600 BC-AD 1000). In this paper, we document the trajectory of research that has led from a regional description characterized by dispersed agricultural settlements and pilgrimage caves, into one dominated by one of the largest and most vibrant polities of the closing centuries of the Classic period.

The study area in which the CBAS project operates focuses on both the Caves Branch River Valley and Roaring Creek River Valley, defined as the hydrologic catchment contributing to the discharge of the Caves Branch River and Roaring Creek River at their confluences with the Sibun River and Belize River, respectively, as well as the broad inter-drainage region that lies between (the so-called Roaring Creek Works and Caves Works) (Figure 2). The Caves Branch River heads in the escarpment of the non-carbonate highlands, its basin covering an

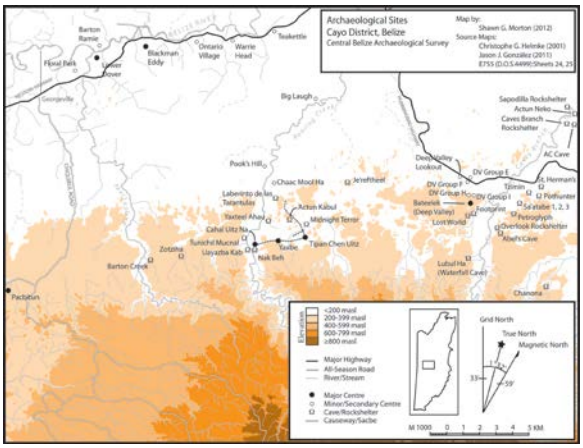

Figure 1. Topographic map of central Belize and CBAS study area.

area of about 200-235 km^2. Small streams join as the river flows northward, along with two major sources of input—that is, the resurgences of two major caves, Footprint Cave (a.k.a. Actun Chek) and Actun Lubul Ha (a.k.a. Waterfall Cave) (Miller 1981:3)—in the heavily entrenched cockpit karst of the foothills. The remaining catchment area is internal and only loosely-defined, the product of a karstic landscape, and broad *polje*; the main stream of the Caves Branch subsumes approximately 3 km north of the Hummingbird Highway. Finally, after ~2.5 km underground, the Caves Branch resurges, reaching the low, alluvial plains where it is joined by several minor streams before flowing into the Sibun River (Miller 1981:5).

The Roaring Creek River has much in common with the Caves Branch, heading in the upland, non-karstic, Pine Ridge, near Hidden Valley Falls (a.k.a. "Thousand Foot Falls"). From here, the river flows northward through

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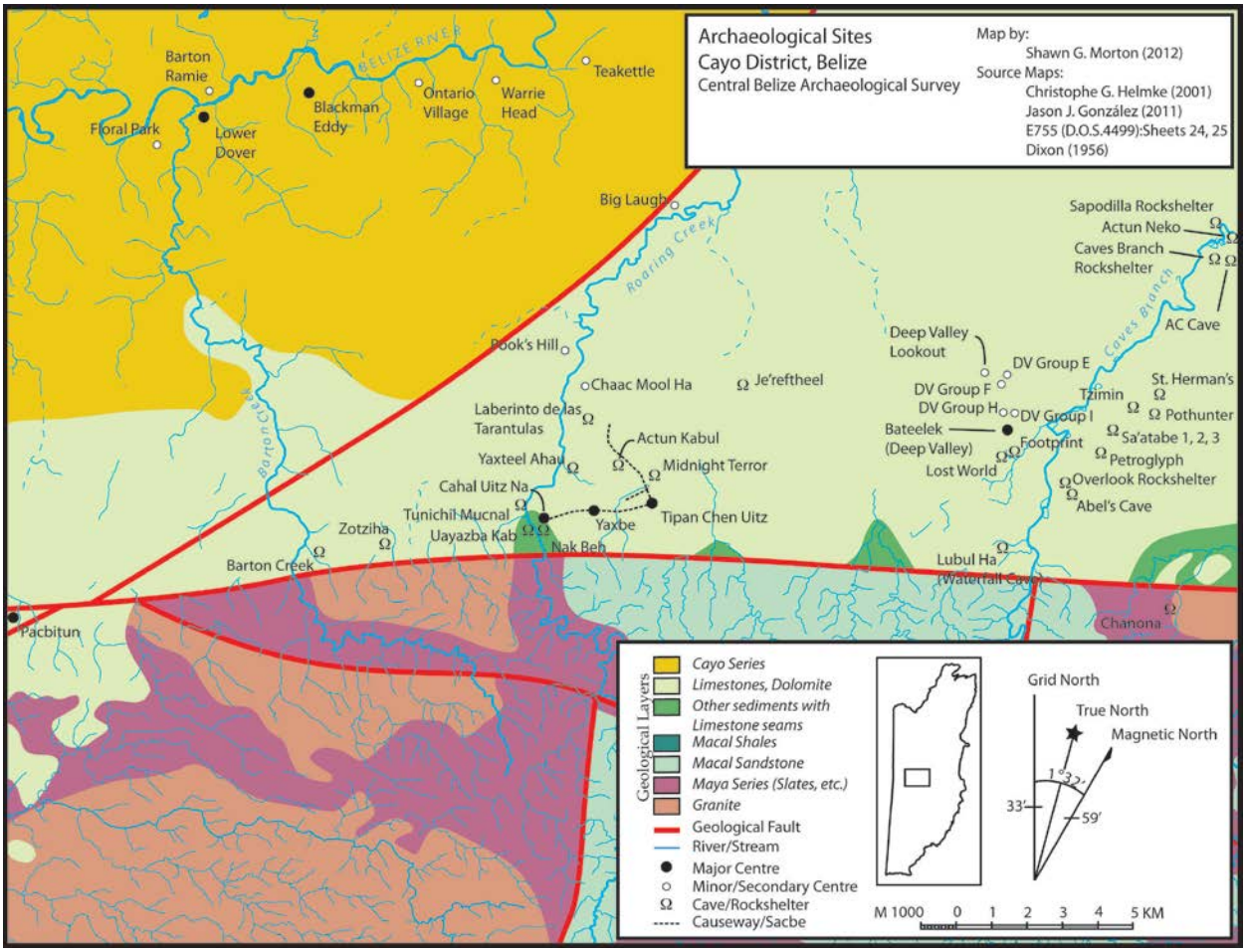

Figure 2. Geological map of central Belize and CBAS study area.

cockpit foothills and across lowland *polje* dominated by dolomites and limestones, until its point of confluence with the Belize River on the outskirts of Belmopan. The Roaring Creek River is fed by a number of small tributaries that develop from the runoff of the Maya Mountains to the south. In the lower reaches, most of these are resurgences of caves in the karstic terrain, notably Actun Yaxteel Ahau and Actun Tunichil Mucnal (Helmke 2009:194).

Generally speaking, archaeological investigations by CBAS (and its immediate forebear, the Belize Valley Archaeological Reconnaissance [BVAR] project) have been considerably more restricted than the above regional definition, focusing heavily on lowland broadleaf regions, and in close proximity to navigable water, extant communities, or modern access to active agricultural/forestry industries. The requirements of archaeological field schools (as run by both projects) have served to further determine actual fieldwork locations. Previous studies seem to have been similarly influenced with the result that a map of known archaeological sites in the region exhibits strong linear clustering along both roads and waterways, as well as at the topographic transition from the low (<200 masl) coastal plains into the more rugged foothills of the Maya Mountains (between 200 and 400 masl). Both patterns may well be a product of survey bias.

Summary of Previous Work in the Region

The study region had received sporadic attention from archaeologists from at least the mid/late-1970s, up until the mid-1990s. Most of the early studies focused on both surface and subterranean sites in the immediate vicinity of easily navigable waterways, extant road networks, and valley escarpments adjacent to

citrus groves and cacao plantations (Bonor 2002; Davis 1980; Goldstein 1995; Graham et al. 1980; McNatt 1996; Miller 1981; Reents-Budet and MacLeod 1997). Somewhat unique in the broader Maya area, evaluation of the Pre-Columbian heritage of this region has always focused rather heavily on subterranean loci (though some surface sites were known and studied; e.g. Davis 1980). This has been fostered, in large part, by a long tradition of speleological exploration by geologists, biologists, and avocational archaeologists, as well as speleologists and cavers (Bartholomew 1973; Frew 1989; Miller 1981; Williams 1992; Young 1961).

Beginning in the mid-1990s, the study region fell under closer archaeological scrutiny. Researchers, working under the auspices of the Western Belize Regional Cave Project (WBRCP), and its parent, the BVAR project, both directed by Jaime Awe, began to systematically record the archaeological remains of both the Roaring Creek and Caves Branch River Valleys. Their efforts revealed a rich archaeological heritage and resulted in description of new surface sites (Awe and Helmke 1998; Awe et al. 1998; Ehret and Conlon 1999; Ferguson 1999; Helmke 2009; Helmke, et al. 1999; Jordan 2008; Song, et al. 2000) and an abundance of previously unreported caves, sinkholes, and rockshelters used by ancient Maya peoples (Bonor 2002; Glassman and Bonor Villarejo 2005; Griffith 1998; Hardy 2009; Helmke 2009; Helmke and Wrobel 2012; Morehart 2005; Morton 2015; Wrobel 2008a; 2008b; Wrobel and Tyler 2006; Wrobel et al. 2007; 2010).

Studies at surface sites constituted an important, if under developed, facet of this early research (a situation unusual in the Maya area, where investigations of surface sites typically overshadow those of the subterranean context). Prior to investigations of the Central Belize Archaeological Survey project, our knowledge of the region's surface archaeology was limited to a relatively small handful of studies, including the work of Clinton Davis (1980), David Goldstein (1995) and Jill Jordan (2008) in the Caves Branch River Valley, and that of Christophe Helmke (2009; though see individual reports of the BVAR and WBRCP projects) in

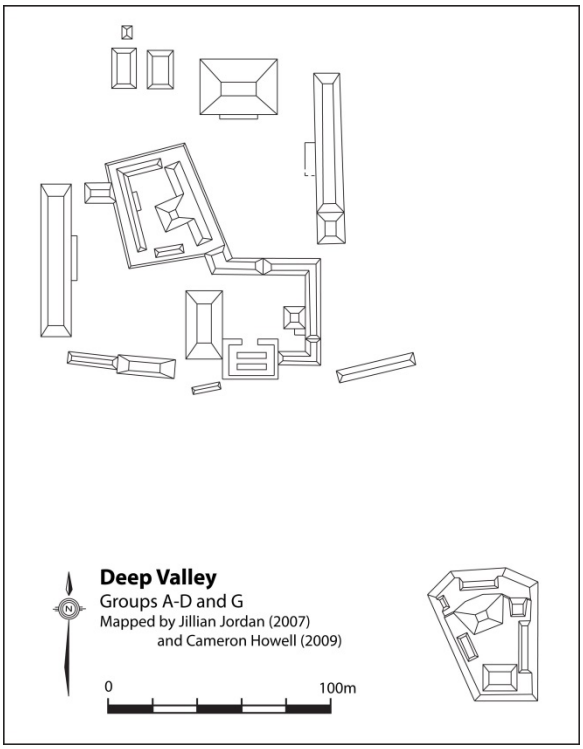

Figure 3. Plan view of Deep Valley.

the Roaring Creek River Valley. At Deep Valley Lookout (Davis 1980), the Xubzulima plazuela (Goldstein 1995) and Deep Valley (previously identified as Baateelek; Jordan 2008), ceramic chronologies universally focus on the Spanish Lookout complex, identified by James Gifford at Barton Ramie (1976:46) and corresponding typologically to Tepeu 2 and Tepeu 3 at Uaxactun (Smith 1955; ca. AD 670-900). The 'Spanish Lookout Sphere' is wide-spanning and includes sites in the Belize River Valley (e.g. Baking Pot, Tipu [Aimers 2002], Xunantunich, and San Lorenzo [LeCount et al. 2002]) and the Sibun River Valley (e.g. Hershey and Pakal Na [Harrison-Buck and McAnany 2007:120]). It is suggested by Jordan (2008) that the universally late date of diagnostic ceramics from the Caves Branch sites along with a limited number of construction phases indicates a Late Classic date for the establishment of nucleated (or urban) settlement in the Caves Branch River Valley (subsequent excavations by Christopher Andres at Deep Valley appeared to substantiate this suggestion; Andres and Shelton 2010). Deep Valley (Figure 3) is, by far, the largest known site in the Caves Branch River Valley, comprised (to date) of nine

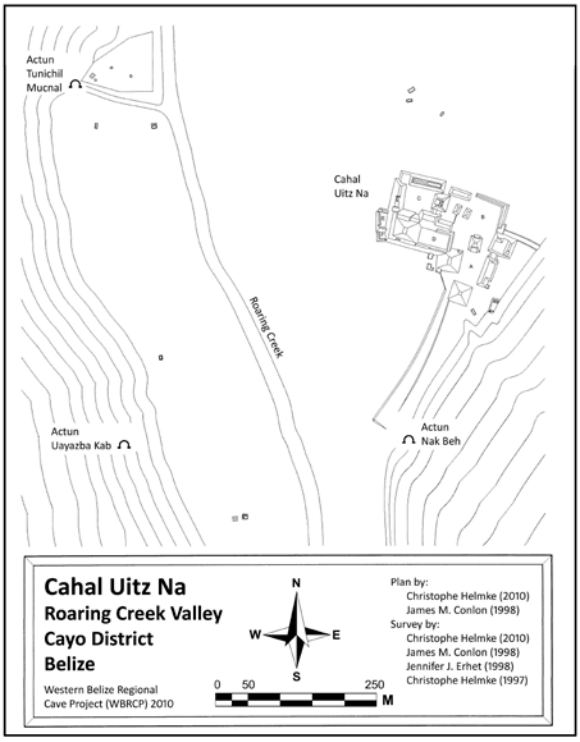

Figure 4. Plan view of Cahal Uitz Na.

distinct groups and incorporating the full range of architectural forms expected of an independent Late Classic Lowland centre (Bullard 1960; Hammond 1975), though it appears both less architecturally integrated and considerably less refined than its long established brethren in the neighbouring Belize River Valley. As there is little direct evidence for integration via either settlement or shared infrastructure, it is presently unclear whether we should be breaking apart these groups into smaller (semi-)independent units. While this distribution fits comfortably within polity bounds suggested for both the Belize River Valley and Roaring Creek River Valley (Andres et al. 2014; Helmke 2009), it also serves to highlight the continuing problems associated with identifying settlement hierarchies cross-regionally.

In the Roaring Creek River Valley, Helmke (2009) and others (e.g. Awe and Helmke 1998; Ehret and Conlon 1999; Ferguson 1999; Helmke 2009) have reported a very similar picture for the primary centre of Cahal Uitz Na (Figure 4), secondary Chaac Mool Ha, residential Pook's Hill plazuela, and a handful of additional minor peripheral groups (Awe and Helmke 2007; Helmke 2009; Helmke et al. 1999). Datable materials are associated predominantly (but by no means exclusively) with the Late Classic (Spanish Lookout or Tepeu 2) or later Terminal Classic (Tepeu 3). Earlier ceramics, dating to the Terminal Late Formative to Early Classic (Proto-Classic) transition have been recovered in excavations at Cahal Uitz Na (Ferguson 1999:51). While smaller residential groups in the Roaring Creek River Valley, such as the Pook's Hill plazuela (Helmke 2009) show considerable evidence of remodelling, it is interesting to note that the largest of sites appear to have been remodelled relatively infrequently. For instance, at Pook's Hill, the eastern shrine appears to have been raised during the Early Classic and witnessed as few as three major phases of construction, with additional minor refurbishments over the course of four and a half centuries (Helmke 2009), whereas at Cahal Uitz Na only three phases were identified in the ballcourt despite nearly a millennium of use (Ferguson 1999:51).

The Central Belize Archaeological Survey Project

The CBAS project is a direct intellectual outgrowth of the Belize Valley Archaeological Reconnaissance project in this region, beginning independent operations in the summer of 2009. This research, while spanning the drainages of the Roaring Creek River and Caves Branch Rivers, as well as the upland inter-drainage zone between, is centred on the major civic-ceremonial centre of Tipan Chen Uitz (Figure 5). First reported following the inaugural field season of the CBAS project, Tipan Chen Uitz (Tipan for short) lies in a rugged and little studied upland zone, the Roaring Creek Works. Steep hills, ridges, and karstic outcrops dominate this dissected upland and Tipan lies atop one such karstic plateau. As we have reported elsewhere (Andres et al. 2010; 2014), the centre is architecturally complex and impressive in scale; it incorporates the full variety of civic-ceremonial architectural forms expected of a Late Classic Lowland urban epicentre, including three pyramidal structures, a ballcourt, numerous range structures, two dominant acropoli, and an impressive masonry cistern referenced in the site's name (Andres et al. 2014). Currently,

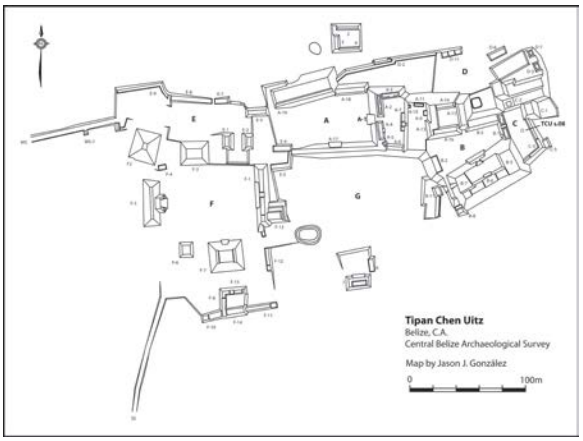

Figure 5. Plan view of Tipan Chen Uitz.

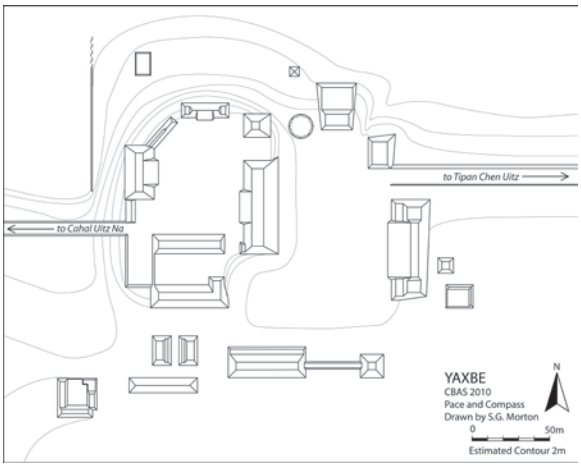

Figure 6. Plan view of Yaxbe.

based on direct information from ceramics recovered from architectural excavations, the monumental architecture of Tipan appears to have been constructed at some point in the Early Facet of the Late Classic period (Tiger Run complex ca. AD 590-670; Tepeu 1), and was occupied until the beginning of the early portion of the Terminal Classic or Early Postclassic (early facet of the New Town complex; ca. AD 870; analogous to the Caban complex at Tikal). It appears that the site may have been abandoned rapidly, as several structures within the civic-ceremonial core may have been left incomplete (Andres 2011). As is the case with the sites in the Caves Branch and the Roaring Creek, Tipan was most likely constructed in relatively few episodes.

What is more, several unexpected discoveries have served to transform our understanding of this portion of the eastern Southern Lowlands. In 2010 project members followed an ancient raised road, or *sacbe*, extending off the western edge of Tipan Plaza E. Tracking roughly west for approximately 1.5 km, the *sacbe* terminated at another monumental centre. Dubbed Yaxbe for the heavily forested road that led to it, the site is distributed around two large plazas that conform to local topographic constraints and again replicates the full gamut of architectural features expected of an independent minor centre (Figure 6). The architecture of Yaxbe clearly conforms to an emerging local pattern identified at Tipan (Andres et al. 2014), consisting of rough, dry-laid boulder core buildings, faced and plastered, and in some instances incorporating large crystalline limestone slabs on the lowest course and/or as stairside panels. Slate appears to have been used to cap at least some masonry vaults, and both sites incorporate masonry-lined cisterns. Plazas appear at least partially unfinished, with rough bedrock extending above what must once have been smooth plastered surfaces (also noted by both Jordan and Andres at Deep Valley) (Andres and Pierce 2015:66-80). At Yaxbe, too, certain structures may have been abandoned mid-construction. In many ways, the architecture and incorporation of landscape features at Yaxbe reflect that of Tipan at a more diminutive scale. Another *sacbe* was found to extend off the western margin of Yaxbe and terminate, approximately 1.5 km further to the west, at Cahal Uitz Na in the Roaring Creek River Valley, where local architectural patterns again seem to be similarly in evidence (Ehret and Conlon 1999; Helmke 2009). Finally, a *sacbe* extending off the north margin of Tipan and trending toward the north-west is believed to lead to Chaac Mool Ha, also in the Roaring Creek River Valley, though traces of the *sacbe* disappear as it descends into the heavily cultivated valley bottom.

These architectural cues are significant in that they tentatively suggest relationships farther afield: similar examples of large exposed masonry terrace faces are known from sites in the Pasión area of Guatemala, including Dos Pilas, Aguateca, Tamarindito, La Paciencia, and El Excavado (Houston 1993). Closer to home, they are also present on the stair-side outsets of Str. B-14 at Naranjo. We have argued elsewhere

(Andres et al. 2014) that this architectural tradition may mark affiliation with Naranjo, and the Pasión region in the period associated with the wars waged by K'ahk' Tiliiw Chan Chaahk in the late 7th and early 8th C. AD (Martin and Grube 2000:76-77).

A second significant discovery came in 2011, when CBAS project co-Director Christopher Andres identified several large fragments of a carved monument on the outset axial stair of Structure A-1 (Andres et al. 2014). This acropolis has been the focus of excavations within the site core of Tipan since 2010. Recovered fragments of the monument are embellished by five glyphic medallions that together form a coherent, if partial, statement. Project epigrapher, Christophe Helmke has interpreted the statement as referring to the dedication of a stone pedestal for, or a simulacrum of, a palanquin on a period ending on *uxlajuun muwaan*, '13 Muwan', or 9.14.0.0.0 — 6 Ajaw 13 Muwan, corresponding to the 1st of December, AD 711 in the Julian Calendar (Andres et al. 2014:58-60).

In 2013 (Helmke and Andres 2015) and 2015 (Andres et al. n.d.), additional monuments were discovered at Tipan that add depth to this picture. Significantly, Monuments 3 and 4 are ballplayer panels, the first of their kind to be discovered in Belize, and these appear to confirm ties to Naranjo, and furthermore imply alliances and vassalage in a network of allegiance with the Snake-head dynasty established at Calakmul (ibid.).

Our knowledge of subterranean sites also has developed significantly over the past several years. Given present evidence from surface contexts alone, one would be forced to conclude that the region of Belize discussed here, in general, remained unpopulated (at least in the sense of nucleated habitation) until relatively late. Data from the cave context contrast sharply with this observation. The earliest evidence of human activity in the CBAS study area may be a Lowe point recovered from disturbed contexts in the Caves Branch Rockshelter (Hardy 2009:79; Wrobel 2008a; 2008b). While clearly out of original context (it was found in direct association with an Early Classic Fowler Orange-red jar and skeletal remains yielding an AMS date in the Late Formative), this point may nonetheless indicate that humans were living in or moving through this region as early, perhaps, as the Archaic period. Figure 7 compares the temporal span of use as indicated by ceramic remains in a number of caves across the study area. From this, it is clear that the majority of caves in the region, particularly when we focus on the largest such examples (Actun Lubul Ha, Midnight Terror, Petroglyph and Footprint Caves) include materials extending as far back as the late facet of the Middle Formative. Given the pattern of (re)distribution of cultural material noted throughout the region (Morton 2015), it could be argued that these objects were introduced in periods later than their manufacture (as in the case of the Lowe point, above); however, solid radiocarbon dates recovered from sealed contexts in Midnight Terror Cave fall cleanly within the Early Classic period (Brady pers. comm. 2015), suggesting that at least part of this temporal span represents genuine primary deposition. Other non-mixed, discrete surface deposits associated with Early Classic materials have been documented in Petroglyph Cave (Reents-Budet and MacLeod 1997), Footprint Cave (Graham et al. 1980), Actun Uayazba Kab (Griffith 1998; Ferguson 1999), and Actun Tunichil Mucnal (Helmke 2009). These too may similarly represent primary contexts. Even given that earlier materials were frequently intermixed and redistributed with later deposits, it would seem unlikely that this material would derive from too far afield and thus we can say with relative certainty that the region was inhabited (or in use) by at least the late facet of the Middle Formative period.

To a certain degree, data from cave contexts additionally speak to (help to clarify?) broader political affiliations through reference to surface contexts. Specifically, a number of ceramics recovered from TCU s.08, a small cave within a plaza in the monumental core of Tipan, are decorated with glyphs and glyphic elements. These decorated ceramics can be subdivided into two broad temporal groupings: the early facet of the Late Classic (Uacho Black-on-orange) and the late facet (Belize Red or Benque Viejo Polychrome). Christophe Helmke has identified the latter group, typical of this region, as composed of pseudoglyphs presenting an

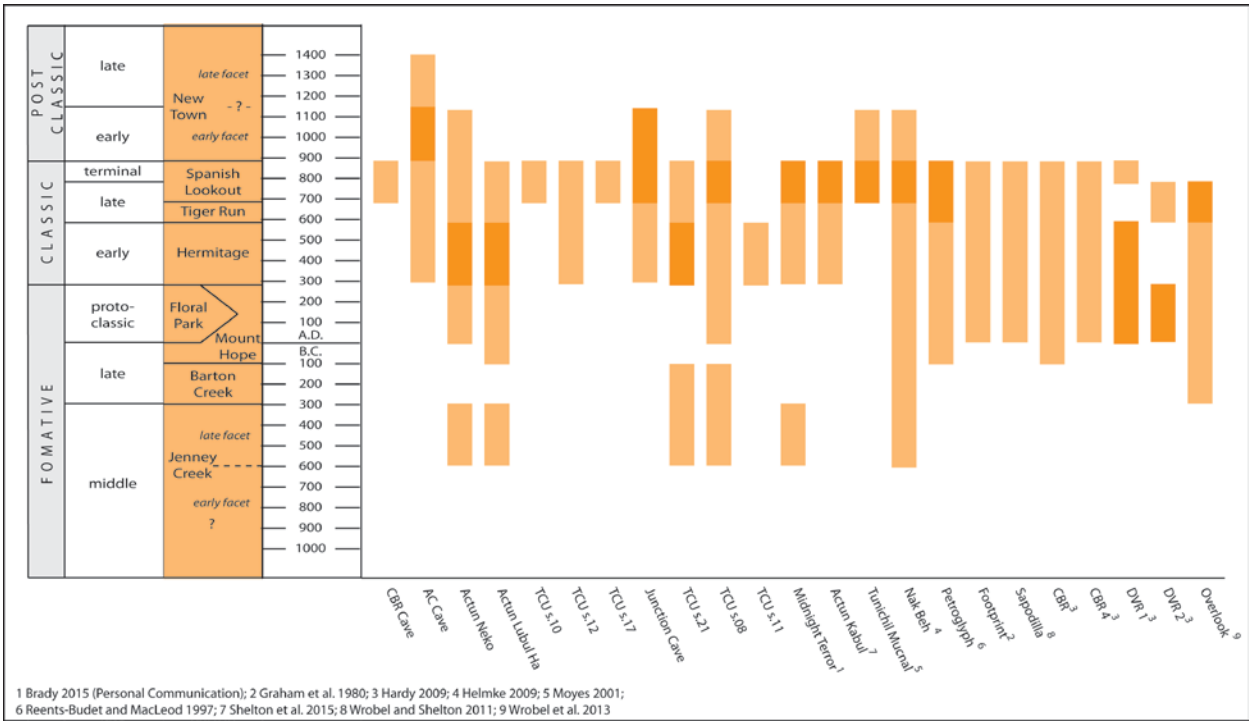

Figure 7. Relative chronologies of central Belize cave sites.

abbreviated and repeated dedicatory verb (Andres et al. 2014:53). The earlier vessel is more interesting. According to Helmke (Andres et al. 2014:54), the text refers to the Calendar Round date, wherein only the initial Tzolkin notation '5 Manik' is preserved. The remaining sections of the text are thought to record parts of the names and/or titles of the original owner of the bowl. A second vase with slightly everted sides seems to repeat this phrase (or part of it) and was likely part of the same set, or ware, as the bowl. A large portion of a well-preserved Saxche Orange-polychrome vessel recovered by James Brady from Midnight Terror Cave falls in line with these and bears a partially viable dedicatory phrase. Based on the style and execution of this vessel it may have been produced at a workshop in the vicinity of Naranjo, yet surprisingly it also exhibits some traits of contemporaneous Petkanche Orange-polychromes of Altun Ha. Further petrographic and instrumental analyses of this specimen may help to clarify its provenance and thereby the polity from which it originally stemmed. What may be more significant is the presence of these vessels at Tipan or at least within TCU s.08. These vessels are commonplace in the central Lowlands, particularly at Tikal, during the early facet of the Late Classic (Andres et al. 2014:55; Chase 1994; Culbert 1993), and this has been attributed to the extension of Tikal's control/influence at sites such as Dos Pilas (Brady 1997:608; Houston 1993:102; Martin and Grube 2000:56-58) and Caracol (Andres et al. 2014:55) during this period. Conversely, with the waning of Tikal's power in the mid-6th century, the production and consumption of Uacho and Saxche ceramics declined, finally falling out of use at Caracol as late as AD 582 (Chase 1994:163). The presence of such ceramics at Tipan implies participation in a network of allegiance centred on Tikal, especially at the time of the site's founding. While the circumstances surrounding the introduction of such ceramic materials in the region remains ambiguous, the evidence that Maya people in this part of Belize were engaging in wide and significant economic and sociopolitical networks, is not. Ceramic data from other caves suggest similar connections: A Middle Formative Cooma Striated sherd from TCU s.21 shows early connections to the Maya

highlands and El Salvador (Gifford 1976), sherds of Paila Unslipped demonstrate connections with Uaxactun (Smith 1955), and broader connections with the Peten, Pasión, and Yucatan are demonstrated by Early Classic sherds of Aguila Orange, Caldero Buff-polychrome, and Dos Hermanos Red (Sabloff 1975). While the Late Classic cave assemblage in the region continues to include sherds illustrating broad regional affiliations (Chunhuitz Orange, Juleki Cream-polychrome and Uacho Black-on-orange [Smith 1955]), the non-utilitarian assemblage is dominated, by far, by local types such as Yalbac Smudged-brown, Mount Maloney Black, Roaring Creek Red, and Vaca Falls Red (Gifford 1976).

Given possible trade routes connecting these areas along the Hummingbird Corridor, emphasized by the common presence of Belize Red within Tipan Chen Uitz (in TCU s.08), it is perhaps not surprising that this region would rise to prominence (Chase and Chase 2012). Was the basis of this development participation in trade, exchange, and resource extraction as suggested by Elizabeth Graham (1987) nearly three decades ago? Alas, answering this specific question will have to await further research. At this point, it is worth recalling a curious observation—that localization and preferential participation in eastern Belize Valley economic networks within the region seem to occur in the very period that architectural and textual evidence is suggesting broader western affiliations. Seemingly, there is an as yet poorly understood disjunction between broad ideological (as emphasized by text and architecture) and economic (as emphasized by ceramics) patterns of affiliation/association.

Future Directions

In the first five seasons of the CBAS project, the picture of our study region has thus shifted from one in which a mostly rural population was nucleated around a selection of civic-ceremonial centres in the valley bottoms, to that of a heavily urbanized region supporting (if we accept a relationship between direct areal control, shared infrastructure, and polity extent) one of the largest polities of the eastern Central Lowlands during the turbulent final centuries of the Classic period. While the CBAS project has, on the whole, made consistent efforts toward a truly regional approach, work in this area is still very much in its early days and will benefit from future field research within each of the currently-identified civic-ceremonial centres. More pressing still, and this will be an area of focus beginning in 2017, we need to begin in earnest to define features of settlement and the broader landscape. We look forward to the opportunity of sharing the results of this research in due course.

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15 ACTIVITIES AND FUNCTIONS OF ANCIENT MAYA CITIES: A PERSPECTIVE FROM NW BELIZE

Fred Valdez, Jr.

A review of prehistoric Maya settlements in NW Belize have allowed for discussions of how to interpret patterns of location and site activity. While a review of small settlements is provided and discussed, a significant interest is to bring to discussion the occurrence of large settlements (cities?) and the role(s) between polities. The large prehistoric sites in NW Belize serve as a basis and perhaps as a catalyst to further our understanding of ancient Maya social and political organization. The sites of La Milpa, Maax Na, and Dos Hombres serve as the primary sites discussed from NW Belize. Neighboring regions of Peten and Rio Bec are brought into the discussion of polity activity and interaction.

Brief Background and History

The Programme for Belize Archeological Project (PfBAP) has completed 24 seasons of regional archaeological research in the Rio Bravo area of NW Belize. The initial research endeavors were extensive survey and mapping. In the process of survey efforts we have located several large centers including Dos Hombres, Max Na, and Grand Cacao, in addition to the previously known La Milpa. Several middle-sized sites have been documented including Say Ka, Wari Camp, Dos Barbaras, and Las Abejas among others. Additionally, numerous much smaller settlements are part of the Rio Bravo landscape (see Figure 1).

Our findings over this multi-decade endeavor include extensive settlements and significant landscape modifications such as *pozas*, terraces, *chultuns*, wells, and more. Many of the small sites along with various features have been the focus of graduate student research (theses and dissertations) as well as undergraduate student training.

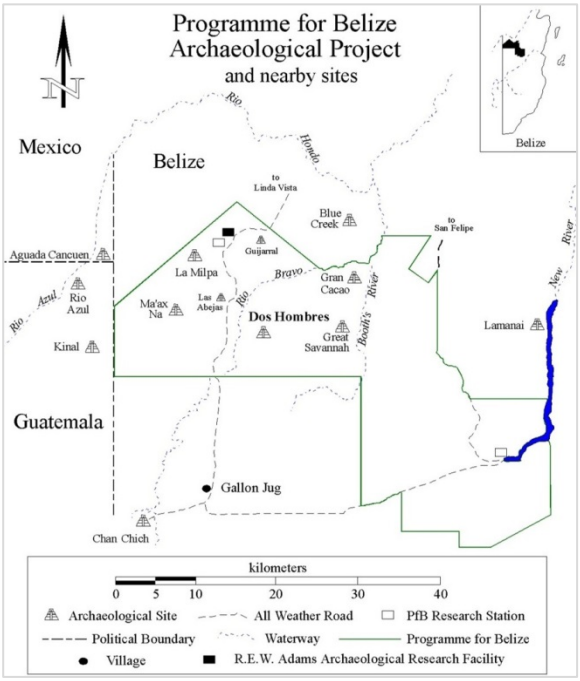

Figure 1. General map of the PfBAP research area with selected sites. Courtesy of the PfBAP.

Chronology as a Regional Interest

Our effort at a regional chronology is spear-headed by the ceramic studies of Dr. Lauren Sullivan, PfBAP Ceramist. We have data indicating an initial Maya settlement of the area during the Middle Preclassic and extending through to the Postclassic. The significant periods of occupation are the Late Preclassic as a core or base at most sites; we have a dispersed settlement at the Early Classic; and a return to intensive "city" or center settlement during the Late to Terminal Classic. Postclassic occupation is sparse in the Rio Bravo region except locations close to dependable water sources, such as the spring-fed Booth's River (for example, the prehistoric Maya site of Gran Cacao).

Settlements Comments

PfBAP has continued to have a significant research effort at small site identification and documentation. These smaller settlements are not carbon copies of each other, but rather have specific layouts that likely reflect particular activities and functions.

Small communities were often thought of as being independent, perhaps self-reliant, and primarily effective at reproducing themselves. We now understand from our research and

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believe with great certainty that many of these communities operate within a system of socioeconomic interdependencies. These entities and their interactions are part of a very complex regional production and exchange system. The individual communities exploit resources, in their particular occupation and/or settlement area, in either a raw format or perhaps as refined products. With local resources, both as raw and/or refined products exchanged as needed, there were also special events (such as festivities, etc.). Some of the specialized community activity and/or product is indicated at various sites such as Chawak But'o'ob (Figure 2; Walling 2011) and Quincunx (Zaro and Lohse 2005). These special events also serve as a venue for broader ritual activities that create greater intercommunity solidarity and exchange (Scarborough and Valdez 2003, 2009).

Larger centers must have been aware of and responsive to the various community interactions and requirements of their "support" populations. The critical requirements of infrastructure, transport and scheduling were among the responsibilities of the larger centers while equally dependent upon the hinterland producers. The "rural elite" that Bullard (1960) noted more than 50 years ago have been since observed and reported at numerous small communities throughout the Maya Lowlands. These rural elites likely coordinated production strategies for a community or a group of communities (Scarborough, Valdez, and Dunning 2003). Likely occurring at many sites, and in proportion to the host site, were marketplace activities and special events. It may have been long-distance trade items, or artifacts of highest quality and skill, that drove the economic system (Inomata 2001). When compared to other archaic states, the ancient Maya were not a less complex system, but rather a civilization adapted to a different environment with different adaptation requirements. Maya civilization was a great success adapting and thriving in a semi-tropical environment and their story has clear implications for similar and present-day ecologies (Scarborough and Burnside 2010).

How can there be within a polity several sites producing the same materials? In most cases, where sites are producing similar

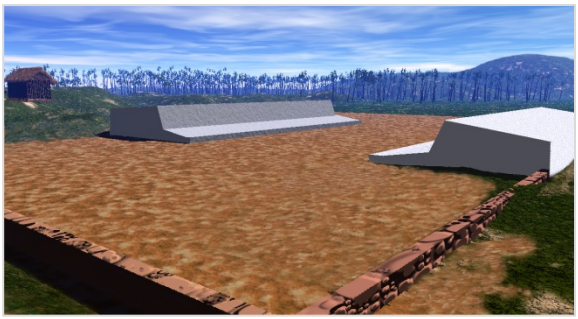

Figure 2. Artist rendition of the Chawak But'o'ob ball court. Courtesy of S. Walling and the PfBAP.

materials, for example, stone tools, they are likely to be different stone tools at each site, although some overlap is likely. This also applies to pottery production where access to good clays, tempering material, etc. may be available to several communities, but each produces particular jars or bowls, even though each is capable of producing the whole range. Each then takes their "specialized" craft to market, and the corresponding important social, religious, and economic event(s). The communities can then exchange goods as well as knowledge, ideas, etc. Why could or would such a system exist? This "system" helps form interdependencies for goods and services between the larger polity's communities. The system or mechanism is perhaps managed/arranged by the larger centers or polity leaders. This interdependence overseen by the polity capital provides leaders with an authority of managing a "unified" polity.

Summary Comment

As mentioned above, small site function(s) and differences between the settlements and structures of these sites indicate varying adaptive practices among the ancient Maya. We must consistently revisit our interpretations of available data. For example, in northwest Belize several large centers are within proximity of each other and have medium nodes or settlements between the larger sites. This settlement pattern represents a very elaborate system and had mechanisms for social, political, and economic control "generally speaking" that had to be in place and required maintenance. All of this, the settlement decisions, the systems of production, and

Figure 3. Map of La Milpa (after Hammond and Tourtellot 1993).

methods of exchange, are very complex, representing questions of organization, and what were (or must have been) concerns among the controlling populace to maintain the *status quo* that have been worked on for many years and perhaps several generations (at least).

Introducing Cities

A few comments about cities versus towns are in order. The significant differences between cities and towns go beyond the simple consideration of size. We more often consider (or think of) cities as administrative nodes and with varied complex political aspects of a higher or more impactful order. Cities may be functionally defined whether as centers of trade (economic concerns), or serving a religious purpose, or perhaps as centers of "governmental" (or ruling) authority, among other possibilities. Cities are also distinct from the hinterland counterparts with their nucleated settlement and a varied division of labor and specialization.

Cities with their concentrated populations may serve one or several of the mentioned functions and equally important is the impact/influence of cities on the surrounding landscape of towns, villages, etc. That impact on smaller settlements, however, diminishes with greater distance from the city. Clearly, many towns and villages may serve similar or related functions associated with cities, though more varied functions may be located within cities and in a greater degree of complexity, authority, and impact. Distinguishing cities and towns solely by some of these functions remains impossible. The PfBAP research as a regional endeavor emphasizes that cities, (or any settlement type) as stated by Hansen (2008), must not be studied in isolation, but understood in relation to its hinterland.

La Milpa

Much of the research at La Milpa by the PfBAP has focused on Plaza A (or the Great Plaza; Figure 3). Aylesworth (Aylesworth and Suttie 2009) conducted a soil resistivity survey that revealed a pit filled in antiquity, a backfilled excavation unit from earlier researchers, and a structure. The building (or structure) was built atop an early plaster floor and was comprised of large limestone blocks that were plastered along the exterior surface. The ceramics recovered from test excavations along the structure date to the Late Preclassic. Given limited excavations at this locale, it remains difficult to define the nature of the Late Preclassic community at La Milpa.

Structure 3 (Figure 4) is located on the southeast side of Plaza A is one of the largest pyramidal structures in the region. It is also associated with at least seven stelae and altars. Debora Trein has been investigating the various ways that this structure and the surrounding area may have been used. Monumental architecture is often believed to be associated with ritual

Figure 4. Illustration of La Milpa Structure 3, by D. Trein. Courtesy of the PfBAP.

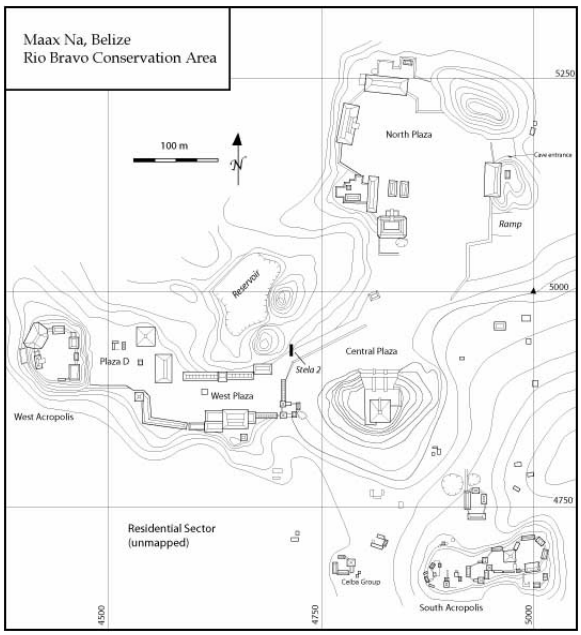

Figure 5. Map of Maax Na. Courtesy of the Maax Na Project and PfBAP.

performance and the politics of the elite. Trein (2012; 2013) hypothesizes that this area may have also functioned as a working space for groups other than the elite. This possibility is supported by the recovery of high quantity of lithic debitage to the northeast of the structure. The some 35,000 lithic artifacts recovered suggest late stage biface production and re-sharpening occurred here – perhaps in conjunction with the "construction and maintenance" of Structure 3, exchange of lithic material, or production (Trein 2012:22). It is interesting that this area is flat compared to the southeast area of the site. Additionally, the ceramic and lithic artifacts recovered had worn edges and were minute in size which suggest trampling and indicate that this part of the site may have been a "high-traffic" area (Trein 2012).

Courtyard 135 and the adjoining area are located to the west of the Southern Acropolis and consist of three connected courtyards with ancillary structures to the south. Based on a sunken throne room and round altar, Hammond proposed that this area was the residence of a La Milpa ruler. Unlike Courtyard 149, multiple plaza surfaces were not identified and this courtyard seems to have been constructed during the Late Classic (Lewis and Me-Bar 2011). Continued excavations here and in other courtyards at La Milpa and smaller sites in the regions (by Lewis and others) continue to examine how economic, religious, and ritual practices vary across social status.

There has also been extensive work done in Courtyard 100 where a number of dense artifact concentrations revealed very different activities (ranging from elite domestic middens to *de facto* refuse) and demonstrated a long history of cultural activities in this area of La Milpa that continued well into the Terminal Classic, long after the site was thought to have been abandoned (Sullivan 2012; Sullivan et al. 2013). Lewis is seeing similar ceramic deposits in Courtyards 149 and 135 and subsequent analysis will reveal what types of activities took place.

Maax Na

The site of Maax Na (Figure 5) is one of the larger sites in the area, located within seven kilometers south of La Milpa and equidistant between La Milpa and Dos Hombres (all large ceremonial centers). Maax Na differs from other sites in the area (such as Dos Hombres and La Milpa) in that it grows rapidly in the Early to Late Classic, but not on the scale seen at other sites. It also may have been abandoned earlier as there isn't much indication of Terminal Classic occupation or use (King et al. 2012). One of the things that makes Maax Na special is the fact that it is associated with several caves - which are scarce in the Three Rivers Region and much smaller than those in the Belize River Valley (King and Shaw 2003; King et. al. 2012). This association also distinguished Maax Na from other sites in the area and suggests that it may have had a different function (King and

Shaw 2003; Valdez 2008). Maax Na may also have played a critical role in Maya cosmology in the region. Spider Cave, while small (8 m long x 7.5 m wide), may be one of the largest in the area and it is located along the south side of the main entrance ramp or walkway to the ceremonial plaza (King et al. 2012). King and Shaw (2003) suggest that this may be what originally attracted settlers and visitors to the area. Excavations at the cave entrance revealed a dense concentration of unslipped and monochrome pottery (primarily jars). Many of these sherds had blackening on the interior and may have been used for burning copal (King et al. 2012). Inside the cave about 1,000 sherds were recovered – including slipped and unslipped jars, bowls, plates, and censers – some of which were burned. Excavations in a small shrine associated with Structure 1A-9, the large building that dominates the group the cave is under, revealed a second entrance to the cave, which would have provided access from the group. It appears that this second entrance was intentionally sealed with large blocks and stones in antiquity, thereby effectively "closing" the cave or "killing" its power – most likely when the site was abandoned (King et al. 2012; Sullivan 2012).

The vast majority of ceramics recovered from Maax Na date to the Late Classic. This number is comparable with overall trends in the Three Rivers Region, but may be inflated to some extent, as for practical and research related reasons much of the research in the area has focused on the Late Classic. An increase in activity is also observed concerning more construction in residential and ceremonial architecture as well as more significant agricultural intensification and land modification.

A lip-to-lip cache was recovered on the west stairs in the easternmost building of the South Acropolis at Maax Na. The two vessels include one decorated with the mat or pop motif. In this case, the mat motif form is an interwoven incised-multiple twist design that appears as a panel across the top of the lid vessel and as the only ornamental design on the vessel. Robicsek (1975) has suggested, in this form, the motif may indicate that the owner of the bowl was a person of authority. Several vessels with a

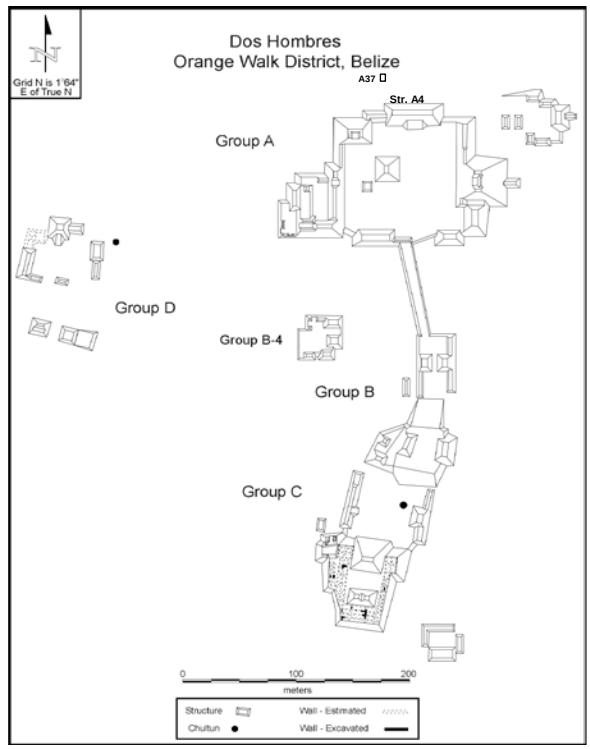

Figure 6. Map of Dos Hombres (after Houk 1996; Lohse 2001). Courtesy of the PfBAP.

similar motif were found in a cache in Plaza B at La Milpa and have been observed at Rio Azul (Sullivan et al. 2014, Sullivan 2012).

Interestingly, there are several small sites surrounding Maax Na (e.g., Bolsa Verde) that were only established in the Late Classic and may have been the result of a population increase that forced people into all environmental zones - optimal or not (Sullivan 2012). "Several of these, including Bolsa Verde, were resource-specialized communities. That suggests that something in the networks binding the Three Rivers Region changed during that time period, either allowing for or calling for greater specialization" (King and Shaw: 2003:76).

Dos Hombres

The Maya site of Dos Hombres is located down the escarpment from upland Maax Na and La Milpa, occupying and controlling different environmental zones. In terms of site layout, Dos Hombres resembles La Milpa in many characteristics including plaza placements north to south (Figure 6). Much of the current layout of Dos Hombres took form in the Late Classic.

Dos Hombres is, however, about 70% the size of La Milpa and likely had support communities (resource-specialized) different from the La Milpa hinterland settlements.

Chronologically, Dos Hombres has Late Preclassic through Terminal Classic occupation. Preclassic architectural findings include a rounded building/platform and the associated ceramic types. An Early Classic tomb had been located at Dos Hombres representing the early part of the Early Classic, but most of the observable diagnostics at Dos Hombres are of the Late Classic. The final phase of occupation at Dos Hombres is the Terminal Classic which witnessed the demise of the Dos Hombres ruling family and the site's abandonment.

An Overview

From the NW Belize perspective and primarily for the Late Classic, cities of the region functioned within the organizational networks (social, political, economic, and religious) of early Maya civilization. There were likely functional differences among the early cities that reflect location, control of both human and material resources (Bard 2008), and production (material and otherwise).

Marcus and Sabloff (2008) have linked constructions such as temples, palaces, schools, marketplaces, plazas, etc. among the architectural features of cities, in addition to other components. Houk (2015) has suggested "that the variability seen in Maya cities, which nonetheless all draw on a standard inventory of urban forms – plazas, ball courts, temples, causeways, palaces, and so on – has more to do with the nature of Maya kingship than it does with a lack of common ideas about how to build a city." I would here argue from a broader perspective that while kingship was important and there was certain flexibility in the construction of cities, etc. it is likely that the significant function(s) of a given city dictated its form (and plan?) rather than a standard set of architectural forms.

In the case of NW Belize, we see significant differences in the "construction blocks" of La Milpa versus Maax Na. These differences in emphasis of certain building types and layout may more likely reflect the important function(s) at each site rather than the whims of kings to either be imaginative or move with a sense of emulation. As Marcus and Sabloff (2008) stated,

> "We should remind ourselves that the processes and motivations that led to the establishment of the first cities may well be different from the processes and motivations that led to the founding of secondary cities in those same parts of the world. When texts occur with secondary (or later) cities, there is always the temptation to extend them back to the first city, which may well be in error. The causes for the earliest urban centers lie in pre-urban times, not in the reaction to a preexisting city."

Related to determining the function(s) of particular places (buildings or sites), is the corresponding analysis of associated artifacts (or ideally written texts). Attempting to determine site function based on special layout or structure form alone is insufficient as similar architectural forms may have varied in function or been multifunctional.

The primary interest of this paper has focused on the site proximity and possible interaction between La Milpa, Maax Na, and Dos Hombres of northwest Belize. This kind of comparison, however, may be well suited to other regions including sites near the Belize-Guatemala border such as Yaxha, Naranjo, and Nakum. Another important combination of sites in proximity is Campeche's Becan, Xpuhil, and Chicanna, but the details for these other localities are let for future analysis.

As with the Rio Bravo sites, all are very close to each other and as a "regional" aspect should be stylistically the same, but vary significantly in architectural layout and execution. Thus, while these sites are perhaps of the same polity, they may be quite different in their "main" function(s).

Concluding Comments

The information presented here is just a small glimpse into the regionally focused work being done in the Three Rivers Region by the PfBAP. The data support significant changes during the Late Classic with more local autonomy and organization observed. Increasing populations during this time may have encouraged the Maya to develop different resource-specialized communities (Scarborough,

Valdez, and Dunning 2003) that tried to "diversify production as much as possible" (Dunning et al. 2003: 24) which resulted in high levels of specialization and exchange and an increase in diverse resource specialized communities. While a review of small settlements is provided and discussed, a significant interest is to bring to discussion the occurrence of large settlements (cities?) and the role(s) between polities. The larger centers, including La Milpa, Maax Na, and Dos Hombres among others may have provided specialized services, but this has yet to be verified in any significant manner.

Several lines of information must be combined/utilized in attempting to determine "services" provided within cities. In addition to architectural form/plan, the identification of special artifacts may give some insight into particular activities at a given locale. We must also remember that cities served their hinterland populations and would have been the center for celebrations and festivities of the polity, including inaugurations, consecrating temples, and performance centers (in addition to marketplace activities). The location(s) of cities, towns, villages, and smaller settlements in NW Belize provides us the opportunity of understanding proximity between the varied populations to attend any location for a required interest easily within a day's time/walk. It remains intriguing to try and grasp what activities or functions were served by these varying settlements, whether similar or greatly different in architectural layout.

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16 "THERE IS NO DEATH! WHAT SEEMS SO IS TRANSITION": DIFFICULTIES IN IDENTIFYING POLITICAL BOUNDARIES BETWEEN LAMANAI AND KA'KABISH

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The identification of social, cultural, and/or political boundaries has been long considered key aspect of archaeological research. In furtherance of this goal many approaches have been attempted ranging from the application of Thiessen polygons and drop-off density models, to the use of distinct assemblages as ethnic or regional markers. However, these models may impose an artificial and somewhat static approach to landscape occupation, failing to take into consideration shifting political alliances, and the changing fortunes of centres. This paper discusses the current difficulties in identifying the possible political boundary between Lamanai and Ka'kabish in light of new evidence regarding this region during the Classic period.

Introduction

The identification of boundaries, social, cultural, or political, has been long considered a key aspect of archaeological research. Consequently, many approaches have been advanced as a means for identifying boundaries; however, care must be exerted when using these models so that they do not concentrate on a single, or narrowly focused, point of time and space, and as such promote the image of static landscape occupation. These single 'snap-shots', while useful for viewing particular moments in time, provide a limited view of the socio-political landscape and fail to illustrate shifting political alliances, the changing fortunes of centres, and the fluidity of populations that we now realize characterised much of ancient Maya history. To highlight these points, we will discuss the current difficulties we have experienced in trying to identify the possible political boundary between Lamanai and Ka'kabish.

Models of Analysis

Before beginning a discussion of the data, and the problems encountered, will we comment on the nature of identifying boundaries. In the Maya world, there are few anthropogenic markers of physical boundaries known; these include such things as the stela markers placed around the Copan valley (Fash 1991: 101; Martin and Grube 2008: 201; Webster 2002), walls around Mayapan (Hare and Masson 2012), and within the larger Tikal urban landscape (Webster et al. 2004), as well as the famous ditch, or moat, around Becan (Evans and Webster 2001: 435; Webster 1976). However, it should be noted that many of these may serve other functions, such as internal divisions or aguadas (see Hansen 1998: 87 Note 9) rather than polity markers and only the monumental valley markers of Copan include non-urban territory.

In the absence of physical cultural markers, or clear epigraphic references, researchers must resort to other methods to try and determine the possible locations of polity boundaries. As a review of all the methods that have been employed in the archaeological literature to assess boundaries would exceed the scope and purpose of our discussion, we will restrict our comments to three methods used in the Maya world (see Iannone 2006 for a fuller discussion). We will note how their application and subsequent inability to adequately resolve the issue of identifying a political boundary between Ka'kabish and Lamanai has left us still struggling for answers.

The first and most common means for identifying ties between sites is through assessment of the cultural material assemblage, both artefactually and architecturally. Similar assemblages, particularly of rare or unusual materials or features is seen to suggest ties between sites. The closer the correspondence the tighter the linkage. However, this method implies that entire assemblages can be identified or that structure forms can be clearly known, which requires extensive excavation and analysis.

Another method initially used for ancient Mesopotamian and Greek city-states but also

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employed in the Maya world (Marcus 1987, 1993; Mathews 1991), is the creation of Thiessen polygons. These are defined mathematically by the bisection of a series of points so as to create an area of influence in which "any location inside the polygon is closer to that point than any of the other sample points" (ESRI.com). The idea behind this model is to identify not only the primary centre (or polis) but also the rural area that was linked to it, and likely interwoven into a reciprocal support network, based on Christaller's central place model (see King 1984).

In Central Place Theory city arrangement relies on the idea of tiers, and makes the assumption that all the higher order central places are of similar size (big) with sites decreasing in size and services as one moves away from the centre (King 1984). This model relies on the identification of the primary centres or polity capitals, a debatable issue in its own right, but one beyond the focus of this paper, suffice-to-say that in Christaller's (and many other's) interpretations, primary generally equates to largest.

Marcus (1976), argued that by using emblem glyphs to reconstruct the relationships between sites we could achieve a hierarchical ranking more closely reflecting the original system of the ancient Maya, believing that the presence of an emblem glyph was indicative of a site's status as a political capital. This concept was elaborated upon by Peter Mathews, in which he used Thiessen polygons to divide the Classic period Maya world into polities by correlating sites possessing emblem glyphs with primary centres (Mathews 1991).

This desire to recreate the ancient Maya landscape as the people themselves envisioned is an ideal goal but it is not without inherent problems. Most notable are the assumptions that if a site possessed an emblem glyph we would be able to identify it, and that sites without emblem glyphs were, "politically less important" (Marcus 1993). These assumptions fail to take into consideration the rampant looting that has occurred at many sites. An example of this conundrum is Site Q; known from monuments in museums, but lacking the archaeological provenience that comes with in situ artefacts, Site Q was cast adrift on the Maya landscape. It was only the discovery of a monument buried in a collapsed building at La Corona that allowed us to finally identify this Maya site (Canuto and Barrientos Q 2013: 2). In truth, one must wonder, if the monument at La Corona had not been buried would it too have fallen victim to looting? Thereby, leaving La Corona nameless and mute, consigned to the depths of insignificance in reconstructions of Maya history.

In using emblem glyphs as markers of polities or polity capitals we must also acknowledge the various issues involved in understanding their meaning and locations. Although generally considered toponymic in nature, the use of the Mutul (or Tikal) main sign in the emblem glyph of Dos Pilas (at a time when it was ruled by a linage with ties to the Tikal royal family) raises questions as to possible dynastical or lineage bases to these symbols (Houston and Mathews 1985: 2). The exact nature, or intended meaning of these glyphs, as political, dynastic, or geographic designators has yet to be conclusively determined. We also must be cautious of identifying the site at which an emblem glyph is found as the home city of the glyph. We know from places such as Hatzcap Ceel that rulers from dominate centres sometimes erected monuments commemorating their victories or, in this case, recording their accessions, at subordinate centres (Martin and Grube 1995). As Chase notes (2004: 324), "no one-to-one correspondence between emblem glyph and polity can be assumed".

Moreover, there are many emblem glyphs or site names that are found in the epigraphic record for which we have not been able to associate a site. In several of these cases, these sites are linked to rulers who are subordinate lords, suggesting that the conflation of emblem glyphs with polities is in error – although this may also be a matter of scale and autonomy rather than political boundaries, and the existence of political entities of varying size and degrees of autonomy based on socio-political context must be acknowledged.

At this point we wish to turn the discussion to another method used for identifying possible divisions between polities; that of population drop-off models. This method

is based on the idea that settlement boundaries may be identified by the "incremental fall-off in habitation density" (Levi 1993:33), with the common practice being to demarcate boundaries between polities at the point with the lowest occupation (or no-occupation) density. This method had been used successfully in the Three Rivers Region, with a 1994 study finding that at both Dos Hombres and La Milpa settlement seems to drop off after 5km from the sites, with the 10 km diameter radius around the sites forming the sustaining areas (Robichaux 1995; Tourtellot et al. 2003; see also Healy et al. 2007:24). However, it has been noted that settlement patterns do not necessarily fall into evenly dispersed suburban residences, but rather often cluster into groupings of varying sizes, some with prominent architecture, leading Bullard to hypothesize on the existence of a 'rural nobility'. The dispersed nature of settlement clusters, and presence of larger residences and sometimes small civic-ceremonial buildings in these outlying areas makes the identification of community and polity boundaries extremely difficult (Rice and Culbert 1990).

Geography

Turning our attention northward to Lamanai and Ka'kabish, these two sites are situated in North-central Belize to the north-west of the New River Lagoon. Lamanai occupies a point along the northwest banks of the New River Lagoon, near the headwaters of the New River, and is currently the largest known site in the area (Andres 2005).

Ka'kabish is located on a rise a further 10 km inland along a north-westerly track and although initially identified as a small site with only 21 known structures (Guderjan 1996), it is currently known to have had at least 104 structures arranged in 10 plazas and/or courtyards of varying sizes (Jamik 2012). Evidence suggests the site likely encompassed a much larger number of structures, all now fallen to agricultural clearing. This distance between the two sites corresponds with that identified for sites in the Belize River Valley to the southeast (9.9 km [Driver and Garber 2004]) and the north-eastern Petén to the west (10.4 km [Hammond 1974:325]) significantly less than the 26 km identified by Harrison for the Quintana Roo area to the north (Harrison 1981]).

Both Ka'kabish and Lamanai share a similar chronological history. Radiocarbon dates from corn confirm that settlement at Lamanai existed as early as 1500 BC (White 1997: 173), however, the earliest ceramics date much later, in the late Middle Formative period (600-400 BC). This late Middle Formative Mesh Complex (600-400 BC) is represented by one burial and a sparse collection of ceramics and, according to Powis "does not constitute a functionally complete ceramic complex" (Powis 2002: 502). The first functional complex at Lamanai (Lag) dates to the succeeding Late Formative (400-100 BC) (Powis 2002). Ceramic material from Ka'kabish, however, predates both of these complexes, coming from the early Middle Formative period (ca. 800-600 BC). This Mormoops complex, which is also supported by radiocarbon data, forms a complete complex (Sagebiel and Haines 2015). Occupation at Lamanai continues from the Formative period through the Post-Classic and into the Colonial period (Graham 1987, 2004, 2011; Graham et al. 1989). At Ka'kabish occupation continues from the Formative period, with a hiatus in occupation in the early Late Classic period, but resumes in the Terminal Classic and continues into the Post-Classic period (Sagebiel and Haines 2015).

In his 1991 work Mathews, based on the presence of an emblem glyph at Lamanai on Stela 9, envisioned Lamanai at the centre of a polity. The proximity of the sites, similar chronology, along with other elements to be elaborated upon below, suggest that the two sites were likely in contact and probably linked for at least a portion of their history. The questions therefore become: when were they linked? And, how, or what form, did this connection take? Also, did a boundary, whether it be political, social, or psychological, even exist between the two sites? And if so, can it be identified archaeologically?

Key Points & Material Evidence

The first question – when were they linked – emphasizes the recent work on the Classic period (AD 250-900) that has indicated that power structures, rather than being statically

inscribed upon the landscape, were dynamic entities that fluctuated as communities competed to establish, maintain, and regain power and territorial control (Demarest 1993, 1997; Demarest et al. 1997; Driver and Garber 2004; Estrada-Belli 2011; Hansen and Guenter 2005; Houk and Valdez 2011; Iannone 2004, 2005; Reese-Taylor and Koontz 2001; Stuart and Stuart 2008). Over the past several decades, archaeological research has severely altered our concept of the Maya political landscape; initially perceived as being a few large polities (Adams 1981, 1986), we now know it contained many polities of varying size (Culbert 1991; Demarest 1990, 1997; Martin and Grube 1996, 2008; Mathews 1991). We also know that many sites, either willingly through heterarchical alliances or unwillingly through conquest, were dominated by other cities for periods of their history (Martin and Grube 2008). Consequently, the idea that Maya polities were flexible, with periods of coalescence and fragmentation (Marcus 1992, 1993), is well documented (Demarest 1993, 1997; Estrada-Belli 2011; Hansen and Guenter 2005; Iannone 2004, 2005; LeCount et al. 2002; Martin and Grube 2008; Palka 1997).

Ceramic Evidence

Ceramically, both sites are quite similar starting in the latter part of the Middle Formative (600-400 BC). Both the Mesh complex at Lamanai and the Noctilio complex at Ka'kabish (600-400 BC) contain Joventud Red, Chunhinta Black, and Guitarra Incised wares (Sagebiel and Haines 2015; Powis 2002:502); however, at Ka'kabish, Richardson Peak, Pital, Muxanal, and Chicago groups also are present (Sagebiel and Haines 2015). It should be noted that the absence of these groups at Lamanai may be a factor of the small sample recovered.

The succeeding Late Formative period at Lamanai has been divided into three complexes, the Lag (400-100 BC), the Zotz-early facet (100 BC-AD 150), and the Zotz-late facet (AD 150-250). At Ka'kabish we have yet to refine our ceramic chronology to this extent and our Late Formative complex is all designated as the Rhogessa complex (400 BC-AD 250/300). Like their preceding complexes, there are distinct similarities in types present in the ceramic assemblages from the two sites (i.e., Cabro Red, Flor Cream, Lechugál Incised, Polvero Black, Alta Mira Fluted, Laguna Verde, Puletan Red-and-unslipped, Largartos Punctated, Sierra Red varieties, and Society Hall Red). There also are marked differences, with Powis (2002:88-90) identifying Accordian Incised, Ciego Composite, Quacco Creek Red, Guacamallo Red-on-Cream, Liscanal Grooved-incised, Pahote Punctated, Monkey Falls Striated, and Chahmah Washed sherds in the assemblages from Lamanai. While at Ka'kabish Sagebiel has identified material belonging to the Rio Bravo Red, Repasto Black-on-Red, Repollo Impressed, and Chicago Orange types (Sagebiel and Haines 2015). Thus showing that, while the inhabitants at both sites are participating in the Chicanel ceramic sphere, both communities are exhibiting some differences in type preferences.

Ties to the Central Petén in the Early Classic, or perhaps to the wider regional influences, are also noted in the ceramic assemblage at Ka'kabish where cast-off mortuary goods were left behind by the looters, because they were either broken or monochrome; these included several black Central Mexican, or Teotihuacan-style, slab-footed vases (Balanza Black). Only one such vessel was recovered at Lamanai, this being from the woman's tomb (N9-53/1) in the Mask Temple (N9-56) (Pendergast 1981a:97; Powis 2002: 518). While one can speculate that this implies Ka'kabish had stronger ties to the Central Petén, it does not rule out links between Ka'kabish and Lamanai, particularly when one examines the mortuary architecture of the Woman's Tomb and a second similar tomb (N9-56/1) also found at the Mask Temple.

Mortuary Architecture

It is with the examination of the Classic period components, particularly in regards to mortuary architecture, that things become noticeably odd and the questions of autonomous or unified polities truly emerges. At Ka'kabish, rampant looting, starting in the 1980s, has exposed many tombs. While the mortuary goods are almost completely absent in the majority of the cases, non-valued items (i.e., broken vessels [polychromes and monochrome], obsidian blades), carelessly missed pieces (i.e., small jade

beads), and, of course the mortuary architecture itself remains.

It is with the mortuary architecture that we have our most striking evidence of high-status elites at both sites. Although both Lamanai and Ka'kabish have strong Early Classic components, and high-status graves exist at both centres during this period, only at Ka'kabish do we find tombs that are corbel vaulted. While the length of these tombs remains relatively consistent at just over 3 metres (actual measurements range from 3.18 to 3.3 metres), they vary more extensively in both width, from a mere 0.96 m to 1.4 metres wide, as well as height, ranging from 1.27 m to 2.25 metres. The largest and most elaborate of these vaulted burial chambers is Tomb FA-6/1, dated to the late 5th century, which had red painted walls decorated with darker red glyphs (Haines and Helmke n.d.; Helmke 2011), and a passageway leading 2.5 metres to the west. Passage tombs of this type have been documented in the Central Petén (Guetner 2012: pers. comm.) and also at Caracol (Chase and Chase 1987: 26, 1994, 1996) and Minanha (Iannone 2005: 32), and ties to the Central Petén were noted in the cast-off ceramic mortuary assemblages at Ka'Kabish and in the Woman's tomb at Lamanai mentioned above.

The Woman's Tomb (N9-53/1), along with that of the male burial in the Mask Temple (N9-56/1) appear to have been constructed using a wooden hooped framework (now decayed) that was placed over the body and covered in fabric and layers of plaster to create a domed space around the individual. Pendergast described this mortuary construction as forming a "cocoon-like chamber" (Pendergast 1981b: 39), and, based on the associated ceramics, dated them to the beginning of the 6th century AD (Pendergast 1981b: 38). To date only three tombs using this type of hooped-frame construction have been reported, the two previously mentioned at N9-56 at Lamanai and one from Structure D-5 at Ka'kabish (Tomb D-5/1) (Haines 2008).

Further linking these tombs, or their occupants together, are similar ceramic polychrome plates which were recovered from all three tombs. However, petrographic analysis conducted by Howie has revealed most conclusively that the example from the tomb at Ka'kabish was not made by Lamanai potters. Not only is it compositionally different, having feldspar and igneous rock fragments indicative of the Mountain Pine Ridge Area, but it is also technologically different from those at Lamanai, specifically in how the slip pigment was produced. Scanning electron microscopy also has revealed differences in firing methods and decorative and surface treatment techniques. From a Type-Variety perspective, these dishes present an interesting challenge. Although at Lamanai vessel types change, they are all part of the same tradition of local manufacture. The Ka'kabish tomb dish is very interesting in that it indicates that there were other producers of these polychrome dishes, and that these different producers had distinctive approaches to making dishes that are strikingly visually similar. All we can say for sure at the moment, is the Ka'kabish dish, while visually similar to those from Lamanai, and coming from a tomb whose design and construction is unique to the Lamanai/Ka'kabish area, is most certainly not made by the same potters as the Lamanai examples. As the cultural material assemblages, both artefactually and architecturally, show strong signs of both similarities and differences using them as a criteria by which to judge polity association is inconclusive at best, a headache at worst!

Hiatuses and Hieroglyphs

The history of interaction between the two sites becomes perhaps slightly less foggy in the Late Classic period, although this is largely because we have yet to find anything dating to the early Late Classic at Ka'kabish. It appears that Ka'kabish suffered an occupational hiatus between the start of the Late Classic period and the Terminal Classic period (ca. AD 600-800). Speculation as to the reason for this hiatus may provide our strongest evidence that these two sites were combined into a single polity during this time.

A possible reason for the hiatus at Ka'kabish can be found on Stela 9 at Lamanai. This monument, erected in AD 625 by K'ahk' Yipiiy Chan Yopaat declares him to be an elk'in kaloomte' and a k'uhul ajaw. The title, k'uhul ajaw, implies that the individual is the 'divine lord' of what always has been assumed to be Lamanai (Closs 1988; Simon Martin, pers.

comm. 2012). However, according to Martin, lack of comparative epigraphic information makes this attribution open to question and it is also possible that K'ahk' Yipiiy Chan Yopaat is from another, yet undetermined, centre.

It should be noted that, unlike in the Late Classic period when the title became more wide-spread and one could argue debased, during the Early Classic period the title of kaloomte' was denoted an especially high rank attributed to only a few rulers (Simon Martin, pers. comm. 2012). Loosely translated as 'overlord' or 'high king', the term kaloomte' is interpreted as referring to a paramount position, one above that of "divine lord" (Freidel et al. 2007:200; Stuart 2000:486-487; Wren and Nygard 2005:173), and it is associated with either a military conqueror or political leader of a hegemony.

The use of the term elk'in, a geographical designation meaning east, suggests that the individual was claiming to be the "high ruler of the eastern quarter" (Graham 2016:206). Although whether this claim to dominance is based on military activity or political, economic, or marital alliances, including the nearby site of Ka'kabish, is a debate for another time. What is clear is that at the end of the Early Classic period (ca. AD 600) the distribution of power in the region appears to shift, with Ka'kabish waning and Lamanai if not exactly ascending, then at least holding steady, and possibly becoming the centre of a polity as envisioned by Mathews (1991). It should be noted that Lamanai, rather than flourishing as one might expect, also exhibits a lull in construction with efforts being focused on façade remodelling as opposed to completely rebuilding structures (Pendergast 1992:73).

If this larger 'eastern' polity, consisting of a merged Lamanai and Ka'kabish, existed, its duration was potentially short-lived, as in the early 9th century Stela 9 was destroyed and Ka'kabish and Lamanai are revitalised. The resumption of activity at Ka'kabish not only includes occupational evidence but also refurbishing of the front of the main temple, Structure D-4 (Bob). What is also of interest is that this flurry of activity continues into the Post-Classic period. Recent ceramic evidence uncovered this year from a chultun immediately south of Group D, suggests that occupation at Ka'kabish possibly continued into the Late Post-Classic period. This burial contained a miniature vulture vessel similar to the Late Post-Classic vessels from Santa Rita Corozal, along with two other copper objects – a plain ring and a small pair of 'tweezers', similar to, but much smaller than those found in The Loving Couple Burial at Lamanai which we believe also dates to the Late Post-Classic period (Pendergast 1989).

A nearby chultun excavated in previous years also yielded a wealth of copper objects, including 9 complete or fragments of rings and 32 bells of various forms (Gonzalez 2013). While numerous visually similar copper objects were found at Lamanai, XRF analysis of the materials from both sites conducted by Dr. Aaron Shugar has revealed that, like the cocoon-tomb plates, similar appearances does not mean similar compositions. Shugar has found that several of the Ka'kabish objects have unique elemental compositions suggesting that, at the least, they were not the result of a 'trickle-down' redistribution model but separate production runs, and that at the most, Ka'kabish was tied into different trading or trader networks (Shugar 2015 pers. comm.).

Population Density and Drop-off Models

In regards to the issue of population density and drop-off models it appears that the 5 km drop-off point noted for Dos Hombres and La Milpa does not apply to Ka'kabish and Lamanai. Not only are the two sites only 10 km apart, the 5 km midway point between them is marked by a small centre identified as Coco Chan (Baker 1995) and considerable rural residential mounds, identified as Chomokeil (Patterson 2008), the latter made easily visible by the clearing and ploughing activities of the area Mennonites. Although work on a systematic transect between the two centres is still on-going the intervening areas between Coco Chan and both Ka'kabish and Lamanai appear to be unevenly taken up by either residential groupings of varying sizes and densities and empty areas (McLellan 2012). McLellan, in his survey of the settlement area, has noted that the areas where occupation is lacking seem to be the wettest or most easily flooded (McLellan pers. comm), and that these empty areas are often adjacent to other, drier and

more densely occupied areas. It is tempting to suggest that these 'vacant areas' may have been used for milpas or arboriculture but without intensive hydrological and soil studies the actual original use of these areas remains unknown, and while these vacant areas may help us identify small rural community boundaries they do nothing to aid us in understanding possible polity boundaries between Ka'kabish and Lamanai.

Summary

In summary, our work at Lamanai and Ka'kabish suggests that none of the models presented – similar assemblages, Christaller's Central Place, the use of thiessen polygons based on emblem glyphs, or population drop-off models – have proven effective. There were obviously boundaries, in that people probably paid taxes and owed allegiance to one lord rather than another, however, understanding the existences of, or division between potential polities is much more complicated than alluded to by these models. The case of Central Place theory, which relies on the identification of the largest site in the region, and assumption that it is therefore the capital, presents the problem in that we don't know how large Ka'kabish was.

As for relying on emblem glyphs to define polities, while attempting to recreate the ancient Maya landscape as the people themselves envisioned is an ideal goal, it too is not without its inherent problems. Ka'kabish has been the subject of rampart looting for almost three decades and anecdotal accounts among the villagers in the area report carved stele being hauled away. Moreover, two uncarved stela have been found on the site which may have once been painted. As such it is possible that an emblem glyph may have been present at Ka'kabish, but we have yet to find evidence of it. It is also possible that the undeciphered emblem glyph at Lamanai on Stela 9 is actually that for Ka'kabish, or possibly used by both like Tikal and Dos Pilas. It is also possible that the emblem glyph belonged to neither Lamanai nor Ka'kabish but is from a third centre whose ruler conquered both cities.

As noted population drop-off models are proving equally unhelpful in identifying a polity boundary. Not only are we encountering difficulties in identifying clear points of population decline, the settlement zone appears particularly long-lived and identifying possibly earlier components of some later residences is challenging due to the underlying sediments – which in some places is over a metre of dense black clay (McLellan 2015 pers. comm.). Consequently, identifying fluctuations and or changes in the occupation of the settlement zone is difficult and time consuming.

Conclusions

In conclusion, we would like to confess that when it comes to explaining the relationships between Ka'kabish and Lamanai we are presenting more questions than we are answering. It is clear that the issue of defining relationships, let alone political boundaries cannot be based on a single, or limited set of variables, but rather, as Chase notes, a multitude of variables is required, including "ceramics, architectural plans, settlement layouts, burial practices, epigraphy, and the distribution of certain goods and features" (Chase 2004: 325). Moreover, as the increasing corpus of research over the past decades has shown, these polities, when identifiable, were flexible, dynamic entities, fluctuating in size, political power and influence, and even autonomy as the centuries rolled past.

It also needs to be recognised that a geo-political boundary "does not necessarily identify the boundaries of social, political, or economic interaction" (Chase 2004:323). Rather we need to acknowledge that the lived experience of the people occupying these sites may have meant that they conceptualised their sense of belonging, and therefore their interactions, quite differently from what we might perceive, or even what was politically mandated. This is particularly true if one considers that identity can change depending on the situation ranging from broad to quite narrow definitions of affiliations (i.e, how a person might explain their identity to someone within their own neighborhood or small community versus how they might identify themselves to someone from another, or distant, city); each context carries with it a distinct level of integration and degree of participation, and which type of explanation a person chooses to use encodes different social

information. It should also be noted that in many cases personal identity and socio-political ties are not always congruent due to cross-boundary kinship ties. Something that also may have happened in the ancient Maya world, between the communities in the settlement areas at a greater distant from the city centre.

While we may never know the exact nuances of the relationship between Ka'kabish and Lamanai, we can draw several new conclusions about the political landscape of this area of north-central Belize. The archaeological evidence indicates that both sites flourished during the Late Formative period (400 BC-AD 250), and established themselves as autonomous political entities, each likely sporting their own elite rulers during the Early Classic period. At the end of the Early Classic period (ca. AD 600) the distribution of power in the region appears to shift, with Ka'kabish waning and all monumental construction, and perhaps even occupation, ceasing throughout the Late Classic period (AD 600-800). During this period, activity at Lamanai continues, albeit at a reduced pace, and it appears to become the dominant centre for the area, and possibly the polity capital. Monumental construction at Ka'kabish resumes during the Terminal Classic and Early Post-Classic periods (AD 800-900) before ceasing completely by the beginning of the 11th century. A flurry of construction activity also is noted at Lamanai in the Ottawa Group (N10-3) during the same period (Graham 2004: 224). Occupation at Ka'kabish and Lamanai continues throughout the Post-Classic period, as does their engagement in trade networks. While occupation at Lamanai continues into the Colonial period, occupation at Ka'kabish, as far as we know, does not, and current evidence suggests the site was abandoned by the end of the 15th century.

And so, when it comes to the fluctuating histories of ancient Maya sites what you see is that "There is no death! What seems so is transition" (Longfellow Resignation 17). North-central Belize was a dynamic area where cities were created, grew, merged, and separated – assuming new forms through time on an ever changing political landscape.

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17 TIKAL'S LANDSCAPE: FOUR DECADES OF SOIL, SETTLEMENT AND THE EARTHWORKS

Timothy Murtha, David Webster, Richard Terry, and Christopher Balzotti

Forty years ago, William Haviland and Dennis Puleston transformed Maya archaeology by offering a sophisticated perspective on Classic Maya land use and social organization. While much debate has transpired since, their work remains uniquely important because they based their interpretations at Tikal on regional settlement survey and comparative studies of households, essentially developing a landscape perspective of the Maya. During the last twelve years we have revisited many of the questions posed by Haviland and Puleston, first by re-evaluating the earthworks and more recently by focusing on the coupled natural and human system dynamics embedded in Tikal's regional landscape. We are investigating the spatial and temporal dynamics of land-use, agriculture and resource availability at Tikal. Combining diachronic environmental simulation with analysis of settlement patterns, our work is not only regionally focused, but also emphasizes the role of landscape in Tikal's history. This paper reviews and summarizes some of our key observations about landscape through the lens of Tikal's earthwork, settlement patterns, and environmental change.

Introduction

This article reviews and summarizes our recent research at Tikal, Guatemala carried out over the last 12 years. Our research focuses on questions of landscape, settlement and regional organization. What we observe at Tikal is not a vast engineered landscape as might be expected for such a substantial Classic Maya site, but a complex regional and localized mosaic of settlement, soil and water resources. Spatially, Tikal's regional landscape is heterogeneous, partly due to clear evidence of past environmental change, *i.e.* erosion. Early erosion transformed Tikal's regional landscape by establishing differentially distributed ecological and agricultural niches. Accordingly, the Tikal region is best described as a patchy landscape, both culturally and ecologically. The patchiness is reflected in patterns of settlement, forest type and diversity, and soil properties. Our current efforts are investigating these niches, along with the long-term spatial and temporal dynamics of land use management, agricultural decision-making and patterns of resource availability in the region. To carry out this work we are relying on some traditional archaeological survey, but are mostly focused on soil and environmental surveys and remote sensing tightly integrated with environmental simulation. Early on, however our work at Tikal was more traditionally archaeological in focus. Even though our current project is guided by some archaeological questions, our field and lab work is focused almost exclusively on environmental and ecological surveys, which we are comparing to past archaeological surveys to inform our interpretations about Tikal's landscape.

The idea is fairly simple: every piece of Tikal's regional landscape holds a clue to the decisions and actions of the past. By piecing those clues together we are attempting to address some longstanding questions about the coupled natural and human history first raised by the Tikal Sustaining Area Project. Uniquely, Tikal is one of the largest Maya sites, but doesn't have demonstrative *landesque* evidence of intensification in the form of terracing or raised fields. Some of our key questions are:

- What areas were used intensively, perhaps as evidenced by our soil studies?
- What areas were modified or impacted by past landuse?
- What areas were stable agrarian patches?

While these questions can be framed under a heading of modern landscape archaeology, *the idea of landscape* at Tikal is at least four decades old.

More than forty years ago, William Haviland and Dennis Puleston transformed Maya archaeology by offering a sophisticated perspective on Classic Maya land use and social organization and new methods for studying the lowland Maya. Dozens of project members contributed to these new perspectives through specialized studies, but Haviland and Puleston's work carries significant impact because it was

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synthetic (Haviland 1968, 1969, 1979, 1972, 1997 and 2003; Puleston 1968, 1973 and 1983). They based their interpretations of Tikal on settlement survey, comparative excavations, environmental observations, and detailed studies of households. All of this work was carried out with a clear emphasis on regional analysis and understandings. Simply, Puleston and Haviland developed a landscape perspective of the Maya well before the *idea of landscape* was so pervasive in archaeology. Puleston (1973), for example, put forward ideas about *environmental possibilism*, clearly communicating the importance of archaeological studies of soil for interpreting how land, "…affected the lives of the people who formerly lived on them."

Beyond advancing new interpretations of the Classic Maya, their work also defined new landscape research methods for the lowlands, including: household survey, excavation, analysis of settlement patterns, regional soil survey and techniques for estimation of population. And while their work occurred more than four decades ago, they raised compelling questions about Tikal's regional landscape, which remain unanswered, incomplete and understudied (e.g., there were no new earthwork surveys between 1968 and 2003).

There has been limited regional settlement research at Tikal since the Sustaining Area project finished, but those that followed build on the initial TSAP project efforts. For example, Anabel Ford's (1986) pioneering inter-site transect furthered the *idea of landscape* at Tikal by examining the role of population, soil and landform for understanding the distribution of settlement between Tikal and Yaxha. In an exceptional cultural ecological study, Ford (1986:6) writes, "This model considers the economic relationship between population and basic resources such as land as a key to understanding development. Under conditions of population growth, the model considers settlement alternatives which account for potential settlement consequences." Clearly, these were similar questions raised by the TSAP investigations, but expanded in breadth and enhanced in depth by Ford's inter-site survey and excavation. Nearly two decades after the Sustaining Area Project, Ford (1986: 92) offered one of the more salient summaries about lowland regional landscapes from her observations at Tikal, linking the distribution of natural resources (arable land and water) to settlement patterns at a variety of scales,

> *"The development of the central lowland Maya has been explained by reference to their local social and physical environmental conditions. This is seen as a consequence of competition for good arable land and control over the scarce water sources…one can interpret the developmental sequence as superseding levels of economic and political organization at which competition occurs, beginning at the local familial level and culminating at the regional societal level."*

Other regional studies were carried out in subsequent years, including work in the bajos, but no real synthetic approach. Mindful of these contributions, we initiated work at Tikal in 2003, first by re-evaluating the earthworks through survey and excavation and following up with testing ecological techniques for studying Tikal's regional landscape and most recently, linking these efforts to dynamic environmental modeling.

Our project is a regional landscape archaeology project. A great deal has been written about archaeological landscapes in the last 10-15 years and while Denis Cosgrove (1998:13) noted that the usage of landscape in geography was imprecise and ambiguous, archaeological usage does not suffer such ambiguity. Most archaeological studies of landscape are concerned with the physical study of the integration of natural and human phenomena. Many archaeological studies of landscape are now case studies documenting the impact of human agency in altering the physical environment, e.g., describing how civilizations transformed or engineered their environments.

Importantly, we view this work as a regional landscape study, not a site centered study. And such an approach influences the way in which we interpret Tikal. Instead of asking how did the region support the site (agricultural resources)? OR How did the site support the region (water resources)? We're asking primary questions about how the region is structured culturally and ecologically. Secondary questions include how and when does central Tikal exert

control or authority? And then what are the spatial and temporal dimensions of those efforts? This approach differs from other more recent efforts to investigate Tikal's natural systems. For example, Scarborough and colleagues' (2015) exceptional and detailed efforts to study central Tikal's water engineering system offer complementary site center interpretations that are embedded within our broader regional systems based approach.

We have four specific research questions in our current project, essentially:

1. What were the environmental and landscape effects of ancient Maya settlement, growth, expansion, and eventual depopulation? Specifically, what were the quantitative effects of deforestation and increasingly intensive agriculture on water and soil availability throughout the watershed?
2. How did the Maya respond to these transformed resources and maintain and manage them through time and across the landscape?
3. How did the changing availability of resources influence the built environment or spatial arrangement of settlement, including emic statements of territory and polity size, such as the earthworks and regional political centers? And did seasonal extreme variations in precipitation, i.e., droughts, differentially influence these patterns?
4. What is the role of niche construction during these key periods in Tikal's political history?

The theoretical focus of our work relies on niche construction and niche inheritance. Niche construction is, "the process whereby organisms…modify their own and/or each other's niches (Odling-Smee et al. 2003: 419)." As Hardesty (1972) observed, culture is the human ecological niche. Humans, directly and indirectly transform their environments, but they also evolve trans-generational cultural niches or traditions. Such niches are literally inherited or otherwise culturally allocated through time. We argue that the dynamic cultural and sociological dimensions of agrarian niche construction and inheritance are exceptionally useful to understanding how Maya landscapes were structured (Webster and Murtha 2015).

While our modeling work is still underway, we have derived several working interpretations, summarized under the following headings:

- Regionally, Tikal is best described as an agrarian and ecological mosaic.
- Settlement and population are differentially distributed in a variety of micro regions.
- While there is a complex system of water management in the site center, water is rather abundant, regionally.
- Clear evidence for landscape transformations and soil erosion.
- A diversity of agriculture was likely practiced everywhere through time, not necessarily at the same time.

The Earthworks and the Shape of Tikal's Landscape

35 years after it was first published, the discovery and description of the great Tikal earthwork provided a clear picture of the shape of Tikal's landscape and polity. In many ways, the earthworks and more importantly the territory it defined became a benchmark for the size and structure of other lowland Maya sites. Combined with the western and eastern bajos, the earthwork offered a well-defined 120 sq km Tikal with expectations of a highly centralized polity with high densities of households and populations inside the earthwork and low densities outside the earthwork, also providing space for dispersed agricultural activities.

Between 2003 and 2008, we tracked down the original sections of the earthwork (Webster et al 2007). We identified and mapped (Figure 1):

1) A new section of the west of the logwood bajo, with a curious bifurcation;
2) Two large sections of a new western earthwork, between El Zotz and Tikal;
3) A new eastern earthwork running parallel to the one reported by Pulleston and Callendar; and,
4) A new southern earthwork (small section);

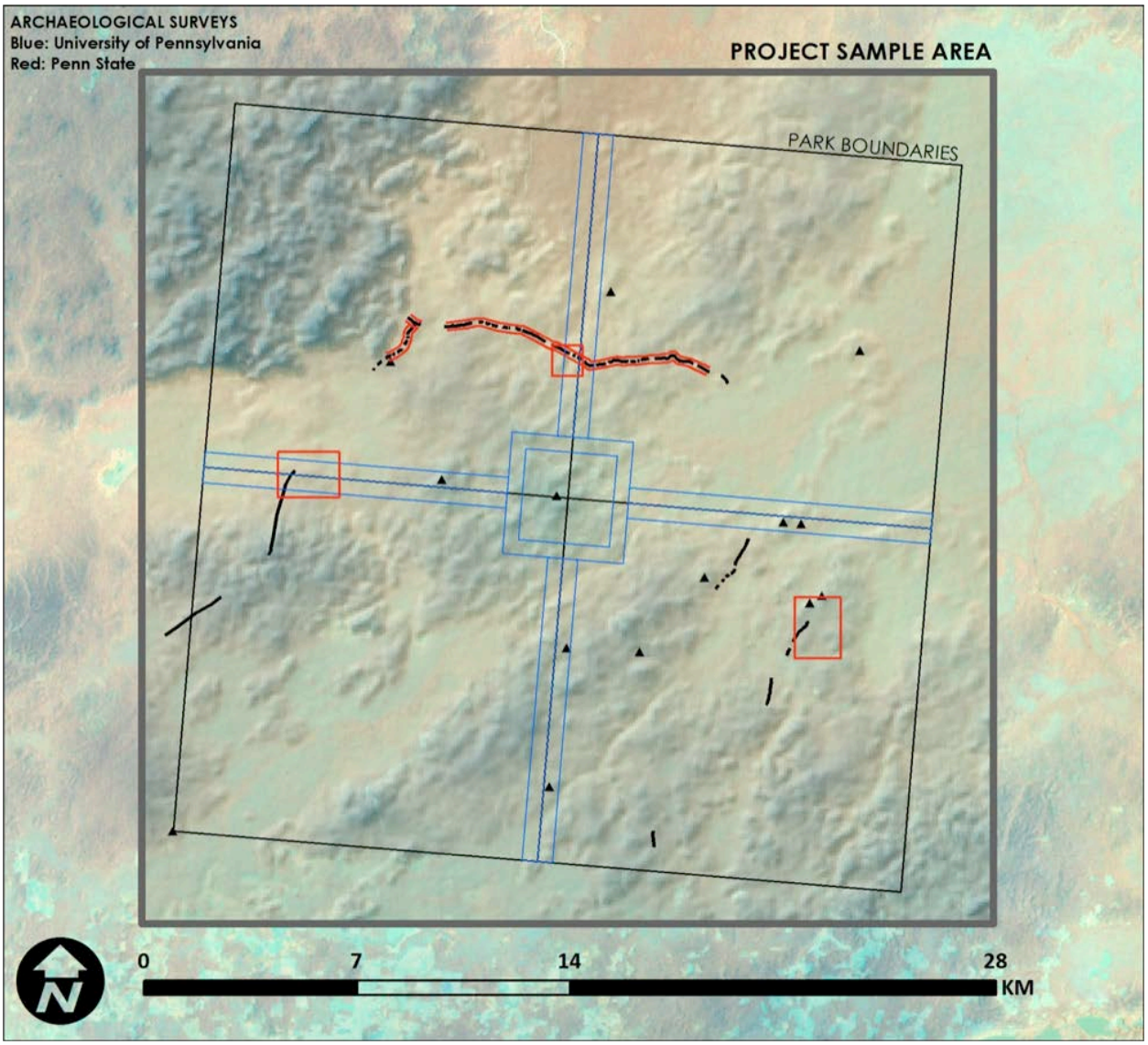

Figure 1. Map of Tikal illustrating survey areas, the earthwork and the national park boundaries.

We also carried out two seasons of excavations and:

1) We cleaned and expanded Puleston and Callendar's excavations along the northern earthwork;
2) We added comparative trenches along the northern earthwork; and,
3) We opened 12 new trenches to compare the form and construction of the earthwork in western, eastern and southern sections.

Even at the end of mapping, it was abundantly clear that the earthwork was not as clear-cut nor as well defined as it had come to be assumed. The form, construction and distribution raised many more questions about the original interpretations of the earthwork. Instead of verifying the well-defined boundary our results indicated that we needed to broaden our efforts and expand our focus regionally. The earthwork is diverse and distributed, responding to local and regional topographic conditions. The earthwork no doubt expresses 'an attempt' by Tikal to centralize or coalesce regional authority, but not necessarily a uniformly successful attempt, spatially and temporally. Simply, the earthwork doesn't conform to the highly centralized parameters put forth early on.

One potential issue is that perhaps we may be placing irrational expectations on the earthworks or similar features in ways that Maya kings never perceived of landscapes, i.e., as rationally bounded and organized agrarian space, like estates or districts? Regardless, our emergent picture of the Tikal polity is a fragmented and negotiated space whose boundaries are dynamic, with distinctions between residential areas and agrarian areas not so clearly defined, perhaps reflecting Ford's observations about competition (Ford 1986:93).

Households, Settlement and Population of Tikal's Landscape

One key way we expanded our focus was to define transect and large block settlement survey areas. We added regional surveys, beginning in 2003 (Figure 1):

1) A transect survey of households north and south of the northern earthwork;
2) Block regional surveys, including:
    a. West of Tikal
    b. A block to the south east of Tikal that intersected Ford's transect.
    c. A block to the North adjacent to the transect and earthwork.

These surveys were accompanied by a household test pitting program completed by Kirk Straight (Straight 2012). Most of our field observations are consistent with the findings of Puleston and Ford in a general sense, that Tikal's region can be characterized best by a clustered pattern of settlement in the uplands. Importantly, landform and landscape are better predictors of settlement regionally, certainly than proximity to the earthwork (Webster et al 2007).

Our survey added structures and plaza groups to the Tikal regional map, but didn't add any additional residents (through estimation). In fact, our recent peak estimates for the Tikal region centering around 45 – 60,000 seem reasonable, when considered regionally (Webster and Murtha 2015). What is interesting is that population densities and settlement distributions vary regionally, potentially demonstrating how local ecological patterns may have contributed to household patterns. We've begun to loosely demarcate some of these regions with observable differences (Figure 2):

a. Tikal's Central Plateau
b. The Southeastern Region (Arroyo Negro)
c. The Northern uplands
d. The Uaxactun uplands
e. The Southwest lowlands
f. The Western uplands

While not quantitative, each of the above regions offers differing patterns of densities, agglomeration and dispersion of households. This is something that we will be working on soon.

Water and Climate

Another aspect of our project is an investigation of the spatial and temporal dynamics of Tikal's regional water system through coupled climate and water simulation. Like most other Maya Lowland sites, Tikal's water management strategy was focused on storage in order to sustain the four-month dry season. Central and epicentral Tikal exhibit evidence of incredibly well engineered reservoirs surrounded by canted plazas in order to maximize runoff collection (Scarborough et al 2015). Initial results from our study are showing that land use strategies often amplify the effects of climate change, especially in regards to water availability. For example, certain levels of deforestation around Tikal actually increase reservoir water storage due to higher levels of runoff, even during times of drought (French et al 2014). Regionally, water is rather abundant. Small depressions or substantial drainages border regions of settlement, making elite control of water unlikely. Admittedly, the data for our interpretations here are limited to qualitative field observations. But we are investigating ways we can potentially map, quantify, model and monitor regional water, also coupled to climate.

Tikal's Agrarian Landscape: Erosion and Enrichment

Echoing Puleston's sentiment about regional soil analysis, we've always felt that soil studies were key contributions needed for understanding Tikal's landscape. Olson (1981: 261-262), who was responsible for Tikal's early

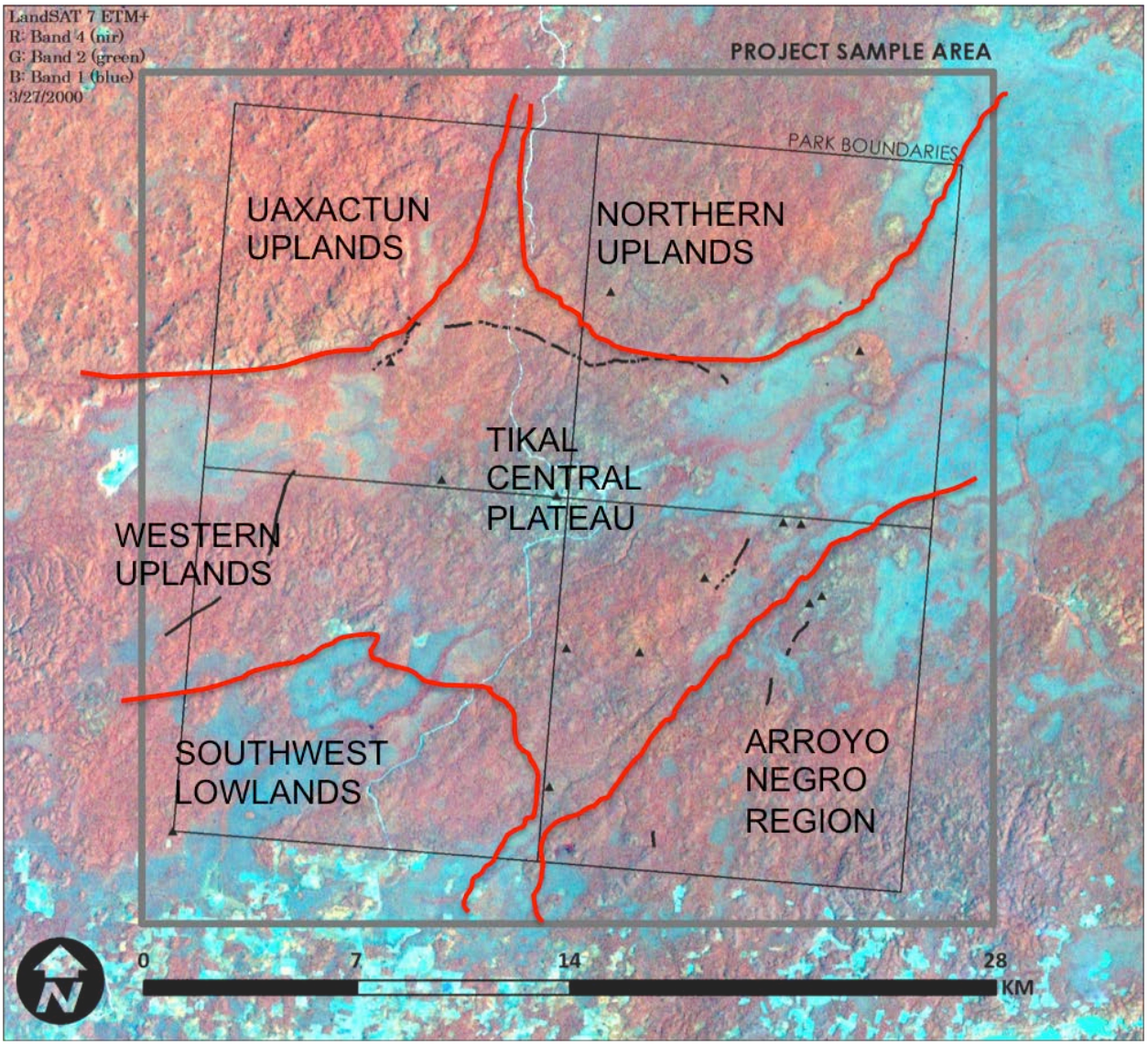

Figure 2. Settlement Regions of Tikal.

soil studies, offered three important conclusions central to analysis of the agrarian landscape of Tikal:

1) There is an important distinction between upland and lowland soil varieties. Upland soils (or mollisols) are naturally fertile. Lowland (often wetland) soils would have presented substantial challenges to Maya farmers.
2) Though fertile, upland soils are extremely vulnerable to erosion and damage. The Maya would have been able to manage the 'visible' aspects of soil, but unable to manage the 'invisible' or less obvious characteristics, primarily erosion and declines in soil fertility.
3) The Tikal landscape was probably stable until the first settlers began clearing the forest. He correctly believed that modern soils have not recovered from the Maya occupation even after more than 1,000 years of abandonment, and noted farming in Peten is still challenging today with pesticides, erosion control and fertilizers.

But these conclusions needed to be evaluated regionally. To date, we have collected, analyzed and evaluated 230 soil profiles and a number of

additional samples from the Tikal region. These were initially focused on the earthwork trenches and test excavations, but have since been focused on intensive and extensive sampling, in order to:

1) understand the current distribution of soils, quantify and qualify the influence of erosion on past land use; and,
2) develop a detailed regional soil map for use in remote sensing and environmental modeling.

Extensive sampling has been coupled to forest types and broad ecological regions, including 60 new profiles adjacent to forest plots monitored by Guatemala's forestry department (CONAP). Intensive sampling provides a detailed perspective on households and landscape as well as providing empirical observations to inform remote sensing analysis and classification.

One area we intensively studied was the landscape, soil and vegetation surrounding the site of Ramonal, where we gridded the survey area into one hectare sample areas (see Burnett et al 2012). Each hectare was surveyed for vegetation, tree species and forest type and we stratified a sample of soil profiles. The purpose of this work was twofold:

1) to provide a detailed picture of landscape and settlement 8 kms from central Tikal and outside the earthworks; and,
2) To provide empirical environmental observations that could then be applied to remote sensing analysis.

For all of the samples, basic chemistry, available P and C3/C4 enrichment studies (for identification of past maize production) have been completed. Two key interpretations are emerging from this work: first, past agrarian activity isn't constrained to one place or landscape and second, there is widespread evidence of erosion at Tikal.

Erosion has presented a complicating methodological factor. As Olson observed, the hillslope soils of Tikal never fully recovered. It is difficult to sample even moderately sloping areas and retrieve a fully recovered soil profile. One half of an auger bucket is not uncommon on the hillslopes of Tikal. This precludes analysis of the hillslope soils for C3/C4 enrichment. One sample and one region is potentially unique in this respect and we are anxious not only to examine the C3/C4 results, but perhaps develop a new study for this region in the future. In the Uaxactun uplands (Figure 2) there appears to be a relative absence of surface water and archaeological features and substantial erosion. It is only one observation, but this could be indicative of a large stretch of uninhabited area no more than a 3-4 hour walk from central Tikal.

Our efforts confirm and refine some interpretations about soil regionally:

1. Erosion is widespread;
2. The erosion, while not uniform, likely occurred early on;
3. Erosion likely provided the stable landscape that was heavily relied on during the Classic Period.
4. While the above soil pocket or ecological niche was the preferred landscape feature during the Classic Period, agricultural use must have varied spatially and temporally (even responding to annual shifts in preciptation).

Tikal's Agrarian Landscape: Remote Sensing

To transfer these discrete observations about soil to the regional landscape, we initiated a program of remote sensing. This is not remote sensing in the classical archaeological sense of the term, i.e., identifying or mapping features. We are using remote sensing for landscape classification (see Griffin 2012). We compared the observations of our C3/C4 soil tests (n = 185 samples) to 24 predictors from 3 remote sensing sources (see Balzotti et al 2013 table 2): AIRSAR**,** Landsat 7 and IKONOS -2. We tested three quantitative models of enrichment along with one binomial model (simply amount enriched vs. enriched or not).

Based on our intensive soil studies, our guiding assumption is that Classic Period Tikal Maya inherited a transformed or constructed niche, i.e., eroded soils at the footslopes and toeslopes (edge of bajos). Remote sensing in this case is used to identify the potential spatial distribution of this key soil resource. The models predicted areas with high potential for ancient maize production near the bajo edges and on foot and toe slopes around clusters of satellite settlements, suggesting that long-term

maize agricultural practices existed where they could be sustained, such as house gardens and/or highly favorable soil close to surface water. Importantly, these tests did not eliminate other areas, just identified prime areas. From this, we conclude that relatively small areas of the agrarian landscape showed high potential for continued and 'sustainable' agricultural uses. Somewhere in the 28 - 35% range of Tikal's regional landscape (see Balzotti et al 2013; Webster and Murtha 2015). Our analysis is ongoing, especially the work focused on environmental modeling. We are continuing a program of computer modeling of water using ArcSWAT and PIHMGIS.

Review and Summary Conclusions

The regional landscape of Tikal is best described as a complex mosaic with local and regional variables, like slope and topographic position, determining past land use. Even though Tikal is generally considered one of the largest Maya sites, from a landscape perspective it doesn't exhibit the sort of engineered or anthropogenic conditions that are expected of such a site. There are no landesque capital features to speak of. We estimate the peak regional population of Tikal to be somewhere in the order of 45-60,000 persons in a roughly 452 km2 area (total area density of 132 persons per km2) (Webster and Murtha 2015). This is by no means a uniform density. Regional patterns of settlement and population have begun to emerge from our recent work. Centrally, water is managed. Regionally, water is rather abundant. Environmental processes were influential throughout the development and decline of Tikal. Soil erosion due to deforestation transformed Tikal's landscape, shrinking the overall arable base, but creating a rather stable well drained agrarian niche. Tikal's upland soils on slopes have never fully recovered. The diversity in agrarian landscape spatially was likely equally varied temporally. Variable cropping systems were no doubt deployed throughout the landscape responding to annual fluctuations in precipitation.

Puleston (1973: XX) closed his dissertation with a thoughtful statement about the Maya, writing, "Surely the brilliance and magnitude of ancient Maya achievements are a reflection of an entire network of stable and harmonious adjustments to the special conditions found in the tropical forest environment." We aren't certain if all of the adjustments or human actions provided stable and harmonious adjustments to Tikal's regional landscape. But through extensive and intensive soil sampling and analysis, some traditional archaeological methods and some lessons from landscape archaeology, we are continuing to peel back the layers of Tikal's embedded landscape narrative.

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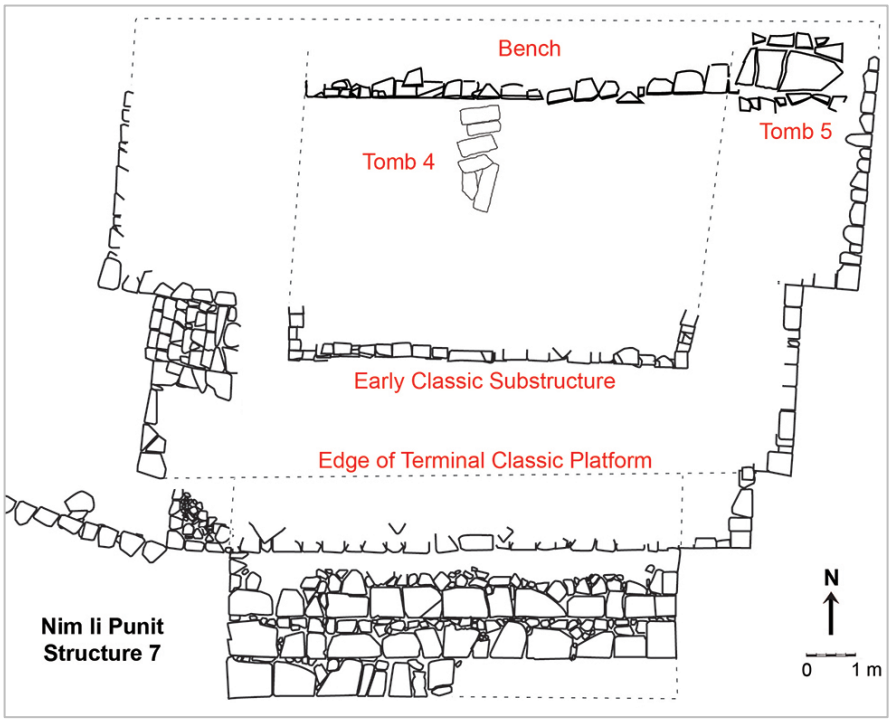
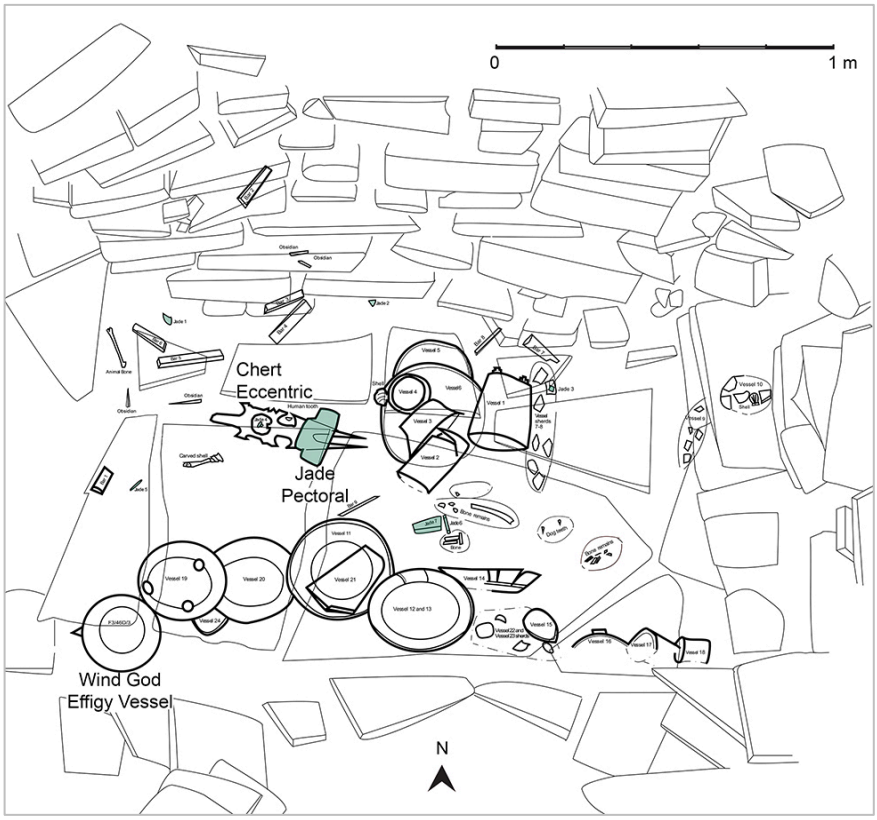
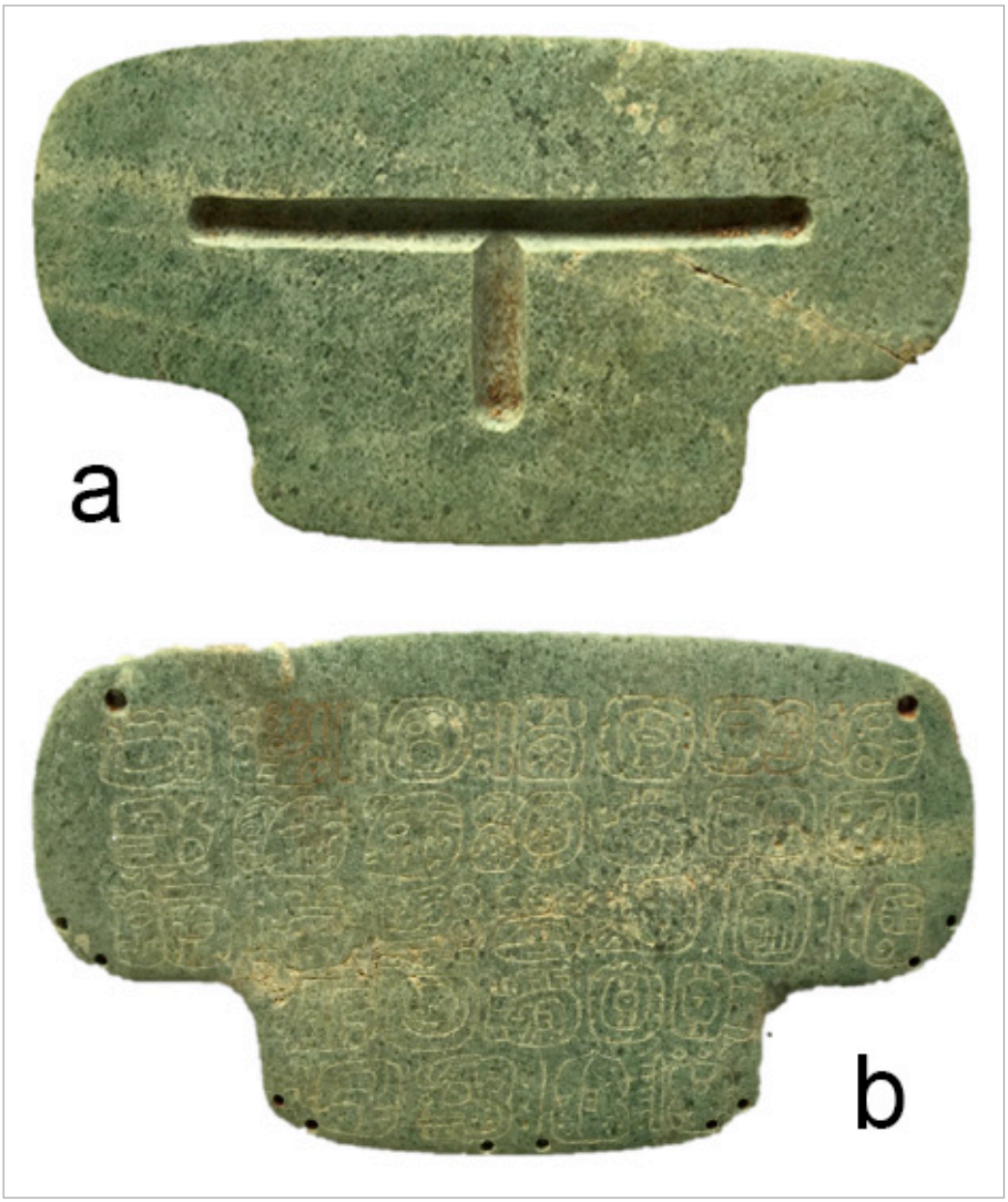
SECTION TWO: GENERAL RESEARCH PAPERS



Plan of Nim Li Punit Structure 7, showing both the T-shaped final platform (with separate stairblock and two stairside outsets) and the Early Classic substructure. Tomb 4 is shown with its capstones, Tomb 5 is shown with capstones removed. The north arrow refers to the excavation grid and is perpendicular to the first step of the reconstructed stair (drawn by Borrero, Fisher, Azarova, and Braswell).



Plan of Tomb 5, Nim li Punit (drawing by Azarova).



The Nim li Punit Wind Jewel: (a) front; (b) reverse. The pectoral measures 188mm wide by 102mm high by 8mm thick; high-resolution photographs and drawings will appear in a publication dedicated to the hieroglyphic text (photograph by Azarova).

18 IN THE PALACE OF THE WIND GOD: THE DISCOVERY OF THE NIM LI PUNIT WIND JEWEL

Mario Borrero, Maya Azarova, and Geoffrey E. Braswell

The Nim Li Punit Wind Jewel, a large jade pectoral worn by Maya kings, is one of the most spectacular ancient Maya archaeological artifacts ever found in Belize. It is the second largest carved jade known in the country; only the K'inich Ajaw Head from Altun Ha is larger. Unlike the head, the Nim Li Punit Wind Jewel contains a long and important historical hieroglyphic text. Most importantly, its discovery in 2015 was made in a fully documented excavation permitted by the Institute of Archaeology (Figure 1). Had the Wind Jewel been looted and sold to a private collector, there would be no clues that it came from Nim Li Punit or even from Belize. The Wind Jewel was dedicated in A.D. 672 and was worn by rulers during scattering rituals that occurred on important period-ending dates in the Maya Long Count calendar. It is shown in use on Nim Li Punit Stela 2 and Stela 15, which date to the eighth century, A.D. In this article, we describe the discovery of the Wind Jewel in Tomb 5, which we found in the northeast corner of Structure 7. Structure 7 is interpreted as the royal residential palace of Nim Li Punit and was built in two construction phases dating to the Early Classic and Terminal Classic periods. The tomb itself was dedicated at about A.D. 800/830, long after the Wind Jewel was first worn. In addition to the large jade pectoral, numerous other important artifacts were discovered in the tomb. Today, the Nim Li Punit Wind Jewel is kept safely in the Belize Central Bank where it is protected for future generations of Belizeans, and Structure 7 has been consolidated so visitors can better appreciate the small but important Maya dynastic center of Nim Li Punit.

Introduction

Figure 1. Excavation of Tomb 5. Three courses of stones from the collapsed south wall can be seen in the left half of the photo.

Nim Li Punit is a small Classic-period Maya center located in Indian Creek Village, Toledo District, Belize. Despite its size—fewer than sixty mounds are located within the boundaries of the protected archaeological park (Figure 2)—Nim Li Punit was an important dynastic seat of the Southern Belize Region. This is attested by the presence of eight carved monuments dating to the eighth and ninth centuries A.D., that is, the second half of the Late Classic and early Terminal Classic periods. Only Pusilha, the lone Classic Maya city in the region (Prager et al. 2014:257), has more hieroglyphic monuments that can still be read (Prager et al. 2014: 257, 267-296).

In 1976, Nim Li Punit was rediscovered and named by Dr. Joseph Palacio, the first Belizean Commissioner of the Department of Archaeology. The modern name is a literal translation of the Q'eqchi' phrase "Big [is] the Hat," coined because of the large headdress worn by the ruler depicted on Stela 14, the tallest Maya stela in Belize. Shortly after the rediscovery of the site, Norman Hammond and colleagues documented several of the carved stelae, mapped the South Group and ballcourt, and conducted very limited test excavations (for a full description, see Hammond et al. 1999). In 1985, Richard Leventhal and colleagues excavated a series of test pits at the site and mapped a larger portion of its center (Leventhal et al. 1985). Leventhal also conducted salvage excavations of a collapsed burial, Tomb 1, described in a newspaper report (Manning 1986). More than a decade later, members of the Mayan Archaeological Sites Development Programme (MASDP) excavated Tombs 2 and 3 in front of Structure 8. These were discovered during clearing operations conducted as part of a consolidation and development program designed to improve the touristic value of the site (for a general description of the work, see Larios Villareta 1998). The most detailed information available concerning the

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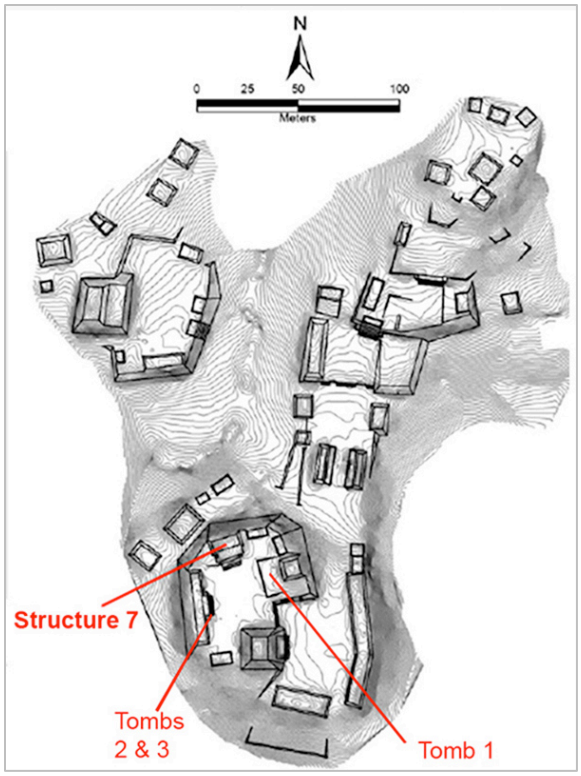

Figure 2. Map of Nim li Punit, showing the location of Structure 7 and Tombs 1-3.

excavations of Tombs 1-3 is found in signs and artifacts displayed in the Nim Li Punit Visitors' Centre.

Although archaeological research conducted at Nim Li Punit before 2010 is best described as exploratory and preliminary, the hieroglyphic corpus of the site is much better known and studied. Virginia Miller and Barbara MacLeod were the first to comment on the artistic program and hieroglyphic content of the monuments (MacLeod 1981; Miller and MacLeod 1977; see also Hammond et al. 1999). David Stuart, Nikolai Grube, Dmitri Beliaev, and Phillip Wanyerka all have made important contributions to the understanding of the Nim Li Punit corpus of monumental hieroglyphs (Beliaev 2006; Grube et al. 1999; Stuart and Grube 2000; Wanyerka 2003). Wanyerka (2003:82) reads the emblem glyph of Nim Li Punit as *Kawam*, which he takes to be a raptorial bird. Nonetheless, Dmitri Beliaev (2006) points out that three distinct emblem glyphs appear on monuments at the site, and one should probably be read *Wakaam* (on Stela 2). The individual portrayed on Stela 1 seems to carry two titles related to places or polities. Given that the candidates for emblem glyphs of Nim Li Punit are not known at other sites, it is difficult to assert which one (or perhaps more than one at different times) unambiguously was the title of local dynasts. It might very well be that some of the lords shown on the monuments of Nim Li Punit are from other places.

There are no unambiguous references to lords of any archaeologically identified sites, with the probable exception of Altun Ha, mentioned on Stela 2. Other passages on the same monument and two other stelae at the site that date to the first half of the eighth century mention lords of *Ek' Xukpi*. *Xukpi* is the main sign of the Copan emblem glyph, but it never appears with the modifier *Ek'* ('black') at that city. The *Ek' Xukpi* title was famously employed by Lord K'ak' Tiliw Chaan Yopaat of Quirigua, but is limited there to stelae that all date to a time *after* the title ceased to be used on monuments at Nim Li Punit. Thus, we do not know from where the *Ek' Xukpi* lords mentioned at Nim Li Punit came, let alone what the title implies. Finally, a phrase on Nim Li Punit Stela 21 contains the compound *ox witik* ("three roots"), which in some contexts is a toponym referring to part of the city of Copan. Wanyerka (2003:80) argues that on Stela 21 it is an indirect object, the place—Copan itself—where a Nim Li Punit ruler performed a scattering ritual. But the textual context is open to other interpretations. *Ox witik* equally may be the thing that was scattered (i.e., a direct object) or joined with the following *k'awil mo' k'inich?* as part of the name of the subject of the sentence. In sum, there are tantalizing epigraphic clues pointing towards Quirigua and Copan, but they are ambiguous and uncertain. The lack of clear references describing political relations, marriages, or warfare events with more famous Maya polities is characteristic of the texts of southern Belize. For this reason, any new text that sheds light on external connections outside of the Southern Belize Region has considerable importance. The newly discovered Nim Li Punit "Wind Jewel" is one such text.

The Toledo Regional Interaction Project

Archaeological research began again at Nim Li Punit in 2010 as part of the Toledo

Regional Interaction Project (TRIP), directed by Geoffrey E. Braswell. TRIP emerged out of the Pusilha Archaeological Project (2001-2008) in an attempt to understand how three of the major sites (Pusilha, Lubaantun, and Nim Li Punit) of southern Belize interacted with each other and formed a region (Braswell et al. 2011:116-117). Our work at Nim Li Punit commenced with a set of test pits designed to retrieve ceramic materials that would help us determine the dates of site occupation and construction (Fauvelle et al. 2012). In 2012, we excavated and consolidated Structure 8, a long range-structure that we interpret as a *popol nah* or council house. We also began excavations of Structure 7 at that time, and exposed and consolidated the west side of the structure (Fauvelle et al. 2013). We interpret that platform as supporting the royal residence of Nim Li Punit. In 2015, we returned again to Nim Li Punit to complete our excavation and consolidation of Structure 7.

The Royal Residence: Structure 7 of Nim Li Punit

Structure 7 is located at the northern end of the South Group of Nim Li Punit, northwest of and above the Stela Plaza (Figure 2). The platform and the entire plaza group are constructed atop a heavily modified hill. Structure 7 has been investigated and consolidated on three separate occasions. First, the front stair and portions of the southern wall of Structure 7 were exposed and consolidated by the MASDP (Larios Villareta1998). During the 2012 field season of TRIP, Braswell and Chelsea Fisher cleared and consolidation the western side of the structure, revealing a stair (Figure 3). We also began excavation of the core of the building and revealed a bench and floor of a substructure. We found numerous offerings beneath the flagstone flooring of the final-stage structure, which date it to the Terminal Classic period (Fauvelle et al. 2013:248-249). A crypt burial (called "Tomb 4") cut into the plaster floor of the substructure date that platform to no later than the Early Classic period, specifically about A.D. 400 (Fauvelle et al. 2013:250).

Work conducted in 2012 made clear the primary function of Structure 7 and 7-sub. These sequential platforms supported the royal residence of Nim Li Punit from the Early to

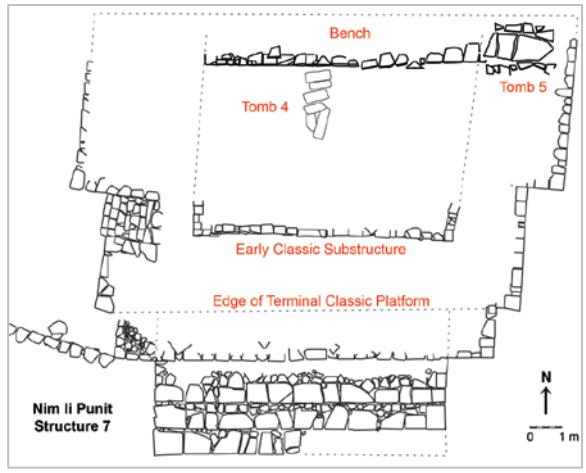

Figure 3. Plan of Structure 7, showing both the T-shaped final platform (with separate stairblock and two stairside outsets) and the Early Classic substructure. Tomb 4 is shown with its capstones, Tomb 5 is shown with capstones removed. The north arrow refers to the excavation grid and is perpendicular to the first step of the reconstructed stair.

Terminal Classic periods. This argument is based on the architectural form of the platform, the fact that it has two outbuildings associated with it (Structure 7a and Structure 6), the proximity of the platform to an eastern shrine (Structure 5), the multiple accesses to the summit of the final stage platform, and the number and kind of caches and burials encountered within the building (Braswell et al. 2012:5).

In 2015, we returned to complete excavations of Structure 7. This field season of TRIP was dedicated to liberating and consolidating the eastern side of the final-stage platform, as well as continuing excavations into the core of the structure. The purpose of this was to better understand its construction history, to discover more caches and burials, to determine the dimensions and shape of the substructure, and to better date that substructure by recovering materials from its fill that pre-date the intrusive Tomb 4.

Construction Sequence of Structure 7

TRIP excavations have revealed that Structure 7 was built in two major phases. Ceramics from a deep unit (Suboperation 40M) within the platform demonstrate that the palace plaza was inhabited at the dawn of the Classic period. In fill layers beneath Structure 7 itself, we recovered pottery with mammiform supports

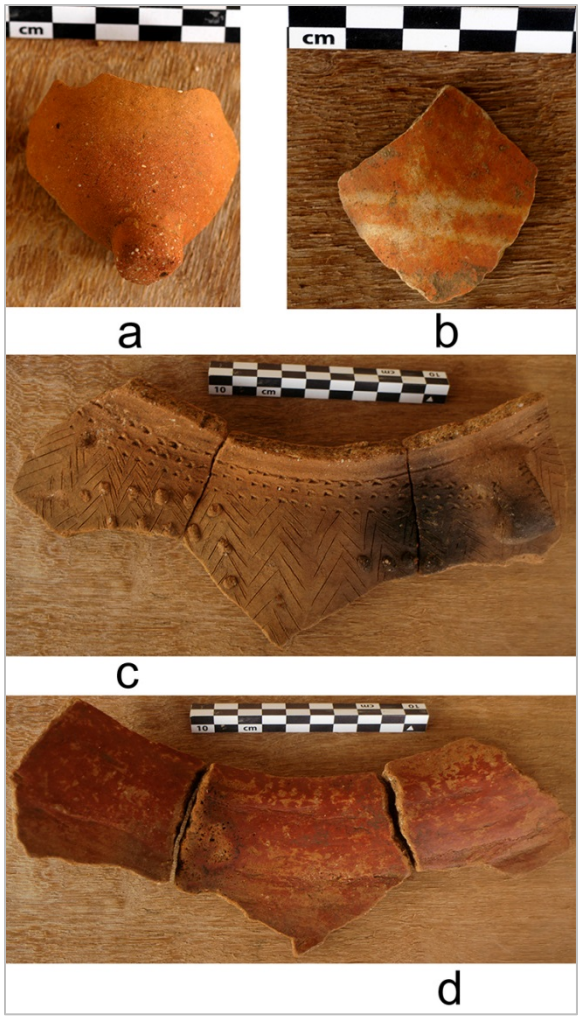

Figure 4. "Protoclassic" pottery from the fill within and beneath Structure 7-sub. Note mammiform supports (a-b) and resist decoration (b); (c-d) are images of the outer and inner surfaces of three sherds that have a thick waxy slip on their inner surface.

and Usulutan resist decorations (Figure 4), and even some sherds with thick "waxy" slips, alongside more typical Early Classic polychromes. We date this transitional Terminal Preclassic/Early Classic material to what we tentatively call the Early Classic I phase (Irish and Braswell 2015:273-274), but now extend backwards in time that phase to about A.D. 150-400. The earlier initial date is supported by the presence of typical "Protoclassic" modes. This pottery from fill below and within Structure 7-sub is among the oldest known from any habitation site in the Southern Belize Region, and is fully as old as published materials from Uxbenka (Jordan and Prufer 2014).

No clear floor was found beneath Structure 7-sub. This implies that it was constructed at the same time as the supporting platform was raised and leveled. Structure 7-sub is a rectangular building measuring 9m in length (east-west) and at least 6m in width (north-south). The northern side of both Structures 7 and 7-sub long ago fell down the slope of the hill. The platform wall consists of about 14 courses in a single straight body that stands 187cm high. This rectangular platform was topped with a plaster floor and a bench feature that ran the length of the back north side of the building (Figure 3). The building faced south and must have had a stair on that side facing the plaza. Excavation just south of the Structure 7-sub platform wall did not reveal a stair block, so we assume it was removed as part of the remodeling process. We observed the partial to complete removal of stair blocks in Stages I-III of Structure 8 (Fauvelle et al. 2013:247, Figure 6). We assume that some sort of perishable structure was built on top of Structure 7-sub covering the bench and at least most of the plaster floor on top of the platform. We did not find any traces of walls or postholes.

A curious burned feature was found across most of the mound within the fill of Structure 7-sub. This is below the level of the topmost stones in the platform walls and beneath the plaster floor of the substructure. The most likely explanation is that a large fire was built within the fill as part of a dedication activity during construction. We also have considered the possibility that Structure 7-sub was once lower than its maximum height and burning occurred on top of it before a vertical expansion stage increased the height of the platform. But there is no evidence of a floor at the level of the burning and we can find no clear line in the masonry that implies that the walls of the substructure were ever added on to build them higher.

Structure 7-sub was modified around A.D. 400 when the plaster floor on top was cut into and the burial crypt "Tomb 4" was placed in the core of the platform (Figures 3 and 5). The walls of this crypt were constructed of vertically placed stones that held up a series of six capstones. When we excavated Tomb 4, four capstones ran across the width of the tomb and

Figure 5. Nim li Punit Tomb 4 with the capstones still in place. The cut through the plaster floor of Structure 7-sub, made to open the tomb during the Terminal Classic remodeling stage, was not patched in ancient times; photo board rests on the Early Classic bench.

two more were placed at its foot in a V-shape. Given that Tomb 4 was re-opened in Terminal Classic times, we cannot be sure that this was the original arrangement. We date Tomb 4 to about A.D. 400 because of the three slab-footed, direct-rim tripod vases found within it (Figure 6; Fauvelle et al. 2013:250, Figure 8). In the southern Maya lowlands, these are most often found in tombs dating to A.D. 378-450. A large chert eccentric, two large cowrie shells, a monochrome plate, and a few very small green-painted shell beads imitating jade also were found within the crypt. After the crypt was constructed, the floor of Structure 7-sub was re-plastered above it, diminishing the height of the bench by a small amount.

The next major modification to the platform occurred when the final stage of the Structure 7 platform was built. This certainly occurred after A.D. 800 and probably sometime around A.D. 830. This date is deduced from the presence of pottery belonging to the Pabellon Modeled/Carved supersystem found within the fill of the addition and in Tomb 5. The Terminal Classic construction episode marks a major overall symbolic change for Structure 7. First, the perishable superstructure was removed and the stair block in the south leading to the plaza was completely taken apart. At this point, the workers enclosed the original rectangular platform of Structure 7-sub within a T-shaped platform (Figure 3). This was built by creating a larger frame of walls on at least three sides of Structure 7-sub. The new T-shaped platform completely enclosed the earlier rectangular Structure 7-sub, and at no location do the new exterior constructions abut or come into contact with the older structure (except perhaps on the now collapsed north side of the building). On the west side of the structure, a small stair was built to allow access to the top of the platform. At the southern side of the platform, a wide stair block served as the principal access to the top. This was flanked by two small stairside outsets. The eastern side does not include a small staircase. Instead, at the northeast corner of the platform a wall was constructed that connects Structure 7 to Structure 7a. At least two steps lead up on it from the top of Structure 7a, thus providing access to the northeast corner of the summit of Structure 7. Workers built a drain into the connecting wall, allowing water to flow northwards out of the plaza and off the hilltop.

In addition to expanding the footprint of the platform, Terminal Classic remodeling built it upwards. Because of collapse, we were able to consolidate the eastern wall of Struture 7 only to a height of 172cm above the plaza surface (it extends another course deeper into and below the plaza floor). The slumped top of the mound is about 1m higher than this. Thus, the final stage platform stands roughly 90cm above the top of Structure 7-sub. The space between the walls of the newly constructed T-shaped Structure 7 platform and rectangular Structure 7-sub was packed with fill stones of varying sizes and with earth fill.

Several lines of evidence imply that at this time, Early Classic Tomb 4 was re-opened and some of the offerings in it—including a Dos Arroyos polychrome plate (Fauvelle et al.

Figure 6. Three direct-rim tripod vases from Nim li Punit Tomb 4. The two brown-black vessels were made in the Maya lowlands, but the origin of the central stuccoed and painted vessel is not yet known.

2013:250), many of the small green-painted shell beads (some of which were left in Tomb 4), and some human bones—were removed, rededicated, and reinterred in caches elsewhere in the new platform. The plaster floor that once covered the capstones was cut and not patched. Instead, a crude retaining wall and fill of the new Structure 7 platform were placed directly above its capstones.

As the platform was expanded and filled, a series of offerings were placed within the fill of its final stage. Some of these were found along the centerline (i.e., south of and above Tomb 4), but most were placed in fill above the Early Classic bench, especially along its eastern two-thirds. Some of these offerings were placed within a crude cache box made of crude retaining walls constructed above the bench and the northern end of Tomb 4 and west of Tomb 5 (we call this cache box Feature 3/46N/8 and refer to it as a "crypt" in Fauvelle et al. 2013:248-249). Other small offerings—usually of one or two vessels, often with teeth, sting ray spines, or even green-painted beads that had been removed from Tomb 4—were found at shallower levels to the east and west of Feature 3/46N/8 and above the bench.

Near the eastern end of Structure 7, the Early Classic bench was extended directly over Terminal Classic fill, that is, beyond the original bounds of Structure 7-sub. Smaller and more rustic stones were used for this extension. On top of this was built the single most important feature discovered in Structure 7: Feature 3/46P/2 or "Tomb 5" (discussed in more detail below).

After the platform walls were built, fill placed, and Tomb 5 and the other offerings were dedicated, a stair block was added to the south side of the platform. The platform was surmounted by a low superplatform accessed by two rows of stone blocks (Features 3/42M/1 and 3/42/M/2). The top of the superplatform was paved with flagstones to form a floor. The capstones of Tomb 5 form part of this flagstone flooring. If this surface was plastered, all traces have since disappeared. We imagine that a perishable superstructure completed the building and that it served as the royal residence during the very last decades of occupation at Nim Li Punit.

Nim Li Punit Tomb 5

In 2012, Braswell and Fisher noted the presence of a large capstone on the surface of the northeast corner of Structure 7. They considered the possibility that a tomb might be present, but the capstone is much smaller than

those used in Tombs 1-3. Moreover, the placement of a major tomb near the surface at the back corner of a platform seemed unlikely. Because of time constraints, Braswell decided to postpone exploration of this portion of Structure 7 to a later season when all of the eastern side of the platform could be excavated and consolidated.

Exploration of the core of Structure 7 commenced in 2015 with the re-opening of the 2012 excavations down to the level of the Early Classic bench and the floor of the substructure. We next expanded our excavations eastward, in an effort to trace the bench to the eastern edge of the platform and to reveal more caches in the Terminal Classic fill above. In the eastern profile of the first new unit and at the level of the bench, we revealed an intact vessel belonging to the Pabellon Modeled/Carved supersystem. We call this pear-shaped vessel the "Wind-God Vase" because it depicts a Late to Terminal Classic Maya version of the deity of music, merchants, and the winds that bring the monsoon rains (Figure 7a). Karl Taube (personal communication, 2015) suggests that it probably was a ceramic drum. For stylistic reasons, this vessel certainly dates to after A.D. 800 and probably to A.D. 830 or so, which in turn provides further evidence that Structure 7 final was built in the Terminal Classic period.

Because of this find—and the presence of capstones on the surface east of the location of the vase—we expanded excavations in that direction. Upon clearing overburden on top of the capstones, the tops of a collapsed southern wall (north facing) and slumped northern wall (south facing) were exposed, defining the long axis of Tomb 5. The Wind God Vase, which was located flush with the southern wall, was preserved because that wall had collapsed into the tomb in such a way as to create a shield above the vase. The western wall—which should have been encountered during and before the excavations that revealed the Wind God Vase—was not identified. We surmise that it had totally collapsed and that we removed the stones that constituted it without noting a fall pattern as we cleared downwards to the Early Classic bench, that is, before we knew of the tomb or of other walls. Further excavation revealed that the eastern wall (west facing) of

Figure 7. The Wind God Vase (a) and large chert eccentric (b) found in Tomb 5, Nim li Punit.

Tomb 5 consisted of two steps leading down into it.

Contents of Tomb 5

Outside and above the tomb proper we recovered 574 ceramic sherds, one piece of obsidian, 13 chert artifacts, one whole *P. indiorum* shell, and two jade bead fragments. We also found 10 enigmatic stone bars, three stone bar fragments, five figurine fragments, and what we first interpreted as an isolated offering. This consists of a small chert eccentric that is a nose ornament and a fragment of a carved jade *sak hunal* pendant (Figure 8). The latter were worn as diadems in the headdresses of Maya kings and are common items in royal Maya tombs.

After removing the capstones, we change lots and continued our excavation into Tomb 5 itself (Figure 9). Within the tomb (but excluding specific vessels shown in Figure 9) we collected 893 isolated ceramic sherds, 30 pieces of obsidian, two pieces of chert, one package of human remains, one whole *P. glaphorus* shell, one whole and 10 fragmentary *P. indiorum* shell, one whole and one fragmentary *S. pugilis* shell,

Figure 8. Chert nose ornament (a) and fragments from two sak hunal pendants (b). The nose ornament and one of the pendant fragments were found above the slumped capstones of Tomb 5, the remaining fragments were found within the tomb.

20 other fragmentary faunal specimens, one piece of coral, one stone bead, one exhausted obsidian core, three obsidian blades (at least two of which are bloodletters), and a few figurine fragments. A fragmentary and poorly preserved *Strombus* shell is carved, perhaps with glyphs. Also recovered were nine whole stone bars of the same kind sort found above the capstones, for a total MNI of 20 (Figure 10).

These bars are made of sedimentary limestone and most appear to be painted or dyed dark red on one or both ends. In form, they closely resemble whetstones, but they certainly did not serve that purpose. We consulted with several scholars about their function. Chase and Chase state that such bars appear widely at Caracol, and that they "were utilized both for ritual purposes and probably as spacers for making net bags out of perishable fibers and plants (Chase and Chase 2015:18, Figure 6). This is as good an explanation as any, although it is hard to understand why they are painted red on their ends or why such a utilitarian artifact would appear in a tomb in such quantities. We speculate—and it is only speculation—that they are representational devices akin to axe money and that their caching removed a certain amount of wealth or obligations from circulation.

A total of 25 vessels were found in Tomb 5 in three distinct locations (Figure 9). The first of these is a line of vessels—ending in the west with the Wind God Vase—along the southern wall. A second concentration was located near (but not against) the northern wall close to the center of the tomb. Two more very fragmentary vessels were found associated with the steps leading down to the chamber. With the exception of the Wind God Vase (now in a display case at the Nim Li Punit Visitor's Centre) and a couple of small, highly eroded bowls, most of the pottery was broken. Pending analysis—which will begin in 2016—we cannot yet say with certainty that there are only 25 vessels. Roughly half of the vessels are Belize Red, including at least one vase in a pear-shaped form. Because Belize Red does not appear in the Southern Belize Region until about A.D. 800, these, too, help date the context to the Terminal Classic period. The remainder are polychromes, most of which are highly eroded.

Several jade items were found within the tomb. These include two tubular beads, two earflares or other ornaments, a bead fragment, two more fragments from carved *sak hunal* diadems, and a beautiful celtiform wedge or chisel placed near the center of the tomb (Figure 11). The most significant artifacts, however, are a large intact T-shaped jade pendant placed on top of a chert eccentric (Figure 7b). The latter was snapped in two places when the southern wall collapsed on top of the pendant.

A human tooth was found inside one of the two "eyes" of the large eccentric, and a second human tooth was recovered on the floor near the northwest corner of the tomb. Tomb 5, however, did not contain a complete set of human remains. Indeed, we call it a tomb because of its formal characteristics (coursed walls spanned by capstones) and not because of its contents. Just east of the jade celt, two small concentrations of very poorly preserved bones were found, but we are not yet sure if they are

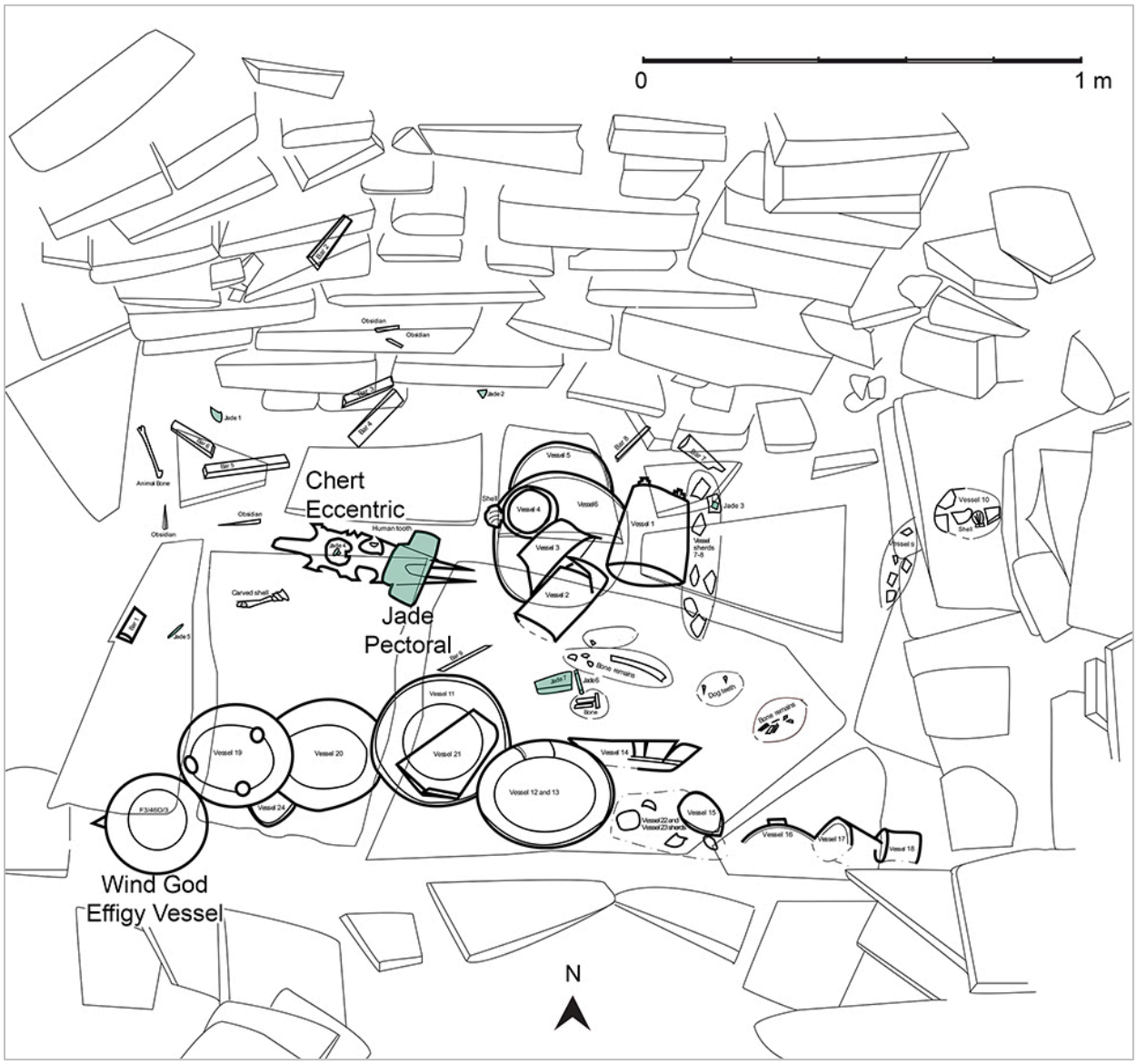

Figure 9. Plan of Tomb 5, Nim li Punit.

Figure 10. Seven limestone bars from Tomb 5, Nim li Punit. Compare with Chase and Chase (2015:Figure 6).

human. In fact, two dog canines were found associated with one of these concentrations.

The absence of a clear set of human remains is certainly not a result of preservation. Such remains (a partial set) were found about 5m away in Tomb 4. Thus, we interpret the ritual context of Tomb 5 as a large dedicatory cache and not as a primary interment. It could be that the scarce remains—if they are, indeed, human—were moved from the Early Classic Tomb 4, which was opened during the construction phase of the final-stage platform. In sum, Tomb 5 *could be* a rich secondary

burial, but it also is the result of a dedication ritual for the last construction phase. Most importantly, it is a Terminal Classic cache containing new pottery and some of the most valuable heirlooms of the Nim Li Punit dynasty.

We continued our excavations beneath the flagstone floor of Tomb 5. Here we recovered a few small items including 43 ceramic sherds, two obsidian fragments, two chert pieces, two *S. pugilis* shells, and one package of faunal remains. Some of these items may have filtered down from the tomb, others may have been incorporated in the fill that supported it. After excavations were complete, we consolidated the collapsed south wall of Tomb 5, replaced the flagstones, backfilled the tomb, and replaced the capstones.

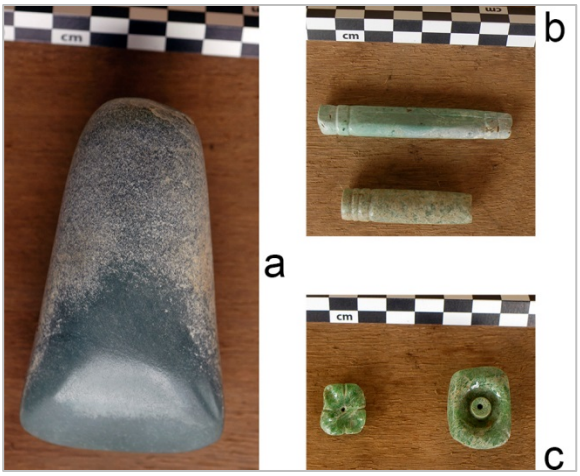

Figure 11. Jade celtiform wedge or chisel (a), tubular beads (b), and earflares or other ornaments (c), from Tomb 5, Nim li Punit.

The Wind Jewel Pectoral

The jade pendant—really a pectoral—is 188mm wide, 102mm high, and 8mm thick (Figure 12). Although much less massive than the famous jade head from Altun Ha, its maximum dimension surpasses that of the head. In two ways, the pectoral is a much more technologically impressive creation. First, its shape is entirely different than the form of a jade nodule. It is completely flat and is a very thin slice with perfectly parallel surfaces. Second, a 4mm wide hole was drilled through the entire length of the 8mm thick pectoral and emerges at both ends of the crossbar of its T-shape (not visible in Figure 12). This must have been both time consuming and painstaking. The hole served to thread the cord that supported the pectoral.

The T-shaped form of the pectoral is the *ik'* sign, and a large *ik'* glyph is carved across its front side (Figure 12a). *Ik'* is the Mayan word for wind. For this reason, we call the pendant the Nim Li Punit Wind Jewel. The T-shape of the Structure 7 platform echoes the form of the pendant, and the Wind God Vase provides further emphasis tying Tomb 5 to the winds that bring the rains.

The reverse of the pectoral is carved with 30 hieroglyphs (Figure 12b). The text consists of three rows of seven glyphs above a row of five glyphs and a final row of four glyphs. When worn, these 30 glyphs would not have been visible; it is a private text. Nonetheless, the

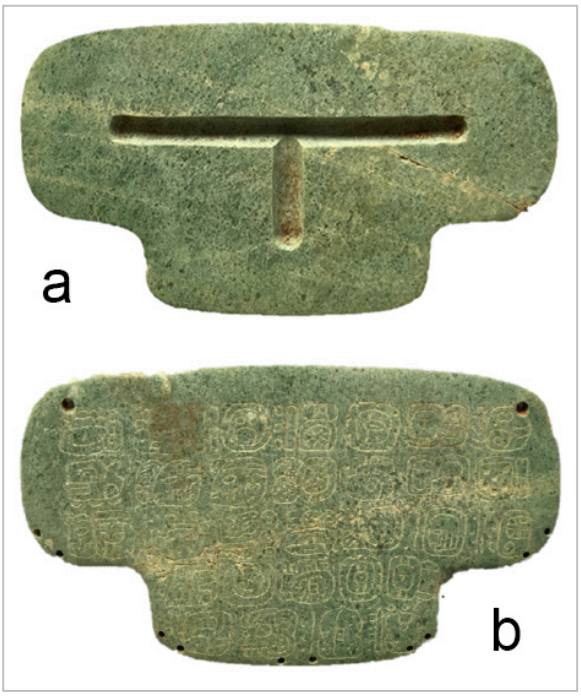

Figure 12. The Nim li Punit Wind Jewel: (a) front; (b) reverse. The pectoral measures 188mm wide by 102mm high by 8mm thick; high-resolution photographs and drawings will appear in a publication dedicated to the hieroglyphic text.

inscription was found facing upwards in Tomb 5. Perforating the reverse of the pectoral and emerging diagonally from its thin edges are 12 additional holes. Six of these actually perforate the inscription, indicating that they were added after the text was incised. Two holes near the top may have helped to suspend the pectoral, but

five sets of two probably supported tinklers of jade or shell.

Christian Prager and Braswell have prepared an article about the hieroglyphic text that is currently (1 January, 2016) under review. We reserve complete discussion of its interpretation for that article, but note here that it is historical in nature and is comprised of a discussion of the wearer and his parents. It points to family connections not in Quirigua or Copan but to the north and northwest. The text contains a dedicatory date of 10 Ajaw 8 Yaxkin, which correlates to A.D. 672. This makes it the oldest inscription yet known from Nim Li Punit. Thus, the Wind Jewel was about 150 years old when it was interred in Tomb 5 during the early ninth century. Most intriguingly, Stela 2 and Stela 15 of Nim Li Punit display elites—probably rulers of the site—wearing the actual pendant while conducting ritual scattering events (Figure 13). These two monuments depict scattering events in A.D. 721 and A.D. 731, two and a half and three *k'atuns* (roughly 50 and 60 years) after the text was carved. Thus the Wind Jewel was an important heirloom of the kingdom of Nim Li Punit that was used for generations after it was first carved and finally buried near the end of occupation of the site.

Figure 13. Nim li Punit Stela 15 showing a ruler wearing the Wind Jewel and the jewel itself.

Jade and the Maya

Jade *sak hunal* diadems, necklaces, belt celts, anthropomorphic and zoomorphic pendants, ear flares, and beaded skirts are traditionally linked to images of Maya rulers, in fact, as noted by Karl Taube, "one of the more common ways of portraying the abject and pathetic state of captive elites is to have them stripped of their jade finery" (Taube 2005:23). Jade is often related to a wide range of interrelated concepts of kingship and authority, wealth, prestige, water, maize, cosmological centrality, and immortality (Taube 2005:25). The Nim Li Punit pectoral is particularly interesting because it associates jade with wind. The ancient Maya identified jade with the essence or the breath of life, so by putting a jade bead in the mouth of the dead as a burial practice, jade became the "breath spirit essence of the deceased" (Benson and Griffin 1988:225). Jade also could be viewed as a replacement for a human heart that bestows vitality to the dead, and hence, was an essential element in burials.

As noted by several scholars, jade pectorals portraying the *Ik'* wind sign appear both in Maya art—on stelae and in stucco (Finamore and Houston 2010:122)—and as actual objects. The latter include a pectoral from Calakmul (Taube 2005:33) and perforated plaques from Chichen Itza (Proskouriakoff 1974:150–151, 159). According to Taube, four earspool wind-signs placed around a floral form, a motif found on Naranjo Altar 1, a carved bone from Tikal Burial 116, and a Late Classic vessel in the Museo Popol Vuh could all refer to the winds of the four directions that bring the precipitation needed for life. Hence, caches featuring four jades placed around a central element may depict not only the cardinal world directions and the center, but also the directional winds (Taube 2005:32–34). The *ik'* sign may also refer to the breath essential to performing music. For this reason, it appears on rattles, drums, and other musical instruments (Looper 2010:159). Jade belt-celts, which typically hang as tinklers in sets of three, also sometimes display the *ik'* sign and possibly refer to a clinking sound they make upon movement, or

"jade acoustical qualities" (Taube 2005:32). The interpretation of many jade pendants as wind jewels relies on their appearance as "pendant bar-and-bead assemblages," which probably depicted "drops falling from cloud-making wind" (Taube 2005:34). Tinklers suspended from the holes in the Nim Li Punit Wind Jewel could have represented such drops. The *ik'* shape of some pendants makes this connection all the more clear.

We suggest that the T-shaped pendant from Nim-li-Punit has a significant relation to shell-shaped pendants and "Olmec spoons." Such jade spoons and shells are known from Olmec offerings on the Gulf Coast, tombs in the Maya Lowlands, and even from offerings of avian axe pendants in Costa Rica (Andrews 1987:79). Some of the Formative shell-shaped pendants are wider than they are tall and contain a protruding element facing downward. Most shell-shaped Formative pendants represent bivalves, such as the jewel from Nakum Tomb 1 (Źrałka et al. 2011) or a stylized T-shaped razor clam pendant discovered by Norman Hammond at Cuello. But at least a few represent conch shells cut longitudinally. The Postclassic wind jewels worn by the priests of Ehecatl/Quetzalcoatl, of course, were spiral sections of actual conch shells. Thus, there is a demonstrated link between the god of the winds, shells, jade, breath, and water.

We argue that Late Classic pendants like the Nim Li Punit Wind Jewel evolved out of these earlier forms. Over time, the plaques became flat rather than concave like a shell, and the T form became more pronounced. Thus, jade *ik'*-shaped pectorals link concepts of life, the heart, and breath to shells, wind, water, and the rains.

Conclusions

Excavations in Nim Li Punit Structure 7 conducted during 2012 and 2015 have led to a wealth of information. First, we have recovered from deeply penetrating excavations ceramics that indicate the site was occupied at the very dawn of the Early Classic period. "Protoclassic" modes and waxy-slipped pottery—found mixed with early polychromes—imply a date of about A.D. 150 for the oldest known occupation of the site. This pottery is every bit as ancient as anything else yet known from habitation sites in the Southern Belize Region. As at Uxbenka (see Jordan and Prufer 2014), we have yet to find an unmixed, pure deposit of Late Preclassic sherds.

Our work in 2012 suggested that the Structure 7 platform likely supported a domicile. What is more, and given the location of the platform and the presence of two important tombs in it, Structure 7 likely was the location of the royal residence of Nim Li Punit. Our excavations have revealed that the platform was built in two major construction episodes. The first took place sometime in the first half of the Early Classic period, specifically A.D. 150-400. Tomb 4, cut into the platform, most likely dates to around A.D. 378-450, placing an upper date on the construction of the substructure. Three pottery vessels in a form best known from Teotihuacan were found in Tomb 4, but at least two of them were made in the Maya lowlands.

The platform remained largely unchanged until A.D. 800 or slightly later. During the Terminal Classic period, the entire platform was encased in a T-shaped structure. Tomb 4 was opened up and some of its contents were moved and re-deposited alongside Terminal Classic artifacts in a series of caches. Most spectacularly, Tomb 5 was constructed. It is the richest tomb yet discovered in Southern Belize, and contained three artifacts of particular note: the Wind God Vase, a spectacular supernatural chert eccentric, and the Nim Li Punit Wind Jewel. The last is the second largest jade artifact ever legally excavated in Belize and contains an important historical inscription that Christian Prager and Braswell will analyze in a subsequent publication.

The final form of the Structure 7 platform, the Wind God Vase, and the *ik'*-shaped Wind Jewel link Tomb 5 to the winds that bring the summer monsoon and life. By the time the jewel was buried in Tomb 5 it was already 150 years old. Roughly 100 years earlier, it was depicted on two stelae showing kings performing important scattering rituals. There can be no doubt that it was one of the most important royal heirlooms of Nim Li Punit.

Acknowledgements We gratefully thank the Institute of Archaeology, especially Director Dr. John Morris, for permitting our research and

Figure 14. Archaeological excavators from Indian Creek and 2015 staff of TRIP. Left to right: Juan Mas, Arsenio Shol, Santiago Sam, Domingo Acal, Jose Sho, Maya Azarova, Victor Mas (holding the Wind Jewel), Mario Borrero, Santiago Akal, and Sebastian Mas.

providing tremendous support to us upon the discovery of the Wind Jewel. Our research was entirely supported financially by the Faculty Senate of the University of California, San Diego. We thank the many members of the community of Indian Creek, Toledo District, for their years of work on the Toledo Regional Interaction Project (Figure 14), as well as the staff at the Nim Li Punit Visitor's Centre. We also thank Chelsea Fisher for her work on Structure 7 in 2012. Finally, we thank Mr. Robert Hirons of the Lodge at Big Falls for supplying a temporary safe place for the Nim Li Punit Wind Jewel before the arrival of authorities representing the Government of Belize. The Nim Li Punit Wind Jewel is now at the central office of the Belize Central Bank where it shares companionship with the Jade Head of Altun Ha.

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19 CLAIMING PLACE AND SHAPING IDENTITY IN THE HINTERLANDS: EXCAVATIONS AT KAQ'RU' HA', TOLEDO DISTRICT, SOUTHERN BELIZE

Claire Novotny

The Maya Mountains region of southern Belize is crucial for examining social identity among ancient Maya settlements during the Classic period (AD 250-900) because of its cultural and geographic marginality. It is often the spaces and regions in-between perceived centers of power and influence that produce dynamic expressions of identity through their diverse social relationships. The first goal of the Aguacate Community Archaeology Project (ACAP) was to illuminate the ancient economic and social relationships between political centers and hinterland settlements in the Maya Mountains region and investigate the construction of a regional social identity during the Classic period. Excavations were conducted at a complex multi-component site called Kaq'ru' Ha' located on Aguacate land; this paper presents my analysis of architecture, ceramics, lithics, and mortuary patterns in order to argue that Kaq'ru' Ha' was constructed during the Early Classic period (AD 250-600) and was most closely affiliated with Uxbenká and, later, the Lubaantun social and economic spheres. These data show that rural sites were participating in a region-wide social identity, while maintaining a strong connection to a local landscape.

Introduction

Political interactions that fueled the construction of ancient Maya cities have been a focus of the discipline from its inception. Epigraphic sources, tombs, and artifacts from paramount centers such as Tikal and Copán have elucidated the various political alliances, wars, trade, and ritual practices that constructed a vibrant Maya social world (e.g., Canuto, Bell, and Sharer 2004; Sabloff 2003). As the discipline has expanded its understanding of Maya society there have been more investigations of the myriad "minor centers" and households that blanket the landscape of the southern lowlands (Robin 2012; Yaeger 2010; Ashmore, Yaeger, and Robin 2010; Willey et al. 1965). These investigations have shown us not only the variability and complexity inherent in Maya settlements but also how the people inhabiting smaller sites shaped the political dynamics of their regions. In this paper, I will report excavation data from Kaq'ru' Ha', a Classic period (AD 450-800) site in the Maya Mountains region, southern Belize, that furthers our understanding of how rural communities participated in regional political systems and maintained notions of social identity.

The Aguacate Community Archaeology Project

Starting with the idea that rural communities actively shaped the politics of their regions, the Aguacate Community Archaeology Project (ACAP) was established to investigate the role of hinterland communities in the sociopolitical and economic system of the Maya Mountains region of southern Belize. A second, but equally important, archaeological goal was to investigate the construction of a regional social identity during the Classic period. A third goal was to engage the Q'eqchi' community of

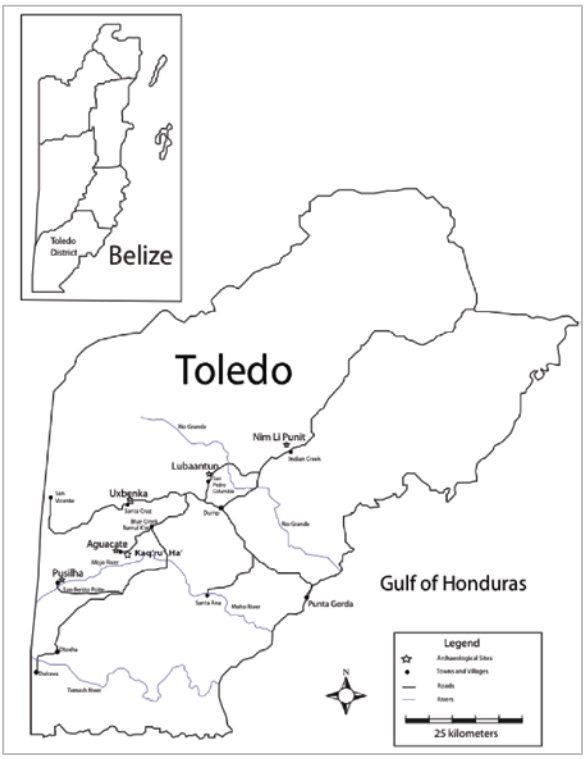

Figure 1. Map of Belize and the Toledo district, showing locations of archaeological sites mentioned in the text.

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Aguacate in the archaeological research process. The results of the community engagement, though ongoing, are reported elsewhere (Novotny 2015); this paper will focus on the archaeological results.

Like most regions of the southern lowlands, archaeological investigations in the Maya Mountains to date have focused on the political centers (Braswell et al. 2005; Leventhal 1992; Prufer et al. 2011; Hammond 1975). These investigations have provided a chronological framework and shared architectural and ceramic patterns that led to Richard Leventhal's (1992) claim of a "regional tradition" linking political centers. The goal of ACAP was to address this claim from the perspective of those dwelling outside of the polity capitals of the Maya Mountains.

ACAP investigations focused on the site of Kaq'ru' Ha' (Red Water, in Q'eqchi' Maya), a site with domestic and administrative components located on Aguacate community land in the western Toledo district (Figure 1). This paper uses architectural, ceramic, and mortuary analysis to argue that the residents of Kaq'ru' Ha' were participating in regional sociopolitical and economic systems and maintaining control of local resources. The research presented here also demonstrates that regional social identities may have shifted over time.

Archaeology in the Maya Mountains Region

In order to exploit the valuable natural resources of the Maya Mountains region, the four political capitals of Lubaantun, Nim Li Punit, Pusilhá and Uxbenká were strategically located in an intermediate zone between the coastal plain and the Maya mountains, proximate to the richest soils and on top of ridgelines or hills (Hammond 1975:98). AMS radiocarbon dates from the Uxbenká civic center and the surrounding settlements date the founding of the site to the Late Preclassic period (AD 80), making it the oldest known site in the region (Prufer et al. 2011). Other evidence of an early occupation includes Early Classic (AD 250-500) stelae and associated monumental architecture at Uxbenká (Prufer et al. 2006; Wanyerka 2009), as well as Early Classic ceramics recovered from cave contexts (Braswell et al. 2005:67; Dunham et al. 1989:268). The Late Classic was a period of florescence for the Maya capitals of southern Belize; they experienced unparalleled levels of growth and monumental construction. For reasons that remain unclear, by the end of the Terminal Classic period (AD 800-1050) these cities were steadily depopulated except for evidence of an ephemeral Postclassic presence at Pusilhá and strong evidence for coastal trade (Braswell et al. 2004:227; McKillop 1996). Material evidence of participation in wider trade routes and the Late Classic Maya cultural sphere include imported polychrome ceramics, architectural styles, and nonlocal goods such as crafted jade and obsidian blades and cores.

For the purposes of this study, the material correlates of sociopolitical integration and regional social identity include: 1) sites constructed on modified ridges or hills located along waterways or natural corridors, 2) ceramic types that illustrate trade and identity, and 3) burial patterns that are emblematic of a regional social identity. Structures, ceramics, and burials can be used purposefully by people to invoke meaning and to structure social interactions; "material culture is used actively to have an effect in the social world" (Hodder and Cessford 2004:28; see also Hodder 2012). Engagements between socially informed actors, the objects they produce, and broadly accepted social networks create identities. This perspective is critical when interpreting past behaviors because it links social identity to material production and practices.

The Kaq'ru' Ha' Built Environment

Kaq'ru' Ha' was constructed on a modified slope rising above a seasonal swamp with a semi-permanent pond. The pond draws animals as a water source, especially peccary (wild pig), hence the name Kaq'ru' Ha' (Red Water) given to the area by local hunters. The site rests on a slope extending from a natural cliff, which forms the southern boundary of the site. Kaq'ru' Ha' consists of three terraces with two to three structures framing each terrace (Figure 2). Kaq'ru' Ha' served both ceremonial and residential functions based on Hammond's (1975:75) interpretation that residential structures are, on average, 1.2m in height while

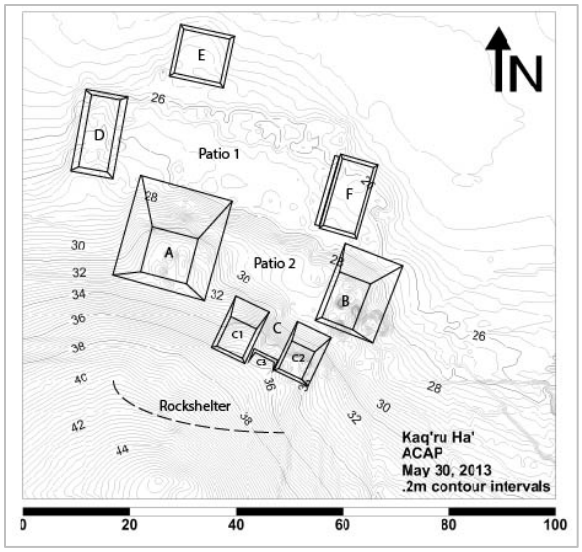

Figure 2. Map of Kaq'ru' Ha' showing structures and patios.

ritual structures are 5m in height or greater. The structures at Kaq'ru' Ha' fit into this designation (see below).

Kaq'ru' Ha' is comprised of two terraces and one monumental platform supporting a total of nine structures (Figure 2). Surface collections indicate that the site consisted of a household as well as administrative or ritual buildings. The terraces use a natural hill slope to elevate the structures over the surrounding floodplain of Aguacate Creek. The dramatic cliff face would have been a significant feature on the landscape, as would the site, since it is the only instance of monumental architecture in the study area.

Structure A

Seven meters in height, Structure A is the tallest building at Kaq'ru' Ha'. The dimensions of its summit architecture are 6m x 6m, and it is oriented to the east, where it faces Structure B across a patio. The building phases of Structure A reveal a lengthy and significant investment in the remodeling of the building. Altogether, four construction phases were identified. Based on the stratigraphic and architectural evidence presented here, this building may have functioned as a residence at one point, but was remodeled into an ancestor shrine. Artifact analysis supports this claim (see next section).

The original basal platform of Structure A, though not excavated completely, was likely rectangular in shape. The stratigraphic sequence reveals that the summit was increasingly restricted until its final construction phase that features a square summit with an area of $6m^2$; the structure is more pyramidal in shape in its final form than rectangular. The third construction phase included the sequential interment of seven individuals (Figure 3; Table 1). As subsequent remodeling and re-flooring expanded the structure, the sacred and the residential became conflated, creating a domestic mausoleum.

The radiocarbon dates also suggest that the individuals were interred over a relatively short span of time during the Late Classic period. If the structure was used as a residence in between burial events, then we would expect to find well-defined floors of packed earth or lime plaster to support a living surface and household activities such as cooking, crafting, or resting. There was very little soil in between the burials (Figure 4), and very few artifacts, suggesting that it had a specialized or ritual function during this stage. Furthermore, the transition between what I am interpreting as a residential function and a ritual function is defined not only by the burials, but by a thick level of artifact-free soil (see Figure 4). While domestic refuse was found as part of construction phases in other buildings (e.g. the step of Structure B, see below), clean soil and clay fill was used at Structure A.

Structure B

Excavations at Structure B and the surrounding patio indicate that its function was a residence. The basal platform is rectangular and its summit area is $12m^2$; though the retaining wall forming the east side of the structure reaches to 4m, the basal wall on the west side is a relatively low 1m. A natural hillslope was modified with clay fill as well as cultural material and limestone rocks to construct a flat surface on which to build further structures. Excavations on the east side of Structure B revealed a series of steps built of partially modified limestone blocks connecting Structure B to the lower terrace; this step was filled with re-purposed midden material from an unknown location. The terrace signifies a monumental construction effort, since it is faced with modified and unmodified limestone cobbles and

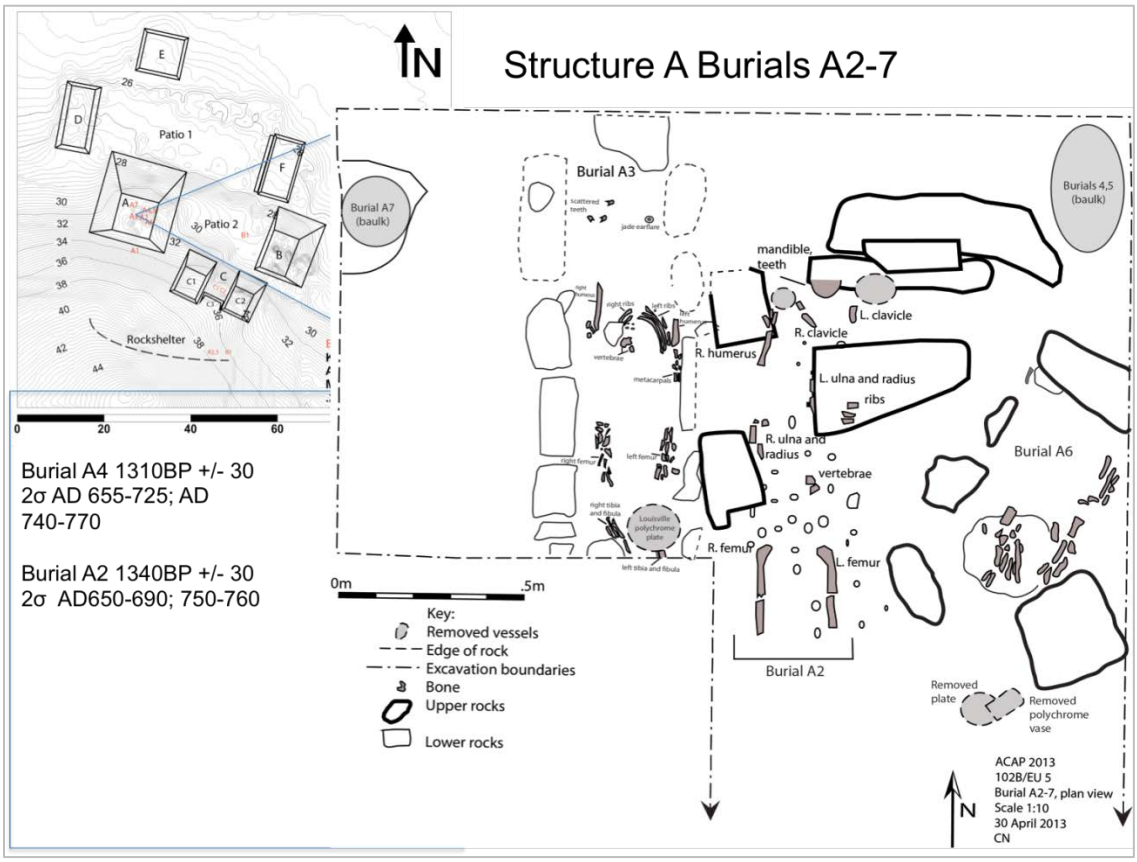

Figure 3. Composite, plan view of burials on the summit of Structure A.

Table 1. Summary of burial data from Kaq'ru' Ha'. Age at death and sex determined by Willa Trask.

Burial Number	Structure	MNI	Funerary Architecture	Interment Type	Position	Orientation	Age at death	Sex	Associated Artifacts
A1	A	1	N/A	Primary	Extended Supine	East/west	N/A	N/A	None
A2	A	1	Simple cyst	Primary	Extended Supine	North	18-21 years	N/A	Two eroded bowls, chert flakes and nodules
A3	A	1	Stone-lined cyst	Primary	Extended Supine	North	25-30 years	N/A	Louisville polychrome tripod dish; jadeite earspool
A4, A5	A	2	Stone-lined cyst	Primary/ Secondary	Extended Supine	North	N/A	N/A	None
A6	A	1	Simple cyst	Primary	Extended Supine	North/ northwest	N/A	N/A	Ceramic fragments
A7	A	1	Simple cyst	Primary	N/A	N/A	N/A	N/A	Chacluum Black bowl
B1	B	1	Simple cyst	Primary	Extended Supine	North	5-7 years	N/A	Eroded bowl, canine tooth
C1	C	1	Simple cyst	Primary	Extended Supine	South	18-21 years	N/A	None
C2	C	2	Simple cyst	Primary	Extended Supine	North	18-35 years	N/A	None
R1	Rockshelter	1	Simple cyst	Primary	Extended Supine	North	25-35 years	N/A	Louisville polychrome vase
R2	Rockshelter	2	Cache	Secondary	N/A	N/A	N/A	N/A	Saxche/Palmar Orange bowl

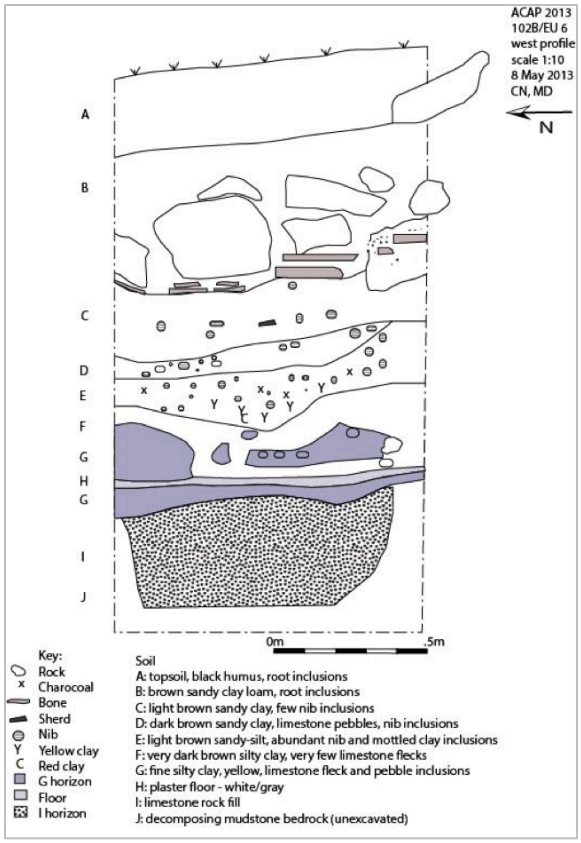

Figure 4. West-facing stratigraphic profile of Structure A.

rises 4m above the lower terrace. The burial encountered in the terrace/patio (Burial B1) was not intrusive, suggesting that the individual was interred as the terrace was being built. The individual was a sub-adult, (Willa Trask, personal communication 2014) interred in a supine position oriented to the north, with a very eroded bowl and a canine tooth. The radiocarbon date taken from Burial B1 suggests an initial construction date as early as AD 430 (Table 2).

Structure C and C_2

It is clear that it took a monumental effort to raise the platform above Patio/Terrace 2; the well-preserved walls of the platform functioned as retaining walls as well as support for the summit architecture. Based on the stratigraphy of the platform, it seems to have been constructed during one phase around AD 631. Summit structures were constructed in one episode, coeval to the interment of several individuals in the patio. It is likely that this structure was a residence, based on the architecture, ceramic sherds that may have been storage or water vessels, obsidian and chert tools, and grinding stone fragments.

Two burials were encountered in the patio area, west of the basal wall of Structure C1 (MNI = 3). Analysis of the teeth indicate that two of three individuals were between 18-35 years old at death. Radiocarbon dates from one of the individuals in the comingled burial C2 dates the interment to AD 631, or the Late Classic period. By extension, and in corroboration with ceramic evidence, the terrace platform and structures were constructed simultaneously during this period.

Rock shelter

Defining the southern edge of Kaq'ru' Ha' is an imposing limestone cliff with weathered niches and crevices along its face (see Figure 2). Though it is not technically an architectural feature, its presence on the landscape delineates the site boundary and was used by residents as a ritual locale. There is no large tumble from the cliff, but run-off has created a seasonal drip line; scattered ceramic and lithic artifacts were deposited in niches and beneath a slight overhang. Significant lime deposits from the drip line had crystallized on the ceramic artifacts, but the sherds are well-preserved; specialized deposition of these ceramic artifacts is suggested by their abundance and the inclusion of large, re-fitting pieces of vases and incensarios. The ritual deposit is 10 meters long and between .5 meters and 2 meters wide. While it seems that the western end of the rockshelter was used as a ritual deposit, this niche was used for burials, presumably for residents of Kaq'ru' Ha'. In total, the poorly preserved skeletal remains of three individuals were recovered from the niche (Table 2).

Shovel testing of the rock shelter deposit revealed artifact density to be highest in the western area of the rock shelter. Types of artifacts recovered include large fragments of water jars, bowls, cylinder vessels, and censers. Several re-fitting sherds from a polychrome cylinder vessel were recovered from shovel test 6. They were very well preserved and include a band of glyphs (or pseudoglyphs) painted around the rim. The body of the vessel portrays several figures sitting cross-legged in profile (Figure 5).

Table 2. Radiocarbon dates of bone collagen from burials at Kaq'ru' Ha'. University of Arizona dates calibrated with the IntCal13 calibration curve (Reimer et al. 2013).

Lab and Sample Number	Structure	Material	Burial ID	Ceramic Complex	Uncalibrated Age	2σ calibrated date range
UA X27781	Patio/Terrace 2	Human bone	B1	Tzakol	1458 +/- 55 BP	AD 430-492; AD 530-665
UA X27782	Structure C	Human bone	C2	Tepeu 1	1381 +/- 55 BP	AD 564-722; AD 740-767
Beta 381577	Structure A	Human bone	A3	Tepeu 1-2	1310 +/- 30 BP	AD 655-725; AD 740-770
Beta 381576	Structure A	Human bone	A5	Tepeu 1-2	1340 +/- 30 BP	AD 650-690; AD 750-760

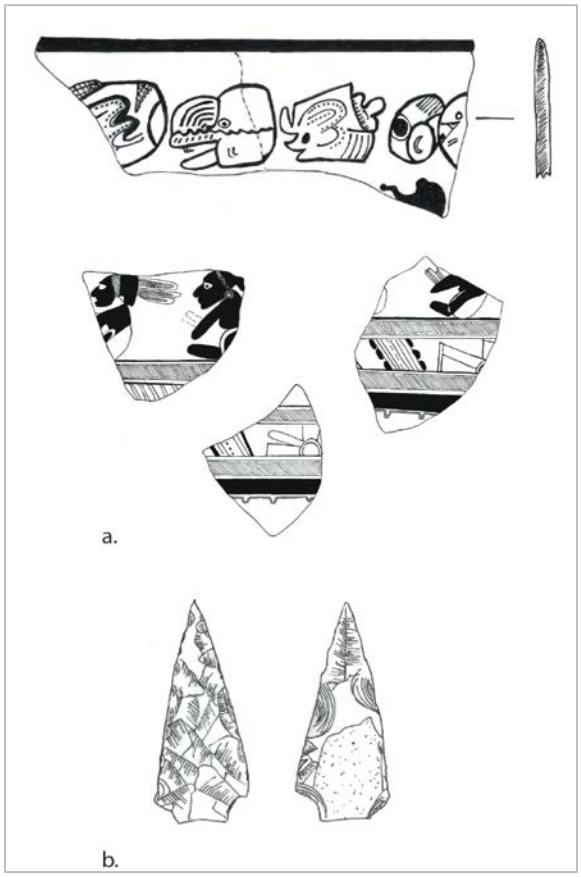

Figure 5. a. Fragments of a Louisville/Zacatel polychrome vase with a hieroglyphic band and figural drawing, and b. a white chert biface. Both were recovered from the rockshelter.

In addition, a white chert biface was also recovered from shovel test 6 (Figure 5). The presence of three burials on the east end of the rock shelter combined with a midden comprised of special-function vessels suggest that this area was used as a locale of ritual deposition, likely including (but not limited to) the inhabitants of Kaq'ru' Ha'.

Kaq'ru' Ha' was inhabited by a co-residential group that was well-connected to political centers during the Late Classic period. While this power was materialized through the built environment and access to knowledge about mortuary patterns, regional connections were also evident in the ceramic assemblage.

Ceramic analysis

Ceramic analysis was conducted during the 2013 field season in order to address questions of chronology and regional economic and sociopolitical integration between Kaq'ru' Ha' and nearby political capitals. The results indicate that Kaq'ru' Ha' was founded during the Early Classic Tzakol 2-3 (AD 400-600) ceramic phase and inhabited through the Late Classic Tepeu 1-3 (600-900) ceramic phases (Table 3). In chronological terms, the ceramics bracket a time period from AD 400-900. The Early Classic and Late Classic types and forms recovered from sites on Aguacate community lands are discussed below.

Early Classic period (AD 250-600)

Radiocarbon dates reported in the previous section suggest that construction began at Kaq'ru' Ha' during in the latter part of the Early Classic period, no earlier than AD 430. The ceramic evidence supports this date by including groups typical of the Early Classic II phase (400-450/600 CE) identified at Uxbenká (Jordan 2013:117). The Kaq'ru' Ha' assemblage is characterized by red monochromes (Santa Cruz Group), orange-

Table 3. Summary of ceramic analysis.

Time Period	Slip	Paste and Surface Finish	Surface Decoration	Form	Groups
Early Classic	unslipped, red, orange, possible brown (may be faded red)	reddish brown, medium hardness; glossy finish	horizontal and vertical striations on the exterior; painted abstract and geometric designs; incising on the exterior and interior rims	jars with vertical or outcurving necks, squared rims with grooved lips, outflaring everted and horizontal everted rims, bowls with medial and basal flanges, bowls with rounded sides, occasional nubbin feet.	Triunfo Striated; Santa Cruz Red; Balanza Black; Actuncan/Dos Arroyos Polychrome
Late Classic	unslipped, red, black	reddish brown, calcite temper; yellow with ash temper; pink/orange fine paste; glossy finish	horizontal striations; modeling; figural and glyphic painting; incising; stamping	modeled bowls; bowls with incurving sides; tripod plates; vases; bowls with rounded sides and flat bases; bowls and jars with incurving sides; jars with vertical necks	Turneffe Unslipped; Pualacax Unslipped; Remate Red; Chaaclum Black; Zacatel/Louisville Polychrome; Saxche/Palmar Orange Polychrome; Miseria Applique; Pedregal Modeled

slipped polychromes (Actuncan/Dos Arroyos Group), and unslipped striated jars (Triunfo Group). Forms include jars with vertical and outcurving necks, open bowls, squared lips with grooves, incised rims, and bowls with outflaring everted and horizontal everted rims (Table 3).

Late Classic period (AD 600-830)

Similar to the ceramic sequence at political capitals (Hammond 1975; Fauvelle 2011; Jordan 2013), Kaq'ru' Ha's ceramic assemblage designates it as a Late Classic Tepeu 1-3 (AD 600-900) sphere site. In fact, the bulk of diagnostic ceramics date to the Tepeu sphere (87%). The transition between Tzakol 3 and Tepeu 1 is unclear; groups often continue between time periods and the current sample is not robust enough to identify a definitive shift. Locally produced types such as Turneffe Unslipped, Remate Red, Chacluum Black, and Louisville polychromes are prevalent in the assemblage, with small quantities of imported types present as well (Table 3).

The imported types consist primarily of Palmar Orange polychromes and a Miseria Applique bowl with a few examples of Belize Red body sherds. Belize Red has a distinctive ash-tempered paste and is produced in the Belize River Valley; its presence in upper stratigraphic levels at Pusilhá and Nim Li Punit lead Braswell and colleagues (2005) to consider it a Terminal Classic marker for southern Belize. Louisville polychrome is a local cream-slipped polychrome analogous to the Zacatel group in the Petén region. Hammond's (1976) INAA study of cream-slipped polychromes suggests that they were produced locally at Lubaantun. Another diagnostic attribute from Lubaantun is unit-stamps -- one body sherd with stamped motif was recovered from Structure B, suggesting that Kaq'ru' Ha' residents were participating in regional exchange networks.

Figurines

Thirteen figurines and figurine fragments were recovered from Kaq'ru' Ha'. Significant themes include warriors and rulers, evidenced by headdresses and spears, a helmeted figure that may be a boxer, a woman holding a dog, and two fragmentary figural plaques (Figure 6). Figurines were recovered from surface and fill contexts, which is not an unexpected discard pattern, according to Halperin (2014:112).

In the Maya Mountains region, evidence for the manufacture of mold-made figurines was recovered from the ceremonial center at Lubaantun (Hammond 1975; Wegars 1977). Forms include boxers, ballplayers, market women, women grinding corn, rulers with headdresses, and supernatural deities (see

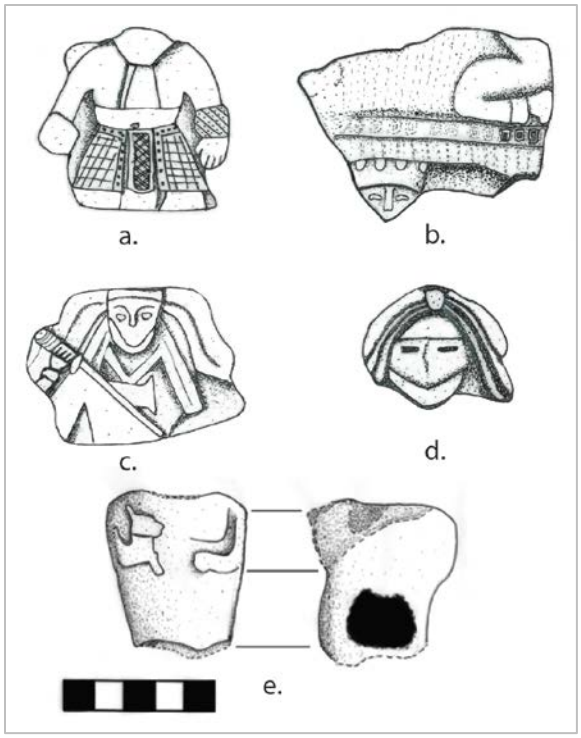

Figure 6. Figurines and figural plaques recovered from Kaq'ru' Ha': a. boxer; b. fragment of figural plaque with a kneeling figure; c. ruler with headdress and spear; d. boxer head; e. "market woman" with dog.

Wegars 1977 for a typology). The figurines recovered from Kaq'ru' Ha' are consistent with some of the types that were manufactured at Lubaantun, and could indicate a political connection between the two sites. Further analysis of the Kaq'ru' Ha' figurines, including INAA testing to confirm the source of the clay, would illuminate this idea. However, I argue that the presence of portable media in the hinterlands suggests sociopolitical integration. Christina Halperin (2014) links the profusion of figurines during the Late Classic period to growing populations, urbanization, and increasing displays of power from political centers. She argues that ceramic figurines were "instrumental in disseminating state ideologies beyond the confines of public ceremonial spaces and into the visual culture repertoires of households" (Halperin 2014:2). Though further research is necessary, it seems that Lubaantun could have disseminated figurines as a political strategy during the Late Classic period.

The ceramic artifacts reported here provide information about chronology, site occupation, and structure function. The ceramic assemblage from Kaq'ru' Ha' indicates that the site was occupied during the Early Classic period. This reinforces the radiocarbon date of AD 430 that was garnered from Burial B1. However, the main occupation phase was during the Tepeu 1-2 (AD 600-900) ceramic complex. The Terminal Classic period (AD 900-1050) is less clear at Kaq'ru' Ha'. The types adhere closely to the typological summary composed by Norman Hammond (1975) at Lubaantun, and Jillian Jordan's (2013) work on the Early Classic phase at Uxbenká. This suggests that the residents of Kaq'ru' Ha' were integrated into regional ceramic traditions. Additionally, the presence of at least one imported vessel and locally produced, Petén-style polychrome vases suggests that Kaq'ru' Ha' residents were participating in the wider Maya cultural sphere.

Discussion and Conclusion

Kaq'ru' Ha' was constructed during the Early Classic period, and was most closely affiliated with the Uxbenká and Lubaantun social and economic spheres, evidenced by architectural, burial, and ceramic data. As political centers expanded during the Late Classic period residents reinforced their claim to the land by increasing the intensity of their mortuary program, focused on an ancestor shrine on the western side of the site (Structure A). These data show us that rural sites were participating in a region-wide social identity, while maintaining a strong connection to a local place. The practices and interactions between people living at these sites created a regional identity while claims to local places were maintained.

Kaq'ru' is strategically positioned along east/west riverine and overland passages and is placed in reference to a distinctive geologic feature, the rockshelter. This indicates the importance of landscape and environment to the people that lived here. During the Classic period, Kaq'ru' Ha' would have been a noticeable and significant place on the landscape. Adding to its prominence is the monumental architecture that raises the site above the valley floor. The site plan of Kaq'ru' Ha' is in keeping with the southern Belize tradition of establishing settlements along rivers

or overland passages and using natural topography to accentuate the vertical dimension of the site core.

Eleven burials were recovered from Kaq'ru' Ha'. Seven individuals were interred in Structure A, one in the patio west of Structure B, three in the patio of Structure C, and two in a niche in the cliff face. All of the individuals were interred in an extended supine position, and ten of the thirteen were oriented to the north (preservation was too poor to establish body position for Burials 2 and 11). In the Maya area, mortuary practices can be seen as emblematic of community ritual and social identity; this mortuary pattern suggests that the people of Kaq'ru' Ha' were rebuilding structures and claiming the landscape by interring ancestors.

Mortuary evidence, including burial locations, architecture, body positioning, and grave goods are sensitive indicators of social identity. Interring the deceased with their head oriented to the north was an evocative symbol of supernatural connections to ancestors, and perhaps worked to create the ancestors themselves. To date, this pattern holds for elite tombs as well as simple cyst graves at Kaq'ru' Ha', Uxbenká, Pusilhá, Lubaantun, and Nim Li Punit. Consistent body positioning may reinforce Richard Leventhal's (1992) assertion that southern Belize maintained distinctive, region-wide traditions.

As a region, southern Belize is considered marginal to regions like the Petén -- the "heartland" of Classic Maya kingship and civilization -- or the populous Belize Valley to the north. Therefore, Kaq'ru' Ha' is at the margin of the margins. Even so, life there during the Late Classic period was characterized materially by integration into regional social and political spheres while maintaining local patterns of site planning and architecture. Material references to locales in the Petén region as well as to political centers in the Maya Mountains suggests intensive interactions across the landscape in multiple spheres – ritual (e.g., mortuary patterns), economic (e.g., obsidian and jade), and sociopolitical (e.g., polychrome pottery).

The results discussed in this chapter provide multiple lines of evidence for the negotiation of identity and sociopolitical engagement within the Maya Mountains region. Agency and intentionality emerges in the activities of planning and building dwellings, producing stone tools, and burying specific ancestors. Engagement with a region-wide social structure is also evident in the consumption of imported ceramic vessels, obsidian, and jade. The activities of claiming the landscape and procuring local resources suggest a synthesis of the local and the regional; outward expression of regional social identity belies an additional concern with anchoring themselves to the local landscape.

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20 PRELIMINARY FINDINGS FROM IX KUKU'IL, TOLEDO DISTRICT, BELIZE

Amy E. Thompson and Keith M. Prufer

Ix Kuku'il is a small ancient Maya community situated in the southern foothills of the Maya Mountains in the Toledo District of Belize. This paper discusses the preliminary findings from survey and test unit excavations that were conducted at Ix Kuku'il between 2013 and 2015. To date, eight administrative areas and 59 settlement groups of varied social status, based on architectural complexity and elaboration and artifact assemblages, have been identified at Ix Kuku'il. Survey findings also documented natural features on the landscape including freshwater springs and caves, which may have played a role in the settlement decisions. Relative dating based on regional ceramic typologies indicate that Ix Kuku'il was occupied primarily during the Late Classic (AD 600 - 800).

Introduction

In 2011, the Uxbenká Archaeological Project (UAP) obtained Light Detection And Ranging (LiDAR) data, which creates high-resolution 3D terrain models and is able to visualize ground surfaces beneath tropical vegetation. This cutting-edge technology allows us to detect larger architectural groups, small residential platforms, landscape modifications and other aspects of the built environment undertaken by the ancient Maya (Chase et al. 2011). LiDAR allows researchers to rapidly detect spatial patterns of the built environment that are impossible to detect with other remote sensing techniques, and within limitations can replace many aspects of traditional pedestrian survey in dense tropical forests (Prufer et al. 2015). While our 135 km^2 of LiDAR data was focused on Uxbenká, we also identified a large plaza with an eastern triadic building located 7 km to the northwest of the Uxbenká site core. In 2012, a one-day reconnaissance of the site documented the plaza with a triadic building; the locals called this place "Ix Kuku'il". The reconnaissance of Ix Kuku'il recorded a 100 m circular plaza with eight buildings situated around a central plaza. A 10 m tall eastern triadic building and uncarved stela suggested that this site was an independent political center rather than an outlier of Uxbenká.

Ix Kuku'il is a small Maya center located in the southern foothills of the Maya Mountains, in the Toledo District of Belize. Survey in 2013 focused on documenting the extent of the architectural remains of Ix Kuku'il while fieldwork in 2014 and 2015 emphasized understanding the development and occupational history of Ix Kuku'il through test unit excavations among settlement groups and larger architectural groups across the site. This paper discusses the preliminary findings from fieldwork at Ix Kuku'il from 2013-2015.

Regional Background

Relatively little archaeological research has been carried out in the Toledo District compared to the rest of the Maya region over the past century. Scholars including Thomas Gann, Norman Hammond, Richard Leventhal, Heather McKillop, Geoff Braswell, Keith Prufer, and Claire Novotny have worked at southern Belizean sites including Pusilha, Lubaantun, Nimli Punit, Xnaheb, Wild Cane Cay, Payne's Creek, Uxbenká, and Aguacate. The Toledo District is geographically circumscribed by the Maya Mountains to the north and northwest, pine barrens to the northeast, the Caribbean Sea to the east, and swampy *bajos* to the south. The largest Maya centers in the area include Pusilhá, Uxbenká, Lubaantun and Nimli Punit, which are located along a fertile upland ridge running on a SW to NE axis (Figure 1). These sites share carved stela traditions, association with distant centers, and comparable architectural styles and construction materials, suggesting similar histories. However, differences in ceramic assemblages and site core architectural density have been suggested by Braswell, Prufer, and others to indicate a general lack of political affiliation between them (Braswell and Prufer 2009).

The region is known for rich agricultural lands that are highly productive due to a 25 km long natural formation consisting of interbedded

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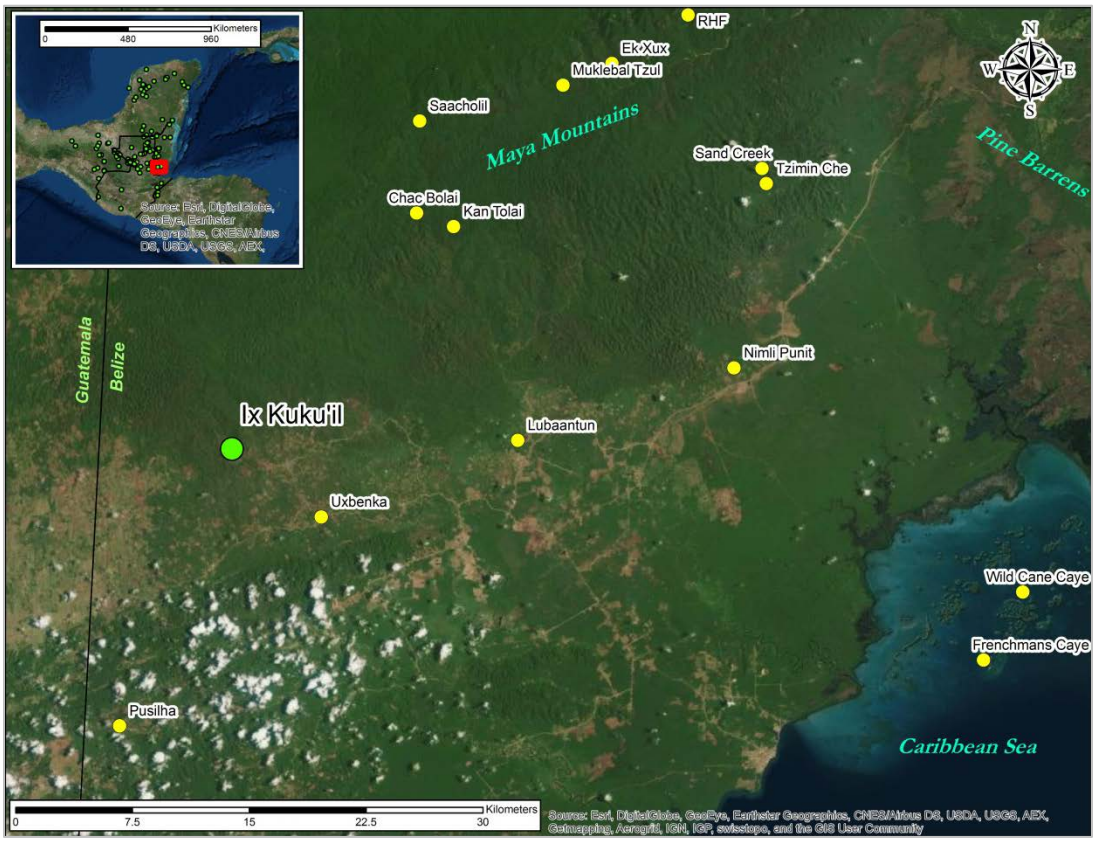

Figure 1. A regional map of archaeological sites in the Toledo District with the location of Ix Kuku'il emphasized. The inset map shows the location of large map compared to major centers in the Maya region.

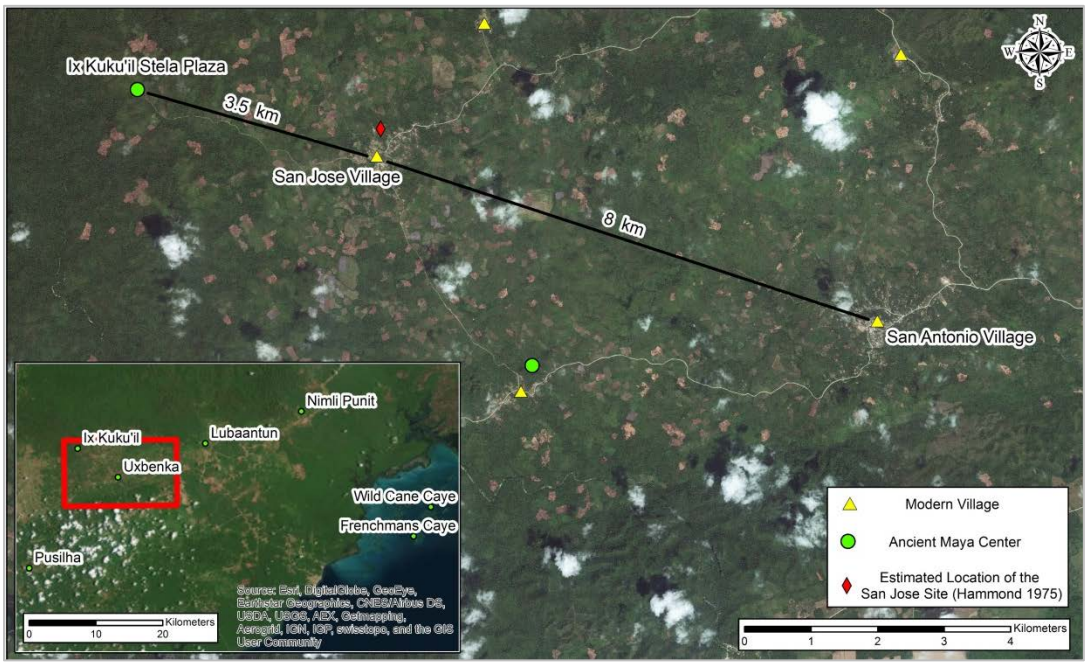

Figure 2. The estimated location of Hammond's (1975) San Jose site, based on descriptions, in comparison to the location of the Ix Kuku'il Stela Plaza and the modern villages of San Jose, Santa Cruz, and San Antonio, Toledo District, Belize.

Tertiary mudstones, shales, and sandstones known as the Sepur Formation. The Sepur Formation contains pockets of Cretaceous Campur Formation limestones (Keller et al. 2003). This regional geologic formation, referred to as the Toledo Beds (Wright et al. 1959), covers 220 km^2 and encompasses three of the four major Maya centers in Toledo: Lubaantun, Nimli Punit, and Uxbenká. This sub-region of Toledo is a large cacao producer today (Hammond 1975; Wright et al. 1959) and likely was in the past as well, and allows for high crop yields (Prufer and Hurst 2007). These factors likely played a role in the ancient Maya selecting this area for their communities.

Archaeological Background of Ix Kuku'il

While the discovery of Ix Kuku'il is not novel to the indigenous population of San Jose village, archaeologists have only mentioned the site a handful of times prior to the UAP's research initiative at Ix Kuku'il. In the mid-1980s, Richard Leventhal's team performed a regional archaeological survey in Toledo. According to a local informant from San Jose village, Leventhal's team visited the Stela Plaza (Group A) at Ix Kuku'il during a one-day reconnaissance. "Ich Cucuhil" appears on several maps from the early 1990s in discussions of Leventhal's research at Uxbenká (Leventhal 1990, 1992; Jamison et al. 1991). However, aside from these few maps, Ix Kuku'il was undiscussed in the regional archaeological literature until 2013 when preliminary survey was conducted to test the extent of the site.

While Ix Kuku'il's Stela Plaza was not documented by archaeologists until the mid-1980s, ancient Maya residential areas associated with Ix Kuku'il were noted by Norman Hammond in the mid-1970s during his survey of archaeological sites in the Toledo district. In an appendix in his *Lubaantun* volume, Hammond (1975) briefly describes a small site called "San Jose" located 8 km northwest of San Antonio and just north of the modern village of San Jose (Hawiia), Toledo District (Figure 2). This site is situated at an elevation of 200-300 m in the foothills of the San Antonio Valley. Hammond describes the San Jose site as a hilltop platform measuring 30 m long by 15 m wide, with a pyramid 3-4 m in height situated on a lower platform that is 1-2 m in height (Hammond 1975). This is likely a residential area, similar to those seen on the eastern side of Ix Kuku'il, as discussed below. His description does not match that of any of the major architectural groups documented thus far at Ix Kuku'il (see Thompson and Fries 2014). Rather, the San Jose site Hammond visited was a settlement group associated with the larger center of Ix Kuku'il. The distance of this documented settlement group to the Stela Plaza inform the extent of the ancient Maya center.

Community Cooperation in Archaeological Objectives

Prior to Richard Leventhal's documentation of Ix Kuku'il, the Green Creek Farmer's Cooperative (GCFC), a local farming cooperative group has helped protect the site from looting activity since 1977. The GCFC communally leased a large plot of land to the northwest of San Jose village for cacao orchards, *milpas*, and household gardens. Cacao groves were planted shortly after the establishment of the communal land and are still present along the road that leads to the Ix Kuku'il Stela Plaza. According to their leadership, Ix Kuku'il was given its name as one "faces the cacao" as they travel from San Jose village to the Stela Plaza, as cacao groves are located on land between these two areas. The GCFC continues to promote the protection of the site. The UAPs research team at Ix Kuku'il worked together with the San Jose village leadership, including the village chairman, and the leaders of the GCFC during survey and excavations at Ix Kuku'il following the model established in Santa Cruz as part of the Uxbenká Archaeological Project.

Survey Findings

Using the LiDAR data, we created a predictive model for the location of archaeological sites at Uxbenká (see Thompson and Prufer 2015). This predictive model was employed during survey at Ix Kuku'il and allowed for efficient and effective survey. Following the UAP protocol, large architectural groups that did not conform to typical Maya housemound types were designated as "Groups", indicating areas of administrative or civic function. Small buildings situated around a

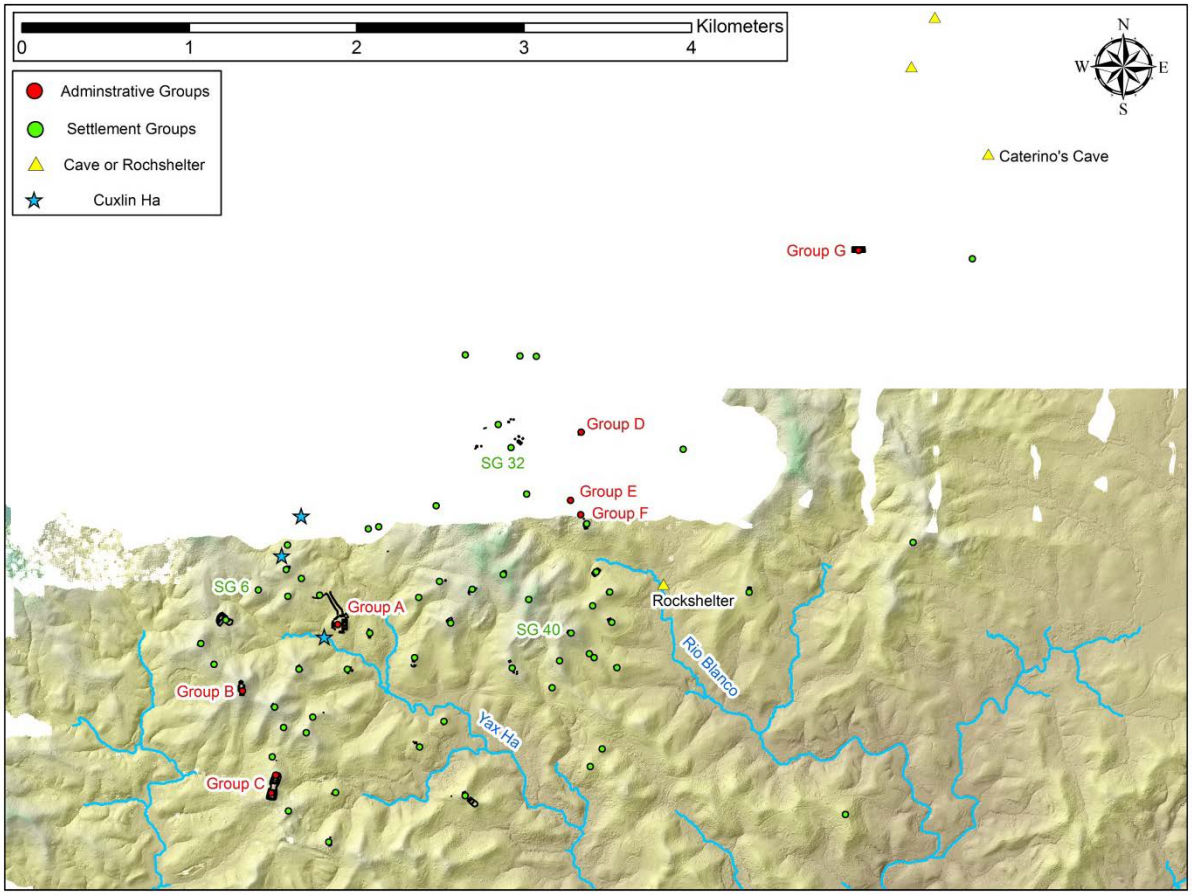

Figure 3. The extent of know settlement associated with Ix Kuku'il. Specific features discussed in the text are emphasized including archaeological sites, cuxlin ha, rockshelters, and caves.

central (formal or informal) plaza, a configuration typical of ancient Maya households, were designated as "Settlement Groups" (SGs).

Since 2013, eight administrative areas and 59 residential groups have been documented across more than 6 km2 (Figure 3). Survey work has consisted of focused survey in the area surrounding the Stela Plaza. Additional opportunistic "roadside" surveys concentrated on investigating hilltops that had recently been burnt for *milpa* farming adjacent to the road. The primary feature types documented during survey were archaeological sites and landscape features including caves, rockshelters, and *cuxlin ha* (freshwater springs).

Landscape

The Ix Kuku'il landscape is composed of the hilly terrain of the foothills of the Maya Mountains in southern Belize. This area is situated along the northern edge of the Toledo Beds and the transition from mudstones and shales to limestone was apparent across the site. While limestone is present, all of the buildings are constructed of sandstone, with the exception of the 125 m long and 20 m wide *sacbe*, or raised causeway, connected to Group A. The steep terrain creates interwoven streams flowing into larger rivers. Freshwater springs are abundant in the area according to local farmers.

The interspersed karst landscape results in the presence of caves and rockshelters in the area. Caves and rockshelters were commonly used by the ancient Maya as sacred spaces that acted as portals into the underworld (Prufer and Brady 2005). One rockshelter, situated 2 km to the west of Group A (Figure 3), is located upslope of the Rio Blanco directly adjacent to a modern footpath. The rockshelter was

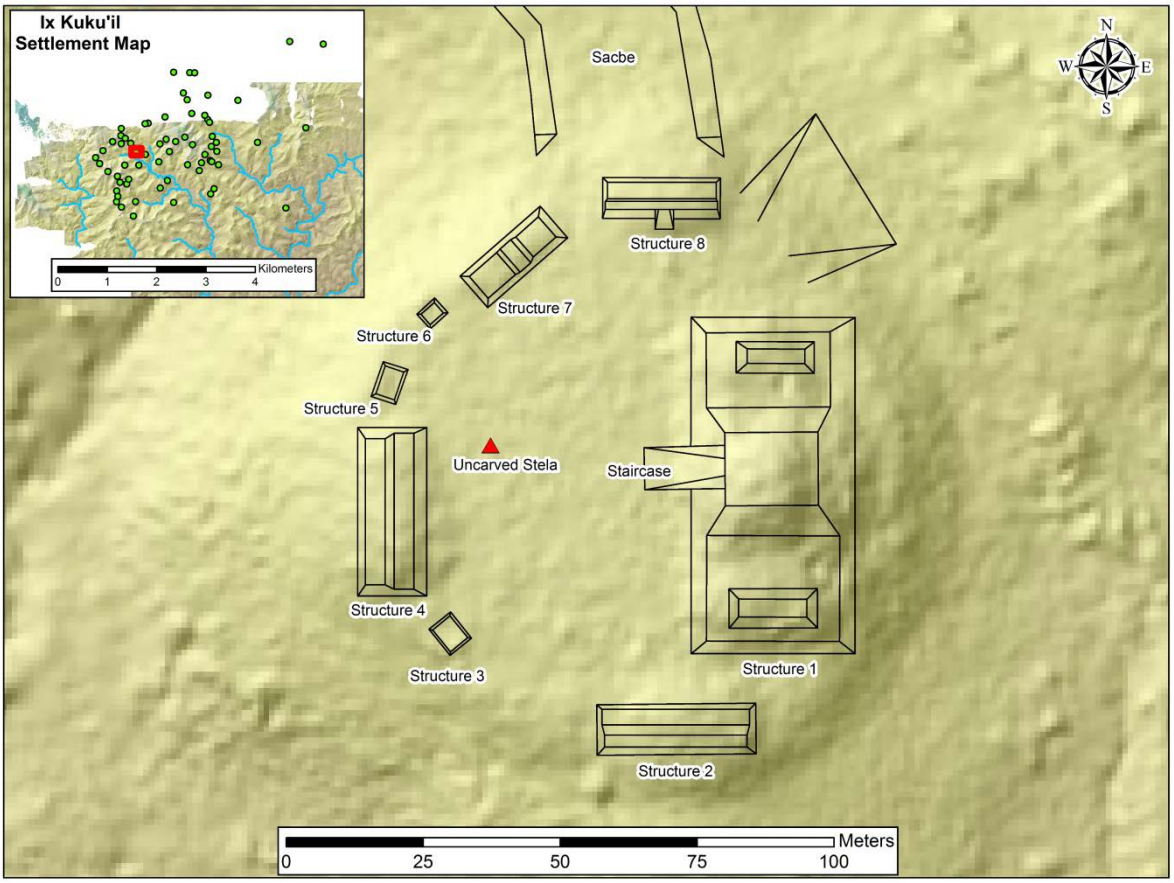

Figure 4. A plan view of Ix Kuku'il Stela Plaza (Group A), which includes notable features such as an eastern triadic building, an uncarved stela, a *sacbe*, and a *cuxlin ha*.

composed of a natural fracture in the bedrock and is located along the edge of the outcrop. Scattered across the surface within the rockshelter were a stone bark beater, ceramics, and lithics. The presence of a bark beater suggests that possibility of paper production and utilization at Ix Kuku'il. In addition to the rockshelter, a cave feature named Caterino's Cave (Figure 3), located 4.8 km to the northeast of the Stela Plaza, contained the remains of a Tepeu 2 vessel dating to the Late Classic (Thompson and Fries 2014). A cave feature was documented beneath one of the buildings in SG 36 and several other caves have been documented to the north, as the bedrock transitions from mudstones to karst limestone. Caves and rockshelters are abundant across the area but have not been more widely documented, as survey to date has focused on recording architectural features and the extent of the Ix Kuku'il site.

Perennial water is available across the landscape due to the presence of large rivers with runoff from the Maya Mountains, and *cuxlin ha*. The major rivers that flow through the area are the Yax Ha, which runs close to the Stela Plaza, and the Rio Blanco, which is located on the eastern portion of the site. These rivers eventually merge 5.5 km south of Ix Kuku'il, prior to entering into Ho Keb'al Ha cave and re-emerging in Blue Creek village on the southern side of the "Rock Patch", a rugged limestone relief feature. To date three *cuxlin ha* have been documented in the area surrounding Ix Kuku'il (Figure 3), though it is likely that more freshwater springs exist. The locations of these natural features undoubtedly played a role in the settlement decisions of the ancient Maya.

Ix Kuku'il was initially thought to be an outlying community associated with Uxbenká. However, the extensive settlement across more than 6 km^2 and variations in architectural

complexity suggest various levels of social strata were present at Ix Kuku'il and that it was likely an independent polity during the Late Classic Period. Continued survey of the area will likely reveal additional settlement groups as well as significant natural features across the landscape that shaped the settlement patterns and socio-political decision-making of ancient Maya communities at Ix Kuku'il.

Non-Residential Architecture

Ix Kuku'il's main site core, Group A or the Stela Plaza, contains eight structures situated around a central plaza with a triadic pyramid situated on the eastern edge (Figure 4). The circular plaza area is 100 m in diameter with a 125 m long and 20 m wide limestone causeway extending to the north of the group. A single uncarved stela measuring 4.2 m in length was found on the western side of the plaza. While there is no evidence of writing on the stela today, it might originally have been carved or painted.

Unlike most administrative centers in the Maya region, the Stela Plaza at Ix Kuku'il is located on one of the lowest hills in the area, with an elevation of 325 m. Sites located on the hills surrounding the Stela Plaza peer down into the plaza. A tributary to the Yax Ha river winds around the base on the plaza, and a *cuxlin ha* (Figure 3) would have allowed year round access to water. The seven additional administrative areas are spread out across the landscape surrounding Ix Kuku'il (Figure 3). The architectural complexity of these groups varies greatly. Group B consists of four buildings situated around a central plaza, while Groups D and F are composed of a series of large, low lying platforms housing several smaller platforms with complex and restricted entrances (Figure 5a, 5b, 5c). Group E is located 1.5 km to the northeast of the Stela Plaza and is a single building containing the only documented masonry walls at Ix Kuku'il, which are uncommon among southern Belize sites (Braswell and Prufer 2009). Group G is composed of four buildings situated around a central plaza and sitting on top of a U-shaped platform. A possible narrow ballcourt is present at Group G. Group H consists of a series of modified, flattened hilltops with stone facing composed of three tiers of flattened hills with two structures. Combined, these tiers made the base of the structure appear to be more than 20 m tall, suggesting massive labor investments into the built environment.

Several trends are apparent among the non-residential architectural complexes at Ix Kuku'il: (a) People around Ix Kuku'il employed the same "southern Belize façade" found in other regional sites, creating the appearance of large structures by facing hillslopes with stone (Braswell and Prufer 2009); (b) as at other southern Belize sites, structures at Ix Kuku'il generally lack masonry superstructures or evidence of the corbel vaults; (c) architecture is situated exclusively on hilltops and saddles, consistent with the our settlement model for the Rio Blanco Valley (Thompson and Prufer 2015); (d) site organization is either a series of large, low-lying platforms composing a single group (e.g. Group D) or an open plaza with buildings surrounding it (e.g. Group B); (e) hilltops were frequently heavily modified (flattened) to create larger areas for occupation (Prufer et al. 2015); (f) restricted access to central precints is present in both large administrative areas and in some of the settlement groups. This pattern of widely separated administrative groups may suggest a heterarchical distribution of power across the geopolitical landscape at Ix Kuku'il.

Residential Architecture

The 59 residential groups documented at Ix Kuku'il vary greatly in their size, degree of architectural elaboration, and location. Settlements range from a single building to groups of up to nine structures. Some residential groups are composed of small platforms while others consist of several layered platforms with staircases, patios, and bench features. The location of settlement groups is not directly related to their architectural complexity or sociopolitical status as larger settlement groups with more buildings with elaborated architectural features such as staircases and benches are dispersed across the site. For example, one of the largest settlements groups SG 32, contains an outlying temple/shrine and may have been occupied by local elites based on the presence of larger buildings indicating greater labor investment, and artifacts such in

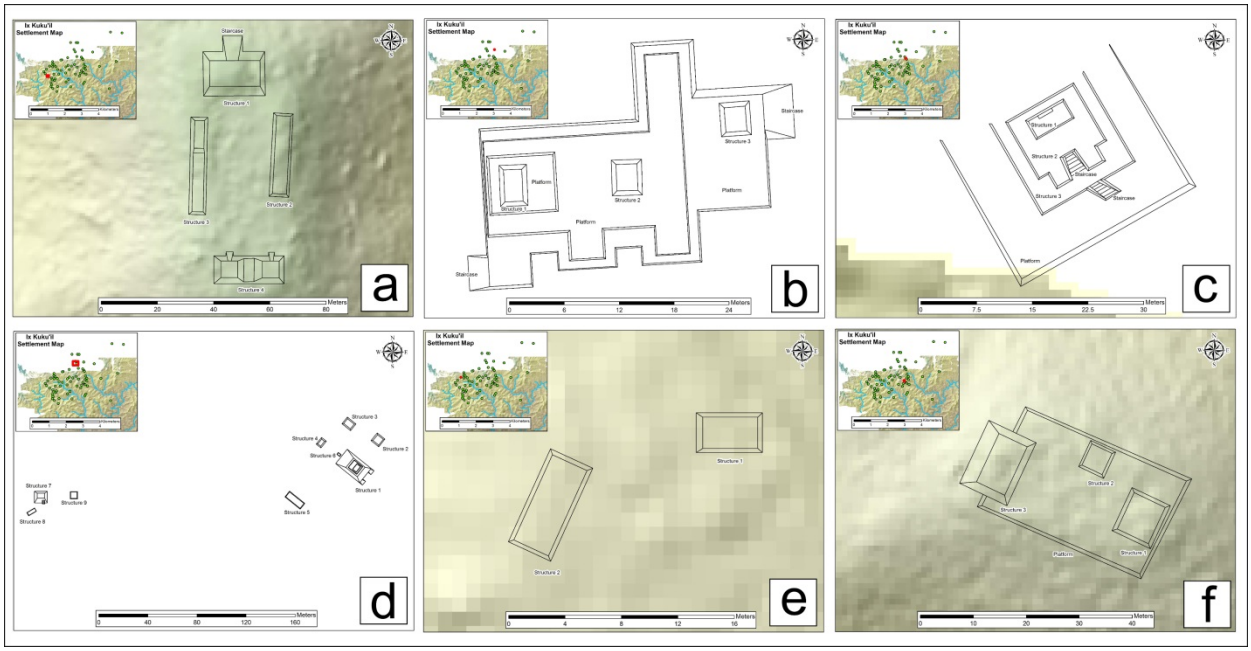

Figure 5. Plan view maps showing different architectural layouts, elaborations, and complexity across the geopolitical landscape of Ix Kuku'il. Specific administrative areas discussed throughout the text include (a) Group B; (b) Group D; and (c) Group F; while settlement groups discussed in the text include (d) SG 32; (e) SG 6; and (f) SG 40. Inset maps show the location of each site in comparison to the larger settlement system.

domestic rituals such as speleothems, figurines, and censers. SG 32 is situated 1.5 km to the northwest of Group A, while SG 6 is located merely 0.5 km to the northwest of Group A, contains two small buildings, and was likely occupied by lower status individuals (Figure 5d and 5e) due to the lack of architectural investment, and dearth of status-enhancing items in conjunction with abundance of utilitarian pottery.

The spatial layout of residential areas varies across the geopolitical landscape. A large ridge divides the site, making it impossible to see the Stela plaza from the east. The settlement groups on the eastern side of the ridge have similar architectural arrangements that consist of several building platforms situated (formally or informally) around a central plaza on a flattened hilltop platform (e.g. SG 40; Figure 5f). The architectural arrangements of settlement groups in the northern and western areas of the extant settlement do not follow this trend. This suggests that architectural arrangements and spatial layouts of residential areas vary across the site and may be affiliated with different social or lineage groups.

Although these residential groups are spread across an area of more than 6 km2, they exhibit several common trends: (a) almost all of the hilltops show evidence of modification to flatten the hill to create a large living area; (b) some groups consist of only two low platforms arranged in an "L" shape; we suggest that the remainder of the perimeter of the hill may have had perishable superstructures with earthen foundations; (c) many of the eastern groups have three to four structures arranged around a central plaza and placed atop a platform; (d) architecture was situated almost exclusively on hilltops and saddles, consistent with the predictive model.

Excavation Findings

Initial excavations at Ix Kuku'il focused on chronology building through small test units located in plazas and in building platforms. Plaza units were situated adjacent to building platforms with the goal of obtaining datable materials (i.e., charcoal) from plaster floors and caches associated with the construction of the building platforms. However, in-structure units tend to identify construction sequences and

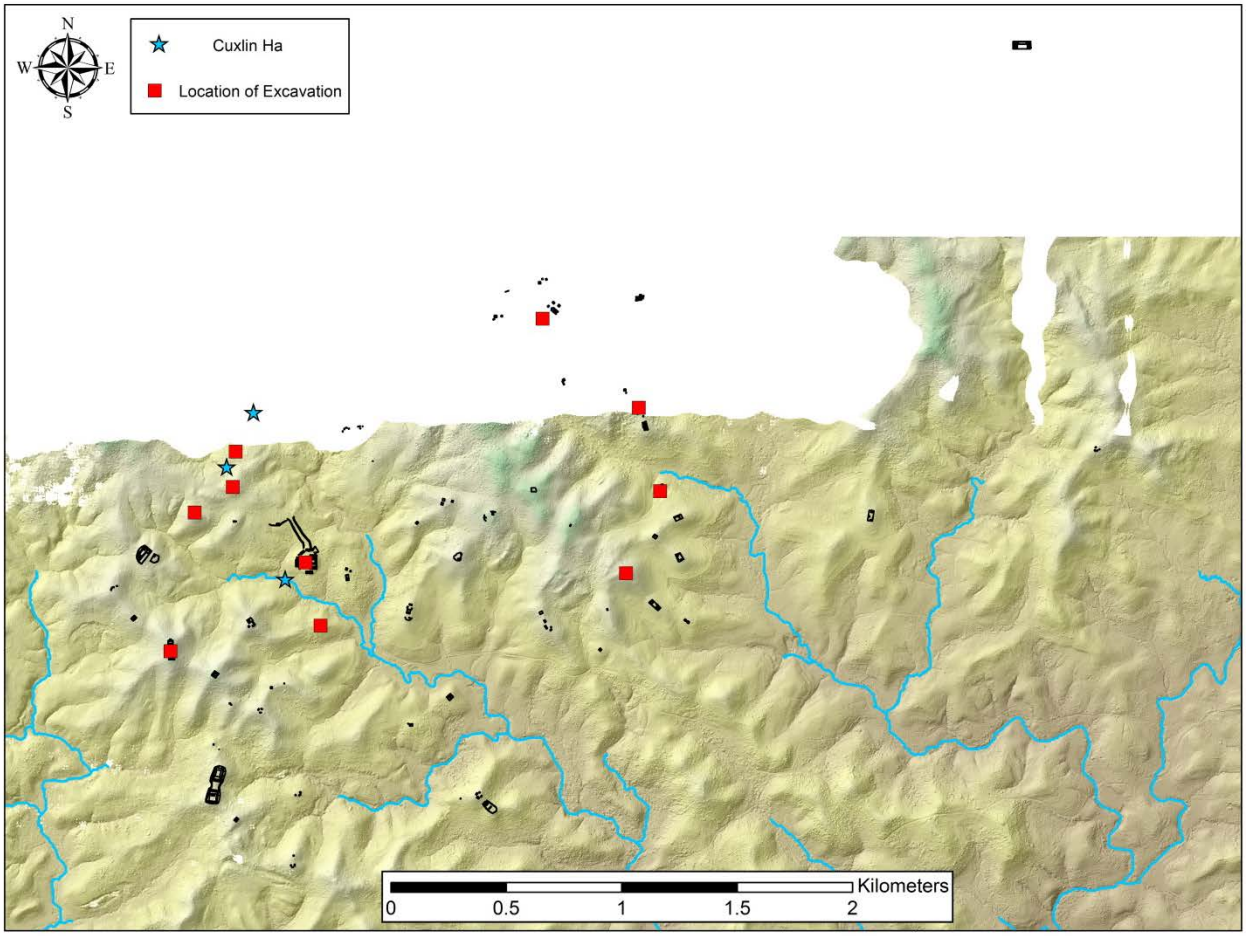

Figure 6. The locations of architectural groups that have undergone archaeological test unit excavations during the 2014 and 2015 field seasons.

artifacts more frequently than plaza excavations among hinterland households of Toledo. Therefore, to accommodate for time and the desire to obtain as much information as possible, excavations occurred both in plazas and in building platforms. To date, archaeological excavations have occurred in ten groups (Figure 6). These locations were selected for test units as they are dispersed across the site, and have varying degrees of architectural complexity. Therefore, they could provide evidence for the development and occupational history of Ix Kuku'il, as well as shedding light on the various aspects of community and status across the landscape.

All excavations in the plaza revealed shallow bedrock with few construction phases. Two plaster floors were documented in the plaza of Group A. Among the plaster floors were an abundance of *jute* shells, possibly used to create the lime plaster. Eroded plaster floors were identified in some settlement groups, while no plaster floors were documented in any of the smaller settlement groups such as SG 6. The lack of intact plaster floors in small households is consistent with data from Uxbenká. This is likely due in part to the highly acidic soils, as well as hundreds of years of bioturbation, and modern farming that combine to result in the breakdown of these fragile and shallow ancient floors. In addition to plaster floors, the presence of packed cobble floors was identified at several of the settlement groups (which may indicate longer periods of occupation than simple dirt floors due to higher labor investment. Excavations in building platforms suggest multiple construction phases. For example, at SG 51 several walls and cobble floors were

documented above a burial feature in the floor of a household. Likewise, at Group F a lip-to-lip cache feature was placed in an existing floor (Thompson 2015) prior to the abandonment of the group.

The use of different colored stones for different architectural features was documented at SG 51. The patio of the building has starkly white stones compared to the rest of the platform while the stones used as the base and capstone for the burial feature were distinctly yellow. Additionally, a lip-to-lip cache of red ceramic vessels was placed over the pelvis of the individual (Thompson 2016). This suggests the intentional use of different colored stones for specific architectural features at SG 51.

In addition to documenting architectural complexity across the site, excavations at Ix Kuku'il revealed the presence of an obsidian workshop at SG 16. Within a 1x2m unit, a variety of obsidian was collected including debitage, flakes, prismatic blades, and cores; the diversity in obsidian is uncommon among residential groups at Uxbenká and therefore likely represents an obsidian workshop or reduction area. SG 16 is located just south of Group A, and the close proximity to the administrative area may explain why this household contained an obsidian workshop.

Excavations at Ix Kuku'il also focused on building a chronological sequence for the site. Charcoal samples were collected whenever possible for AMS radiocarbon dating and ceramics from Ix Kuku'il were used for relative dating. Ceramic types were identified using the Uxbenká ceramic typology (Jordan 2014), as Uxbenká is the closest ancient Maya center and likely had ties to Ix Kuku'il. Ceramics identified among architectural features included Better than Puluacax, Puluacax, Chacluum Black, Remate Red, and Turneffe, all of which date to the Late or Late/Terminal Classic. A handful of sherds appear to be Early Classic in style based on rim form (Thompson and Fries 2014). Few polychrome sherds were found among the administrative or residential areas; this is likely due to a biased sampling strategy that targeted plaza areas as well as in-structure excavations among hinterland households.

The ten test unit excavations at Ix Kuku'il suggest that Ix Kuku'il was briefly occupied primarily during the Late Classic based on the lack of deep construction sequences present at other, longer occupied Maya sites. Plaza unit excavations revealed little in regards to datable contexts, archaeological materials, or construction phases compared to in-structure excavations. The excavations yielded information on burial practices, caching events, and production at Ix Kuku'il. Continued excavations in the future will focus on refining the occupational history of Ix Kuku'il and understanding the developmental history of the ancient Maya center.

Conclusions

The preliminary findings from the first three seasons of field work at Ix Kuku'il indicate an extensive settlement system, with high degrees of architectural elaboration and complexity among both residential and administrative areas. The array of artifact classes and types indicate that a full spectrum of social strata were present at this ancient community. Several administrative areas were located across the site, representing a highly diverse geospatial landscape. Ix Kuku'il occupants utilized both local and long distance trade goods and were connected with the greater Maya region through trade networks, as evidenced by the presence of obsidian, jade, and bark beaters.

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21 SPATIAL PATTERNING OF SALT PRODUCTION AND WOODEN BUILDINGS EVALUATED BY UNDERWATER EXCAVATIONS AT PAYNES CREEK SALT WORK 74

Heather McKillop and E. Cory Sills

Systematic flotation survey identified two rectangular wooden buildings and a post fence buried below the sea floor at Paynes Creek Salt Work, along with briquetage—the clay pots used to evaporate brine over fires to make salt. The site was ideal for investigating the spatial patterning of ancient activities inside and outside the buildings, as well as in the open yard defined by a line of palmetto palm posts. Transects were set out along an interior wall of each building and extending beyond the building at each end. Additional transects were placed perpendicular to the original transects. Techniques developed for excavating underwater are described, including use of submerged and weighted grid frames for excavations, use of long knives for cutting the mangrove peat matrix, use of plastic tapes for measuring depth of excavations in 10 cm levels below the sea floor, and use of a pulley system with Marine Transport Devices to transport excavated material to off-site screening stations. Screened material was sorted, typed, and recorded at the Lagoon Lab in shallow water nearby. Analysis of the artifacts reveals the yard was kept clean, whereas there was abundant evidence of salt production inside and immediately outside the wooden buildings.

Introduction

Historically and prehistorically states often controlled the production and distribution of desired resources. State control of salt production and/or distribution was carried out by control of the resource, the means of production (labor), and/or the means of distribution. In ancient China and during the Roman Empire salt production was, at times, controlled by the state (Adshead 1984; Flad 2011). The dynastic Maya surely had an interest in maintaining a regular supply of this basic biological necessity that was localized along the coast and at one inland salt works (Andrews 1983; Mackinnon and Kepecs 1989; McKillop 1995, 2005a, 2015; Valdez and Mock 1991; Woodfill et al. 2015). The depiction of a "salt person" painted on a Classic period building at Calakmul underscores the urban Maya interest in salt (Carrasco et al. 2009).

The dynastic Maya leaders of the Classic period may have controlled the production and/or distribution of salt by installing state representatives at salt works or by sending work parties to collect salt. In ancient China, a local representative of the state resided near salt works to collect a salt tax (Flad 2011). Archaeological evidence of a state representative overseeing salt production would include an overseer's residence near the salt works, as well as the presence of non-local goods. Sending work parties to collect salt would have been a seasonal endeavor during the non-agricultural dry season. Alternatively, the inland dynastic leaders may have established alliances with the coastal Maya living near or at the salt works. Evidence would be an absence of an overseer's house, the presence of coastal subsistence goods, continuity in salt production facilities and traditions, and evidence of alliances, such as trade goods. Production may have been carried out by local workers year-round inside buildings to avoid rain.

Figure 1. Map showing location of Paynes Creek National Park in southern Belize.

Excavations of the Paynes Creek Salt Works were carried out to address the context of salt production—household or separate workshop, the extent of production—seasonal or year round, and the identity of the salt

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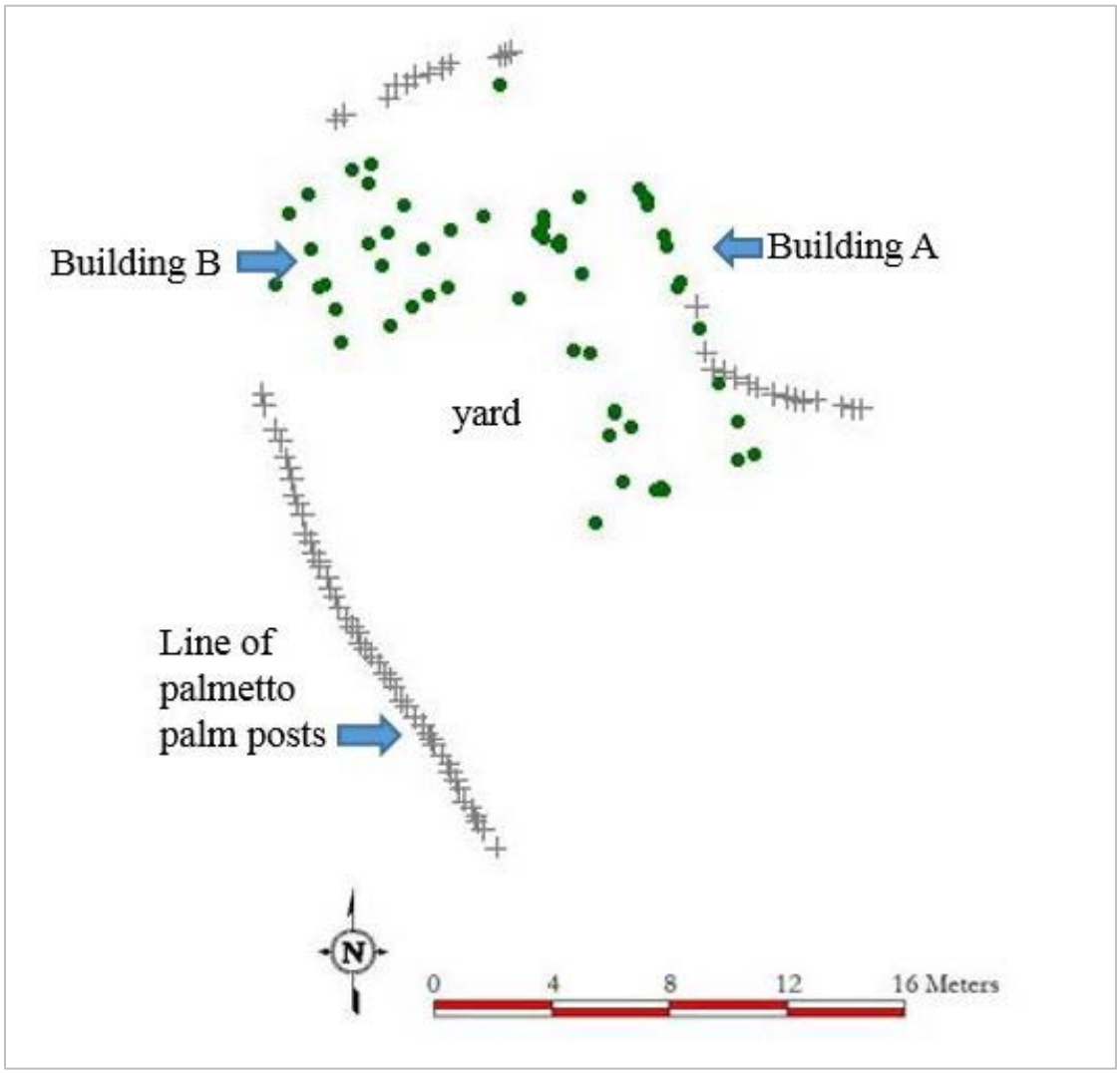

Figure 2. Map showing the location of wooden buildings at Paynes Creek Salt Work (PCSW) 74, with dots (solid wood posts) forming the outlines of structures and x's (palmetto palm posts) forming a line demarcating the boundary of the yard.

workers—either local entrepreneurs or seasonal visitors/families from inland cities. Previous research demonstrated mass-production of salt (from standardization of the salt pots, McKillop 2002) and large-scale production (indicated by the discovery of over 100 salt works). In this paper we discuss the results of excavations at Paynes Creek Salt Work 74, carried out in 2012 and 2013 (Figure 1).

Household or Factory Production

The domestic economy of household production includes activities within and around the domicile itself, as well as activities carried out by householders at other locations, such as farming, fishing, and hunting that are located near resources, some of which are seasonally exploited (see Nietschmann 1973). Salt makers often live in residences near salt works, either in the same community (Reina and Monaghen 1981) or nearby (Flad 2011; Parsons 2011). At the highland Maya community of Sacapulas, Guatemala, the salt makers' residences are located behind the salt work buildings, which were adjacent to the salt spring (Reina and Monaghen 1981). Flad (2011) suggests that the salt workers at Zhongba on the Yellow River in China lived nearby, but not at the salt works. Parsons (2001) notes that salt workers lived in Nexquipayac approximately 2 kilometers from

their salt works. Salt production can be year-round or seasonal. In west Mexico, inland settlers visited the coastal salt works seasonally and set up temporary camps nearby (Williams 1999, 2003).

If the salt workers lived at the Paynes Creek Salt Works, either in separate houses (as at Sacapulas) or in the same building or plaza group, we would expect to find evidence of household activities such as those found in Maya residences at nearby Wild Cane Cay or at Chan in western Belize (see McKillop 2005b; Robin 2012). Material remains of household activities can include middens with plant and animal food remains, burials associated with houses, a variety of pottery vessel forms for household use in storage, cooking, and serving, as well as obsidian, chert, and ground stone tools. We would expect multi-crafting, including remains of salt production and domestic activities.

If evidence of residential activity is lacking, then we expect the salt workers lived farther away—either on the coast at Wild Cane Cay or another nearby coastal settlement (see McKillop 1996a), or inland such as at the likely salt consumer communities of Lubaantun and Nim Li Punit. Workers from the coast or inland communities may have visited the Paynes Creek Salt Works seasonally and set up temporary camps, as reported by Williams (1999, 2003) for west Mexico. Evidence in the archaeological record of coastal or inland settlement would include shared artifact assemblages, motifs, and temper in pottery. Activities at non-residential salt works may have been solely focused on salt production, or may have included related activities, such as cleaning and salting fish.

Excavations at Paynes Creek Salt Work (PCSW) 74

The organization of ancient Maya salt production was investigated through excavations at Paynes Creek Salt Work 74, a site with clearly demarcated wooden buildings and briquetage—the broken salt pots used to evaporate brine over fires (Figure 2). The site was discovered during systematic underwater survey in the western arm of Punta Ycacos Lagoon in 2006. Visible evidence consisted of briquetage and wooden posts protruding from the seafloor. PCSW 74 was located beside several other salt works that

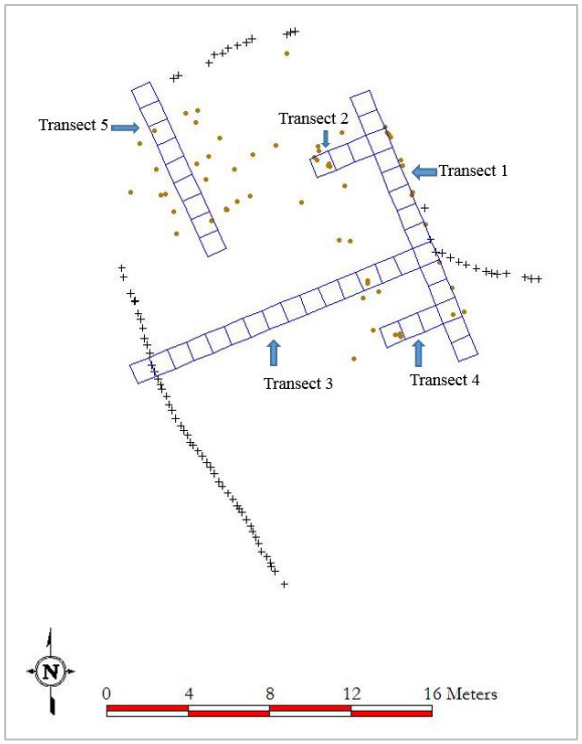

Figure 3. Map showing the location of transect excavations at PCSW 74.

formed a line along a relict shoreline (McKillop 2012; Sills and McKillop 2010). After discovery of Site 74, a team of archaeologists traversed the site in a boustrophedonic pattern, placing pin flags beside wooden posts and selecting artifacts visible on the seafloor. The location of each post and flagged artifact was mapped using a total station, with the data downloaded to a GIS. The outlines of two wooden buildings were well-defined by posts (Figure 2). Briquetage on the seafloor identified salt production was an activity at the site.

Transect excavations in 2012 and 2013 were placed at PCSW 74 to examine the material evidence of salt production and any other activities inside and outside buildings. Excavations focused on the interior and immediate exterior of each building and the yard. The yard was clearly defined as the space between the buildings and a line of palmetto palm posts (*Acoelorraphe wrightii*; Figure 2). The palmetto palm posts defined the boundary of the site as no artifacts are visible on the sea floor on the other side of the palmetto palm posts. One-meter wide transects were placed along an interior wall of each building and

extending two meters beyond in each direction (Figure 3). An additional transect was placed in the yard. Building A has interior dimensions of 10 X 3 m. A 14 m trench, Transect 1, was placed inside the building along the eastern wall. An additional three 1 X 1 m transects (Transects 2, 3, and 4) were placed perpendicular to Transect 1 inside the building along the north and south walls, respectively. A 15 m transect, Transect 3, was placed perpendicular to Transect 1 to extend across the yard and one meter beyond the line of palmetto palm posts. Transect 5 was placed along the west wall of the interior of building B. Transect 5 extended 2 m outside the building to the north and about 1.5 m outside the building on the south.

Each transect was set out using a 25 m plastic tape, with one person sighting along the tape from one end in order to maintain a straight line. Short lengths of 1" PVC pipe (about 30 cm in length) were placed at one m intervals. Before each PVC pipe was sunk into the sea floor, its location was written in black Sharpie along the side on the end to be sunk into the sea floor. The mangrove peat that forms the sea floor preserves the writing. The lines of PVC pipes demarcating transects formed the east wall of Transect 1, the north wall of transects 2, 3, and 4, and the west wall of transect 5. For excavations, a metal or a PVC plastic grid frame, each measuring one meter on the inside dimensions, was placed beside PVC meter markers and weighted with dive weights at opposing corners (Figure 4).

Excavations were carried out in 10 cm levels measured using plastic sewing tapes from the seafloor to a maximum depth of 60 cm. Stainless steel kitchen knives with 18" blades were used to cut the peat, along 6" pointing trowels. The peat was cut into sections and placed in small buckets with holes. When a bucket was full, the contents were dumped into 100 lb flour sacs placed inside small inflatable floats called MTDs (marine transport devices) along with a plastic bag with the provenience written with a black Sharpie (Figure 5). The plastic bag was then rolled up and placed inside another plastic bag. An MTD was tied to a length of PVC pipe beside the excavation unit. When a sack was full of excavated material, the MTD was untied from the PVC pipe and

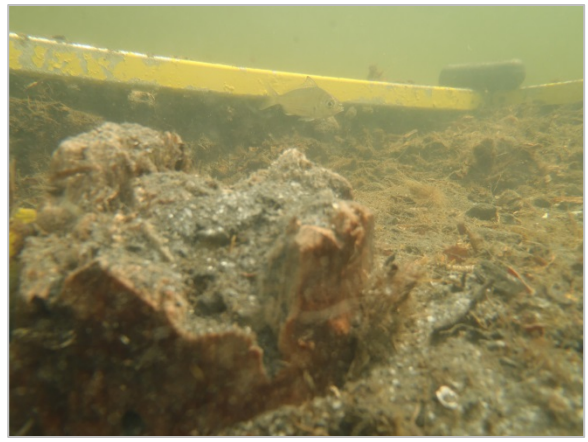

Figure 4. Underwater view inside excavation unit defined by metal grid frame held in place with dive weights. A wooden post protrudes from the sea floor.

Figure 5. Transect 1 excavations showing Marine Transport Devices (MTDs) to hold sacks of excavated marine sediment.

attached to a line extending from the excavations to an off-site screening area in the water (Figure 6). The MTD line worked like a clothes line, consisting of a long line of rope tied around 4 long PVC pipes to move the MTDs to and from the site. The system allowed water screening off site, without the excavators trampling on the site or dragging heavy sacks of marine sediment across the site. In addition to excavated material, drinking water, sunscreen, snacks, empty sacks, and other supplies were moved to

Figure 6. Off-site screening area at PCSW 74.

excavators. The MTD line was moved as needed to be close to excavations. Excavators floated above the sea floor, either using RFDs (Research Flotation Devices) or floating in the buoyant salt water.

We used "Scuba Notes," plastic waterproof notebooks with attached pencils, to record information on excavations. An underwater camera was used to film underwater and take digital images. A digital camera and digital video camera were used to take photos, with the camera equipment stored in dry bags in the PRS (Portable Research Station), anchored to the sea floor and moved along the transects.

The excavated marine sediment was screened using ¼ "mesh. The marine sediment consisted of firm mangrove peat containing briquetage, other artifacts, and plant remains. Screened material was placed in Ziploc bags. Labels were written using black Sharpie on small Ziploc sandwich bags that were folded and placed inside another sandwich bag to keep the label dry and intact. The labeled bag was placed inside each artifact bag. Flour sacks were used for excavations with abundant material.

Screened material was sorted, identified, and recorded at a Lagoon Lab set up nearby. The Lagoon Lab consisted of two plastic tables with folding metal legs under a tarp or tail-gating tent. For Transect 1 excavations in 2012, the Lagoon Lab was set up at a nearby point of land beside where we anchored the project boat. In 2013, the Lagoon Lab was set up in the shallow water at the Eleanor Betty Site. Bags were ferried from the site and stored in the mangroves. Excavating was faster than screening, even with two screens: Sacks of excavated material were stored on the seafloor inside excavated units and then transported to the lagoon lab for screening in deep water off site. Equipment for the Lagoon Lab transported and stored in waterproof bags included electronic balances for weighing material, cameras, calipers, notebooks, markers, and plastic bags. Screened material was rinsed in sea water and sorted into material classes.

Selected artifacts from the excavations were transported to the field station for 3D imaging using a NextEngine portable 3D scanner. The mangrove peat matrix and sea water that has remarkably preserved the artifacts and wooden architecture made the artifacts friable once removed from their protective environment. Three-dimensional imaging is used to create an additional scientific record of the recovered artifacts so they can be returned to deep-water caches for long-term conservation.

Artifacts from PCSW 74

Most of the excavated material was briquetage from the Punta Ycacos Unslipped type (McKillop 2002). Briquetage was sorted into rims, body sherds, solid clay cylinder vessel supports, bases (for vessel supports), sockets (for the top of vessel supports), amorphous clay lumps (ACLs), and other objects. The ACLs were unrecognizable fragments of sockets, spacers, and bases. Analysis of material from transect one indicates that amorphous clay lumps dominated in all units and depths, both inside and outside the building (Figure 7). Briquetage was common inside the building and immediately outside. Salt evaporation pots include round-sided bowls, jars, and vertical-wall basins of Punta Ycacos Unslipped type. All sherds have characteristic smooth interior and rough exterior. Water jars include Mangrove Unslipped jars with grooved, square lips, as well as Warrie Red jars, including one with an "S" unit-stamp on the vessel shoulder. In contrast, little pottery was recovered from Transect 3 excavations in the yard.

Abundant plant food remains were excavated at the eastern end of Transect 1, both inside and outside the building. Most of the plant food remains were endocarps of two

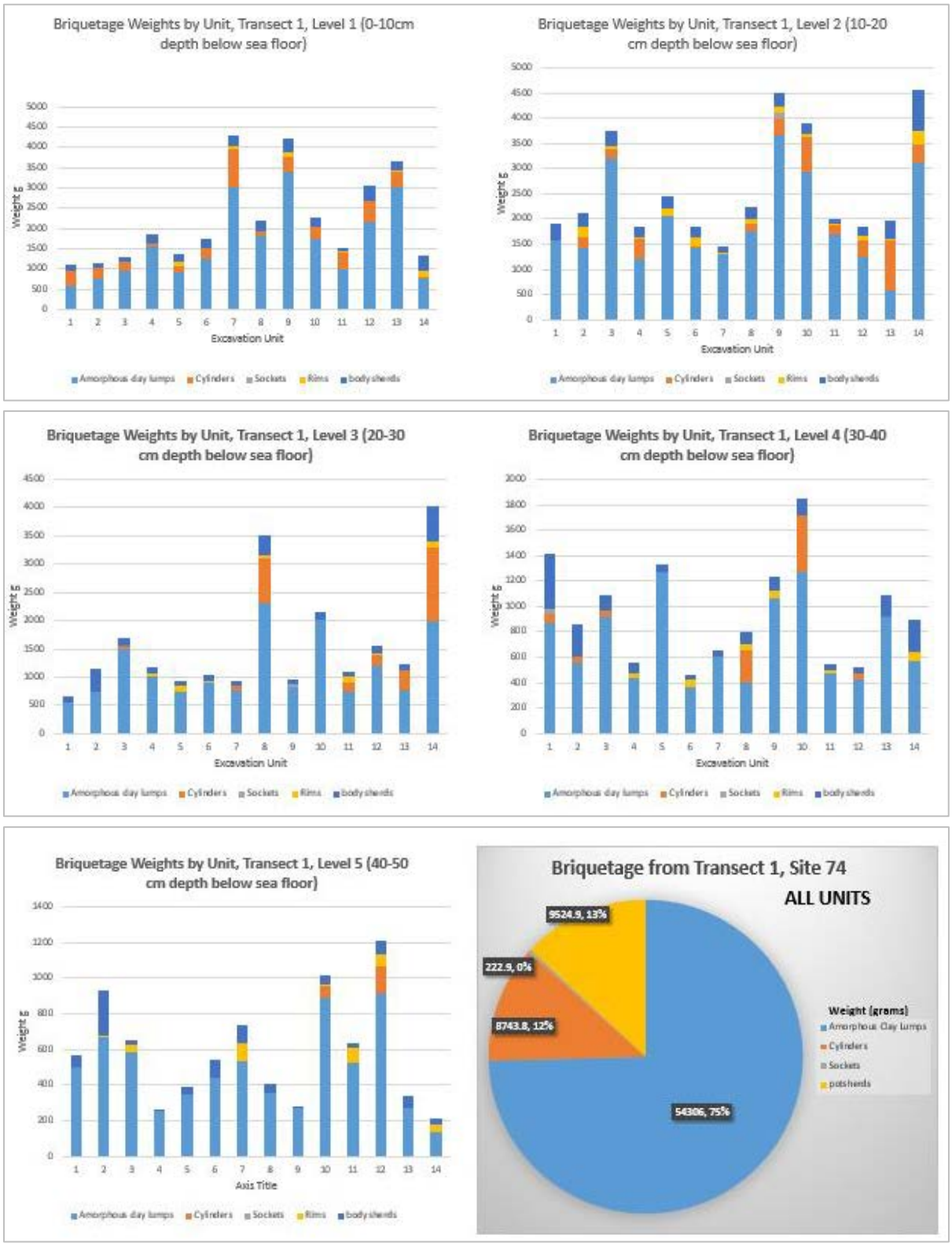

Figure 7a, 7b, 7c. Bar charts and pie chart showing weights of briquetage by unit and depth in Transect Excavation 1 through Building A at Paynes Creek Salt Work 74.

common native palm fruits, cohune (*Attalea cohune* or *Orbignya cohune*) and coyol (*Acrocomia mexicana*). Endocarps from both palm fruits were commonly recovered from the sea floor at most of the underwater sites. The native palms do not grow in salty water, but are common on high, dry ground in southern Belize. They have been recovered from Classic and Postclassic period midden deposits at nearby Wild Cane Cay, as well as other nearby coastal and island sites, notably Pelican Cay, Frenchman's Cay and Pork and Doughboy Point (McKillop 1994, 1996b). Although smaller than coconuts, the native palm fruits grow in large clusters, so may have been a significant wild food source. As suggested for Wild Cane Cay, these and other tree crops may have provided a significant food source in areas of limited land (McKillop 1994). Other tree crop remains recovered from PCSW 74 include mamey apple (*Mammea americana*) and nance or craboo (*Byrsonima crassifolia*). The trees do not grow in salty water. The palm fruits, nance, and mamey apple may have formed part of meals, collected from trees that grew at the salt works or harvested elsewhere and brought to work. The lack of floor boards for the buildings meant they were constructed directly on dry ground. The sediment matrix of the site consists of mangrove peat which is deposited under conditions of sea-level rise, similar to salt works in the eastern arm of the lagoon (McKillop, Sills, and Harrison 2010).

Paynes Creek Salt Work 74 dates to the Late to Terminal Classic based on type-variety analysis of ceramics and a radiocarbon date on a blade fragment from a wooden canoe paddle (Beta #350510: Cal AD 660 to 730 and Cal AD 740 to 770). The age is corroborated by the presence of Belize Red sherds (locally referred to as Moho Red) in small numbers in the excavations as well as Mangrove Unslipped jar rim sherds that have grooved lips typical of the Terminal Classic. A clay boat model (Punta Ycacos Unslipped type) resembles boat models from PCSW 57 (Orlando's Site), as well as other boat models from Moho Cay and Altun Ha carved from manatee rib bones, and painted and incised depictions of canoes elsewhere (McKillop, Sills, and Cellucci 2014).

Discussion

Transect excavations at PCSW 74 reveal that activities at the site were focused on salt production indicated by the abundance of briquetage, along with water jars used to store brine and salt. Water jars included Mangrove Unslipped and Warrie Red types. Unit-stamping with an "S" decoration on the vessel shoulder on a Warrie Red sherd also supports a Late to Terminal Classic age for the site. The lack of diversity of vessel forms, and lack of spindle whorls and fishing weights typical of Wild Cane Cay or other coastal Maya communities suggests that neither building was used as a residence. Instead, the buildings were used for producing salt by evaporating salty water in pots over fires. Indoor production means salt making could have occurred year round instead of seasonally.

A lack of diversity of pottery shapes and abundance of briquetage also was found from excavations at other Paynes Creek Salt Works, notably Chan b'i, Atz'aam Na (Sills and McKillop 2013), Stingray Lagoon, David Westby, and Orlando's (McKillop 2002). Chemical analyses of marine sediment associated with buildings at Chan b'i suggests a focus on a single activity (Sills, McKillop and Wells 2015). However, any bones from burials or animal bones in midden deposits would not have been preserved in the acidic mangrove peat that preserved the wooden building posts. Excavations at the nearby above sea level earthen mounds at Killer Bee and Witz Naab indicate they were slag heaps from enriching the salt content of brine before the evaporation process, since the matrix is was mostly composed of briquetage and soil (Watson et al. 2013). There was no indication the earthen mounds contained residences for salt workers or for a local representative of an inland city as in ancient China (Flad 2011). Instead, the archaeological evidence from PCSW 74 such as the lack of ceramic diversity, along with local forms of pottery, and evidence of botanicals from nearby woodland areas supports an interpretation that the inland cities formed alliances with the coastal Maya who lived near the salt works. This interpretation contrasts with the idea that an overseer from the state controlled the production and/or distribution of salt in the ancient Maya economy.

Figure 8. Survey at Paynes Creek Salt Work 74, showing large size of pottery sherds.

Conclusions

Excavating underwater has the benefit of wonderful preservation not commonly seen at terrestrial inland sites in the Maya area with the exception of dry caves. Although difficult, underwater excavations at PCSW 74 yielded excellent preservation of wooden posts that demarcate the outlines of wooden buildings, plant food remains, a portion of a wooden canoe paddle blade, and a small ceramic canoe. The lack of trampling by animals or people after the salt work was abandoned and the subsequent sea-level rise, meant that the sherds were large, with many measurable rims and reconstructable vessels (Figure 8; McKillop and Sills 2013).

The methodological techniques that were developed at PCSW 74 will continue to preserve these underwater sites from trampling by excavators. The use of long knives for cutting the mangrove peat matrix insures that artifacts will not be ripped apart. The MTDs allowed the excavators to transport heavy bags of sediment across a site without dragging on the sea floor In addition, water screening excavated material at off-site screening stations shields the site from possible contamination. All of these techniques will guide the PCSW future excavations.

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22 SETTLEMENT AND RESOURCE DEVELOPMENT AT ALABAMA, BELIZE: PAST, PRESENT, AND FUTURE INVESTIGATIONS

Meaghan M. Peuramaki-Brown

Alabama is a small major ceremonial centre nestled against the Maya Mountains, approximately 20 km inland from Placencia Lagoon. Located by the Stann Creek Project in the 1970s, investigations in the 1980s by the Point Placencia Archaeological Project determined that the epicenter was constructed and occupied by the Maya during the Late to Terminal Classic periods (ca. 600-900 AD). In 2014, the Stann Creek Regional Archaeology Project returned to the site to investigate settlement biography and its relationship to local resource development. The Phase I Reconnaissance had three goals: 1) to collect and assess as much data as possible regarding the 1970s and 1980s investigations, 2) to assess the condition of the Alabama epicenter for the first time since the 1980s, and 3) to initiate the first systematic settlement survey in the area. Combined results of investigations in the 1970s, 1980s, and 2014 suggest a biography for Alabama that is reminiscent of an instance of rapid resource-based urbanism, known colloquially as "boomtown".

This contribution is dedicated to Elizabeth Graham and J. Jefferson MacKinnon, whose pioneering work in the area of Alabama made possible the line of questioning presented in this article.

Introduction

In July 2014, the Stann Creek Regional Archaeology Project (SCRAP) conducted its inaugural field season at the site of Alabama in east-central Belize (Figure 1). A small major ceremonial centre (Hammond 1975) or Middle-Level Settlement (Iannone 2004), Alabama is nestled in an alluvial valley among the eastern foothills of the Maya Mountains in the southern portion of the Stann Creek District. Referred to in the literature and surrounding communities as Alabama or Alabama Ruins, meaning "cleared forest" in Muskogen, the site and surrounding settlement occupy the location of the old Waha Leaf Banana Company plantation, in operation after World War II until the late 1960's by the Greene and Atkins Banana Co. (who named the area) based out of Mobile, Alabama (Moberg 1997:34-35). The plantation consisted of groves and workers' barracks (site of the Old Alabama Village), an airstrip, and was connected by road to Alabama Wharf for shipping purposes. In the mid 1980s, Alabama was translated by archaeologists into Mopan and renamed *Chacben Kax* (*C'hacben K'ax, Ch'akben K'aax, Ch'akbe'en K'aax*), meaning "recently-cleared forest" (MacKinnon 1988) or, more literally, "forest that has been cleared on someone's behalf" (Marc Zender, personal communication, 2014).[1]

Alabama is located approximately 20 km inland from the Placencia Lagoon, along the upper tributaries of the Waha Leaf Creek[2] that flow from the mountains out to the lagoon. It is situated approximately 35 km from the Hummingbird Corridor to the north, and roughly 65 km from Nim Li Punit to the south. Currently, the site is part of the Greene Groves and Ranch Ltd. Property (citrus orchards), north of the village of Maya Mopan. This village was established in the 1970s by Maya families from San Pedro Columbia in Toledo to facilitate employment in the area. Since then, it has grown in population due to various industries further attracting families from Toledo and the recent shifting of local communities due to land disputes and hurricane damage (Woods et al. 1997; Residents of Maya Mopan, personal communication, 2014).

In this article, the author recaps past archaeological investigations from the 1970s and 1980s, the goals and results of the SCRAP 2014 investigations, and future avenues of research at Alabama and surrounding areas.

Past Research: SCP and PPAP

In 1976, Elizabeth Graham (1983) briefly visited the area of Alabama as part of the Stann Creek Project (SCP), at which time she noted two mounds over 5m tall near the plantation airstrip, and suggested the likelihood of other structures in the vicinity. Additionally, she provided the earliest assessment of resource availability and distribution in the region, including more detailed analyses of available

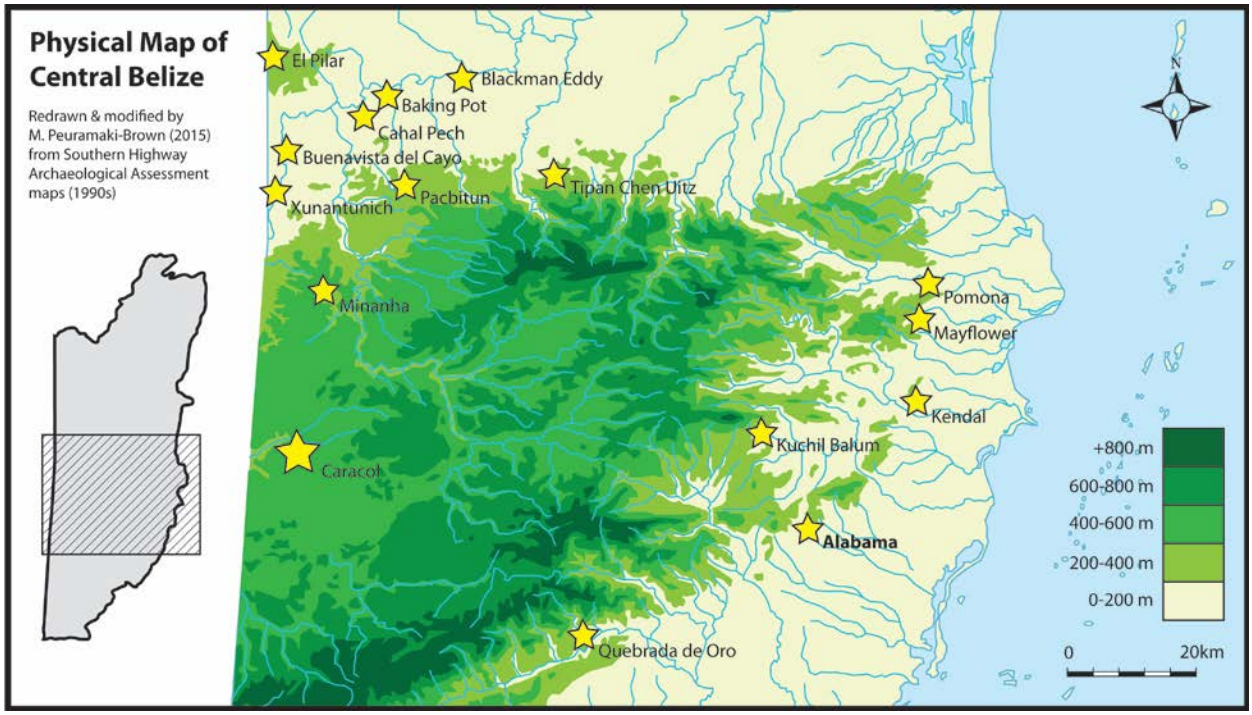

Figure 1. Elevational map of east-central Belize showing location of Alabama. Redrawn and modified from Southern Highway Archaeological Assessment maps (1990s).

soils, stones, clays, etc. (Graham 1987, 1994; see also MacKinnon et al. 1999; McKillop 2002; MacKinnon and May 1988, 1990). Archaeologists did not revisit the area until January 1985, when members of the Point Placencia Archaeological Project (PPAP), under the direction of J. Jefferson MacKinnon, located the site epicentre.

PPAP was initiated in 1983 to examine ancient Maya utilization of the coast and cayes of central and southern Belize. In particular, project members were interested in examining the development of ancient Maya lime and salt producing sites during the Early Classic and Late Classic periods, respectively, the latter of which coincided with population booms occurring inland in the Belize Valley, Peten, and elsewhere in the Maya lowlands (MacKinnon and May 1988, 1990). As part of these investigations, MacKinnon (1989a) argued that because most coastal areas were unsuitable for the construction of large centres due to their low-lying and marshy nature (Pendergast 1979:7), there must have been an important inland centre that served as a focal point for settlement and trade between the coastal salt, fish, and lime producing sites and inland areas leading to the Maya Mountains and beyond. Using locational geography and the 1970s survey data, MacKinnon located the site 1.3 km north of Graham's mounds, nestled against the Maya Mountains and immediately south of the Cockscomb pluton: one of three principal granite sources in the Maya Mountains. Smaller secondary sites were also located to the south, including the Danto and Lagarto Ruins (MacKinnon 1989a).

Over the course of four seasons of PPAP investigations, the epicentre was found to consist of 16 major structures, including an 'acropolis' and ballcourt, arranged around three plazas with a *sacbe* leading into the site from the southwest. Fourteen plain stone, granite monuments were also noted. Based on ceramic[3], carbon-14[4], and obsidian hydration[5] dates from excavations at many locations within the epicenter (Figure 2), as well as assessments of looters' trenches, MacKinnon determined that the buildings were constructed in a single phase during the Late Classic, with occupation extending into the Terminal Classic (MacKinnon 1988; MacKinnon et al. 1993). Only Str. 3, the so-

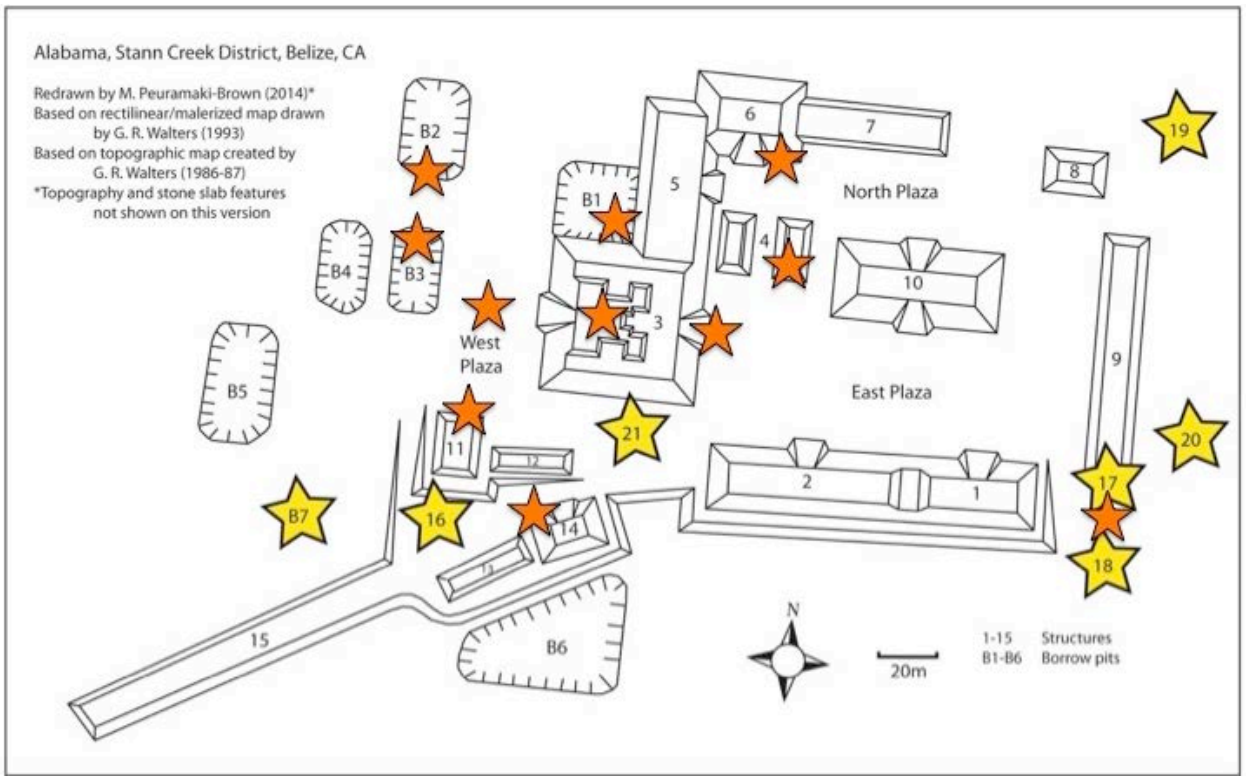

Figure 2. Epicentre map of Alabama, showing locations of known PPAP excavations (orange stars) and new structures located by SCRAP (yellow stars). Topographic mapping of the centre is currently underway. Redrawn and modified from PPAP maps.

called 'acropolis,' contained multiple phases, although all within the Late/Terminal Classic. Some Late Postclassic material was recovered in disturbed cache contexts below granite slabs found lying on the surface of a plaza (suggested by MacKinnon to be a situation of revisiting following abandonment), and two possible Early Classic jar fragments were found at surface east of the epicentre. No Preclassic material was encountered, unlike at the Kendal, Mayflower, and Pomona sites to the north (Graham 1994). No settlement investigations were conducted by PPAP (except for the testing of a set of housemounds across Waha Leaf Creek from the epicentre and the consolidation of Mound 13-1[6]), as it was believed that too much alluvial deposition and modern agricultural activity damage had occurred.

The best-known investigations by PPAP involved their excavations and consolidation of the site's ballcourt and other "megalithic" architecture (MacKinnon 1989b; MacKinnon and May 1991; MacKinnon et al. 1993). The rather large and oddly situated ballcourt (closely surrounded by large architecture on all sides), dates to the Late Classic. The use of granite slabs and blocks as facing stones in the architecture (found throughout the site and settlement), some weighing over 900 kg, is rare in Maya architecture, which is normally composed of the limestone that is so abundant throughout the lowlands (McCurdy 2014). Although no limestone is found near Alabama, the ballcourt markers and cornerstones of many buildings at the site are made of the material, likely brought in from quite a distance and reflecting the importance that the Alabama Maya associated with this material.

Another interesting feature noted were large borrow pits surrounding the epicentre. PPAP tested some of these features and suggested they were the source of core fill materials for the granite-faced buildings of the epicentre. The possibility of additional functions, such as the delineating of plaza areas and the altering of perceived building heights were also suggested (MacKinnon 1988); however, water management does not appear to

have been addressed (based on reports), nor the possibility of materials for clays and/or quartz-sand in local pottery manufacture (Aimers et al. 2015). These topics are currently being investigated by SCRAP.[7]

Present Research: SCRAP

In 2014, SCRAP returned to the site in order to investigate settlement and urban development[8] at Alabama, and its relationship to local resource extraction and trade (Peuramaki-Brown and Schwake 2014). The 2014 Phase I Reconnaissance (to be completed in 2015-2016) had three primary goals: 1) to collect and assess as much data as possible regarding the 1970s and 1980s investigations, 2) to assess the condition of the Alabama epicenter for the first time since the 1980s, and 3) to initiate the first systematic settlement survey in the area. Results of the 2014 investigations, in conjunction with PPAP epicentre data, suggest to Peuramaki-Brown a biography for Alabama that is reminiscent of an instance of rapid resource-based urbanism, known colloquially as "boomtown".

Rapid resource-related settlement and urbanism

When urban centres[9] flower rapidly in response to resource development or colonial initiatives, "instant cities" arise (Barth [1975] traces these forms of development back to ancient Greek times). Often described as "boomtowns"—communities that undergo sudden and rapid population and economic growth, or that are started from scratch because of an influx of people—these settlements are remarkable in that they typically emerge in severely disadvantaged or isolated frontier zones, often on the boundary between shifting geo-political entities (Barnes 1988; Burghardt 1971). These centres can boom then bust after a short period of time, boom indefinitely without interruption, or not boom at all—dependent on where they are located relative to resource extraction and distribution activity (Rodriguez 1982). In essence, these include "spaces of temporally compressed transformations marked by planned and unplanned radical spatial reconfigurations" (Woodworth 2011:14).

The overarching research goal of SCRAP has been to understand the nature of ancient urban development in the Stann Creek District, part of a unique geo-economic hinge zone in the Maya world, and to evaluate the degree of local Maya involvement in resource development and trade within eastern Belize and beyond. Current SCRAP investigations are focused on outlining the settlement biography at Alabama and understanding resource procurement from the perspective of boomtown urbanism, in the attempt to understand dynamic cultural processes and the entanglement of human and natural systems (Kintigh et al. 2014). The author hypothesizes, for a number of reasons discussed above and below, that Alabama represents a boom-bust story of rapid settlement and the beginnings of urban development related directly to local resource exploitation during the Late to Terminal Classic.

Understanding urban development involves a consideration of four major factors, including population development and land conversion; social fabric; presence and purpose of integrative features; and the situation of settlement within larger social, economic, and political organizations. Key points of consideration also include the adoption of multi-level perspectives, from the individual, to the local, regional, and interregional scales. Differentiating rapid resource-based development from other ancient settlement and urban processes involves:

- Criteria 1: Distinguishing a *frenetic* pace and scale of population growth and land conversion, related to rapid in-migration. In other words, rapid development relative to the norm. In the case of the Maya, this might consist of development over a few centuries rather than a thousand years or more, as is the norm (Houk 2015).
- Criteria 2: A *unique and changing social fabric*, also related to rapid in-migration. Determining who arrives? Who was already present? How were they organized in relation to each other? In particular, a transition within communities when residents shift from having strong social bonds that crosscut individual groups to only tenuous bonds that link internal groups, leaving a more "patchwork quilt pattern" of social fabric (Greider & Krannich 1985a, 1985b), often characterized by scattered residential sites versus clustered neighbouring organizations (Arnault et al. 2012; Smith 2011; Smith et al. 2014). This sudden decline in the

density of acquaintanceship, due to rapid in-migration, can be highly disruptive to socialization mechanisms, often leading to destabilizing forms of organization (Agnitsch et al. 2006; Putnam et al. 2003; Zolli & Healy 2011).

- Criteria 3: The presence of *hallmark urban features* (Houk 2015:20-21) that meet functional and place making needs, and are characterized by rapid appearance and hybrid styles reflecting foreign administration and local factors.
- Criteria 4: The location of such processes in *frontier zones*, with population involvement in associated colonization and/or resource development activities (Pullan 2011).

This framework of criteria for investigations at Alabama was developed by the author through a consideration of regional-historical systems theories from economic geography that weave together settlement, economic, and political development (e.g. "Staple Theory"; Easterbrook & Watkins 1984; Innis 1977; Watkins 1963); urban history related to polity expansion (e.g. "Instant Cities"; Bradbury 1979; Stetler 1985); and environmental sociology that considers the social implications of community development in relation to resource extraction (e.g. "Rapid Growth Communities"; Freudenburg 1979, 1982, 1986), alongside methods adopted from archaeology and geology.

Together, these ideas offer a means to consider the impact of staple resource extraction, manipulation, and distribution—commodities that were in constant demand, and often limited in source location—on ancient Maya settlement development and state expansion at local, regional, and inter-regional levels. Of particular interest is the role of grinding stones (granite *manos* and *metates*), clays/ceramics, salt, obsidian (volcanic glass), and crops such as cacao (Sharer & Traxler 2006). Each of the aforementioned theories and models help contribute to a richer understanding of rapid settlement development and provide a context for questions about whether the Maya were truly urban, what forms this may have taken, and the relationship between their dispersed settlements and centralized monumental architecture; therefore, the primary research question guiding SCRAP investigations is as follows: "What was the relationship between the dynamic commodity procurement and distribution systems of the eastern front of the Maya world and the nature of settlement and civic development, growth, complexity, and decline at Alabama?"

Evidence to-date

Based on PPAP work, various observations suggest to the author that rapid resource-based settlement and the beginnings of urbanism may have occurred at Alabama. Three of the aforementioned criteria are addressed. The frenetic pace of population and scale of land conversion is suggested by the single-phase architecture of the epicentre, as well as the large borrow pits. Additionally, little refuse was encountered in architectural fill, suggesting limited occupation in the area prior to monumental construction.

Hallmark urban features in the area could be considered as the ballcourt and sacbe, as well as plaza areas and other non-residential architecture of the epicentre. Interestingly, these features may reflect a lack of knowledge concerning their role (e.g. the odd positioning of the ballcourt), and their rapid construction may be more for placemaking concerns rather than actual functional purposes. This might be similar to boomtowns of the North American Wild West, often no bigger than "villages" or "towns", where the façades of buildings were made to look like their "big city" counterparts (libraries, town halls, etc.), but were in fact false fronts and often not providing of the entire suite of urban services expected of them (Heath 1989). Additionally, the almost "revered" use of limestone within the architecture may be similar to the use of materials from far away in western towns as well – often from important state quarries. This could also suggest a more "colonial" administrative influence. The large slab architecture is also reminiscent of that used at sites such as Tipan Chen Witz and Naranjo (Andres et al. 2014). MacKinnon (1988) suggested colonization by Maya from the interior, based on the lack of use of marine resources at the site and odd use of limestone. These lines of evidence for foreign administration will be pursued in future research; although, the nature of locally

available building materials must also be considered.

The location of Alabama at a political and economic frontier might be discussed in terms of shifting core-periphery, reciprocal or non-reciprocal relations (Schortman and Urban 1994; Urban and Schortman 1999) or dynamic centralized-decentralized models of the Maya world (Marcus 1998). An economic frontier zone is suggested by proximity to the eastern coastal trade routes, the Hummingbird Corridor (Chase and Chase 2012), and possible granite extraction and ceramic production in the area, as well as nearby saltworks. Current investigations into obsidian use by the Alabama Maya should help to situate its population within active trade routes of the period.

The 2014 season

Current goals of SCRAP research have been to continue expanding upon the aforementioned framework of criteria, and comparison with other known processes of settlement and urban development in the Maya world. During a 15-day inaugural field season in 2014 (Peuramaki-Brown and Schwake 2014), funded through a successful crowdsourcing campaign, members of SCRAP visited the epicenter to relocate old excavations and document any looting activity. All structures identified on PPAP maps were relocated, and seven new structures were identified. Previous looting identified by PPAP was noted, with only minimal recent activity encountered, and previous consolidation efforts were re-documented (MacKinnon 1989b).

The epicentre architecture is remarkable in its orthogonal layout, consistent orientation (8° east of True North), and large footprints relative to height (tallest structure is only 7m). In fact, it is particularly notable when overall hectares covered (approximately 4.3 ha, excluding sacbe and proximate plazuela group) and number of structures (18 structures, 3 plazas), are compared to those of other sites in Belize (Figure 3) (Andres et al. 2014:Table 1; Houk 2015:Table 10.1). There are far fewer structures than would be expected of a site this size; for example, Altun Ha (3.5 ha, 28 structures), Baking Pot (4.1 ha, 43 structures), Xunantunich (4.7 ha, 32 structures). In order to

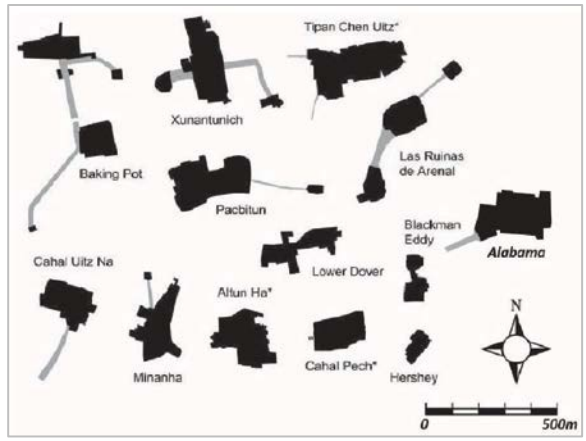

Figure 3. Comparison of Alabama to various "major centres" in Belize. The grey-shaded areas represent plazas and causeways, black represent structures. For the smaller sites, only causeways are shaded in grey, treating structures and plazas in black. Modified from Helmke and Awe 2012: Fig. 4.

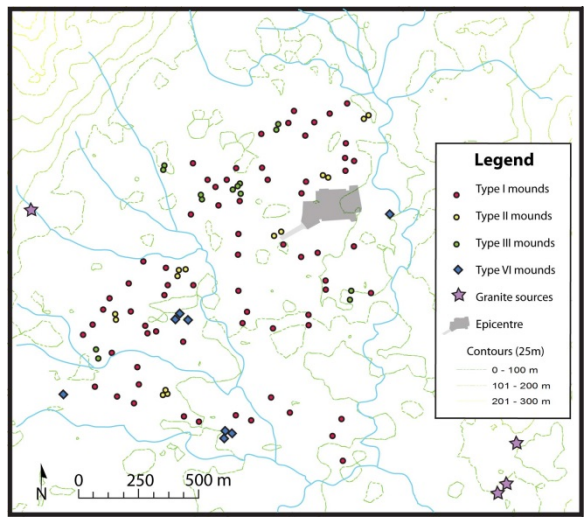

Figure 4. Preliminary GPS map of 1km2 settlement area among the upper tributaries of the Waha Leaf Creek There remains 1.5km2 to survey (limited to Greene Groves property area). Elevation data from LP DAAC (2001).

better examine further details of epicenter layout, organization, etc., it will be subject to full topographic, total station mapping beginning in 2015.

A 1km2 Global Positioning System (GPS) settlement survey was completed around the epicentre by walking orchard rows to confirm the presence of residential features (Figure 4). In total, over 100 individual mounds were identified throughout the area, many with intact granite facings, consisting of over 80 groups including larger Type VI sites spread throughout

Table 1. Percentage of settlement site types in first km2 of Alabama settlement (Property Blocks C1, C2, and D).

Type	Description	n	%
I	Isolated mound less than 2m high.	69	**81.18%**
II	2-4 mounds, informally arranged, all less than 2m high.	6	**7.06%**
III	2-4 mounds, orthogonally arranged, all less than 2m high.	6	**7.06%**
IV	5 or more mounds, informally arranged, all less than 2m high.	0	**0.00%**
V	5 or more mounds, at least 2 arranged orthogonally, all less than 2m high.	0	**0.00%**
VI	1 or more mounds, at least 1 being 2-5m high.	4	**4.71%**
VII	1 or more mounds, at least 1 being higher than 5m.	0	**0.00%**
	TOTAL	**85**	**100.00%**

(Table 1) (based on typology in Ashmore et al. 1994). Additionally, numerous isolated artifact scatters were also encountered (not shown on map), including dense chert scatters, which was not a locally available material. In 2015, the remaining 1.5 km^2 of the property area will be surveyed, in addition to surface collecting at each site in order to develop a preliminary settlement chronology and to conduct a basic clustering analysis. Preliminary surface material assessments in 2014 suggest future excavations of settlement sites have the potential to be productive, as ceramic, chert, obsidian, granite, greenstone, daub, etc. were all present at surface and in reasonable conditions. The formal surface collections in 2015 will guide settlement test excavations in 2016.

An interesting preliminary pattern emerging in the settlement is the apparent lack of clearly distinct clusters of settlement sites, independent from stream-focused organization, which are observed elsewhere in the lowlands and often suggested to be physical manifestations of neighbourhood organization within certain trajectories of Maya urban development (Chase and Chase 2014; Peuramaki-Brown 2014). This is not conclusive and spatial-clustering analyses will be conducted, as well as excavations at individual groups once the settlement survey is completed in 2015; however, it is intriguing as it may allude to a different form of settlement development in this part of the Maya world. Additionally, spacing designations for the assignment of settlement type groups may have to be adjusted (currently settlement site designation is following the Xunantunich Archaeological Project system), as groupings of settlement mounds appear to be more consistently spaced further apart (approx. 40 m), which would decrease the number of Type I mounds present.

Although current planned research into resource development includes clay and granite extraction, as well as possible trade of these materials along with other staples such as obsidian, the author will only discuss the consideration of granite exploitation at this time. Alabama is located in an aureole of metamorphic material surrounding the main body of the Cockscomb granite pluton to the north, and subsource zones to the south (Cornec 2008), with the Waha Leaf Creek tributaries originating from both areas. In 2014, two granite secondary source locales were located approximately 30 minutes by foot from the epicentre. Both areas possess small to massive (some over 2 m tall) boulders of granite that have eroded from higher cliff faces, and rolled downhill. Alternatively, some may also be the result of water movement associated with hurricanes in the past (Dunning and Houston 2011). Samples from each site were collected for export to be geochemically characterized.

Materials at each of these source zones are characterized by iron seams (thin banding), which occur in beds that run through the material. At the source zone southeast of the epicenter, the eroding iron causes huge sheets to slough off (spall), creating natural ‘slab’ forms

Figure 5. Natural slabs formed due to eroding iron seams within granite (left image), and slabs aligned in West Plaza of epicenter (right image). Photographs by M. Peuramaki-Brown (2014).

(*plancha* or "parent slab"; Searcy 2011:34), reminiscent of those of the Alabama ballcourt and West Plaza. In fact, the West Plaza slabs consist of a series of granite slabs from the same boulder, based on similarity of outlines though varying in overall size (Figure 5). At the source zone immediately west of the epicentre, many of the massive boulders contain curved iron seams, creating natural "turtleback" *metate* forms: the most common form of *metate* used during the Classic Period (McAnany 2010:111). This seaming would have eased the process of reducing large boulders for construction and artifact materials; a process similar to that described by Hayden (1987) and Searcy (2011:34), as larger blocks of basalt are broken along natural seams and fractures by tapping the slabs with a hammer. Future investigations will focus heavily on this resource development and management, along with clay exploitation and staple crops, as a possible foundation for settlement and civic development at Alabama.

Future Research

The opportunity to study an instance of ancient rapid resource-based urbanism is compelling, as it provides an innovative way of addressing topics such as ancient Maya urban planning, multi-level economic and socio-political organization, and the shifting relationships of households to larger civic and regional authorities. Although SCRAP work at Alabama is preliminary, it is considered by all project members to be an extension of the significant work conducted by Graham, MacKinnon, and others, in the area. A focus on settlement biography, granite and clay resource management, and the interaction of the ancient Maya of Alabama with their surrounding landscapes, will direct the majority of research in upcoming years. However, historic sites also located within the Alabama area will also offer interesting avenues of future inquiry, particularly regarding colonial, agricultural developments in the district.

By focusing on the nature of boomtown settlement and urbanism, and the question of its resiliency or sustainability as it existed in the past, the current SCRAP research has the potential to provide an example from a deep historical narrative to bolster larger, modern-day geo-economic and political discussions surrounding boom and bust cycles of development. Most critically, it might help understand district specific issues, as the Stann Creek District is currently the focus of much

boomtown activity related to the citrus, banana, shrimping, and tourism industries (Key 2002; Moberg 1991, 1996; Woods et al. 1997).

[1]SCRAP has decided to maintain the name Alabama, as few individuals in the region recognize Chacben Kax, including the neighbouring Maya community where it is referred to simply as "The Ruins". Additionally, the name of Alabama records aspects of local history that should be conserved.

[2]This is not to be confused with the Waha Leaf Creek further to the south (location of Waha Leaf Camp), which feeds into the Trio Branch and Bladen Branch.

[3]Much Pabellon molded/carved ware found throughout the site.

[4]Radiocarbon dates from above and beneath an intact plaster floor atop Str. 3 were A.D. 850 +/- 70 years (Wis.-1914) and A.D. 760 +/- 80 years (Wis.-1914).

[5]Obsidian hydration date from Str. 3 was A.D. 874 +/- 77 years (MOHLAB), and a second date of A.D. 1340 +/- 44 years (Diffusion Labs) from an unknown location.

[6]From existing PPAP maps and reports, the exact locations of these mounds remain unclear.

[7]PPAP investigations did not continue at Alabama beyond 1989 due to a shift in focus to other coastal sites (e.g. MacKinnon et al 1999; Gary Rex Walters, personal communication, 2015), and MacKinnon's sudden passing in 1999.

[8]SCRAP adopts the current human geography notion that any society characterized by "villages", "towns", or "cities" is considered "urban" in nature. The terms "urban" and "rural" are not perceived as an opposing dichotomy. Urban is an inclusive term describing the whole society, while "rural" refers only to a set of specialties linked to specific geographical spaces (Leeds 1980). Additionally, Trigger's (1972, 2003) and Pahl's (1966) continuums address the common factors of urban-ness (integration and nucleation) that vary in number and scale of urban functions at different settlement levels and locations, from hamlets and villages through to cities and conurbations.

[9]A location characterized by high human population density and vast human-built features in comparison to the areas surrounding it, and features special buildings representing the separation of functions that one associates with centrality (Renfrew 2008).

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23 REVISITING CUELLO: THE VIEW FROM THE CLASSIC PERIOD

James L. Fitzsimmons

The archaeological site of Cuello is one of the most important Preclassic sites in the Maya area. Research began there in the mid-1970s under Norman Hammond and his team, and in the decades that followed Cuello was fundamental in changing our image of the Maya Preclassic. The majority of the work here focused on a very small, early portion of the city center: the epicenter of a Middle and Late Preclassic (ca. 1000 BC-250 AD) Maya village, perhaps the oldest in Belize—if not one of the oldest in the Maya lowlands. There is, however, a later phase of occupation for the site dating to the Classic Period. Modest in size but clearly following the trend towards political complexity common in the Maya lowlands at that time, the Cuello of the Classic Period has not truly been excavated. What this means is that although we think we know what Cuello was like, we have very little information on anything after approximately 250 AD. This paper will address what we already know about Cuello during its later phases, what the extant Classic Period data means, and what we might look for in the future.

Introduction

The archaeological site of Cuello is one of the most important Preclassic sites in the Maya area (Figure 1). Research began there in the mid-1970s under Norman Hammond and his team, and in the decades that followed Cuello—and other early Maya sites like Nakbe, El Mirador, and San Bartolo—was fundamental in changing our image of the Maya Preclassic. We have literally gone from seeing the centuries prior to the Classic Period (250-850 AD) portrayed as an interesting, if minor, footnote to seeing this era acknowledged as a dynamic and politically complex epoch. Cuello was a part of this revolution, with the research at this site demonstrating that the origins of settled village life in the Peten and Yucatan began as early as 1200 BC, if not before (e.g., see Hammond 1991). The majority of the work at Cuello focused on a very small, early portion of the city center, in and around an area known as Platform 34. This portion was the epicenter of a Middle and Late Preclassic (ca. 1000 BC-250 AD) Maya village, perhaps the oldest in Belize—if not one of the oldest in the Maya lowlands.

Much of the visible stone architecture at the site, however, dates from the Classic Period, when the site transformed from being a dispersed rural community to a rather centralized, large town (Figure 2). Modest in size but clearly following the trend towards political complexity common in the Maya lowlands at that time, the Cuello of the Classic Period has not truly been excavated. What this means is that although we think we know what Cuello was like, we have very little information

Figure 1. Map of the Maya area (after Hammond 1991: Figure 1.1).

on anything after approximately 250 AD. For example, we do not know what happened to the people of the Preclassic village, or why Cuello adopted the trappings of a Classic center but failed—given its massive 'head start' in the Maya area—to become a major player in the eastern lowlands like Caracol or Xunantunich. We do not know what the site was like in the final years of the Classic Period, when Maya cities throughout what is today Mexico, Guatemala, Honduras, El Salvador, and Belize experienced a dramatic collapse and near-total abandonment. In fact, most of what we 'know' about Classic Period Cuello is hypothetical reconstruction: Hammond (1991), for example,

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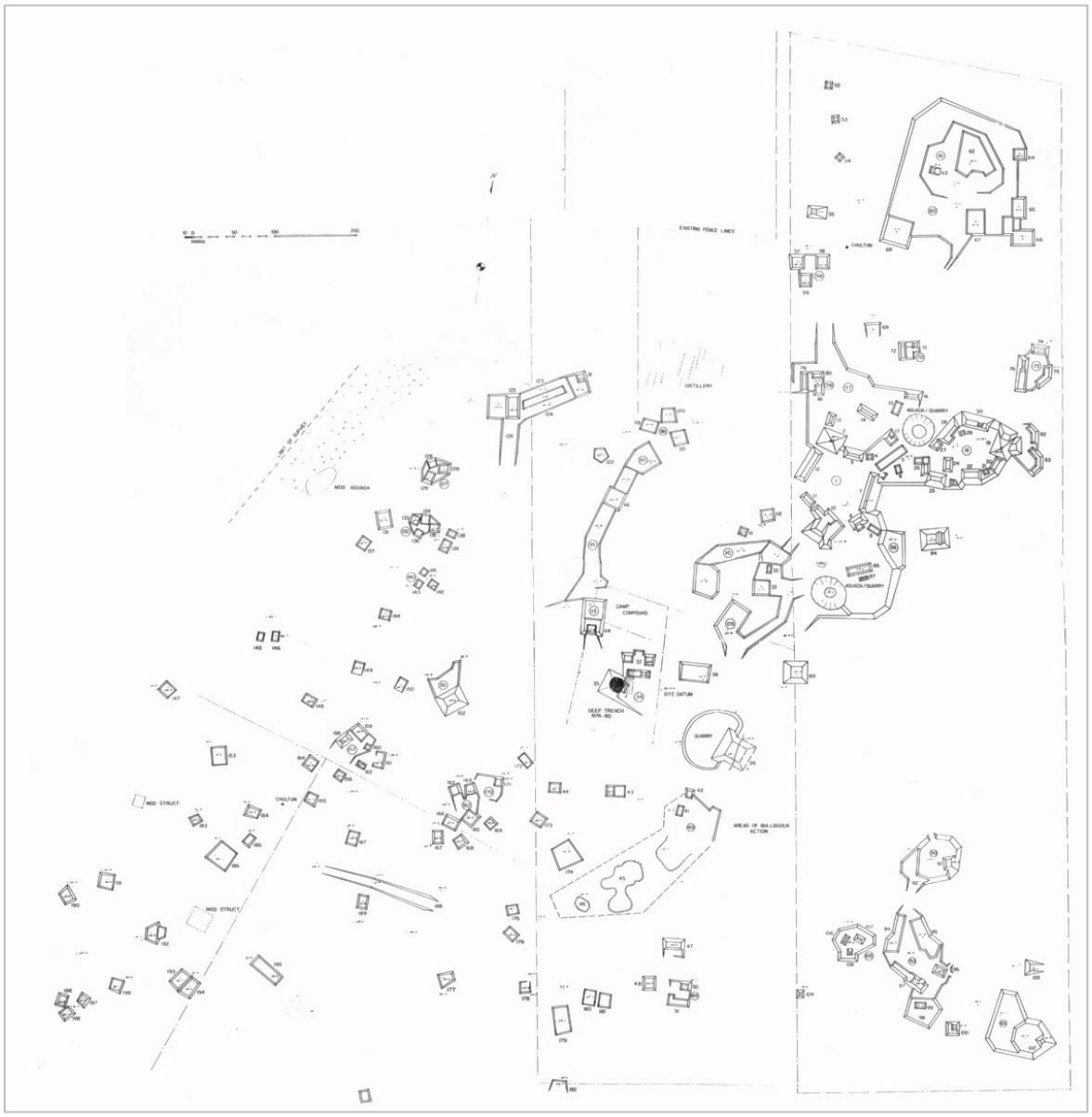

Figure 2. Map of Cuello (after Hammond 1991: Figure 2.2).

has created a rough model for what the progression of settlement looks like at the site. That model has largely remained untouched in recent years, and is integral to what we believe we know about the end of the Late Preclassic—as well as the entirety of the Classic Period—in this part of northern Belize.

Clearly there is much to learn about Cuello during the Classic Period. Cuello lacks, through a quirk of fate to be described, the depredations of any major looting activities (at least, compared to most Maya centers in evidence today). Specifically, the Classic component of the site has not been disturbed, contexts have not been mixed, and many of the features typically destroyed first at sites in the Maya area, such as burials or temple architecture, have not been damaged or tunneled into. The lack of research on Classic Period Cuello also means that much of the site is actually untouched by archaeology, and is the prime reason for why I have started up work there under the Classic Cuello Archaeological Project (CCAP). This paper will address what

we already know about Cuello during its later phases, what the extant Classic Period data means, and what we might look for in the future.

The Site

The Cuello site is located at a mid-point between two larger ceremonial centers, Nohmul and El Pozito, east of the River Hondo and very close to the modern town of Orange Walk, Belize. Logistically speaking, it is quite easy to get to: the site is approximately a 7-10 minute drive from Orange Walk on paved road, and the Classic component—while forested—is also directly accessible by a side, dirt path.

Unlike the large centers of northern Belize, Cuello has largely been spared intensive destruction: although one mound, Structure 39, had been partly bulldozed in the 1970s and another in the Classic center shows signs of a shallow, .5 meter x 3 meter—apparently failed—looter's pit, the majority of the temple-pyramids and platforms at the site are intact. This is primarily because the ceremonial center (and much of the hinterland) has been entirely owned and purposefully protected under armed guard by the Cuello family, which operates the nearby Caribbean Rum distillery. Outside of the northeastern portion of the site, which is where the largest concentration of Classic monumental architecture is located, Cuello is heavily deforested and is currently used by the eponymous family as pasture for cattle and horses. This is not to say that there has been no destruction at Cuello since the 1970s: during the brief survey and mapping season at Cuello in January 2015, project members visited every single structure on the original map of the site. The project also flew a drone over the northeastern portion of the site, obtaining aerial footage for most of what we believe to be the Classic epicenter. Structures 79 and 57, and 59 appear to have been destroyed long ago by construction and agricultural activity, whereas Structures 112 and 111 are today slowly being pushed into the ground by the herds of cattle that roam across these and other mounds on a daily basis. All in all, however, the site is in remarkably good shape.

The original map (Figure 2) of the site was created between 1975 and 1976, with further surveys done for the western and southwestern portion of the settlement in 1980. Although previous archaeological investigations at Cuello, much of it between 1975 and 1987, have produced evidence of a Classic occupation, with surface collections and limited test pits around the site suggesting a much later phase of construction at Cuello to the north and east, most of the work at the site has focused in and around Platform 34, at the center of the current map, and the small temple-pyramid designated Structure 35. This is the area of Hammond's so-called 'swimming pool,' as it is colloquially known in the archaeological community. In January 2015, we were able to take approximately 400 points in the northern and eastern sections of the site. The project will continue mapping in coming seasons, with the ultimate goal of producing a topographic map for the entire site. For the time being, until that map is completed, we will be using the present one. Working on the present topographic map, I can say that the original holds up very well, with perhaps some of the mounds in the northeast, outside of the two main Classic groups, being a bit more dispersed than seen on the 1976 version.

Maps can and do influence our thinking about the locations they feature, and the existing map of Cuello—with Structure 35 at its center—highlights the importance of the Preclassic era here. One looks at it and sees a collection of small mounds and mound groups, but no real urban core. Yet if we wanted to focus, for example, on the Classic Period (250-850 AD), we might consider reorienting the map to place the northeastern section of Cuello dead center. This is how most Classic-dominated archaeological sites are portrayed, and doing this might make us see the site in a different way. After all, this is the most architecturally complex portion of Cuello and the best candidate, if one compares it with architecture at other Maya sites, for the epicenter of Cuello during the Classic Period. In this new configuration, there is suddenly a lot of empty space—space that highlights why more mapping, and particularly more excavations to see the relationship between this epicenter and its surroundings, is necessary here. That being said, substantive fieldwork immediately to the east of this new epicenter is likely impossible: there is a long stretch of

swamp running east of these mounds, followed by an oil palm plantation which runs across almost the entire Cuello family property. Any surface structures that would have been there are unfortunately very long gone, and the drone flights we made over the site in January 2015 substantiate this. But the rest of the site remains, particularly the area to the north. As such, it is clear that there is a larger story arc for Cuello that goes beyond the Preclassic, and with this perspective in mind new work here—is not only necessary but also justified.

In coming seasons, one of the challenges facing the project will be to create a map that accurately reflects not only readily visible architecture but also low- or sub-surface structures, particularly in the aforementioned 'empty' space. The original project at Cuello (see Hammond 1991) found a rather high proportion of temporary, perishable structures in their random sampling within the site. Moreover, some of the mapped structures in and around the Classic epicenter are quite low to the ground: for example, Structure 5 is—at present—less than 10 centimeters in height. Viewing it in person, one wonders whether such a building would have actually been registered if it had not been in an acropolis-like setting. As such, it may be the case that the vacant spaces we see all around what is supposed to be the heart of the political and religious authority at Cuello, ostensibly during the Classic Period, were not so vacant after all. It is, to my mind, rather pointless to create a new map where such structures are not included, and although one must draw the line somewhere (all sites have sub-surface structures that are not formally part of a map), I would suggest that gaining a basic sense of how dense the actual architecture is around the northeast group is necessary. Even if we, rather sensibly, restrict the map to permanent structures, it would seem that more work has to be done here. In short, the absence of anything on the existing map immediately surrounding the northeastern group—particularly to the south, where there appear no visible impediments to construction, such as a swamp or irregular terrain—is suspicious. Indeed, when we look at Cuello with the northeastern group as the center, there appears to be a great number of places where architecture is

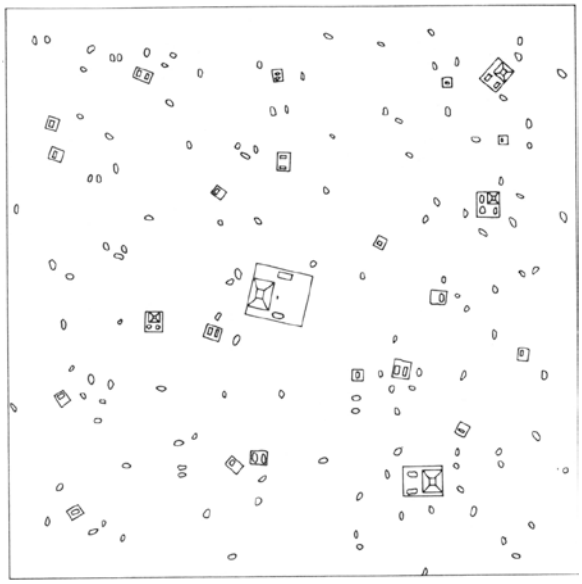

Figure 3. Hypothetical reconstruction of Late Preclassic Cuello (after Hammond 1991: Figure 6.6).

suspiciously absent. To this end, coming seasons will be using GPR and test pits in transects to explore just how 'empty' Cuello really was.

Classic Cuello

None of this is to say, however, that we lack basic information on Cuello during the Classic Period. Far from it: from the work done by Hammond and others on the original Cuello project (e.g., see Hammond 1980, 1991; Hammond et al. 1991; Hammond et al. 1992; Housley et al. 1991; Law et al. 1991; Kosakowsky 1983, 1987; Kosakowsky and Pring 1998; Pring 1977; Pring and Hammond 1982; Robin 1989; Wilk and Wilhite 1991), there are strong indications that the population here may have grown from the Late Preclassic (Figure 3) to reach its peak during the Early Classic (Figure 4). Indeed, the Early Classic appears to have been a time of great change at the site in terms of architecture, socioeconomics, and burial patterns. For example, test pits throughout the site suggest that stone architecture created during the Preclassic was actually not reused or remodeled by the Early Classic occupants, who seemed to prefer to build in new areas or atop perishable Preclassic buildings. The aforementioned northeast group appears to have been built in the Early Classic, which Hammond suggests indicates a switch

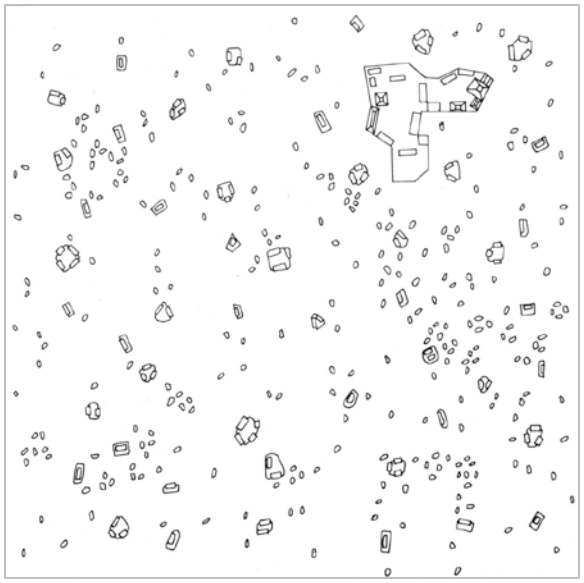

Figure 4. Hypothetical reconstruction of Early Classic Cuello (after Hammond 1991:Figure 6.7).

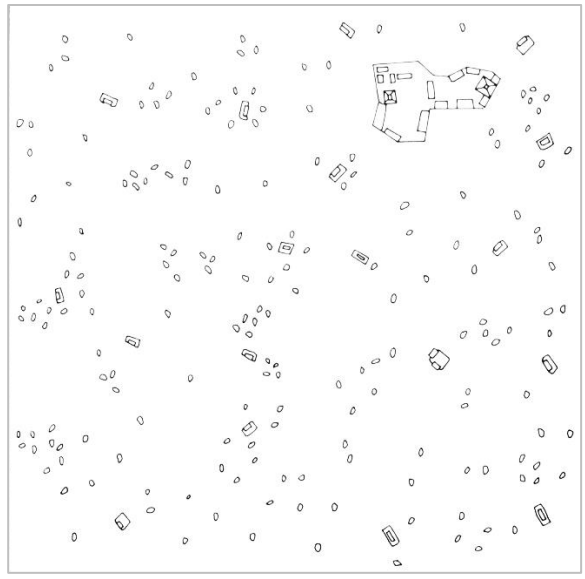

Figure 5. Hypothetical reconstruction of Late Classic Cuello (After Hammond 1991: Figure 6.8).

from kin-based to community-level ceremonial (and probably political) activity.

The Early Classic also seems to have been a time when wealth disparities were on the rise. What Early Classic residential information we have suggests that basic, perishable houses coexisted with well-plastered platforms faced with cut stone. Like other sites in the Maya lowlands, this is accompanied by a switch from building such houses on a single raised substructure, as was common in the Late Preclassic, to houses framing the familiar patios we know all too well for the Classic Period (Kurjack 1974; Ringle and Andrews 1988). Moreover, the number of lone platforms appears to increase during the Early Classic; Hammond and his colleagues (Hammond et al . 1991) suggest that this heterogeneity stems from differential access to resources and is further evidence for the widening gap between the haves and the have-nots at the dawn of the Classic Period.

In terms of burials, there are preliminary indications of a marked switch between the Late Preclassic and the Early Classic. During the Late Preclassic, most burials were concentrated in large, complex platforms. But by the Early Classic it appears to suddenly become fashionable to place the dead below household floors. This is, of course, the norm during the Classic Period. But this kind of change at Cuello is, to my mind, the most significant—for drastic changes in the ways in which people are buried are, from a cross-cultural perspective, typically associated with massive social transformations and/or deviations in population. Moving the dead into houses is a rather drastic change if one considers that this was previously not the norm there.

The Late Classic (Figure 5) does not, on the available evidence, appear to have been a good time for Cuello. Test pits around the site by Hammond and his colleagues suggest that the population declined markedly; they have proposed that, due to the fact that Cuello is not in as advantageous a location for intensive farming as Nohmul, El Pozito, and Lamanai, at least some of the population here may have emigrated to these increasingly prosperous centers during the Late Classic. This is not to say that there is no evidence of Late Classic construction at the site, but that—as Hammond and others note—it appears to slow down as the population becomes less visible archaeologically. Cuello does not appear to have ever recovered from this decline, with little-to-no clear evidence of occupation during the Postclassic either (Hammond et al. 1991).

All of this information provides us with a solid foundation for the present project, to be sure, but most of it is, as mentioned in the introduction, well-informed hypothetical

reconstruction. Most of what we think we know about Classic Period Cuello are hypotheses that need to be tested against the main evidence of Classic construction at the site: the northeastern group. Owing to the random sampling of his test excavation units, not much work was actually done in the northeastern group during the project's full run: plazas, mounds, and other features largely remain untouched. Indeed, even the idea that the northeastern group is "Classic" is based upon limited evidence: surface collections, the overall appearance of architecture in that group, and prior test pits in the general vicinity by Hammond and his team. Having worked in the northeastern group for the 2015 season at Cuello, I can say that the group is rather typical for the Classic in terms of its layout (although there is a dichotomy between architectural styles typical of northern vs. southern Belize within the group itself; Jaime Awe, personal communication 2014), and sherds on the surface are indeed Classic (primarily Early Classic) types. But one needs much more than this to even build a foundation for long-term research. As a result, the Classic Cuello Archaeological Project will be undertaking intensive excavations within the plaza in future seasons to determine the actual sequence of events here.

Authority and the Growth of Cuello

What could have caused Cuello, a place that may indeed have had the aforementioned "head start" in the Maya area, to have declined to the point where its population simply left for better opportunities? Why did the burgeoning elite class of northeastern Cuello fail to transform their center into something larger? Were the elites at Cuello caught up in a larger geopolitical network, only to fall apart or be eclipsed by other centers in the Late Classic? These questions largely depend upon what was holding—or, in the Late Classic, not holding—Cuello together. That is to say, one might explore how much authority the center truly exerted upon the rest of the population. We might look to the relationship between the Classic political center and its more ancient, rural population.

Authority comes in many forms. In terms of material culture, one can—and I intend to—look at economics, religion, or other ideological markers to see how authority is exerted upon the landscape. All of these—and here I am taking a page out of classic Max Weber (1997[1920])—can be seen to be derived from three basic sources: 1) rational-legal; 2) traditional; and 3) charismatic. Rational-legal authority is, at its heart, a mode of authority reinforced by laws, patterns, or rules defined by and attached to—at the very least—a ruling class. If we applied this rational-legal model to the Classic Maya, a Maya polity like Cuello would have clearly defined territorial borders, known both to individuals within that territory and without. Cuello would, during the Early Classic, have rules—economic, political, or religious, for example—that would be known to most living in or near it. And the rules would be what sustain the site and keep it from falling apart. Most Maya archaeologists would probably say that clear evidence for such authority is lacking, but that in certain areas there were efforts by Maya rulers to inscribe formal authority on the landscape, whether it be via far-flung stelae or architectural constructions. Of course, such badges of authority need not be artificial. Natural features, in the case of Cuello perhaps the New River, may have served as explicit boundaries or limits. To my knowledge, however, establishing strict, even quasi-legalistic authority at Maya sites has been an elusive task (Fitzsimmons 2015).

Ideas about traditional authority within Maya political units are, by contrast, very popular today, from the role ancestors played in the built environment to the tensions between authorities based on kinship versus kingship (Houston et al. 2003; McAnany 1995). If we applied a Weberian traditional model of authority to Cuello, we might say that the Early Classic political system there rested on shared, longstanding ideas as to what it was and what it could be. The authority of the Early Classic elites would be defined according to moral (e.g., ancestral, divine, etc.), familial (e.g., kinship and the power of lineage leaders), or other customs and practices involved in the creation of traditional authority. Classic Cuello exists, in other words, because of sacrosanct convention and because that convention has been fostered over time (top-down or more laterally, as at

Xunantunich for example). One could include ideas about moral authority and community in here—many have termed the fostering of such beliefs, for example, as an elite strategy and the belief in the polity as a social enchantment (Geertz 1980; Demarest 1992; Houston 1998; Canuto and Fash 2004). The Late Classic decline at Cuello, in this view, would be the failure of that enchantment to persist. Cuello, in a sense, fails because people cease to believe that the tradition of elite rule holds any meaning (Fitzsimmons 2015).

All of this sounds good, at least in theory. Unfortunately, in terms of what we presently know about the Classic Period at Cuello, these rational-legal and traditional models of territorial authority are problematic. Inherent in both models in the implication that one has, for the duration of the Cuello polity, a civic-ceremonial core built upon a rather stable, temporally persistent, form of authority. We do not have this. Rather, what we seem to have is a village that suddenly, during the Early Classic, starts to adopt the trappings of a Classic Maya center in a location far removed from the original heart of the site as represented by Platform 34. To deal with major shifts we might look at Weber's charismatic model. Charismatic authority, in the Weberian sense, relies upon the "specific and exceptional sanctity, heroism, or exemplary character of an individual person [or set of individuals], and of the normative patterns or order revealed or ordained by him (1997[1920]: 358)." Applying this to a polity, we might say that authority in what I call the "charismatic polity" is inherently unstable, though it can often become traditionalized, rational-legalized, or a combination of both. In this model, charismatic leaders in the Maya area are accumulating social capital for their polity, which they are then transforming into rational-legal and/or traditional models of authority. In this charismatic model of authority, it is not enough for the rulers and the ruled to believe in a moral community or to create clear boundaries for their polity. These are stabilizing forces, to be sure, and I do believe that they were in play to varying degree at Maya settlements. But in this charismatic model, the one that I find the most fitting for the Maya case, traditional and rational-legal authorities do not sustain integrity or political unity per se. Rather, I would argue that what sustains the Classic Maya political unit in the charismatic model is force of character (Fitzsimmons 2015).

This is what we may be seeing at Cuello. If one looks at the Hammond's hypothetical progression of settlement at the site, we see a Late Preclassic lineage compound transformed, in the Early Classic, into something like looks more like a civic-ceremonial center. That center persists into the Late Classic, although the population thins out until the site itself is abandoned. In other words, we see a group of people, likely a family, gaining the upper hand and changing the character of Cuello to be more in line with what is going on elsewhere in the Maya lowlands during the Classic Period. But the area chosen is not the traditional heart of the site, and there are no indications of Cuello being anything other than a village prior to the Classic. It is on its way to becoming a large center, and then suddenly it isn't. This is not to say that there were no rational-legal or traditional modes of authority in place. Only that, for whatever reason, the charismatic elites at Cuello were unable to transform a new way of organizing a Maya site into something more permanent.

How to test this hypothesis? Again, looking at the construction history of the northeast group is paramount: we do not know, at this time, how quickly it went up or its true relationship to prior architecture. Based upon the test pits of Hammond and his team, there were earlier structures in the area, but what they looked like and how they relate to the Early Classic buildings is unknown. Likewise, we need to have a greater understanding of the material culture of the Classic Period at Cuello, particularly if there is anything distinctively "Cuello" about it that can be traced across time and space. This would help us to determine if indeed the inhabitants of Cuello are actually deserting it during the Late Classic for greener pastures, likely Nohmul, El Posito, or even Lamanai. Moreover, a greater understanding the Classic assemblage would help us to gain an awareness of Cuello's relationship to its larger neighbors and its position in regional geopolitics. There already is a foundation for this within the data produced by Hammond and his team, of course, but building upon this

foundation with data from the Classic civic-ceremonial core seems to be a good next step.

One could ask most Maya archaeologists about Cuello and the initial response would likely involve words such as "significant," "Preclassic," "village settlement," or some combination of the three. Phrases like "Classic Period", "civic-ceremonial center", or "temple-pyramid" (other than Structure 35) are almost inconceivable in such a conversation. Yet the preliminary map of Cuello produced in the 1970s points to all these things, and any visitor to the site who has been to a Classic Period center would find much of the northeastern section quite familiar. This project is thus returning to a famous site in order to find out how the things that make this place familiar to archaeologists fit within a much larger story arc, one which unfolded well past the Preclassic into the Classic Period, and ended only with the dramatic collapse of ancient Maya civilization in the 9th century.

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24 INVESTIGATING PROCESSIONAL ARCHITECTURE AT CHAN CHICH, BELIZE

Ashley Booher and Brett A. Houk

Sacbeob represents significant components of the built environment at ancient Maya cities. As such, constructing a sacbe required a sizeable labor force and significant time, and sacbeob are comparable, in those regards, to other monumental architecture, including plaza platforms, range buildings, and temple-pyramids. Like other elements of Maya cities, sacbeob likely had multiple functions—ranging from transportation, to political integration, to water management, to ritual—but some may have been constructed first and foremost for ritual purposes, designed to serve as stages for royal processions and public spectacles. This article reports the 2014 and 2015 excavations of the Chan Chich Archaeological Project that were designed to understand the age, form, and function of the Eastern and Western Causeways at the Maya site of Chan Chich and to look for evidence of ritual activities associated with processions along the causeways and at their termini. While our excavations did not locate conclusive proof of ritual activity along the causeways or at two associated structures at their termini, data from Courtyard D-1 point to a specialized ritual function for the group and its occupants. Given the proximity of the courtyard to the Eastern Causeway at Chan Chich, the finds are circumstantial evidence for processions along the causeways.

Introduction

Sacbeob represented significant components of the built environment at ancient Maya cities. As such, constructing a *sacbe* required a sizeable labor force and significant time, and *sacbeob* are comparable, in those regards, to other monumental architecture, including plaza platforms, range buildings, and temple-pyramids. Like other elements of Maya cities, *sacbeob* likely had multiple functions—ranging from transportation, to political integration, to water management, to ritual—but some may have been constructed first and foremost for ritual purposes, designed to serve as stages for royal processions and public spectacles (see Inomata 2006). This article reports the 2014 and 2015 excavations of the Chan Chich Archaeological Project (CCAP) that were designed to understand the age, form, and function of the Eastern and Western Causeways at the Maya site of Chan Chich and to look for evidence of ritual activities associated with processions along the causeways and at their terminus structures.

Maya Cities, Rulers, and Ritual

This topic, which is the focus of the senior author's thesis research, explores the intersection of ancient Maya urban planning, ritual, and the roles of rulers as performers in public spectacles. From depictions of kings on ceramics and murals, we know that a wide variety of buildings served as the backdrop for royal activities, from the interiors of palaces (which hosted visits, meetings, and rituals), to the steps of buildings (which served as stages for dances and adjudications), to ball courts (which held royal and even mythological ball games). Kingly attire often reflects the audience and setting in these various depictions. When rulers are shown inside buildings, they are dressed rather simply with modest headdresses. Other vessels and the murals at Bonampak depict rulers holding court on the steps or terraces of their royal palaces. In these settings, the ruler is often wearing more elaborate attire than in the interior scenes. Kingly attire, however, is most elaborate when kings perform public rituals outside of buildings. As Takeshi Inomata (2006) argues, the massive headdresses and elaborate backracks worn by kings were designed to be highly visible during mass spectacles. The most elaborate costumes of kings reflect not only a big stage, such as a plaza or the steps to a palace, but also a large audience.

Inomata (2006) argues that one function of public plazas was to accommodate large audiences that witnessed elaborate public spectacles in which the king served as both sponsor and performer. Rather than be confined to public plazas, many public rituals may have involved processions. For example, depictions of kings being carried on litters, bedecked with images of giants or animals, suggest that some mass spectacles involved processions in which the king was carried along a prescribed route in front of the spectators. In large cities, causeways could have functioned as ritual

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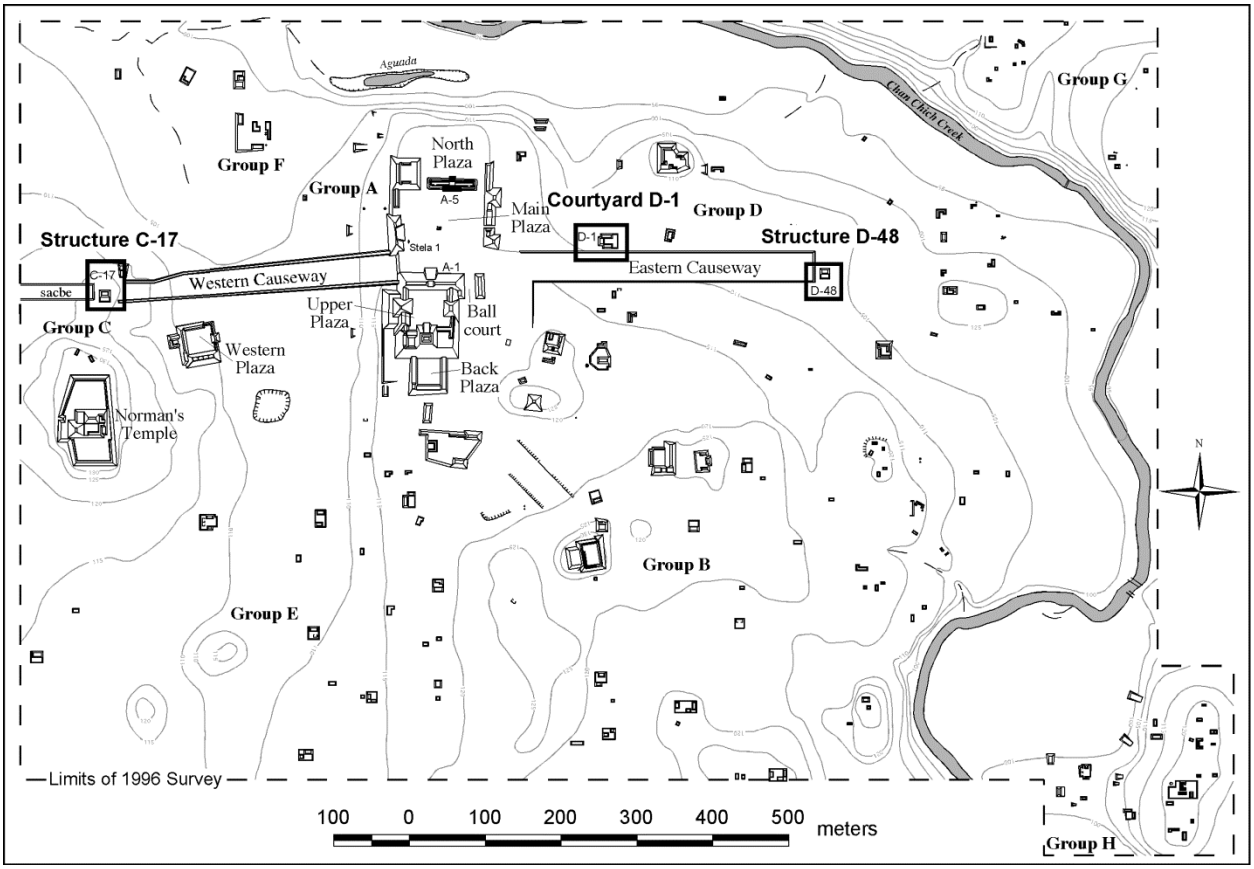

Figure 1. Map of the site core of Chan Chich showing the locations of 2014 and 2015 excavation areas associated with the processional architecture.

procession routes, and Inomata (2006) suggests that the very wide causeways at Tikal, which date to the Late Classic period, were built to allow more spectators to take part in public spectacles.

The murals at Bonampak depict a possible procession in which people wearing special costumes and carrying ritual paraphernalia walk in a single-file line. Among the participants are banner carriers, musicians, and dancers (Miller and Brittenham 2013). These spectacles and processions were important for community identity and "were probably the occasions on which people felt their ties with the ruler most strongly" (Inomata 2006:818).

While architecture is shown in art as the stage for ritual, proving archaeologically a ritual function for architecture is difficult, and most Maya structures probably were multi-functional. For example, plazas could be engineered to serve as water catchment features, temples doubled as funerary structures, and large range buildings may have had residential or administrative functions, but all could be incorporated into rituals and spectacles. Ball courts, with their distinctive architecture, are easily recognized elements of ritual architecture at cities. It is abundantly clear that kings took part in ceremonial ball games, which were witnessed by their subjects. It is not coincidental that most ball courts are located in or near the main plazas at sites. The ball game, however, was only one aspect of a ruler's ritual responsibilities to his or her subjects. From a functional perspective, then, Maya city planning likely took into consideration the need for city architecture to serve as a stage for performances from time to time. In this way it is possible to examine city plans for architectural elements that likely functioned together as the settings for rituals, spectacles, and processions.

The research at Chan Chich is based on the idea that public spectacles formed a significant aspect of ancient Maya society and affected city planning (Figure 1). From a functional perspective, Maya urban design should address the need for city architecture to serve as a stage for mass spectacles on certain occasions (Houk 2015). For the ancient Maya, the need for processions, mass spectacles, and elaborate rituals may have been the primary concern in the arrangement of certain urban design elements. In other words, seemingly disparate elements of a city's plan could all be components of its processional architecture, designed to function as the stage for rituals and mass spectacles. Interpreting architecture through this filter may explain otherwise inconsistent elements of a city's plan—why a building faces a certain direction, why a *sacbe* is a certain width, why a plaza is a certain size, and so on. Houk (2015:Table 10.6) identified five cities with likely processional architecture, including Chan Chich, and another five with possible processional architecture in a recent study of 14 cities in the eastern lowlands (Houk 2015:278–282, Table 10.6).

Processional Architecture at Chan Chich

Thomas Guderjan (1991) first mapped the site core of Chan Chich and recorded the Eastern Causeway—also known as the Harding Causeway. He described it as generally elevated 25 to 50 cm, approximately 30 m wide, and 385 m long (Guderjan 1991:44). Guderjan (1991:44) also noted that Courtyard D-1, which he recorded as Structure 37, "clearly had a function related to the Harding Causeway." Between the end of the causeway and Chan Chich Creek, Guderjan (1991:44) reported numerous house mounds and he speculated the causeway connected the site core to this zone of settlement. During the first season of the CCAP, Houk and colleagues (1996:22) remapped the Eastern Causeway and determined that it ended just west of Structure D-48. On the opposite side of the Main Plaza, they also discovered the Western Causeway, which they described as "composed of two parallel linear mounds defining a 40 m wide space between them." They noted that the causeway terminated at Structure C-17 and that an elevated *sacbe* appeared to begin west of the structure and extend westward, beyond the limits of the mapped portion of the site core (Houk et al. 1996:22).

The Eastern and Western Causeways enter the Main Plaza in front of Structure A-1, a massive structure with a broad stairway and central summit landing flanked by tandem-range buildings. Both of these causeways are about 40 m wide, much wider than they need to be if they only functioned as walking corridors. Attached to the eastern side of Structure A-1 is the site's ball court, which sits on the platform created by the Eastern Causeway. We hypothesize that these four elements, along with the Main Plaza itself, likely comprised the processional architecture at Chan Chich and served as the stage for a variety of performances involving processions along the causeways, spectacles on the stairs and landing of Structure A-1, and ball games. The large plaza would have provided space for thousands of people to witness the events. Furthermore, the two causeways terminate at structures with similar configurations—Structures C-17 and D-48, noted above. The two buildings face south, and each has a small patio platform extending to the south.

Methods and Research Questions

CCAP investigated the proposed processional architecture at Chan Chich in 2014 and 2015. Excavations targeted the two *sacbeob*, the two termini structures, and Courtyard D-1, a small courtyard adjacent to the Eastern Causeway. We used Angela Keller's (2006) work at Xunantunich as a guide. Her study suggests that with a bit of planning and luck it is possible to recover artifacts related to the functions of Maya causeways. Keller (2006) excavated "clearing units" along the edges of the two causeways at Xunantunich where she thought trash might accumulate. Importantly, she found sherds from ceramic drums along both causeways, but a concentration of them near Structure A-21 and the western end of Sacbe II. She also found sherds from censers in the same area, and concluded that "the rituals enacted on Structure A-21 were directly associated with musical performance along the causeways" (Keller 2006:452). She also found other types of

artifacts along the causeways including a chert eccentric, a pyrite mirror fragment, a marine shell pendant, a jade bead, portions of ceramic bowls, and obsidian blades. Some of this debris she interprets as bits of costumes lost during processions, but some she interprets as the remnants of rituals conducted along the procession route. Perhaps by stopping the procession along its route to perform some offering or ritual, the participants could engage an even larger number of spectators (Keller 2006). The specific questions posed by the research at Chan Chich were:

- What are the construction sequences for the two causeways (in other words, how many phases are represented, and what are their ages)?
- What is the architectural form of the parapets on the Western Causeway?
- What is the architectural form of the Eastern Causeway?
- Are there concentrations of artifacts along the margins of the causeways that might be related to ritual processions?
- How similar in size and form are Structures C-17 and D-48?
- Are there concentrations of artifacts on or near Structure C-17 and/or Structure D-48 that might be related to ritual behavior?
- What is the construction history of Courtyard D-1?
- Is Courtyard D-1 functionally related to the Eastern Causeway?

In general, the excavations followed the standard procedures used by the CCAP to investigate architecture and chronology (Houk and Zaro 2015). The project followed methods used by Keller (2006) to excavate clearing units. These units were placed along the edges of the *sacbeob*—off the edge of the Eastern Causeway's platform and against the interior base of the Western Causeway's parapets—to look for artifacts that might have been lost during processions and later swept aside. These units were generally 2 x 2 m in size, and crews only excavated through the topsoil to collect material above the final surface of the causeway or above the original ground surface adjacent to the causeway. To facilitate recovery of smaller artifacts, excavators screened the matrix from the clearing units through 1/4-inch mesh.

Sacbeob Investigations

Construction and Chronology

The 2014 excavations addressed the construction phases, age, and architectural form of the causeways. The Western Causeway is approximately 380 m long and 40 m wide. It has 1.40-m wide parapets, preserved to a height of 45 cm, that were constructed from cut limestone blocks, and had an elevated surface that raised the surface of the *sacbe* 30–45 cm above the original ground surface, at least near the Main Plaza (Booher and Nettleton 2014:94–95). The only other sites in Belize with parapet-lined causeways are El Pilar, Xunantunich, and Caracol (Houk 2015); La Honradez and San Bartolo, two larger sites to the west in Guatemala, also have causeways with parapets (Garrison 2007; Houk 2015). Ceramics from the rubble fill indicate the single-phase construction dates to the Late Classic period (Booher et al. 2015).

The Eastern Causeway is an elevated surface lacking parapets. It is 40 m wide and extends for 430 m before terminating near Structure D-48. Excavations in 2014 within 150 m of the Main Plaza determined the *sacbe*'s northern and southern faces were crudely built with unfaced stones stacked on top of one another to build a coarse platform face (Booher and Nettleton 2014:97). As was the case with the Western Causeway, excavations documented a single, Late Classic construction event for the Eastern Causeway. A test pit encountered irregular bedrock covered by 35–65 cm of rubble fill, but in places along the northern edge of the *sacbe* the surface is elevated approximately 1 m above the natural ground surface.

Clearing Units

The project excavated six clearing units along the Eastern Causeway and three along the Western Causeway (Figure 2). Ceramics from the units include Tepeu 2 and 3 types suggesting use of the *sacbeob* likely extended into the

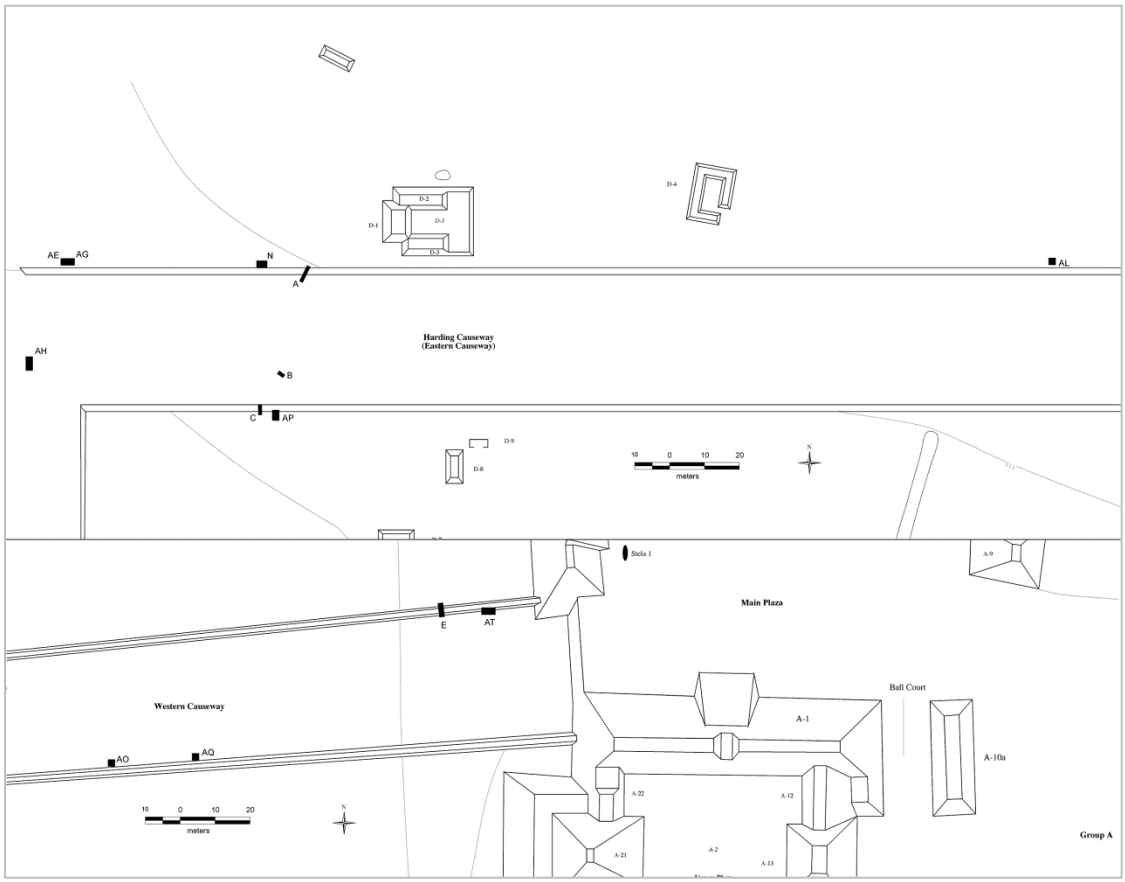

Figure 2. Locations of excavations along the Eastern (top) and Western (bottom) Causeways, including clearing units, chronology test pits, and architectural units.

Table 1. Artifacts Recovered from Above Final Patio Surface on Structure D-48.

Suboperation	Ceramic Sherds	Lithic Tools	Obsidian Fragments	Debitage	Ground Stone	Shell/Faunal
CC-14-AN	3232	32	2	460	7	1
CC-14-AP	992	6	3	224	3	0
CC-14-AS	1633	14	0	173	4	0

Terminal Classic period (Booher et al. 2015). In general, the clearing units produced low-to-moderate densities of ceramic sherds and lithic debitage. However, other than four obsidian blade fragments, two of which were recovered in 2014 along the Western Causeway's parapet, none of the artifacts fit into categories that Keller (2006) associated with ritual use of the causeways at Xunantunich. The clearing units at Chan Chich did not recover any drum fragments, censers, eccentrics, ground stone, or jade.

Sacbeob Termini

Structure D-48

Structure D-48 is located at the terminus of the Eastern Causeway and is approximately 450 m from the Main Plaza. The mound is approximately 16 m long, 9 m wide, and 1.5 m high, with a 20 cm high patio extending to the south. The patio platform measures approximately 5 by 8 m. Crews excavated seven suboperations on Structure D-48 in 2015 to

determine structure form, age, and function. Three of the units investigated the patio, and four targeted the summit and margins of the structure itself (Figure 3).

Excavations documented the summit floor of the structure and the northern and western faces of the structure's and patio's platform faces, as well as the interface between the patio and the structure. The final patio surface was completely deteriorated, with the subfloor fill being the only indication of where the surface had once been. The platform face of the patio structure is composed of two, poorly preserved, crudely constructed courses of faced stones. Associated with the platform face is the exterior surface on which the platform is sitting. Similar to the patio surface, the exterior surface was severely deteriorated with only sub-floor fill remaining. Excavations into the patio surface documented a single—presumably Late Classic—construction event, which elevated the patio 20 cm above bedrock (Booher et al. 2015).

Although crews recovered few artifacts from the summit of the structure, excavations recovered numerous artifacts from the patio, particularly from the two units along its western edge. The topsoil and underlying collapse debris directly below the topsoil of both suboperations yielded large numbers of artifacts as shown in Table 1. The artifacts that were collected were on top of the final patio surface and date to the Late and Terminal Classic periods; they included a thin leaf laurel biface, fragmented pieces of obsidian, mano and metate fragments, and a flat, circular piece of stone jewelry with a hole in the center (Booher et al. 2015).

Structure C-17

Structure C-17 measures approximately 12 m by 8 m and 3 m tall, taller than Structure D-48 (see Figure 3). As mapped in 1996, it has a low patio extending to the south. Three large trees located on the summit of Structure C-17 prohibited any excavations of the architecture of the building. Consequently, only one suboperation was opened at Structure C-17 in the middle of the patio; it was excavated to bedrock to obtain chronological information. Excavations of the patio structure revealed two construction episodes, although only the final, Late Classic phase is relevant to this discussion.

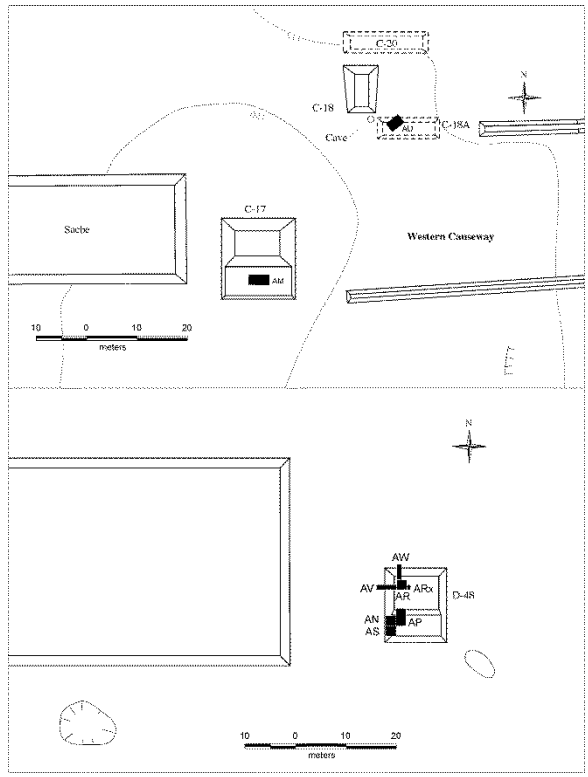

Figure 3. Maps of excavations units at Structure C-17 (top) and Structure D-48 (bottom).

The final phase construction of Structure C-17 revealed in our single excavation was a crudely constructed, one course high platform face, along with possibly the interface between the patio and Structure C-17. The associated final patio surface on which the platform face is sitting, was entirely eroded away with only sub-floor fill remaining. The excavators recovered a large number of artifacts from the collapse debris covering the patio surface, although the counts are considerably lower than were found at Structure D-48 (Table 2).

Discussion

While the two structures are located at the termini of the two causeways, the excavation data do not confirm that they are associated to the causeways functionally. At Xunantunich, Keller (2006) excavated Structure A-21 at the terminus of Sacbe II. Although larger than Structures C-17 and D-48 at Chan Chich, it shares site-planning similarities to the Chan Chich examples. Keller (2006:444) concluded that Structure A-21 was "the focus of ceremonial activity in the west area" likely involving

Table 2. Artifacts Recovered from Above Final Patio Surface on Structure C-17.

Suboperation	Ceramic Sherds	Lithic Tools	Obsidian Fragments	Debitage	Ground Stone	Shell/Faunal
CC-14-AM	976	5	5	183	2	2

processions along Sacbe II based on recovered censer and drum fragments. Unfortunately, while our excavations encountered large numbers of artifacts, the assemblages lack comparable indicators of ritual activity.

Courtyard D-1

Courtyard D-1 is a small courtyard located immediately north of the Eastern Causeway, approximately 170 m east of the Main Plaza. Guderjan (1991) originally proposed the group was functionally related to the *sacbe*. The courtyard consists of three small buildings, none taller than 1 m, that share a common platform. The largest building, Structure D-1, is orientated north to south while Structures D-2 and D-3 are orientated east to west. The three structures all face a common courtyard that is opened to the east. We were unable to excavate Structure D-2 due to a massive cedar tree, which grows from the summit of the building. CCAP excavated 19 suboperations at Courtyard D-1 over the course of two seasons (Figure 4). Unlike the clearing units and the termini structures, Courtyard D-1 yielded evidence of ritual activity.

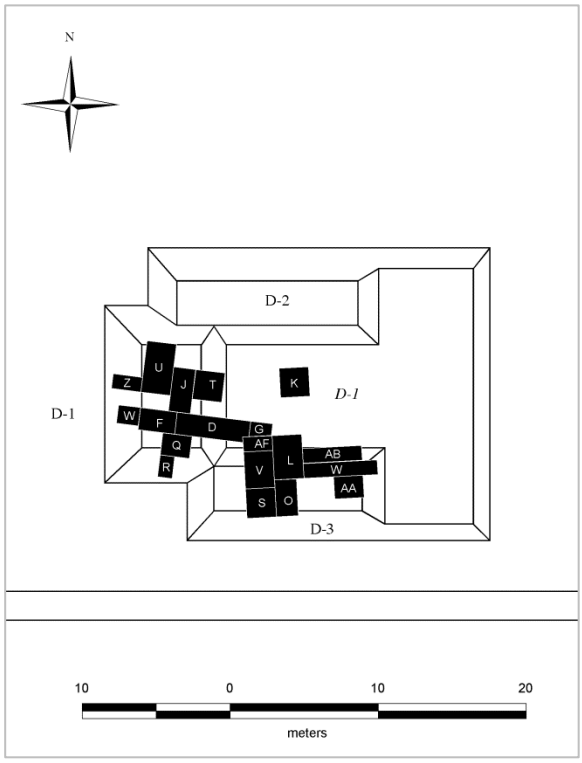

Figure 4. Map of excavation units at Courtyard D-1.

Figure 5. Mold-made spindle whorl from Burial CCB-14 (illustration by Brett A. Houk).

Chronology

A courtyard test pit documented three major construction phases spanning the Late Preclassic period through the Late Classic period. Although we did not excavate completely through Structures D-1 or D-3, our work revealed Late Preclassic antecedent architecture and multiple Late Classic renovations to the two structures with use continuing into the Terminal Classic period.

Structure D-1

The excavations at Structure D-1 determined the building likely had a vaulted entrance—based on the amount of collapse debris and the large number of vault stones encountered between the doorway jambs—that faced onto the courtyard; the rest of the superstructure was apparently composed of pole

Table 3. Artifacts Recovered from Lots CC-14-S-06 and –V-03.

Artifacts	Catalog-Spec. #	Quantity	Description
Ceramic sherds	CC1330	141	
Debitage	CC1279	61	
West-Indian chank	CC1312-01	1	Tip and 2/3 of shell's lip removed
Obsidian	CC1277-01	1	Blade
Human bone	NA	9	One humerus and one radius. Other seven bones fragmented
Metate	CC1278-01–04	24	Three metate basins
Fire cracked rock	CC1276	6	
Ceramic vessel (reconstructed)	CC1430-02	15	Dark red slipped serving plate
Ceramic vessel (partial)	CC1430-01	2	Eroded red-slipped exterior with incised decoration
Biface	CC1425-01	1	Biface
Metate	CC1425-01–08	8	Granite Basin form metate

and thatch. Excavations also exposed portions of a C-shaped bench, documented evidence of several renovations to the structure, and uncovered two burials within the bench. The final form of the structure dates to the Late Classic with use into the Terminal Classic period, with earlier, but unexplored, architecture dating to the Late Preclassic period (Booher et al. 2015).

Two lines of evidence point toward possible ritual activity associated with Structure D-1. First, excavations discovered the base of a Late Classic ceramic drum on the interior floor surface of Structure D-1 at the base of the bench. The second line of evidence is Burial CC-B14. Located in the southern end of the bench adjacent to the eastern wall of the building, this burial was remarkably preserved with approximately 75 percent of the skeletal remains present. The burial contained the remains of a single, adult female placed in a seated position with her arms crossed at her chest and her feet still articulated. The LC_1, LI_1 and RI_2 showed evidence of a B4 modification (Romero 1958), which Vera Teisler (2010:256) and Karl Mayer (1983:18) each identified as resembling the day name Ik' in the 260-day calendar. Mayer (1983) has proposed that the Ik'-shaped incisors were not intended as simple adornments but suggest a religious or esoteric significance. Several grave goods were also found in association with the individual, including a mold-made spindle whorl with a bird design (Figure 5), a shell bead, and a deer antler found directly behind the skull, which could indicate she was buried wearing a headdress. Spindle whorls found in association with burials, especially female burials, are not uncommon and may have been viewed as important tools for Maya women in the afterlife. The ceramics collected from the burial date to the Late Classic period. The combination of the B4 filing, the spindle whorl, and the location of the deer antler could suggest she was a ritual specialist, or at the very least an important spinner or craft specialist.

Structure D-3

The final architectural form of Structure D-3 had a superstructure composed of a perishable building with an exterior platform face separating the building from Structure D-1 and the courtyard surface. The interior comprised two rooms of unequal size, with the larger room primarily consisting of a bench.

A dense artifact deposit was found along the west exterior wall on the final exterior surface. The deposit spanned nearly the entire length of the west wall and consisted of numerous ceramic sherds from broken vessels, obsidian, and ground stone in an ashy matrix (Table 3). The most noteworthy artifacts collected were a West Indian chank (*Turbinella angulate*) shell and nine human long bone fragments (Figure 6). The West Indian chank shell had the tip taken off and smoothed and was missing its outer lip, and may have functioned as a trumpet given these modifications. Out of the nine pieces of human bone collected, two were

Figure 6. Photograph of the West Indian chank shell and human long bone fragment (indicated by arrow), along with sherds and burned ground stone fragments, in situ in the dense artifact deposit against the west wall of Structure D-3.

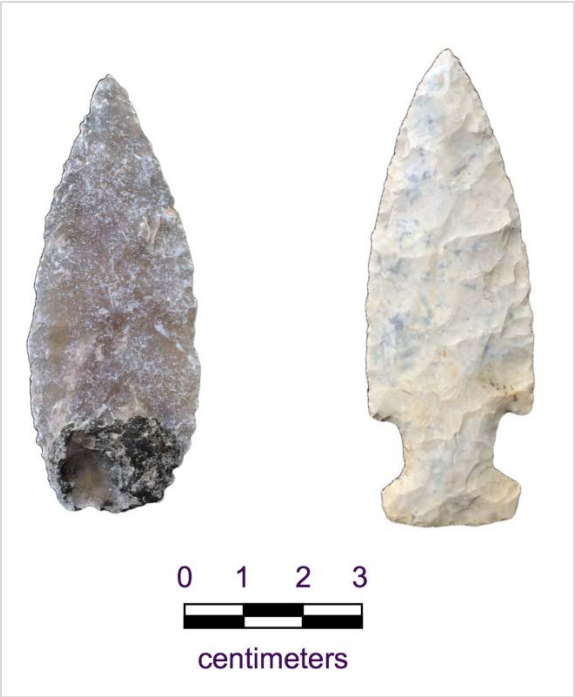

Figure 7. Thin biface with asphaltum on base from Lot CC-14-AB-03 (left) and side-notched spear point from Lot CC-14-L-02 (right).

identifiable as the distal end and shaft of a humerus, and a third was the shaft of a fibula. The remaining six bones are too shattered to accurately identify, but are fragmented long bones (Booher et al. 2015).

The matrix surrounding the artifact deposit was ashy and included pieces of fire-cracked limestone. The stones of the outer wall and several of the ground stone fragments showed evidence of burning, but many of the artifacts, including the chank and the human bone were not burned. The origin of the deposit is unknown; it could be a midden or it could be a terminal deposit related to the abandonment of the group.

Elsewhere in the excavations at Structure D-3, crews recovered two thin spear points (Figure 7), one with asphaltum hafting still on its base, three *Oliva* shell tinklers, and more than 100 spire-lopped *jute* (*Pachychilus glaphyrus*) shells. Many of these materials came from the western room or outside the structure near the southern wall. The eastern room had relatively few artifacts, and the walls and floor were heavily burned.

Discussion

The primary function of Courtyard D-1 was probably residential in nature during its early occupation, but is likely that the courtyard took on a different function during the Late Classic period with the construction of the Eastern Causeway. The West Indian chank shell, which may have been a trumpet, the ceramic drum base, the shell costume jewelry, and the two spear points could all be items utilized during processions on the adjacent causeway. Furthermore, Late Classic Burial CC-B14, which contained artifacts with ritual associations, is a possible example of Courtyard D-1 shifting from a residential function during its early occupation to a more ritual function following the construction of the Eastern Causeway during the Late Classic period.

Conclusions

The 2014 and 2015 excavations of Chan Chich's causeways and associated structures set out to test the hypothesis that otherwise disparate elements of the site's plan functioned together as processional architecture. In the process, the research collected information on the form and age of the two *sacbeob* at Chan Chich, investigated structures at the two *sacbeob* termini, and excavated Courtyard D-1.

Both the Eastern and Western Causeway were elevated although their forms were different in terms of construction. The Western Causeway had parapets constructed from cut limestone blocks, while the Eastern Causeway's

margins had unfaced stones creating coarse retaining walls. The Eastern and Western Causeways were constructed during the Late Classic period with evidence of use into the Terminal Classic period, which coincides with ages of the final architectural phase of Courtyard D-1 and Structures C-17 and D-48. The causeways likely had several functions, although this research specifically looked at the role of processions taking place on the causeways. The evidence collected this season from the clearing units placed alongside the causeways does not definitively point toward processions taking place on the causeways, although our sample size is extremely small. Similarly, the excavations at the termini structures, though not extensive, did not encounter the types of artifacts one would expect if the structures had ritual functions. However, the artifacts collected from Courtyard D-1, which is immediately adjacent to the Eastern Causeway, provide circumstantial evidence for ritual use of the *sacbeob*. The West Indian chank shell, which possibly functioned as a trumpet, the ceramic drum base, the spear points, and the shell costume jewelry could all be items utilized during processions. These artifacts, Burial CC-B14, and the unusual vaulted entrance to Structure D-1 all point to a specialized function for the group during the Late Classic period.

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25 POTS IN THE LATE PRECLASSIC POLITICAL LANDSCAPE: WHOLE VESSELS FROM LAMANAI, COLHA AND CERRO MAYA

Robin Robertson, Terry G. Powis and Fred Valdez, Jr.

When compared, the large collections of Late Preclassic whole vessels from Lamanai, Colha, and Cerro Maya yield information on the differing socio-economic and political realities faced by each site and how those realities were addressed during a critical period in Maya development. Colha, an interior "factory town", produced large quantities of chert tools for distribution throughout Northern Belize. Cerro Maya's identity was grounded in coastal and riverine exchange networks. Lamanai on the bank of the New River was the administrative center for a large interior hinterland. Beyond the presence/absence of types, the associations of forms, vessel sizes, motifs and accompanying goods from the burials, caches and special deposits at each site define patterns of behavior, some of which are unique and others that are shared. These patterns, in turn, enhance our understanding of each site's role in the political landscape and organization of Late Preclassic polities in northern Belize and further afield.

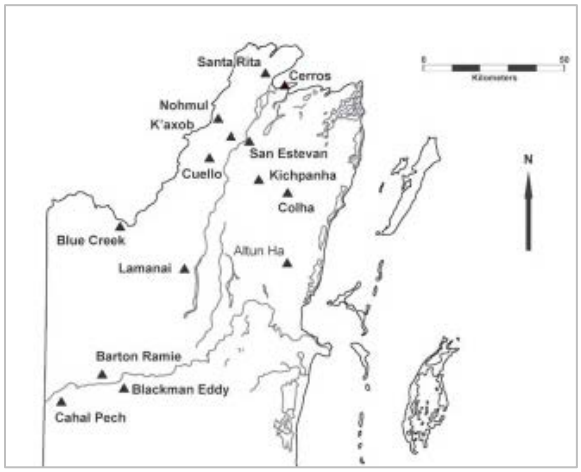

Figure 1. Map of Northern Belize showing locations of the three sites.

Introduction

With a goal of refining the political relationships among three Late to Terminal Preclassic sites in Northern Belize, we undertook a macro-comparison of the reconstructable vessels from Colha, Cerro Maya, and Lamanai to identify patterns in the types and forms present, the contexts in which they occurred and the associated artifacts (Figure 1). The three have different origins and patterns of development. Colha, an interior "factory town", annually produced an estimated 18,000 oval bifaces and trachet bit tools for distribution throughout Northern Belize (Shafer 1994:26). Cerro Maya on Corozal Bay was founded as a port (Robertson and Walker 2015) and continued to be grounded in coastal and riverine exchange networks throughout its Late Preclassic life (cf. Freidel 1978). Lamanai on the bank of the New River Lagoon was the administrative center for a large interior agricultural hinterland (cf. Pendergast 1981). This traditional comparison also served as a test to determine whether more costly physio-chemical analyses of the pottery not available when the material was excavated would be warranted.

The time period under consideration was set by Cerro Maya, the primary occupation of which is limited to 300 years of the Tulix ceramic phase securely dated by radiocarbon dates from 150 BCE to 150 CE (Walker 2005). The Tulix Phase with its 102 reconstructable vessels corresponds to the Zotz Phase (100 BCE-250 CE) with 79 vessels at Lamanai and to the Blossom Bank Phase (100 BCE-250 CE) with 32 vessels at Colha.

General Characterization of the Assemblages

All three sites have the contemporaneous well burnished, soft, waxy slips of the Paso Caballo Waxy wares typical of the Late Preclassic throughout the Maya area, and the hard[1], clinky, glossy, double slipped Chunux Hard wares, initially defined at Cerro Maya (Robertson-Freidel 1980), but the frequencies in which they occur differ (Figure 2). At Colha and Lamanai the waxy wares represent more than one-third of the whole vessels, but at Cerro Maya only approximately one-fifth of the whole vessels are waxy wares. Instead, at Cerro Maya the Chunux Hard Wares make up 45% of the whole vessels as compared with 25% at Colha and 20% at Lamanai. Moreover, within the

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	Paso Caballo Waxy Wares	Chunox Hard Wares
Colha	32% (n=10)	25% (n=15)
Lamanai	39% (n=31)	25% (n=20)
Cerro Maya	19% (n=19)	45% (n=46)

Figure 2. Frequencies of Paso Caballo Waxey Wares versus Chunux Hard Wares at the three sites.

waxy wares, Matamore Dichrome enjoyed greater popularity at Cerro Maya than did Sierra Red. While there are two Matamore Dichrome vessels at Lamanai, the type is absent in the whole vessels at Colha but present in the sherd material.

The roughly equal frequencies of the Paso Caballo waxy wares and the Chunux hard wares in caches and burials well into the Terminal Preclassic at Lamanai and Colha affirms the deep local roots developed out of earlier Preclassic occupations at these two sites. This pattern speaks to their ongoing interaction with ceramic traditions elsewhere in northern Belize and Petén as both sites were transformed from villages primarily of domestic household groups into sites with dispersed residential patterns and large, open public areas with monumental architecture.

In contrast, the dominance of the Chunux Hard wares at Cerro Maya suggests a different pattern even though the site underwent the same development from village to monumental center at about the same time. Intentionally founded as a port by people with ties to Southern Quintana Roo or Yucatan (Robertson in press; Robertson and Walker 2015) where the Chunux hard ware Cabro Red is more prominent than the Paso Caballo waxy ware Sierra Red at this time, Cerro Maya demonstrates an increasing frequency of Sierra Red through time. As the Cerroseaños acculturated to and interacted with the local northern Belize polities through time, they honored the local ceramic traditions by including more waxy wares in sacred deposits, but did so with a twist, using dichrome rather than monochrome vessels.

Turning to the more elaborately decorated slipped vessels, pseudo-Usulutan and trickle decoration become important. These two decorative modes differ in appearance and in the production strategies that created them, as well as in their origins and distributions across the three sites. The psuedo-Usulutan designs of regular, evenly spaced, narrow lines produced with a brush or, more commonly, a multi-toothed instrument, are usually easy to see because of their contrasting colors (Figure 3).

Trickle decoration, on the other hand, had a different production sequence that involved applying an as yet unidentified substance to the rim of a vessel still hot from firing and allowing that substance to dribble or trickle down the sides of the vessel. The resulting lines have irregular or blotchy borders that vary in width and are usually wider at the top than at the bottom (Figure 4). Depending on the temperature of the vessel when it was “trickled”,

Figure 3. Pseudo-Usulutan decoration from Cerro Maya and Colha. (a) Strat 55 lip-to-lip bloodletting cache vessels from Colha. Rim diameter of lower vessel is 35 cm. (b) Cerro Maya Savannah Bank Usulutan vessel in lap of Burial 23 with a rim diameter of 29 cm.

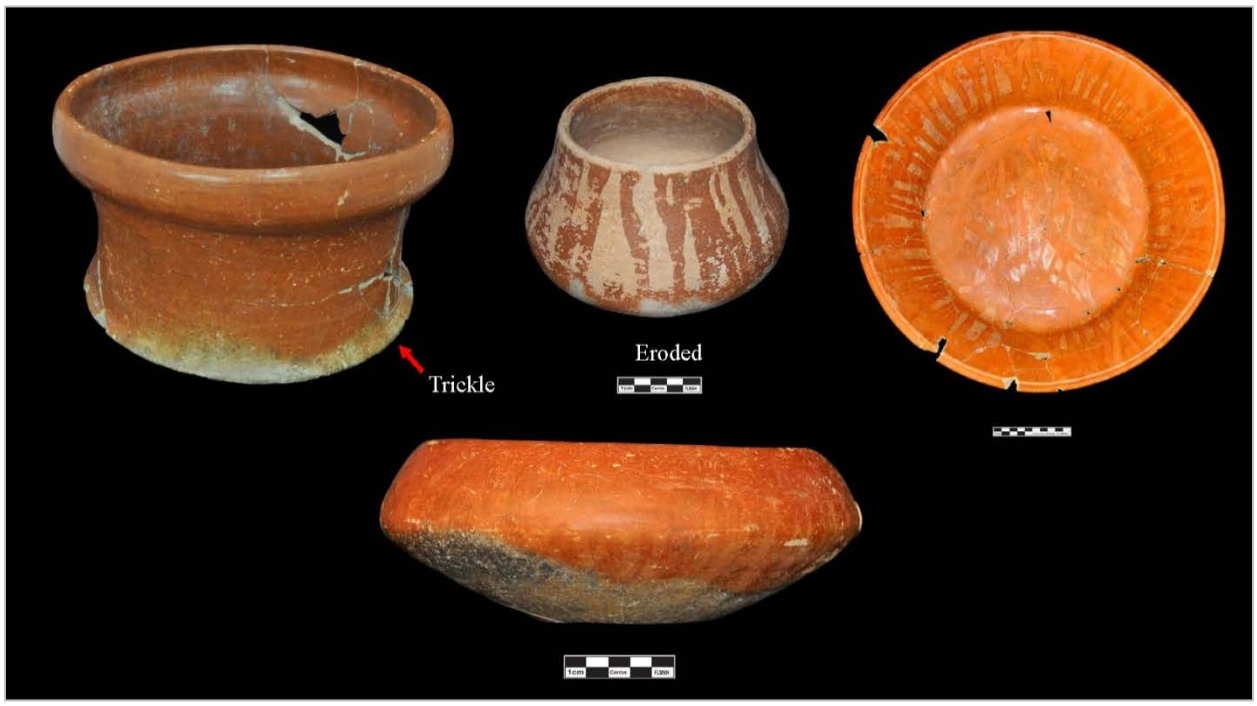

Figure 4. Trickle decoration on vessels from Cerro Maya.

the trickled areas can be either oxidized (or lighter in color) or reduced (black in color because temperatures were too low to burn-off the organic material) in comparison to the slip. When lighter, the trickle is often hard to see unless the sherd or vessel is tilted back and forth to catch changes in the light refraction. Undoubtedly more trickle exists in Late Preclassic assemblages than has been reported. Since Brainerd's (1958) original typology for

Yucatan, trickle decoration has been linked to the Northern Lowlands, while pseudo-Usulutan decoration has been a characteristic of the Late Preclassic assemblages in the Southern Lowlands since Smith's (1977) Uaxactun ceramic report.

Among the more elaborate types, 15% of the whole vessels at Colha had pseudo-Usulutan decoration, and all were from the burials and caches in Op 2012, a stepped pyramid and platform on the western edge of the monumental center (Potter 1982: Fig 1). At Cerro Maya, only 8% of the whole vessel inventory had pseudo-Usulutan decoration, including the interior decoration on the large cache bucket from Cache 1 that held five jade heads (Freidel et al. 2002). Its red-on-buff curvilinear design of plumes and undulating multiple lines is a motif similar to the ones found on the interiors of many Savannah Bank Usulutan dishes. This decorative mode is also invariably present in the ceramic remains of architectural termination rituals at Cerro Maya. At Colha, two lip-to-lip Savannah Bank: Groove Incised vessels in the elaborate Strat 55 bloodletting cache (Potter 1994) in Op 2012 are similar to the Savannah Bank vessel at Cerro Maya (Figure 3) interred with Burial 23, a seated, cross-legged adult in a cist at the base of a chultun at Cerro Maya (Walker in press: Fig 3.7). So too, a tetrapod flaring walled dish recovered from the collapsed mortuary chamber of Burial 3 in Op 2012 at Colha is almost identical to a vessel from the termination ritual on 5C-2nd at Cerro Maya (Figure 5) which, in turn, is similar to a vessel from Tomb 5 at Blue Creek (Guderjan et al. 2014; Kosakowsky et al. 2015). The frequency of pseudo-Usulutan at Colha and its occurrence only in the Main Plaza is intriguing given the site's inland location, size and focus on stone tool production, particularly when compared to Lamanai.

Lamanai had no imported or pseudo-Usulutan reconstructable vessels in this period, but pseudo-Usulutan sherds in the collection suggest the missing vessels are the result of the small number of recovered burials and the absence of reported termination rituals. Sherd Feature 1, for example, may indicate less elaborate termination rites took place at Lamanai. Although the smashed greenstone, hematite and white marl characteristic of these events at Cerro Maya were missing (Robertson-Freidel 1980; Garber 1986), a "pavement" (Powis 2002:247) of fourteen broken vessels along with Pomacea and freshwater mussel shells, bone fragments and a possible handle for a fan (Buttles 2005:214) was identified just above a plaster floor preceding the construction of Structure N10-2, a small pyramidal structure in the site center.

In contrast to the low frequency of pseudo-usulutan sherds, Lamanai had a number of trickle decorated vessels recovered from a late chultun associated with the upper class household group P8-2 (Graham, personal communication, 2015) that co-occurred with mammiform tetrapods and polychromes. Two Black-on-red Trickle, poorly made medial angle vessels with black interiors were also recovered from a contemporaneous burial of an adult male near the chultun. Significantly, also included in the chultun were 11 fragments and one whole vessel of Ciego Composite discussed below.

At Colha, none of the whole vessels had trickle decoration, even though Tuk Red-on-red Trickle, a Cerro Maya type, was identified in the sherd material. In dramatic contrast, 30% of the reconstructed redware vessels at Cerro Maya are Tuk Red-on-red Trickle (Figure 4). Typical of the Northern Lowlands, this decorative mode again affirms the strong relationship Cerro Maya had to the North.

The late occurrence of trickle decoration on vessels in chultun trash and on poorly made burial vessels attests to Lamanai's increasing involvement with other areas through local and long distance trade that may have centered on obtaining salt from Cerro Maya, but also hints at a conservative adherence to the Southern Lowland ceramic decorative norms as the site prospered during the Terminal Late Preclassic. The recovery from the chultun of an unusual carinated and punctated jar similar to two found in Cerro Maya burials (Figure 6) additionally affirms an intensification of the relationship between Cerro Maya and Lamanai during this period. The possibility that the relationship was based in the salt trade is bolstered by the recovery of a tentatively identified Ciego Composite or Coconut Walk dish[2] and eleven fragments of other similar vessels from the

Figure 5. Footed tetrapod vessels from Colha and Cerro Maya. (a) 2012/B3 from Burial 3 at Colha with a rim diameter of 27.5 cm (photograph courtesy of Bruce Templeton). (b) SF-1040 from termination of 5C-2nd at Cerro Maya with a rim diameter 22.5 cm.

Figure 6. Pahote Punctated carinated jars. (a) 524/1 from Lamanai with a rim diameter of 13.3 cm. (b) SF-499 from Burial 15 at Cerro Maya with a rim diameter of 10.5 cm. (c) SF-1363 from Burial 26 at Cerro Maya with a rim diameter of 20 cm.

chultun that are like the large number of the shallow, large vessels thought to have been used in solar evaporative salt production and storage at Cerro Maya (Robertson and Walker 2015).

The absence of trickle on whole vessels at Colha may also speak to a more conservative approach toward the pottery included in burials and caches, an attitude appropriate for this smaller site internally focused on large scale tool production for trade. Like most factory towns, Colha grew, but did so quietly, constructing small pyramids that did not have elaborate facades like those at Lamanai or Cerro Maya.

Caches

The wealth consumed in caches and burials supports these interpretations and leads to another. Cache 1, the dedicatory cache on the summit of Structure 6B at Cerro Maya that contained the greenstone diadem jewels of lordship (Freidel and Suhler 1995), was the richest cache recovered from the three sites. One of the three dedicatory caches associated with N10-43, the largest structure at Lamanai, is almost as rich as and similar to the Cerro Maya cache in a number of ways.

Both contained whole *Spondylus* shells, mother of pearl, greenstone and *Spondylus* shell beads, and specular hematite fragments possibly from mirrors. These items varied in size and amount in ways that may be reflective of the relative status of the two sites. The Cerro Maya cache, for example, included a greenstone ear plug assemblage as opposed to a single bead, fragments from two mirrors rather than the single oval specular hematite fragment, five greenstone heads as compared the one at Lamanai, and was missing the 25 tiny *Spondylus* shell beads recovered at Lamanai. The most significant offerings in both caches were the Olmec-style objects - a finely carved but damaged greenstone pectoral head at Cerro Maya (Freidel et al 2002: Figure 3:17E) and a small shell figurine at Lamanai (Pendergast 2006: Figure 5.7) - and the more common greenstone bib-helmet pendants with goggle (or

butterfly) eyes and sagittal crest reminiscent of a spider monkey skull (Freidel and Suler 1995:140; Pendergast 2006: Figure 5.7). The Olmec style shell figurine and the greenstone spider monkey diadem jewel from Lamanai were enclosed in a complete *Spondylus* shell, whereas the Olmec-style large head at Cerro Maya was on top of the other offerings at the center of a quincuncial arrangement of the four smaller greenstone heads that included the spider monkey head which was face down to the north and the "Jester God" head, or *sak-hunal*, face down to the south. The only pottery included at Lamanai was the unusual cache vessel, a small (14.3 cm in diameter) Polvero Black waxy ware tapering sided jar with a molded lid (Powis 2002: Figure 53). In contrast, the large Savannah Bank Usulutan Cerro Maya cache bucket had a large (56.5 cm diameter) Chactoc Dichrome medial angle plate for a lid and was surrounded by a roughly quincuncial arrangement of four drinking vessels and a jar with three asymmetrical strap handles. The inclusion of the principal diadem jewel (or *sak-hunal*) that was sewn onto the white band (also called *sak-hunal*) symbolic of Maya rulership in the Cerro Maya cache and three other diadem jewels arranged to create a portal to the Other World (Freidel and Suhler 1995:147) suggests the site's role as a place of pilgrimage. The presence of only the more widely distributed "spider monkey" head at Lamanai makes "a strong statement of status" as Freidel and Suhler (1995:141) note, but it is likely a status subordinate to that of Cerro Maya. At Lamanai Sherd Feature 1 with no smashed greenstone seems to support this relative positioning if it is indeed the remains of a termination ritual, as does the absence of offerings associated with the building bearing important stair-side outset masks in the N9-56 sequence at this time (Pendergast 2006:62).

Cache 9, the dedicatory cache on the summit of Structure 5C-1st at Cerro Maya, included a probable specular hematite mirror as well as a greenstone bead and shell cutout in a bucket covered by a large plate. All three recovered summit caches were elaborate and included greenstone, shell and mirrors. The more common lip-to-lip vessel staircase caches at Cerro Maya and Lamanai were empty or included perishable goods. While two caches at Lamanai included a greenstone or albite bead each, there were a number of empty pits ("Lamanai holes"), often on or very near the primary axis of a structure, that may have contained perishable offerings (Pendergast 2006:62), a practice not identified at Cerro Maya or reported from Colha, but perhaps in keeping with the more agricultural orientation of Lamanai at this time.

The Strat 55 or bloodletting cache from Op 2012 at Colha, contained in the two lip-to-lip Savannah Bank Usulutan bowls mentioned above, was also elaborate, but different. Possibly dedicatory, this cache more likely marked a calendrical event that involved bloodletting. A large chert macroblade with human blood on the cutting edge was inside the container; the core from which it was struck and a discarded macroblade lay beneath the vessels. The eight *Spondylus* shell beads, four *Oliva* shell tinklers, 12 greenstone beads and ten Tiger Shark teeth also inside the container (Potter 1994; Buttles 2002) may have been sewn on the regalia or otherwise worn by the individual performing the ceremony that utilized a specular hematite mirror. The bloodletting cache differed from the five far less elaborate dedicatory caches recovered in Op 2012 that have fairly small (by Cerro Maya standards) lip-to-lip Sierra Red or Society Hall bowls, two of which contained only a greenstone ear flare or bead, and in three instances, probably only perishable materials.

The Op 2031 excavations in the Main Plaza at Colha revealed that the transformation from domestic household groups to large open public areas with monumental architecture was marked by three additional dedicatory caches (Lots 14, 86 and 119), two of which were similar to the five dedicatory caches in Op 2012, incorporating two greenstone beads and a shell or coral bead inside Sierra Red lip-to-lip vessels. The third cache of a Society Hall vessel inverted over a stemmed macroblade rested on the surface of the plaza floor.

At Lamanai, the other Late Preclassic architectural cache was a paired set of two small (19.7 to 26 cm in diameter) lip-to-lip Sierra Red dishes placed in a pit cut into the plaza floor at the base of the original staircase. One of the

pairs contained a tubular greenstone bead; the other was empty.

In the later years of the coastal village at Cerro Maya, house renovations were marked by a dedicatory cache of at least one or two vessels (Walker 2013). Immediately after the initial settlement, however, the residence began terminating rather than dedicating houses with increasing elaborate deposits of smashed greenstone beads and ear flares, *Oliva* shell tinklers, *Dentalium* and *Spondylus* shell beads, specular hematite mirror fragments, obsidian blade fragments and stone tools of honey brown chert from Colha. None of these earlier offerings were accompanied by reconstructable vessels (Robertson and Walker 2015).

Similar practices may have occurred at both Lamanai and Colha. While the Late Preclassic domestic exposures at Lamanai are far more limited, there were at least two such caches – one of a celt fragment, a mano and two macroblade fragments inside a large (52.4 cm diameter), low Flor Cream dish laid in the structure core and another of two upright but empty Sierra Red vessels – recovered from elite housemound P8-14 in the northern part of the site center. At Colha a much simpler offering in Op 2031 Lot 99 of a large stemmed macroblade, two tranchet tools, *Pomacea* shell, and turtle fragments placed under a marl capstone with no container in (Sullivan 1991: Appendix A) hints at a similar practice. However, patterns in wealth disposal based on the burial data indicate something else was going on.

The Burials

Although space is too limited for a full consideration of the complexity of the burial patterns at the three sites, particularly those at Colha with its two mortuary complexes (cf. Potter 1982; Sullivan 1991; Anthony 1987; Anthony and Black 1994), preliminary comments about the disposal of wealth in these contexts can be made. Lamanai has eight Late Preclassic burials (Pendergast, personal communication, 2015), half of which were accompanied by ceramics. Only two, both from a plazuela group at South Lamani, had additional grave goods. The more elaborate Burial 2 from Mound II, a housemound, was an extended adult with a thin walled jar over the cranium and another over the pelvis. The individual, wearing a greenstone necklace with a central greenstone pendant, had a side notched obsidian point in the neck area. The later Burial 3 from the same area had a thin walled jar, a mammiform tetrapod jar and a basal flange bowl with two complete and one incomplete obsidian blades.

Burial 110, part of the Late Preclassic mortuary complex associated with the Main Plaza (Op 2031) is the richest burial at Colha. The 40 to 60 year old seated female with lambdoid cranial flattening was surrounded by eleven burials in ten simple burial pits, all of which were cut through three plaza floors and represent separate interment events (Sullivan 1991: 64). She was interred in a loosely constructed cist, holding a San Antonio Golden Brown dish in her lap containing five human skulls and several long bones from two individuals, all of which were defleshed before burial (Sullivan 1991:65). The woman wore a necklace of greenstone and Spondylus beads, the centerpiece of which was a perforated Spondylus gorget, and had a shark vertebra ear flare or hair ornament. The burial and the grave goods, with the exception of the crania in the vessel in her lap, were sprinkled with a red substance.

In contrast to Cerro Maya and Lamanai, ten of the 36 burial lots at Colha included one or more greenstone beads. A bundled infant interred in the stepped pyramid on the western edge of the civic center (Op 2012/12:51) with twelve greenstone beads, three Pacific Coast shells (one of which was a worked disk and one of which had been killed [Buttles 2002:329]), and a ceramic shell effigy vessel may represent more than a simple burial, given the maritime theme and the richness of the grave goods.

Despite its elaborate caches, Cerro Maya revealed nothing like Burial 2 at Lamanai and the two burials at Colha possibly because, while extensive excavations were conducted in the architecture, only limited excavation occurred in the Main Plaza, the likely location of potential elaborate burials at Lamanai, Colha and other sites (James Garber, personal communication, 2015). All but three of the thirty-one burials come from the coastal village (cf. Cliff 1982) in the earlier deposits at the site. While there is no evidence for the kind of mortuary complexes identified at Colha, one of which was associated

Figure 7. Comparison of the size of cache and burial vessels at Colha and Cerro Maya. Vessels at Lamanai are the same size as those from Colha. (a) Colha (photograph courtesy of Lauren Sullivan). (b) Cerro Maya bucket and lid.

with an ancestor shrine, Cerro Maya did have a bundle house for ancestor veneration in the coastal village (Structure 2A-Sub 3-4th; Walker in press) toward the end of its occupation that saw four interments in containers of seven individuals, two of which were young children in a single vessel (Burials 17 and 19) and one of which (Burial 13) was a 2-3 year old accompanied by the long bones of an adult male.

More usually, the Cerroseaños preferred to bury their dead individually outside a house, often in large buckets or basins lidded with large plates. With four exceptions, they reserved their greenstone and *Spondylus* beads, and marine shells for caches or for dedication or termination rites. The single most common inclusion in over half of the Cerro Maya burials was Colha chert tools, tool fragments, or thinning flakes in a jar. At Colha itself chert tools are arguably part of only four or possibly six, of the thirty-six Late Preclassic burial lots[3] all of which are from the Op 2031 in the Main Plaza. Did the Cerroseaños choose to memorialize their northern Belize trade connections in their burials rather than their long-distance connections by incorporating Colha chert instead of the exotics offered in household renovation rituals? Did they reserve the disposal of greenstone for the more public displays of dedication and termination associated with the monumental architecture in which the more regionally available stone tools are unusual? The data suggests they did both.

Importance of Public Events that Consolidated Community

The greater emphasis on public ritual designed to consolidate a sense of community at Cerro Maya as compared to Lamanai and Colha is also suggested by the difference in the size of the vessels included in burials and caches (Figure 7). With rim diameters of 40 to 56 cm, the buckets at Cerro Maya were invariably considerably larger than those with rim diameters of 18 to 32 cms from Lamanai and Colha. The Cerro Maya buckets would have been visible from a distance unlike the smaller dishes or buckets that were the norm at Colha and Lamanai. These large buckets and plates, also used as serving vessels (Robertson 1983), were present in the remnants of dedication and termination rites as well, suggesting large numbers of people consumed whatever they contained during the ceremonies and corroborating the notion that at Cerro Maya

public displays were essential to the success of this small site as a center for long-distance trade and were firmly tied to its role as a place of pilgrimage based on other data (Freidel et al. 2002; Reese-Taylor and Walker 2002; Robertson and Walker 2015).

Spouted Vessels and Small Ollas

Surprisingly, there are no reconstructable spouted vessels at Cerro Maya, an anomaly if spouted vessels were central to the foaming of chocolate beverages consumed during sacred moments as two of us have convincingly demonstrated (Powis et al. 2002). A small number of spouts were recovered from midden or construction fill (profane rather than sacred contexts) in imitation of the Yucatecan pattern identified by Powis and others (2002), raising the question of how the Cerroseaños prepared the chocolate, Cathy Crane's (1986) paleobotanical work has demonstrated that it was consumed on sacred occasions. Residue analysis by Lisa Duffy (Duffy and Walker 2014) recently documented the presence of theobromine in the unusual drinking vessels associated with caches and burials at the site. Chocolate could have been foamed by pouring it back and forth between the drinking vessels and their accompanying asymmetrical strap handle jars. Once frothed it would have been consumed from the drinking vessel (Figure 8). If so, these vessels likely presaged the Early Classic cylinder vessels from Teotihuacan that replaced the spouted vessels of the Late Preclassic in the Southern Maya Lowlands as Powis and others (2002) have hypothesized.

Robertson (in press) has identified similar drinking vessels (Forsyth 1989: Figure 8f-h, 10e and Hansen 1990: Fig 95a and q), Zapatista Trickle on Cream Brown jars, and a low frequency of spouted vessels at El Mirador, supporting the thesis that El Mirador may have controlled the long distance exchange networks of which Cerro Maya was a part (Freidel and Acuña 2014). El Mirador was probably the source for some of the unusual types and forms that are common at Cerro Maya but rare elsewhere in northern Belize, like Zapatista Trickle on Cream Brown (Ball 1977), drinking vessels, and asymmetrical strap handle jars.

Figure 8. Drinking vessel and associated three strap handle jar probably used in frothing cacao at Cerro Maya.

In contrast, at Colha, there are ten whole spouted jars, seven of which were associated with four burials and one unidentified context in the small stepped pyramid west of the Main Plaza (Op 2012) as the only grave furniture apart from other vessels. The other three spouted vessels were also the only grave furniture in three burials in the Main Plaza Op 2031 (Thompson 2005; Powis et al. 2002: Table 2). At Lamanai, two Terminal Preclassic fancy brown ware spouted vessels, a bird effigy with a rim base and another with a bridged vertical spout and a red rim, were recovered from near the top of the deposits in the western chamber of the late chultun (P8-2) associated with thousands of Pomacea shells and animal bones that may be the remnants of a feasting event (LeCount 2001). While both Colha and Lamanai seemingly utilized the northern Belize technique of chocolate preparation, Cerro Maya, in keeping with its origins, employed that of more distant polities to the north and west.

Finally, the Cerro Maya whole vessels included seventeen small ollas, usually with a thin, dull, fire clouded slip designated Hukup Dull (Figure 9). These small jars with vertical or slightly flaring necks, have narrow openings, small interior volumes, thick walls made of dense, hard pastes and generally rounded bases. The ollas occur in four of nine Household Caches catalogued by Debra Walker (2013) and in ten of the thirty-one burials. In both contexts approximately half of them have been ritually killed. This form has not been reported from elsewhere in the Southern Lowlands, but does occur in the Yucatecan Tipikal Pre-slip Striated

Figure 9. Small ollas from Cerro Maya. All are Hukup Dull except for c. f-i have necks removed. (a) SF-290 from Household Cache H with a height of 11.3 cm. (b) SF-485 from Burial 20 with a height of 12.5 cm. (c) SF-501 from Burial 20 with a height of 11 cm. (d) SF-489 from Burial 15 with a height of 11 cm. (e) SF-920 from coastal erosion profile with a height of 10 cm. (f) SF-503 from Burial 22 with a height of 7.5 cm. (g) SF-027 from Burial 2 with a height of 7.5 cm. (h) SF-1612 from Household Cache F with a height of 7.0 cm. (i) SF-800 from Household Cache D with a height of 7.5 cm.

Red (Andrews in preparation) that is similar to Hukup Dull (although the latter lacks the widely spaced striation). Again, the foreign origins of the Cerroseaños are reiterated in the vessels included in their most sacred of personal deposits – burials and household caches.

Conclusions

At about the same time, Colha, Cerro Maya, and Lamanai, all developed from villages largely of domestic household groups into sites with dispersed residential patterns and large open public areas with monumental architecture. While all three sites are part of the Chicanel ceramic sphere, differences in ceramic inventories attest to different origins and foci, as well as to the political relationships among the three. Both Lamanai and Colha, unlike Cerro Maya founded around 150 BCE, have deep Preclassic roots in northern Belize. The Late Preclassic ceramics at Lamanai and Colha developed smoothly out of those roots, adhering to Southern Lowland norms despite the sociopolitical changes and growth the two sites experienced.

The ceramics at Cerro Maya, however, indicate the site was founded by outsiders who continued to express their foreign status in the sacred space of caches and burials with a preference for waxy ware dichromes over monochromes and for the hard, clinky, glossy, double slipped monochromes, trickle decoration and ollas typical of the Northern Lowlands. But, even as they came under the influence of large inland sites, incorporating into their inventory, for example, the drinking vessels and three strap handle jars from the Central Karstic Uplands to froth chocolate in anticipation of Early Classic praxis, the Cerroseaños marked the importance of their northern Belize trade connections with Colha by incorporating Colha chert rather than exotics into many of their burials.

The residents of Lamanai and Colha disposed of their wealth in greenstone, *Spondylus* beads and marine shell in burials. While the sophistication and complexity of the mortuary complexes at Colha may imply that burials were public events, the size of the vessels used does not point to large gatherings of people. The Cerroseaños, on the other hand, invested their wealth in caches, rather than burials, in acts of public disposal and community consolidation that were essential to the ritual performances aimed at increasing numbers of

pilgrims and traders as the site grew and prospered through its mediation of the long distance trade in exotics with some sites as well as with locally produced essentials like salt with others.

At Lamanai, salt production and transport vessels, trickle decoration, and an unusual carinated jar form suggest that influences from further afield, perhaps as a consequence of the salt trade with Cerro Maya, were an important factor in the increasing wealth and population growth that led to monumental construction at the end of the Preclassic. At Colha, however, salt was obtained overland directly from coastal sites without the involvement of Cerro Maya (Valdez and Mock 1991). In addition, the common occurrence of highly desirable honey brown Colha chert in Cerro Maya burials, and the use of unusual vessel forms and pseudo-Usulutan decoration in sacred contexts at both sites, suggests the Cerroseaños emphasized the exchange of greenstone and other exotics, including Pacific Coast marine shells, rather than salt, with the powers that be at Colha. Further testing of these hypotheses by the physio-chemical analysis of pottery samples to test the source of the vessels at the three sites is warranted.

Cerro Maya's wealth and status was based in riverine and coastal trade, both long distance and local. The site was part of a pan-Lowland system, inherently dependent upon distant sites with access to the exotics that were the *raison d'etre* for the exchanges (with the exception of locally produced salt). Consequently, its ceramic inventory is more diverse, incorporating imports and ideas from across the Lowlands. Lamanai and Colha, on the other hand, were more locally focused and independent, pursuing the administration of agricultural surpluses from the hinterlands and the unprecedented production of large quantities of stone tools, respectively, for regional exchange as sources of power and wealth within northern Belize.

[1]Wyllys Andrews V (in preparation) defined seven varieties of Sierra Red at Komchen, the most frequent of which combines hard, usually opaque and rarely waxy, even colored but often rootlet marked or discolored slips with hard, compact pastes. When well preserved, these Komchen Sierra Variety sherds produce a sharp, high sound when tapped against a hard object. In other words, they clink. The senior author examined Komchen Sierra Variety sherds from M-3011 at the INAH Ceramoteca in Merida in July, 2014, and confirmed that Cabro Red and the Komchen Sierra Variety described by Andrews are indistinguishable in terms of slip and production characteristics.

[2]Vessel 496/15 was originally identified as Chamah Washed by Powis (2002:388) because of its similarity to that type at Cerro Maya. Subsequently, he changed the type designation to Coconut Walk after consultation with Jim Aimers and Elizabeth Graham (Powis 2004). However, further complicating the situation, Robertson (in press) changed Chamah Washed at Cerro Maya to Ciego Composite after examining material in the INAH Ceramoteca in Merida from Becan (Ball 1977: 114) and Komchen. Neither Powis nor Robertson have had the opportunity to examine Coconut Walk sherds from Lamanai and Ciego Composite sherds from Cerro Maya side by side, although it would seem the two types are one in the same given the indirect comparisons. The final type designation awaits such an examination.

[3]2031 7/87 had the base of a stemmed microblade under the occipital (Sullivan 1991:68) of a seated adult female; 2031 5/165 included a biface fragment in the lap of a seated middle aged male and a macroblade fragment in his mouth (Thompson 2005). 2031 5/125 had a biface above three individuals, one of which was 10-17 years old with cut marks on the femur, and one of which was an old male with lambdoid flattening (Thompson 2005). Finally, 2031 6/127 included a biface below the cranium of a mid to old adult male in a grave of two individuals (Thompson 2005). Two others are more problematic: 2031 5/116, a fragmented burial, may be a combined cache and burial. Above the skeletal material was a cache of a large eccentric and four small bifacial eccentrics. The bones themselves were associated with a stemmed macroblade, three small stemmed macroblades and two bifaces (Sullivan 1991:66). The latter items may be part of the cache above. 2031 5/136 was an incompletely excavated, poorly preserved adult near a burned area. Two bifaces near the feet of the individual may or may not be associated (Sullivan 1991:59).

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26 INTRODUCING THE AVENTURA SITE

Cynthia Robin, Laura Kosakowsky and Kacey Grauer

This paper introduces the Aventura Archaeology Project. Aventura is located in the Corozal district, 10km southwest and 10km west, respectively, of the better known sites of Santa Rita and Cerros. With a ceremonial complex consisting of six plaza groups with seven temples ranging in height from six to 20m, Aventura was densely settled with 284 structures within its central 1.1km2. Provisionally, Aventura had a long occupation history spanning the Middle Preclassic to the Spanish conquest and perhaps beyond. The Aventura region is rich in coastal and riverine resources providing the ecological basis to sustain long term occupation. Distant from major power centers, the region is a gateway to both the northeast Peten and Yucatan peninsula. Centers in the region are roughly equidistant in size and distance from one another, and largely lack carved monuments and hieroglyphic texts, suggesting that heterarchy may best characterize political organization particularly in the Classic period. Aventura survived the Maya collapse, and a central goal of the Aventura Project is to assess how residents' abilities to play off competing powers as middlemen between the Peten and Yucatan as well as ecological factors may have formed part of the city's long term survival strategies.

Introduction

The archaeological site of Aventura is situated in Belize's northernmost district, the Corozal district. It is part of the Bay of Chetumal region which spans what is now the northern part of Belize and the southern part of Quintana Roo, a region that today is divided by the modern national boundary between Belize and Mexico. Aventura is located 10km southwest and 10km west, respectively, of the better known northern Belize sites of Santa Rita and Cerros.

Aventura, Santa Rita, and Cerros are located roughly equidistant from one another all ringing the Bay of Corozal (Figure 1). While Santa Rita and Cerros are located directly adjacent to the Bay of Corozal, Aventura is situated inland from the bay. Santa Rita and Cerros are well known sites both in Belize and internationally and today are key tourist destinations. Both were the subject of extensive excavations, Santa Rita, by Diane Chase (Chase 1982, 1990; Chase and Chase 1988, 2005) and Cerros, by David Friedel (Freidel 1978; Freidel and Scarborough 1982; Robertson 1980; Scarborough 1991). Aventura on the other hand is little known archaeologically. Previous research at Aventura includes a rough map of the site core and 8 tests pits conducted by Raymond Sidrys of UCLA in 1974 (Sidrys 1983) and excavation of 3 residences by Rafael Guerra, Sherilyn Jones, and Melissa Badillo of the Institute of Archaeology in 2007. The site has never been the subject of a large scale research project and is in need of archaeological attention

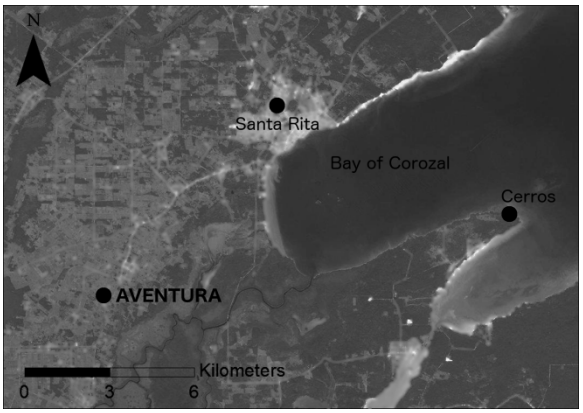

Figure 1. Bay of Corozal showing the locations of Aventura, Cerros, and Santa Rita.

not just to complete the understanding of the prehistory of the Corozal Bay region but also to document and preserve the site. Although not well known archaeologically, Aventura is well known to anyone traveling along the Northern Highway as it is clearly visible when one passes the contemporary village of San Joaquin about 10km southwest of Corozal town (Figure 2). This visibility unfortunately promotes access, looting, and bulldozing, thus the site is in urgent need of archaeological attention.

This paper discusses the background research undertaken by the Aventura Archaeology Project that generated the ideas and hypotheses that form the basis of new research at Aventura. Particularly we focus on a review of the 1970s research undertaken by Raymond Sidrys (1983) and a new Geographical Information System (GIS) project developed by Kacey Grauer (2014, 2015) to collect and

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Figure 2. ESRI base map areal image of the site of Aventura. Patches of trees mark the location of Aventura's ceremonial center as sugar cane can not grow on the stone dense monumental architecture.

Figure 3. Aventura's largest 20m high temple, Temple 1 in Group A.

analyze legacy map data about Aventura and the region.

Settlement and Layout

What is known about the layout and settlement of Aventura comes from Sidrys' 1974 survey work (Sidrys 1983). Sidrys mapped the central 1.1sq km of the site and identified 284 structures. Aventura's central ceremonial complex consists of six plaza groups (Groups A - F) with seven temples ranging in height from six to 20m. Its largest 20m high temple, Structure 1 in Group A is a landmark along the Northern Highway (Figure 3).

While Sidrys' map did not capture all of the smaller features of Aventura's settlement it does provide a reasonably accurate map of Aventura's monumental architecture. Kacey Grauer developed a Geographical Information Systems (GIS) database of existing map information about Aventura and the region, including the maps produced by Sidrys and other early researchers in the region, and ESRI base maps. When Sidrys' map of Aventura's ceremonial core (Groups A – F) is superimposed on an ESRI base map of that locale, the mounds mapped by Sidrys match the pattern of trees that stand out in relation to the sugar cane fields that now occupy the majority of the site of Aventura (Figure 4). Sugar cane does not grow on the site's largest mounds upon which the forest canopy still thrives as farming is not possible due to the density of stone building material. This is also the case for Aventura's larger house mounds, upon which sugar cane farming is not possible. Figure 5 shows a house mound group located 0.25km north of Group A mapped by Sidrys superimposed on an ESRI base map and likewise the mapped mounds and tree canopy line up well.

While Aventura's monumental architecture was well mapped by Sidrys, his survey was not attentive to Aventura's smaller features and the precise mapping of two bajos he identified in the site core, and no survey has ever been undertaken beyond the central 1.1sq km of the site. Thus a primary focus of the Aventura Archaeology Project is to begin to create a new map of Aventura using, Global Positioning System (GPS), laser theodolite, and Geographical Information System (GIS) technologies.

Chronology

What is known of Aventura's chronology comes from Sidrys' (1983) surface collections and eight test pits at Aventura and the more recent, 2007, work Guerra, Jones, and Badillo of the Institute of Archaeology. The Institute of Archaeology research was undertaken when the Fruta Bomba Ltd. Company was constructing their Belize headquarters on a portion of the Aventura site. During their construction they uncovered a burial and notified the Institute of Archaeology. From both of these previous projects, it is clear that Aventura has a long history of occupation and use likely spanning the Middle Preclassic to Late Postclassic periods and possibly beyond. Sidrys identified that Aventura's occupation peak was in the late Late

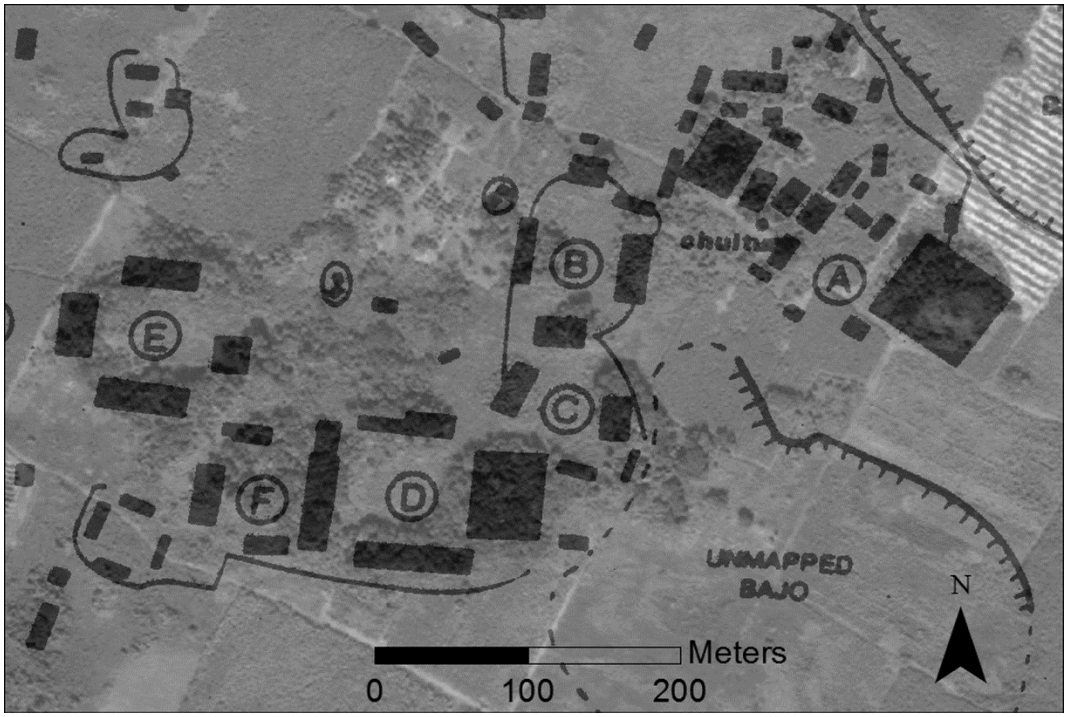

Figure 4. Overlay of Sidrys' (1983) survey of Aventura's ceremonial complex (Groups A – F) on an ESRI base map. Image shows the correlation between the monumental architecture mapped by Sidrys and the patterns of trees growing on the stone-filled remains of monumental architecture where sugar cannot grow.

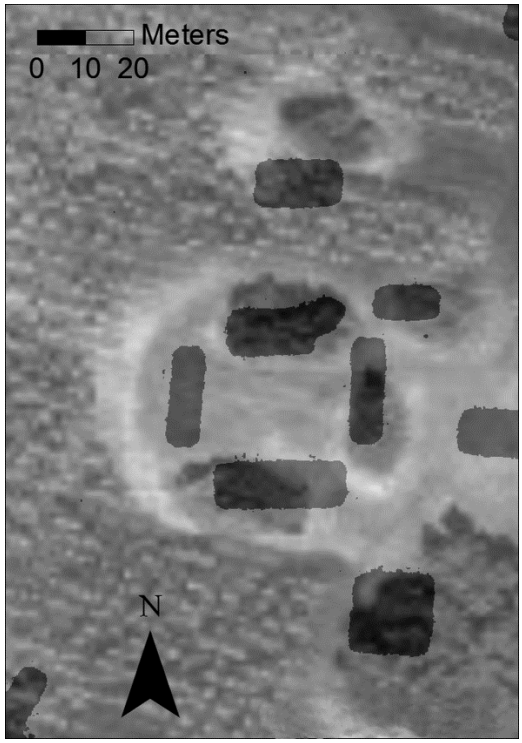

Figure 5. Overlay of Sidrys' (1983) survey of a large residential group located 0.25km north of Group A on an ESRI base map. Image shows the correlation between the mounds mapped by Sidrys and the pattern of trees growing on the stone-filled remains of a large residential group.

and Terminal Classic to Early Postclassic periods, a period that roughly dates from AD 750 to 1100. The Institute of Archaeology excavated three house mounds on the Fruta Bomba Ltd. Company property located northeast of Group A. Within one house mound two burials were identified. The earlier burial interred within the floor of the house dates to the Early Classic period and a later burial interred by one of the walls of the house dates to the Terminal Classic to Early Postclassic period. Both the work of Sidrys and the Institute of Archaeology, suggest a longevity of settlement at Aventura that extends beyond the so called Classic Maya collapse at the end of the Classic period. Aventura's heyday in the late Late and Terminal Classic to Early Postclassic period coincides with and spans the so called Classic Maya collapse of AD 900.

While the existing data points to a long chronology for the site, it is critical to note that the current chronological data, derived from eight test pits and three house excavations, should be considered a preliminary measure of the chronology of a center and is certainly not substantial enough to provide us with a definitive chronology for Aventura. To what extent was Aventura's long history a continuous history, or did Aventura experience periods of occupation, abandonment, and re-occupation across its long history? A key research question of the Aventura Archaeology Project will be to develop a substantial chronology for Aventura.

Sidrys' (1983) sample of ceramics for Aventura consisted of 1,653 rim sherds. The earliest identified ceramics at Aventura date to the Middle Preclassic and Late Preclassic with minor occurrences of Joventud Red and Sierra Red. Additionally there was one sherd of Aguacate Orange dating to the Terminal Preclassic. Based upon current ceramic data there is no sizable ceramic presence at Aventura in the Preclassic. The Preclassic was the heyday of the nearby site of Cerros (Freidel 1978; Robertson 1980), and thus it appears that Aventura was a secondary site to Cerros at this time.

Investigating Aventura's Preclassic period and determining when the site is first occupied will be a key question for future research. Here we draw attention to the layout of the site core, and the focal Group A, which has a generally east-west pyramidal structure layout (see Figure 4). As David Freidel and Wendy Ashmore have noted, a focus on eastern and western architecture in the layout of ceremonial centers tends to be associated with the Preclassic period and sites which have an early founding (Ashmore 1991; Freidel et al. 1993). In the Classic period, north and south architecture becomes primary (Ashmore 1991). Because Preclassic material may be deeply buried, and given the generally east-west focus of its site core, it may be that there is more Preclassic occupation than Sidrys' eight test pits were able to gauge.

There is a full Early Classic Complex represented at Aventura that shows strong ties to Petén types, as is typical for most sites in Northern Belize, including typical ceramic groups such as Triunfo Unslipped, Aguila Orange, Balanza Black. Dos Arroyos Orange Polychrome, and others. In the Bay of Corozal region in the Early Classic power had shifted from Cerros to Santa Rita (Chase and Chase 2005; Sidrys 1983).

During the early Late Classic Aventura appears to have increasing ties with Quintana Roo, as demonstrated by the presence of Egoista Resist, as well as Petkanche Polychrome, which is also found in Quintana Roo and as far south as Copan. Just as the ceramic evidence from Aventura shows shifting ties between the western Peten and northern Quintana Roo and Yucatecan regions, ground stone evidence show similar shifting ties (Sidrys 1983).

Aventura's best represented time period is the late Late Classic and Terminal Classic to Early Postclassic period dating to AD 750 to 1100. During this time Aventura is postulated to have been the primary center in the Bay of Corozal region (Sidrys 1983). This period includes the ubiquitous "Aventura Double Mouth Jar", Buyuk Striated, as well as examples of the ceramic groups Encanto Unslipped, Tinaja Red, and Achote Black. There are also ladle censers, and examples of imported slatewares, fine gray wares, fine orange wares, and plumbate wares indicating long distance connections with the Gulf Coast, the Yucatan, and southwest Guatemala.

The "Aventura Double Mouth Jar" is indeed found everywhere across the surface of the site. The ubiquity of the double mouth jar at Aventura led Sidrys (1983) and others to postulate that it was manufactured at Aventura, a conclusion that anyone who walks around the site would understand. The "Aventura Double Mouth Jar" is found across northern Belize and into Quintana Roo and Yucatan. Debra Walker (personal communication) has suggested that honey and mead, contemporary and historic products of the region, may have been exported in the double mouth jar. The wide range of this jar, which could have been produced at Aventura, would indicate the broad geographical reach of the site. Identifying where the double mouth jar was manufactured and what it was used for is another important question of future research.

Sidrys (1983) identified a large deposit of Late Postclassic Chen Mul incensarios, estimated to include 50-70,000 censer fragments, located approximately 15m south of Group A. Originally, Chen Mul Modeled censers were thought to originate in the area around the site of Mayapan in the Yucatan and northern Quintana Roo. Chase and Chase (1988) have identified locally made copies, known as Kol Modeled, at Santa Rita, which was the primary Late Postclassic center in the Bay of Corozal region, and other local variants have been identified in the Peten (Milbrath et al. 2008). Instrumental neutron activation analyses by Ron Bishop have demonstrated many centers for production of modeled censors across the Maya Lowlands, including Santa Rita (Bishop et al. 2006). It is unclear if the Aventura sample is imported or locally made as we have not examined it.

Beyond the Chen Mul Modeled censers, possible Late Postclassic domestic ceramics were only identified at one group by Sidrys. This led Sidrys (1983) to posit that Aventura became a pilgrimage site in the Late Postclassic and lacked residential occupation of its own at this time. Thus another important question of new research will be to examine the later end of Aventura's occupation and determine when occupation ended at Aventura. Was the censer deposit identified by Sidrys the result of visitation of the site by residents of another site – perhaps the Late Postclassic primary site of Santa Rita? Or was there a smaller more ephemeral Late Postclassic occupation at Aventura, and the deposit was made by local residents of Aventura which had perhaps become the sustaining population for Santa Rita?

Figure 6. Caste War church at Aventura.

Historic period material was not noted at Aventura by Sidrys (1983) perhaps because reporting historic material was not a primary concern of prehistoric archaeologists in the 1970s. In a summer 2014 field visit to the site of Aventura by Cynthia Robin, a plethora of historic material at Aventura was noted including British colonial and Caste War items. Juan Luis Bonor of the Institute of Archaeology recorded a sugar mill at the site in 1994. A Caste War church, locally identified as the second oldest church that is still in use in Belize today, is located on top of a house mound at Aventura (Figure 6). The one historic time period that Cynthia Robin did not identify in her site visit in 2014 was the Spanish colonial period. Thus in addition to Aventura's PreColumbian past, it clearly has a rich history of occupation and use that extends across historic times and continues to today.

Clearly Aventura is a site with a long and rich history. Exactly how long that history is we do not know at this time. To what extent the occupation of Aventura is a continuous one across its history or if the site saw periods of occupation, abandonment, and then re-occupation is also unknown at this time.

Discussion

A key reason to initiate new work at Aventura is to understand the longevity of the

site. Aventura was certainly a site that survived the so called Classic Maya collapse and even thrived and reached its fullest extent in the late Late Classic and Terminal Classic to Early Postclassic periods as the major Classic Maya centers of the Peten were losing power and undergoing abandonment.

Today over half of the world lives in centers or cities – and there can be no more pressing question than understanding how centers succeed and fail over the long term. Archaeology with its unique access to study the longevity of human settlements is an ideal discipline to address this kind of question. Aventura's long history provides a prime case to look at the long term history of a Maya center.

There are a number of reasons why Aventura may have had a long history of occupation and/or re-occupation. The Corozal Bay region in which Aventura is located is rich in coastal and riverine resources providing the ecological basis to sustain long term occupation. Geological surveys of northern Belize identify that Aventura is located in an area with a variety of fertile soils and rich microenvironments (Wright et al. 1959). A 1973 study by Ernestine Green suggests that Aventura and nearby sites were situated to maximize access to fertile soils. Access to a variety of natural resources can provide a basis for sustainability if those resources are not over-exploited.

The Corozal Bay region is situated between the Peten heartland of the major Classic Maya centers and the Yucatecan heartland of Postclassic revitalization. In this sense the Corozal Bay region is in both a peripheral and an intermediary position between the Peten and the Yucatan. In its intermediary position, it is a gateway to both the northeast Peten and Yucatan peninsula and in such a position centers like Aventura may have been able to play off competing larger power centers in these two regions to their own advantage, enabling them to negotiate in times of political hardship in one or the other of neighboring regions.

The three centers that occupy the Corozal bay region, Aventura, Cerros, and Santa Rita, are roughly equidistant from one another, and had different periods of florescence. Given the current ceramic evidence, power was initially seated at Cerros in the Preclassic, shifted to Santa Rita in the Early Classic, to Aventura in the late Late Classic and Terminal Classic to Early Postclassic, and back to Santa Rita in the Late Postclassic (Chase and Chase 2005; Sidrys 1983). Such shifting power relationships suggests that these centers were differentially ranked in relation to one another at different points in time. Shifting power relationships could evidence looser relations of political hierarchy between centers. Lesser degrees of hierarchy, while leading to more short-term power fluctuations, enable greater political flexibility which could lead to longer-term political stability more broadly in a region.

Conclusion

From a traditional perspective a region like the Corozal Bay region might be considered a peripheral region in Maya society. But periphery is not an appropriate label for the Corozal Bay region. Its centers may have been smaller in size with fewer carved stelae and hieroglyphic texts relative to larger sites in the Classic Maya Peten area, but this does not imply that they were of lesser importance in Maya society. A key question of the Aventura Archaeology Project is: is there a relationship between longevity of settlement and the absence of traditional markers of high culture that mark Peten sites such as abundant stelae and hieroglyphs? Perhaps rather than seeing the absence (or lesser representation) of certain traits, such as stelae and hieroglyphs as evidence for a peripheral or provincial type of society, this may potentially be the evidence for alternative forms of community organization and political interactions that may be characterized as heterarchical, rather than hierarchical, and may have enabled greater longevity of settlement over the long term.

As important as the intellectual justification for undertaking new research at Aventura, the practical and ethical imperative of undertaking research at the site is paramount. As Aventura is located along the Northern Highway, it is no surprise that the site is severely damaged by looting and bulldozing. Over half of its second largest temple, an 11m high structure located on the west side of Group A, was bulldozed prior to 1974, leaving only a stub

of the temple intact. This is but one example of the serious destruction at the site.

Northern Belize is an area of Belize that has lacked archaeological attention in recent years and has been the subject of substantial site destruction due to bulldozing. The recent influx of European Union funding to sugar cane farmers in northern Belize has brought mechanized production to sugar cane farming long done by hand. Mechanized agriculture is destroying small mounds that have survived thousands of years of hand agriculture. Nothing is known of Aventura's settlement beyond its central 1.1sq km, and unmapped smaller-scale settlement is being destroyed before it is recorded. New survey work at Aventura is needed on practical and ethical as well as intellectual levels.

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27 COMMUNITY PRESENCE AND IMPACT AT A PUBLIC MONUMENTAL SPACE AT LA MILPA, NORTHWEST BELIZE

Debora C. Trein

In an analysis of the literature produced in the study of ancient Maya public monumental spaces, the terms "elite" and "monumental" are often used interchangeably, pointing to the practice of interpreting monumental spaces as extensions of a privileged social class. This close association between space and a defined social group has undoubtedly advanced our archaeological understanding of how "elites" can harness and manipulate space for furthering their own goals. However, this paradigm has also fostered an interpretive framework that largely disregards the actions and practices of the great majority of the ancient Maya population, who may have interacted with these same spaces in their own distinct, nuanced ways. This paper attempts to provide a cursory examination of how members of an ancient Maya Late Classic (AD 550-850) community may have used, accessed, and impacted a public monumental space in different ways at the site of La Milpa, in northwest Belize. This approach aims to work towards a more inclusive way to study monumental spaces in the ancient past by focusing on the identification of activity areas in the material record as proxies for use and access patterns to these particular spaces.

Introduction

The variable ways in which people and the landscapes they inhabit articulate is an area of anthropological research that has been subjected to many paradigm shifts in the last 40 years (Bourdieu 1977; Lefebvre 1974; Marcus 1989; among others). Previously considered largely as background for human behavior, space has been repositioned as a participant and an arena for the constitution of individual and social identities (Bourdieu 1977; Low and Lawrence-Zuñiga 2003; Marcus 1989). This understanding of space shifts the interpretive focus away from the architects and their intentions to include the multiple ways in which people interacted with space by acting and living in it. Monumental spaces have been likewise incorporated into analyses of a subject's experience of the world, in both living and past societies. Monumental spaces perform simultaneously, as structuring devices communicating ideas of social identity and memory, and stages for activities as varied as market exchange, workshops, disposal of trash, cultural tourism, and dissent, among others (Brück 2001; Caftanzoglou 2000; Kus and Raharijaona 2000). An examination of the breadth of activities taking place within a monumental space can therefore inform our perception of how monumental landscapes may have functioned not only to an architect or a sponsor (likely members of privileged social groups), but to an entire community.

Nevertheless, ancient Maya monumental architecture is still discussed largely through the lens of their designers, where monumental spaces – whether temples, palaces or plazas – are seen to operate chiefly as tools for the communication and legitimization of a distinct elite identity (Ashmore 1991; Demarest et al. 2003; Fash 1988, 1991; Fash et al. 1992; Freidel and Schele 1988; Hammond 1991; Inomata 2006; Schele and Miller 1986; Stuart 1986; Traxler 2003). The actions and reactions of Maya community members at large in relation to monumental architecture and how these materialize in the archaeological record have not been systematically analyzed, although it is largely accepted that non-elite groups accessed and used monumental spaces (Allison 1999, 4; Inomata 2004; Jones 2000; Lucero 2007; Shaw 2012). This paper presents preliminary results of an ongoing project that employs a more inclusive model to the study of how all members of an ancient Maya community articulated with a public monumental space. This will be accomplished by examining the archaeological record present in the area surrounding a Late to Terminal Classic monumental temple at the site of La Milpa, in northwest Belize.

Towards a More Inclusive Model

A more reflexive and inclusive analysis of monumental spaces in ancient Maya society would take into account not only the intended functions built into a space's design, but the variable ways in which people engage (or not)

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with this design. A potential avenue is one that recognizes that people derive their sense of identity and understanding of the world not simply through absorbing norms and notions built into the landscape, but through situated practice – living and acting within variable networks of relations between people, objects and places (Bourdieu 1977; Low and Lawrence-Zuñiga 2003; Marcus 1989; Robin 2002). In this view, monumental spaces may be identified as built landscapes engineered to commemorate a mythical or lived shared past; evoke a shared future; and impart ideas of social belonging, order, and an individual's place in the world (Meskell 2005). This is materially accomplished through the inclusion of ideologically relevant symbols to buildings and landworks, exceedingly large (or small) architecture, high levels of craftsmanship and labor investment, commemorative iconography or epigraphy, and so on. Ideas of social memory, community membership, and social order are accessible and given meaning through engaging in particular relations that stress the monumental characteristics of the space, such as ritual events, public dedications, and political performances (Lefebvre 1974; Moore 1986, 163). However, these particular relations are not activated all the time – one may engage in activities in a monumental space that may not be necessarily ritual-related or politically-motivated, such as cooking, dumping trash, quarrying limestone, or tool-making, for instance. These practices may diminish or obscure the monumental messages communicated by the architecture's design, defining and informing how a particular space is incorporated into the community (Hutson 2010). Monumental spaces may thus be repositioned not only as a transmitter for ideas of social identity, memory, and order, but potentially as multi-function spaces, mediating and participating in the actualization of various types of relations.

The approach outlined above is well suited for an archaeological project since relations between people and spaces are mediated and realized by materiality. Variability in the ways ancient monumental spaces were accessed and used can therefore be inferred from an analysis of the material record in relation to the actions and actors that

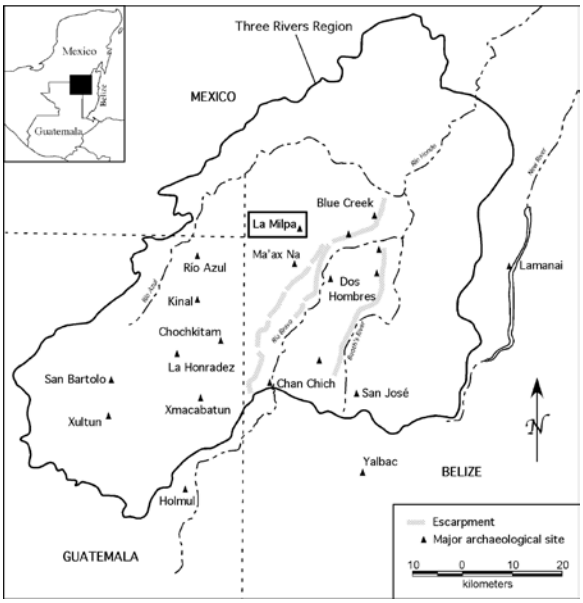

Figure 1. Map of the Three Rivers Region, with the location of the site of La Milpa. Courtesy of Brett Houk.

produced them (Allison 1999; Appadurai 1988; Miller 2005). In order to assess the patterns of use and access to a monumental space, this approach advocates the examination of activity areas in the spaces surrounding a monumental structure. A focus on activity areas allows for an understanding of how these activity areas (and the people who produced them) articulated with one another and with the surrounding monumental landscape.

Case Study: Structure 3 and Surroundings

The dataset presented in this paper originates from the area surrounding Structure 3, a large pyramidal temple structure at the site of La Milpa, in northwest Belize (Figure 1). La Milpa is a major ancient Maya urban center, located 190 meters above sea level on a limestone escarpment. The site is oriented in a largely north-south axis with its largest plaza, Plaza A, positioned at the northern end of the site core. Occupation at La Milpa begins in the Late Preclassic period (400 BCE – 250 CE) (Hammond and Tourtellot 2004; Kosakowsky 1999). La Milpa's core shows continuous habitation through the Early Classic (250 – 550 CE), although only modest construction projects have been identified for this period (Hammond and Bobo 1994). The last observable construction phase at the site core dates to the

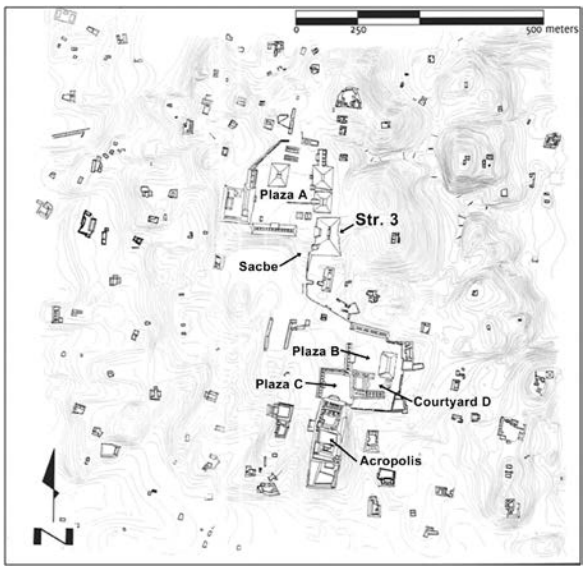

Figure 2. Map of site core of La Milpa with area labels. Adapted from Hammond and Tourtellot 1993.

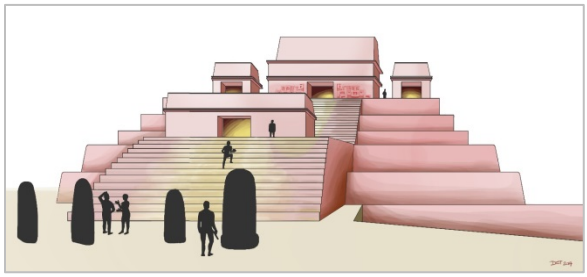

Figure 3. Artist's imagining of Structure 3 last architectural phase, viewed from the southwest. Illustration by DC Trein.

Late to Terminal Classic period (550 – 850 CE), where a number of core structures exhibit multiple construction treatments (Hammond and Tourtellot 2004). At around 850 CE La Milpa is thought to have suffered large-scale socio-economic collapse and abandonment (Hammond and Tourtellot 2004; Hammond et al. 1998), although signs of visitation and small scale habitation after 850 CE have been identified (Moats and Nanney 2011; Zaro and Houk 2012).

Structure 3 is located at the southeastern side of Plaza A (Figure 2). Structure 3 measures 75 meters in side, 20 meters in height at its tallest, and is the largest structure in volume at La Milpa. The earliest detected construction phase for Structure 3 is the Late Preclassic/Early Classic. In this period Structure 3 was a 10 meter tall pyramidal plastered building, based on limited excavations (Trein 2011). In the Late Classic period Structure 3 undergoes a significant construction event that greatly enlarges its' volume, an architectural project that parallels the architectural expansion of most of La Milpa's other core structures (Hammond and Tourtellot 2004; Hammond et al. 1998). A projecting staircase is added on the western façade, along with a mid-level superstructure, and possibly three superstructures at the top, the middle of which was furnished with a façade-wide mask, facing west (Figure 3) (Trein 2013; 2014). Based on the size, morphology, quality and level of construction investment, as well as the position of the structure within the largest plaza at the site, Structure 3 and its immediate surroundings were designed as a monumental space that served as a cornerstone in worldview-making and broadcasting to the La Milpa community and beyond.

Structure 3 frames and defines a number of distinct spaces. This paper will discuss the recovered evidence for activity areas from three of these spaces (Figure 4). Directly in front of Structure 3's main staircase, the area immediately to the west of Structure 3 is topographically even, with a gradual decline southwards. It is further contained by the eastern façade of Structure 8 to the west, the southern façades of Structures 6 and 7 to the north, and the northern head of the main intra-site sacbe to the south. Although this space is considered to be part of the internal Plaza A area, visibility and access into the larger Plaza A space to the north is restricted by the presence of Structures 6 and 7. The second area discussed in this paper is located to the northeast of Structure 3. This sector is characterized by flat topography, its borders defined by the backs of the Structures 2 and 3 to the west, and raised limestone outcrops to the south and east. It is not physically contained to the north, and extends past Structure 1 and 2. Finally, the area to the southeast of Structure 3 is a topographically uneven area characterized by exposed limestone shelves, irradiating to the northeast from the southeastern corner of Structure 3. This sector is defined by the back of Structure 3 to the west, and limestone outcrops to the north and east, and is between 5 to 10 meters below the level of Plaza A and the open area immediately to the north.

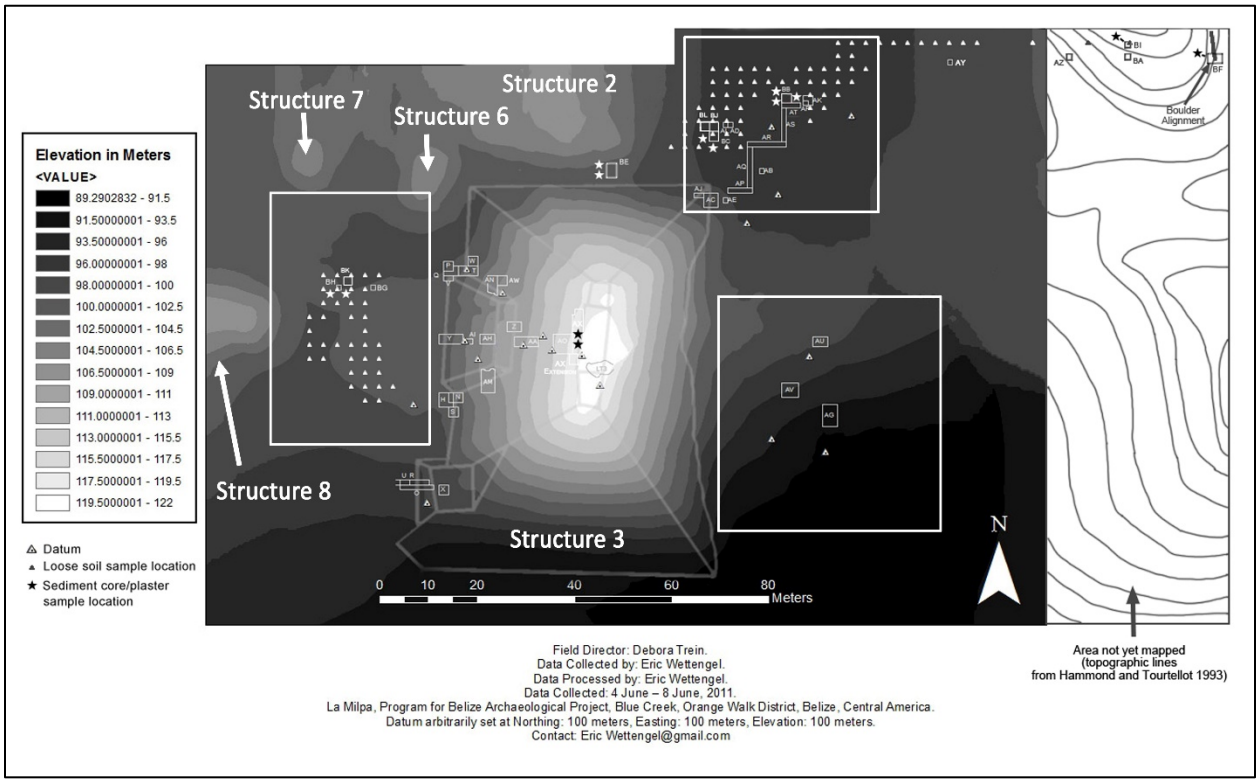

Figure 4. Map of Structure 3 and its surroundings, with the areas mentioned in the text highlighted in white boxes.

Methods and Datasets

In order to identify and examine ancient patterns of use and access to areas surrounding Structure 3, the material proxies for activity areas must be sought. These include but are not restricted to artifact assemblages composed of tools, manufacturing debris, refuse, building materials, raw materials, furniture, animal and plant remains; features and architecture such as hearths, kilns, platforms, fences, walls, terraces, dams; and geochemical and sediment micromorphological data from organic substances, ink processing, composting, cooking, burning, trampling, and sweeping (Kent 1990; Manzanilla and Barba 1990; Rapoport 1990; Trein et al. 2015). It is acknowledged that not all activities will leave a material trace. Nevertheless, many activities do, for instance stone tool manufacture (represented by macro and micro lithic debitage, hammerstones, broken tools), shell or bone bead making (identified through the presence of shell and bone debris both at the macro and micro scale, broken beads), and sweeping (which produces finely comminuted, subrounded, horizontally deposited particles), among countless others (Hutson 2010, 141; Manzanilla and Barba 1990; Matthews et al. 1997). Many of these activity areas have been successfully identified and studied throughout sites in the Maya region and beyond (Hutson 2010; Manzanilla and Barba 1990; Pugh 2004; Smyth et al. 1995; among others).

While this project is ongoing, the data presented in this paper consists of architectural and artifactual data recovered from Late to Terminal Classic occupational surfaces such as plaster floors, dirt floors, and bedrock surfaces present in the sectors to the west, northeast, and southeast of Structure 3. Archaeological material encountered on occupational surfaces are believed to be the most reliable analogues for past activities that occurred in the area (Kent 1990; Manzanilla and Barba 1990). In order to identify and define activity areas, this study relies on the presence of diagnostic materials or features – such as tool types, raw materials, production-stage artifacts, hearths, and platforms (Trein et al. 2015). In addition to architecture and artifact data sets, geochemical analysis and

Table 1. Volumetric information of Late Classic occupational surfaces in units to the west and northeast of Structure 3 mentioned in the text.

Context	E	N	Stratum Definition	Chrono	Context Vol (l)	Ceramic Volume (l)	Context : Ceramics	Lithics Volume (l)	Context : Lithics	Obsidian Volume (l)	Context : Obsidian
A1-AB	168	149	Occupational Surface	Tepeu 2	38	0.22	**0.00579**	0.25	**0.00658**	0.0002	**0.000005**
A1-AD	161.5	158.5	Occupational Surface	Tepeu 2	123	0.9	**0.00732**	0.3	**0.00244**	0.0149	**0.000121**
A1-AF	177	163	Occupational Surface	Tepeu 2	240	1.05	**0.00438**	7.5	**0.03125**	0.009517	**0.000040**
A1-AK	178	164	Occupational Surface	Tepeu 2-3	2,610	2.8	**0.00107**	24.4	**0.00935**	0.1578	**0.000060**
A1-AL	160.5	158.5	Occupational Surface	Tepeu 2	123	0.65	**0.00528**	0.59	**0.00480**	0.0157	**0.000128**
A1-AP	165.5	145	Occupational Surface	Tepeu 2	450	1.175	**0.00261**	1.55	**0.00344**	0.0022	**0.000005**
A1-AQ	165.5	153.5	Occupational Surface	Tepeu 2-3	3,230	3.18	**0.00098**	3.65	**0.00113**	0.0138	**0.000004**
A1-AR	172.5	154.5	Occupational Surface	Tepeu 2	4,080	3.725	**0.00091**	6.588	**0.00161**	0.0268	**0.000007**
A1-AS	172.5	161.5	Occupational Surface	Tepeu 2	1,600	10.2	**0.00638**	6.61	**0.00413**	0.0095	**0.000006**
A1-AT	175.5	162.5	Occupational Surface	Tepeu 2	1,350	1.405	**0.00104**	6.575	**0.00487**	0.0068	**0.000005**
A1-BB	173.5	164.5	Occupational Surface	Tepeu 2-3	2,150	5.25	**0.00244**	8.4	**0.00391**	0.0607	**0.000028**
A1-BC	159	157.5	Occupational Surface	Tepeu 2-3	800	3.75	**0.00469**	1.63	**0.00204**	0.0116	**0.000015**
A1-BG	89	125	Occupational Surface	Tepeu 2-3	300	0.7	**0.00233**	0.02	**0.00007**	0	**0**
A1-BH	83	125	Occupational Surface	Tepeu 2, Chicanel Trace	110	0.25	**0.00227**	0.175	**0.00159**	0	**0**

sediment micromorphology analysis is also planned for 130 sediment samples throughout the area around Structure 3. As the analysis of geochemical and sediment micromorphological samples is ongoing, their data is not yet available for publication.

Comparative volumetric analysis of artifact assemblages is also employed, in which the total volume of an artifact type is compared against the total volume of the archaeological stratum in which the assemblage is located. Volumetric analysis provides a total density of any given artifact type that can be compared to other similar contexts throughout the research area (Table 1). In the case of the areas examined in this paper, the assemblages found on occupational surfaces of the areas to the west and to the northeast of Structure 3 are comparable due to the similarity of the context in which the assemblages are found. The Late to Terminal Classic occupation surfaces in both these locations are represented by a degraded plaster floor, composed of similar proportions of degraded plaster, limestone inclusions, and dense silty clay loam sediment. The area to the southeast of Structure 3 was not included in volumetric analysis since the stratigraphy found in the area was composed of a thin O and A horizon directly on top of limestone bedrock, with no evidence for a plaster or dirt floor, and therefore not comparable to the other two sectors of the research area.

Results and Discussion

West of Structure 3

This space is visually and physically defined by the front of Structure 3, where prominent political and ritually significant imagery are present on superstructure walls, and large performance areas are built into the top landing. This area was likely the space most clearly built to invoke ideas and behaviors associated with monumentality, through the layout of architecture and the politically significant symbols that are embedded in the structure itself (Ashmore 1991; Demarest et al. 2003; Hammond 1991; Inomata 2006; Stuart 1986; Traxler 2003). Of all areas surrounding Structure 3, people using and accessing the space to the west of Structure 3 would have had the opportunity to most directly engage (whether visually, aurally, olfactorily, or physically) with the events occurring on top of Structure 3.

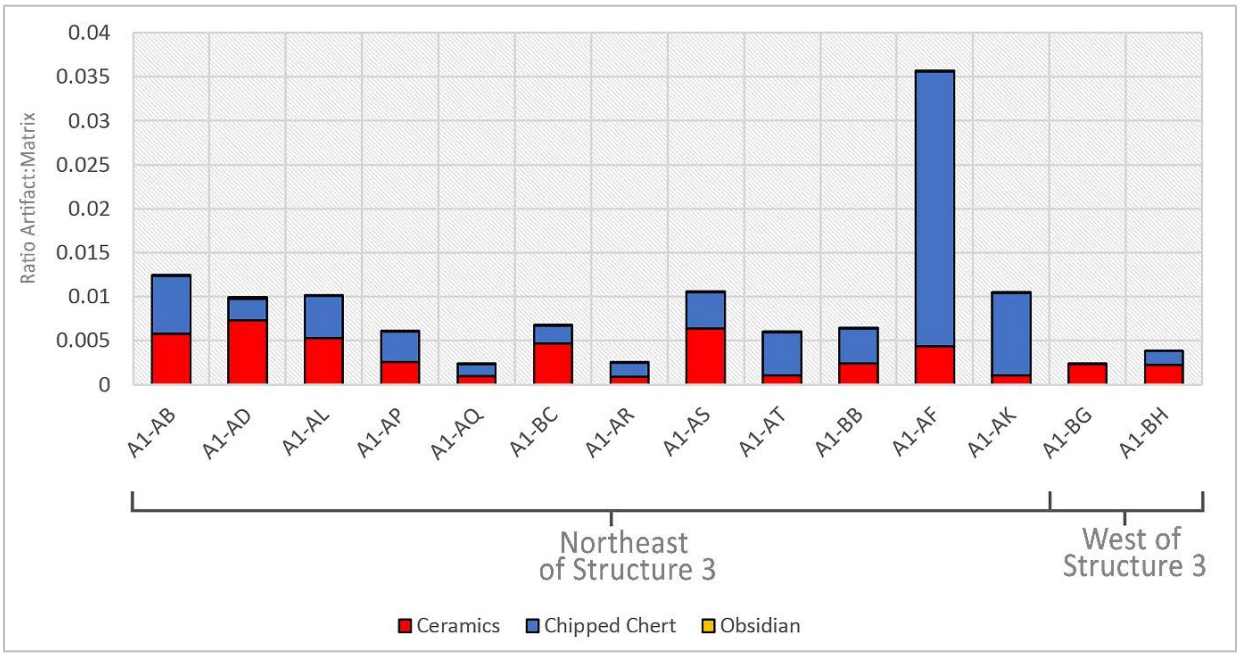

Figure 5. Graph showing the total volumetric data from units analyzed in this paper. The units placed in the area to the west of Structure 3, A1-BG and A1-BH, are on the right side of the graph.

Moreover, as the northern terminus of the main intra-site sacbe and the main access point into Plaza A are located immediately southwest of Structure 3, visitors and La Milpa community members accessing the internal space of Plaza A would be directed to pass in front of Structure 3, again coming in contact with the imagery built into the western façade of the structure any time they transited in and out of Plaza A.

The artifact assemblages recovered in this area, although based on limited excavations, support the hypothesis that this is the area where past behavior would be most pointedly influenced by the monumental character imparted by the structure. The artifact assemblage present in the Late to Terminal Classic occupational surface in the two units excavated in this area was found to be comparatively small in relation to the comparable assemblages present in the area to the northeast of Structure 3 (Figure 5). Fragmented ceramics comprised the great majority of the plaza floor assemblage. Of the entire ceramic assemblage, over 12% of sherds could be associated to a form, the majority of them being bowl and jar fragments (57.1% and 21.4%). Chipped chert is very minimally represented, and obsidian is absent from this space.

The small size of the assemblage and the absence of sharp materials from the occupational surface suggest that the Late to Terminal Classic plaza surface was likely kept relatively clean of debris, or was perhaps not the stage for activities that produced extensive amounts of byproducts such as tool manufacture, although further excavations are needed to test this hypothesis. Nevertheless, these findings are consistent with an area that provided what was perhaps the only access point into the largest and most politically and ritually significant area of the site. While no readily recognizable evidence for activity areas were recovered within this space, other possible activities that utilized perishable, burned, or liquid materials, such as ritual performances, dedications, painting, food consumption and preparation, among others, may have occurred in the area in front of Structure 3. Sediment micromorphology and geochemical characterization will be utilized to aid in the possible detection of such activities in this area in future field seasons.

Northeast of Structure 3

In contrast with the area to the west of Structure 3, the artifact data recovered in the area to the northeast of Structure 3 suggest a more complex use history than that readily indicated by the existent architecture. The area to the northeast of Structure 3 is positioned behind the building, in a topographically flat area that encompasses the areas behind Structures 2 and 1. This area is at the same level as Plaza A, and is accessible to Plaza A through a 2 meter wide plastered corridor between Structures 2 and 3. While Structure 3 itself displays a construction sequence starting in the Late Preclassic, the open area to the northeast of Structure 3 shows signs of architectural modification only in the Late Classic, with the construction of a 0.5 meter high, 50 meter wide platform stretching from Structures 2 and 3 towards the east.

The material culture identified at the level of the occupational surface in the area to the northeast of Structure 3 was found to be denser and more varied than all of the other sectors of the research area. This space is proportionately responsible for over 90% of all the material culture recovered around the structure at the level of the Late to Terminal Classic occupational surface to date. Ceramics are present in significant volume in small clusters throughout this area, both on and off the platform (Figure 6). The ceramic assemblage is differentiated based on preservation state, as the ceramic artifacts found off the platform were generally larger in size, and with less visible wear than their on-the-platform counterparts, based on the percentage of fragments that could be identified by type on and off the platform: 9.38% of ceramic artifacts in the unit furthest from the platform could be associated to a form, while form was recognizable in only 2.60% of ceramic artifacts recovered from units on the platform, on average.

No evidence for ceramic manufacture, in the shape of wasters, stands, raw materials, and burned matrix, was detected in this area. It is likely that ceramics found in this sector were the product of use, breakage, and discard behavior. However, the small size and level of wear displayed by ceramics artifacts in this area does not suggest the presence of a midden, as midden

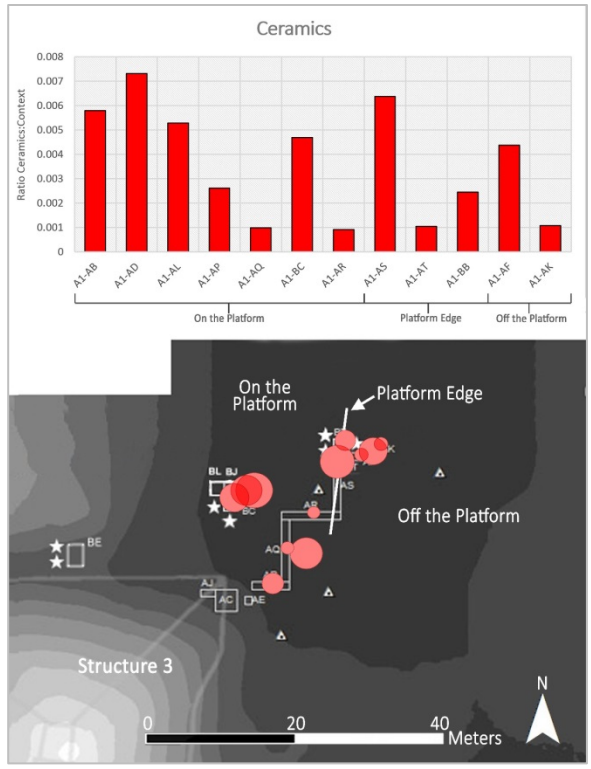

Figure 6. Volumetric analysis of ceramics in northeastern units examined in this paper, and their position in relation to Structure 3.

artifacts tend not to suffer from post-depositional processes (such as trampling) that would cause the breakage and wear observed in the assemblage to the northeast of Structure 3 (Matthews et al. 1997). Sediment micromorphology and geochemical analysis will be utilized to determine whether proxies for activities such as cooking and food disposal (high levels of phosphates, presence of bone and shell fragments, seeds, among others), can be identified to account for the large ceramic assemblage present in units to the northeast of Structure 3.

Chipped chert artifacts comprised the great majority of artifacts in the total assemblage identified in this area. These artifacts were recovered mostly off or adjacent to the platform edge (Figure 7). This assemblage includes over 15,000 lithic artifacts, composed mostly of debitage associated with all stages of manufacturing (especially final stage) and shatter (David Hyde 2011 personal communication). A wide variety of lithic tools was also identified throughout the area,

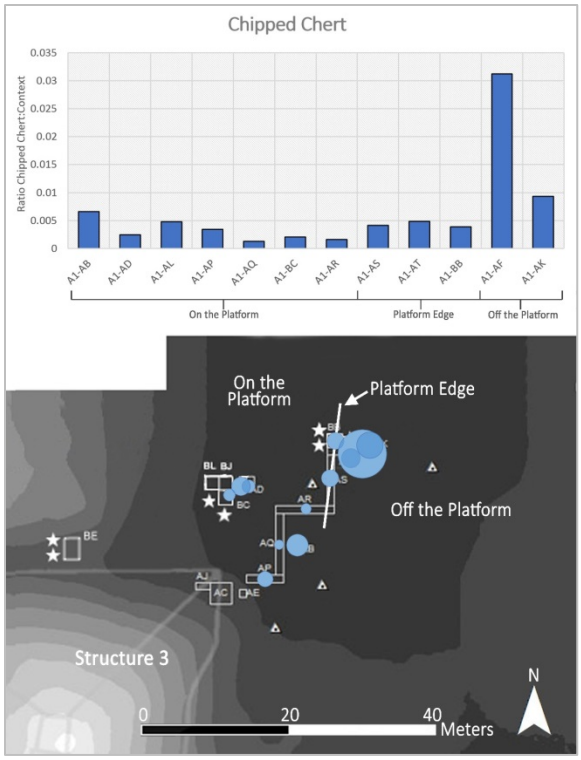

Figure 7. Volumetric analysis of chipped chert artifacts in northeastern units examined in this paper, and their position in relation to Structure 3.

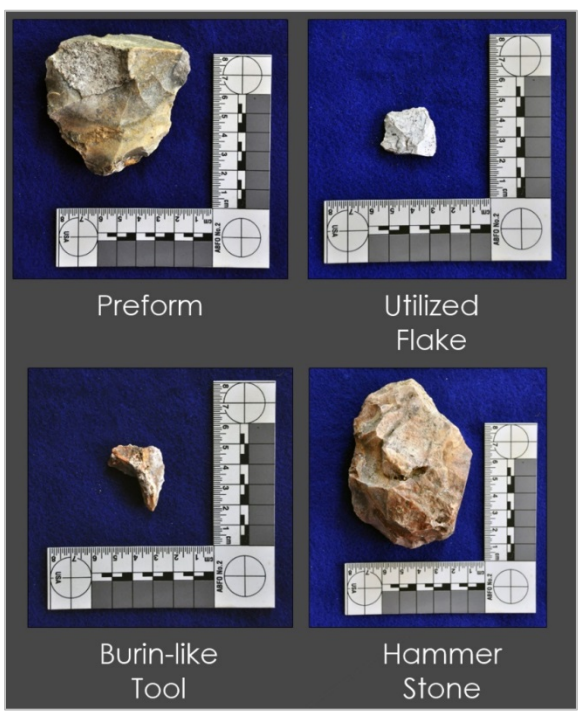

Figure 8. A sample of chipped chert tools encountered in the area to the northeast of Structure 3. Photos by DC Trein.

including hammer stones, biface preforms, celts, burins, and scrapers (Figure 8). Similarly to the ceramic artifacts, the great majority of chipped chert debitage recovered in this area is small, with the largest measurement being less than 2 cm in most artifacts. The size and breadth of the chipped chert assemblage strongly suggests that late stage tool manufacture and maintenance was taking place behind Structure 3 in the Late to Terminal Classic period. The wide variety of tools recovered from this area suggest a correspondent variety of activities, which may have included but is not limited to limestone block shaping, wood working, bead and adorno manufacture, mirror manufacture, and processing of food and skins. Further analysis of the micromorphology of sediment cores retrieved from this area may uncover the microscopic remains of such activities, such as hematite, mother-of-pearl, slate, shell, bone fragments, plant remains, and microdebitage (Matthews et al. 1997).

Obsidian artifacts recovered from this area consisted in their majority of blade fragments and utilized flakes. Non-utilized flakes and debitage were also present in smaller quantities. Unlike chipped chert, distributed mostly off the platform edge, obsidian artifacts are found largely in two clusters, the largest one being on the platform. Obsidian artifacts are almost completely absent from other areas investigated in this sector, and other areas around Structure 3 (Figure 9). The obsidian artifacts recovered were minute, most measuring less than 1 cm across, including unbroken utilized flakes. Additionally, most obsidian artifacts showed signs of battering and flaking around the edges, even in the smallest recovered fragments of obsidian. Similarly to ceramic artifacts, the wear observed in the obsidian assemblages recovered from the platform suggest post-depositional processes such as trampling, and as such do not seem to be associated with a midden deposit (Matthews et al. 1997). The preservation state and narrow spatial distribution of this assemblage suggest the presence of activities that necessitate the fine cutting edge of obsidian, perhaps crafts such as skin and feather work for instance (Masson and Chaya 2000; Rice 1984). Rare finds, in the shape of mother of pearl fragments, two fragments of polished

slate mosaic pieces, and a number of shell and bone beads and adornos, were all recovered largely from the internal area of the platform, in the vicinity of the obsidian deposit.

The character, density, and distribution of the artifact assemblage in the area to the northeast of Structure 3 suggest that this space was heavily accessed and used in the Late Classic period. The artifact assemblage recovered also suggests that this space was regularly maintained, through either the tossing or brushing of sharp chert debris off the platform surface, as evidenced by the large quantities of chipped chert artifacts at or off the platform edge, and the spatial containment of activities involving obsidian. Nonetheless, the presence of small and/or heavily worn artifacts on the platform's occupational surface seems to indicate that either the cleaning was not conducted often enough to completely clean the platform surface or the platform was the stage for a high incidence of debris-manufacture and a high degree of transit that promptly pushed artifacts into the occupational surface as these artifacts were being produced. The size and nature of the artifact assemblage suggests the sustained and continued presence of people in the Late to Terminal Classic engaging in activities that may have varied from goods production, preparation for rituals, marketplace activities, architectural construction and renovation, or all of the above. These are activities that may have been non-ritual and perhaps very laborious in character, and may have involved large numbers of people from a variety of social-economic backgrounds. As such, people participating in these activities engaged in various relations with one another, with objects, and with space that may not have been directly associated with the discourse of monumentality imparted by the temple immediately adjacent.

Southeast of Structure 3

The archaeological data recovered from the area to the southeast of Structure 3 is not included in a volumetric analysis of the research area due to the absence of comparable occupational contexts. Instead, an evaluation of possible activities occurring within this space in the Late to Terminal Classic period has been

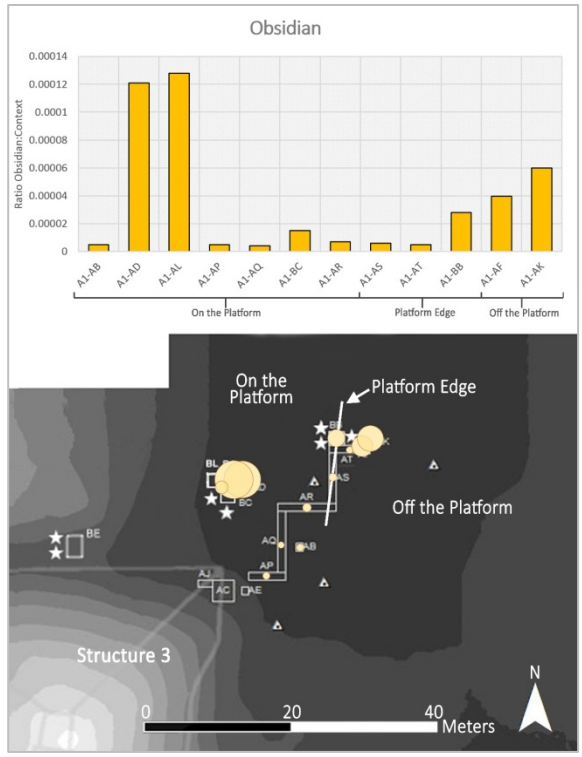

Figure 9. Volumetric analysis of obsidian artifacts in northeastern units examined in this paper, and their position in relation to Structure 3.

undertaken through an analysis of the character of the artifact assemblage. The stacked exposed sheets of limestone bedrock present in this area give this space a bowl-like appearance, rising in elevation as one moves towards the structure and towards the northeast area (Figure 10). Unlike the area to the northeast of Structure 3, which is connected to Plaza A by a corridor, the topographic character of the space to the southeast of Structure 3 physically segregates this area from all other areas surrounding Structure 3. It is likely that this area would have been accessed from the southeast, away from Plaza A, as access from the north and west are blocked by the limestone shelves and the structure itself. Sightlines are similarly interrupted by the limestone outcrops and Structure 3. The stratigraphic profile at this location is shallow, and it is possible that bedrock was exposed at the time of Late to Terminal Classic Maya occupation of this site.

The artifact assemblage encountered in this area was relatively minute but uniform throughout the units. Chipped chert debitage comprises the majority of artifacts in this area,

Figure 10. Photo of the area to the southeast of Structure 3, looking northwest. Arrows point to limestone bedrock shelves. Photo by DC Trein.

Figure 11. Sample of the worn bifaces encountered in this area. Photos by DC Trein.

with some Tepeu 2 and 3 ceramic sherds also represented. Pertinently, a number of distal fragments of large expedient bifaces (likely crude general utility bifaces, or GUBs) showing high degree of battering and blunting on the distal edges was identified (Figure 11) (David Hyde 2015 personal communication). While distal fragments of GUBs have been recovered from other areas around and on Structure 3, the type of wear identified in the tools collected from the southeast of Structure 3 are exclusive to this space. This narrow distribution suggests that this tool assemblage is not the product of architectural collapse from the Structure itself, but from activities happening in this area. Chert bifaces with signs of severe battering and blunting along its distal edges have been associated with several activities, notably the practice of limestone quarrying, where the friction and pressure of the limestone against the chert is known to cause this type of wear (Woods and Titmus 1996). Found in the context of exposed limestone shelves and a Tepeu 2 and 3 ceramic assemblage, the presence of worn and blunt distal GUB fragments suggest that limestone quarrying took place behind Structure 3 in the Late to Terminal Classic. As construction and quarrying are traditionally associated with members of lower social classes in ancient Maya communities (Abrams 1998; Abrams and Bolland 1999), this area may have represented a working site for a group of laborers, an interpretation particularly pertinent considering how inaccessible this space is from other areas around Structure 3 and Plaza A.

Further Work

Many of the suggestions proposed in this paper require a more extensive body of data in order to attain a solid understanding of the significance of Structure 3 to the Late to Terminal Classic La Milpa community. The addition of geochemical and sediment micromorphology data in the upcoming months and the continuation of comprehensive excavations in the area to the west of Structure 3 will provide new angles to the study of activity areas in the spaces around Structure 3 and allow for the fine-tuning of interpretations. Moreover, the model and approach proposed in this paper will also benefit from a comparative study of other monumental structures in the region.

Nevertheless, this paper has hopefully conveyed that it is possible to examine monumental landscapes from a perspective that includes the lived experience of people who accessed and used these spaces in the past. Based on the archaeological record present in the open areas framed by Structure 3, this space may have been the stage for many distinct activities in the Late to Terminal Classic, from the observance of ritual performances, to possible quarrying, workshops, and marketplace activities, among others. Structure 3 framed and participated in a diverse set of relations between different types of people and objects, becoming not one but many places to the Late to Terminal Classic La Milpa community.

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28 FIGURES AND TABLES FOR THE CERAMICS FROM A TERMINAL PRECLASSIC CHULTUN STYLE BURIAL FROM THE SITE OF BLUE CREEK, NORTHERN BELIZE

Laura J. Kosakowsky, Robin Robertson, and Debra S. Walker

In 1998 a Maya Lowland style chultun burial (T5) dating to the Terminal Preclassic (AD 100/150- 200) was uncovered on a karstic erosional remnant in the flood plain of the Rio Bravo, visible from the site core of Blue Creek in northern Belize. The contents of the burial included at least three partial skeletons, and the mortuary assemblage included twenty-eight whole vessels. The immediate threat of looting required a rapid salvage excavation and very preliminary examination of the ceramics. In the Research Reports in Belizean Archaeology, Volume 11, Papers of the 2013 Belize Archaeology Symposium, published by the Institute of Archaeology, Guderjan et al. 2014 (347-59) describe the pottery based on those preliminary identifications made more than a decade ago. Since that time the vessels from T5 have been extensively reevaluated and in last year's Research Reports in Belizean Archaeology, Volume 12 (377-82), we reported the corrected typological designations of the pots. However, due to an error on the part of the senior author, the accompanying tables and figures were not included. We share them here to accompany the text on these important Terminal Preclassic vessels from Blue Creek in northern Belize.

Introduction

In the 2014 *Research Reports in Belizean Archaeology*, Volume 11, Guderjan et al. (2014:347-59), reported on the Maya Research Program 1998 excavation of an intact chultun burial (T5) dating to the Linda Vista Ceramic Complex (AD 100/150-250), of the Terminal Late Preclassic at Blue Creek in northern Belize (Table 1). The burial site is located in the settlement zone of Blue Creek approximately 4.25 kilometers northeast of the site core, and is situated on a karstic erosional remnant in the flood plain of the Rio Bravo that would have been visible from Blue Creek (Guderjan et al. 2014: 348).

However, in that same publication (Guderjan et al. 2014: 352-53) the authors incorrectly identify the twenty-eight whole vessels uncovered within the chultun burial, based on rudimentary preliminary examinations done in the Institute of Archaeology vault in Belmopan by the senior author of this paper in the year 2000. Since that time, the authors of this paper have reexamined the vessels and reclassified them using standard type: variety mode designations (Gifford 1976).

The ceramics are described by Kosakowsky, Robertson, and Walker (2015: 377-82) in "The Ceramics from a Terminal Preclassic Chultun Style Burial at the site of Blue Creek, Belize" in the *Research Reports in Belize Archaeology, Papers of the 2014 Belize Archaeology Symposium*, edited by John Morris, Melissa Badillo, Sylvia Batty, and George Thompson. However, due to an error on the part of the senior author, the accompanying tables and figures were not included. We take this opportunity to provide the table and figures that pertain to the corrected ceramic types, with illustrations done by Candida Lonsdale (not by Jo Mincher as acknowledged by Guderjan et al. 2014: 357). The ceramic research was graciously funded by a grant to the senior author (Kosakowsky & Lohse 2003) by the Ahau Foundation, through the auspices of the late Peter D. Harrison.

The Ceramics

As mentioned previously, the twenty-eight whole vessels (Table 2) from the chultun burial date to the Terminal Late Preclassic Linda Vista Ceramic Complex (AD 100/150- 250) (Kosakowsky and Lohse 2003). In order to allow the reader to examine the accompanying figures more easily we are including brief type descriptions here again as well.

Fifteen of the vessels from the burial are identified as pertaining to the Cabro Red Group, first established by Robertson (1980:158) from the Tulix Complex at the site of Cerro Maya (Cerros) in Northern Belize and as well as at Nohmul (Pring 2000), Lamanai (Powis 2002), Colha (Valdez 1987), and Santa Rita Corozal (Robertson personal observation 2014). The type has also been found at Cuello (Kosakowsky 1987; Kosakowsky & Pring 1998) where it was

Research Reports in Belizean Archaeology, Vol. 13, 2016, pp. 309-316.

Table 1. Ceramic Chronology for the site of Blue Creek and nearby sites in the Three Rivers Region of Northern Belize.

Time Period	Calendar Years, approximate	Regional Ceramic Spheres	Blue Creek and Eastern Escarpment Sites	La Milpa and Western Escarpment Sites	Three Rivers/PfB Sites
Early Postclassic				Mucklehany Lagoon	
Terminal Classic	AD 830/850 – 1000	Tepeu 3	**Booth's River**	Coffin Gate Creek	TR-Tepeu II
Late Classic II	AD 700 – 830/850	Tepeu 2	**Dos Bocas**	Scattered Flints	TR-Tepeu II
Late Classic I	AD 600 – 700	Tepeu 1	**Aguas Turbias**	Mumble de Peg	TR-Tepeu I
Early Classic	AD 250 – 600	Tzakol (1, 2, 3)	**Rio Hondo**	Gentle Work	TR-Tzakol
Terminal Late Preclassic	AD 100/150 – 250	Chicanel (Floral Park)	**Linda Vista**	Edenthal	TR-Chicanel (Floral Park)
Late Preclassic	350 BC – AD 100/150	Chicanel	**Tres Leguas**		TR-Chicanel
Middle Preclassic	650 BC – 350 BC	Mamom	**Crystal Creek**	Mamom?	TR-Mamom
Early Middle Preclassic	1000/800 BC – 650 BC	Swasey/ Bladen	**Cool Shade**		TR-Swasey

Table 2. Ceramic types and vessel forms of the twenty-eight whole vessels from T5, Blue Creek.

Vessel #	Ceramic Type	Vessel Form
BC #5701	Sacluc Black-on-Orange: Sacluc Variety	flaring sided tetrapod bowl
BC #5702	Tuk Red-on-Red Trickle: Groove Incised Variety	large medial angle open bowl
BC #5703	Yaxnik Through-the-Slip Incised: Yaxnik Variety	medial flanged bowl
BC #5704	Tuk Red-on-Red Trickle: Tuk Variety	medial angle bowl
BC #5705	Caramba Red-on-Red-orange: Unspecified Variety	spouted jar
BC #5706	Cabro Red: Cabro Variety	short necked narrow mouth globular jar
BC #5707	Tuk Red-on-Red Trickle: Groove Incised Variety	medial angle bowl
BC #5708	Tuk Red-on-Red Trickle: Tuk Variety	medial angle bowl
BC #5709	Matamore Dichrome: Matamore Variety	short necked narrow mouth globular jar
BC #5710	Tuk Red-on-Red Trickle: Groove Incised Variety	medial angle bowl
BC #5711	Tuk Red-on-Red Trickle: Groove Incised Variety	medial angle bowl
BC #5712	Tuk Red-on-Red Trickle: Tuk Variety	medial flanged bowl
BC #5713	Tuk Red-on-Red Trickle: Tuk Variety	medial angle bowl
BC #5714	Cabro Red: Impressed Variety	medial flanged bowl
BC #5715	Matamore Dichrome: Trickle Variety	short necked narrow mouth globular jar
BC #5716	Cayetano Trichrome: Cayetano Variety	incurving sided tetrapod bowl
BC #5717	Puletan Red and Unslipped: Chiculte Variety	short necked narrow mouth globular jar
BC #5718	Cabro Red: Cabro Variety	short necked narrow mouth globular jar
BC #5719	Hukup Dull: Hukup Variety	short necked narrow mouth globular jar
BC #5720	Tuk Red-on-Red Trickle: Tuk Variety	medial flanged bowl
BC #5721	Tuk Red-on-Red Trickle: Groove Incised Variety	flaring sided tetrapod bowl
BC #5722	Correlo Incised Dichrome: Unspecified Variety	medial flanged bowl
BC #5723	Matamore Dichrome: Matamore Variety	short necked narrow mouth globular jar
BC #5724	Tuk Red-on-Red Trickle: Tuk Variety	medial flanged bowl
BC #5725	Sierra Red: Sierra Variety	flaring sided dish
BC #5726	Hukup Dull: Hukup Variety	short walled vase
BC #5727	Hukup Dull: Hukup Variety	miniature jar
BC #5728	Tuk Red-on-Red Trickle: Tuk Variety	medial flanged bowl

originally called the Big Pond Variety of Sierra Red. The principal identifying attributes of Cabro Red are sherds that normally clink when tapped on a hard surface and have a hard, thin monochrome red double slip with a high luster that cannot be easily scratched, and that normally clinks when tapped on a hard surface. These vessels were fired at a high temperature sufficient to produce vitrification of the fabric in most instances. BC5706 is a Cabro Red short-necked globular jar with post-firing incised decoration in the form of four turtle-like figures around the exterior of the vessel (see Figure 1). BC5714 is a Cabro Red bowl with a medial flange with impressions (see Figure 2). BC5718 is also a short-necked globular jar (see Figure 2). Twelve of the vessels are of the type Tuk Red-on-Red Trickle (BC#'s 5702, 5704, 5707-08, 5710-13, 5720-21, 5724, & 5728) also in the Cabro Red Group, and identified by the presence of secondary red-on-red trickle decoration on both the interior and exterior surfaces of vessels (Robertson 1980:198). The trickle decoration is often quite faint and consists of lines with blurred borders that run down from the rim of the vessel and often merge together. Five of these Tuk Red-on-red Trickle vessels (BC5702, 5707, 5710-11, 5721) are additionally decorated by pre-slip groove incising, also identified on examples of this type at Cerro Maya by Robertson (1980:200). (See Table 2 for vessel forms.)

Two of the vessels are from the more common Sierra Red Group, established as a type at Uaxactun (Smith 1955; Smith and Gifford 1966). The first (BC5725) is a small flaring sided dish with convex base. The second is an example of Puletan Red and Unslipped: Chilculte Variety, a striated short-necked globular jar (see Figure 2: BC5717). Originally described as a type by Robertson (1980:40) at Cerro Maya, it is now recognized as a variety of Puletan Red-and-Unslipped described at the site of Cuello (Kosakowsky 1987; Kosakowsky & Pring 1998; Pring 1977). It is characterized by a Sierra Red slip on the interior of the rim and exteriorly on the neck, thin walls, and an unslipped exterior with brush striations from the neck down. The Sierra Red Group, with all its types and varieties is the most common slipped ceramic group in the Late Preclassic Tres Leguas at Blue Creek, though less common during the Terminal Preclassic Linda Vista Complex (see Table 3) where it appears to be replaced by Rio Bravo Red, a type described by Sagebiel (2005:247-53) at nearby La Milpa.

Three of the vessels (See Figure 1: BC5709; Figure 2: BC5715 & Figure 3: BC5723) are Matamore Dichrome short-necked globular jars, established as a type by Pring (1977). The principal identifying attributes of Matamore Dichrome are vessel areas slipped in two contrasting colors, with one color always red and the other black, buff or brown. BC5715 appears to have faint trickle lines as secondary decoration.

Three of the vessels are of the Hukup Dull type originally named as a variety of Hole Dull by Robertson (1980: 250), and is characterized by a thin dull red slip that is commonly fireclouded. BC5719 (see Figure 2) is a short-necked globular jar, BC5726 (see Figure 3) is a straight sided, flat-bottomed short walled vase, and BC5727 (see Figure 3) is a miniature, restricted orifice globular jar with two loop handles. Hukup Dull can be mistaken for eroded examples of Cabro Red where preservation is not good.

The last five vessels in the burial include one example of a Sacluc Black-on-Orange flaring sided tetrapod bowl (see Figure 1: BC5701) and one example of a Caramba Red-on-Red-orange spouted jar with nubbin feet (see Figure 1: BC5705). Caramba Red-on-Red-orange and Sacluc Black-on-Orange were established as types by Adams (1971) in the Plancha Phase at Altar de Sacrificios, and are found also at Tikal (Culbert 1993; Laporte 1995), at El Mirador (Forsyth 1989), at Cerro Maya (Robertson 1980), and at Nohmul in the Anderson & Cook Collection (Pring 2000). Both types consist of multiple parallel lines created by the more common "wipe-off" technique in which a slip was applied and then partially wiped off with a multi-toothed instrument in some areas to produce lighter stripes in the case of Caramba. The second technique is one of positive painting with a second coat of the original slip or one of a different color as in the Sacluc type. A third vessel (See Figure 2: BC5716) is a Cayetano Trichrome tetrapod bowl, a type described by

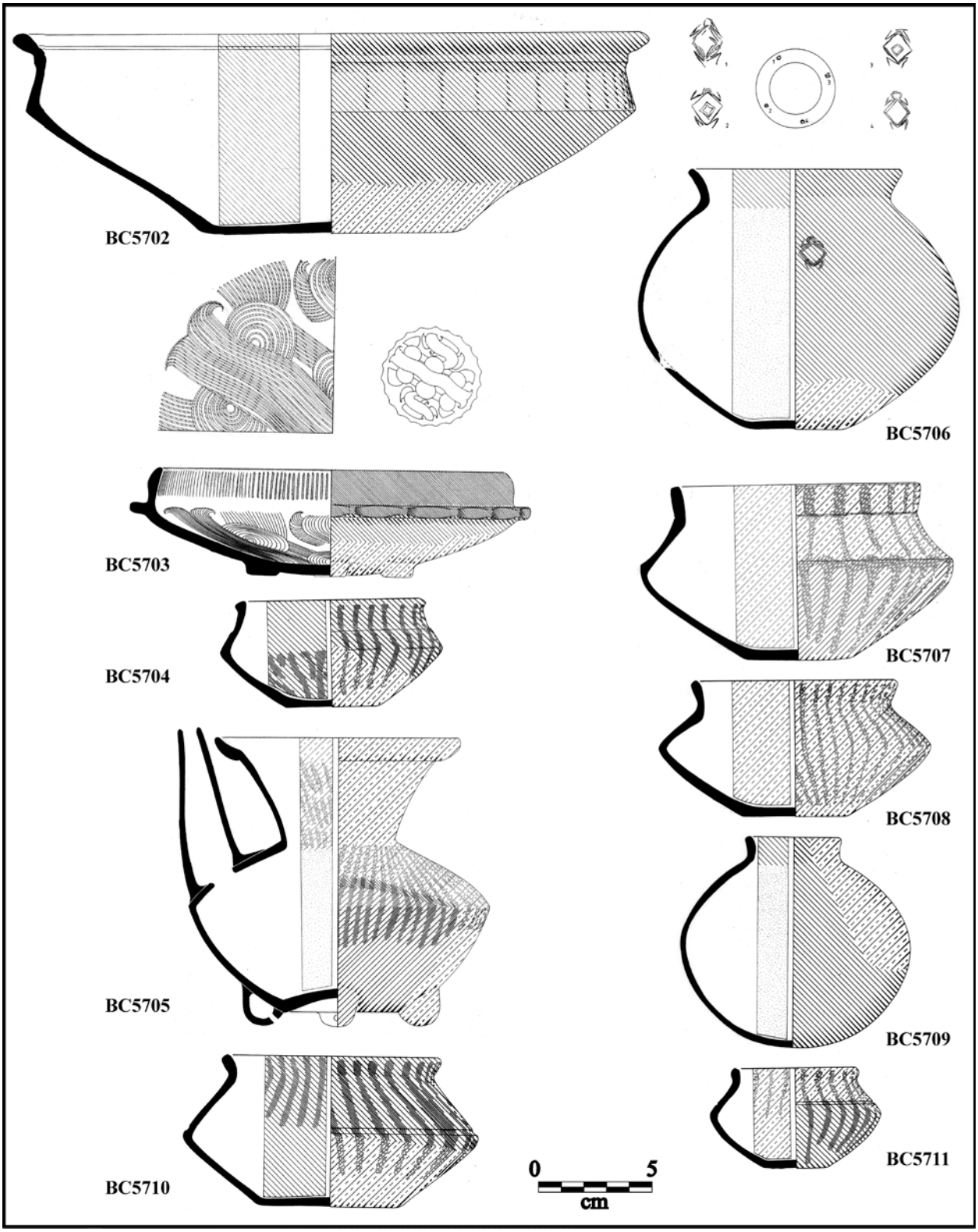

Figure 1. Whole vessels from over the cranium of Burial 34 (BC 5703) and from the end of the right arm of Burial 34 (BC5702; 5704-5711) in T5, Blue Creek. (Illustrated by Candida Lonsdale).

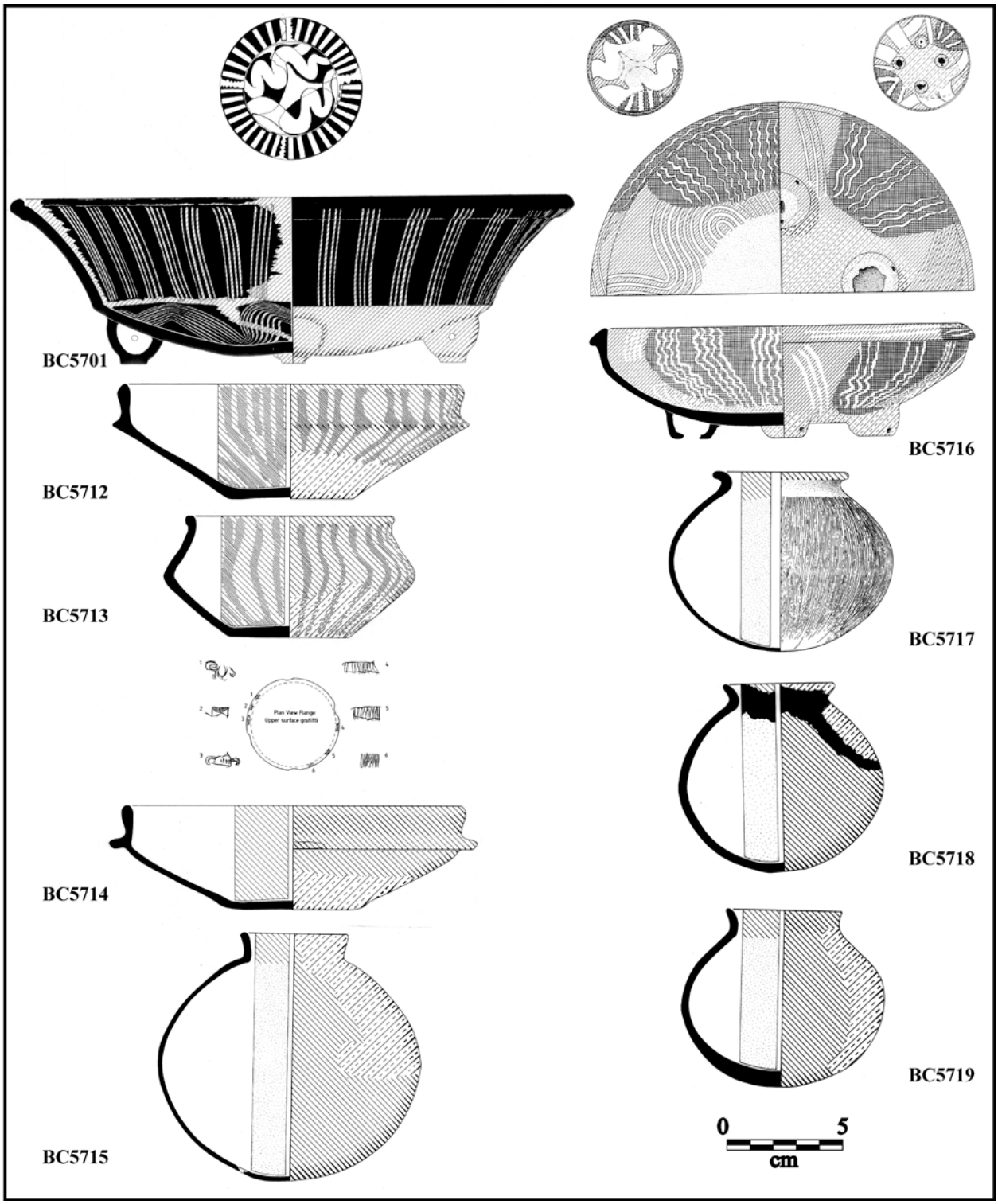

Figure 2. Whole vessels from the end of the left arm of Burial 34 (BC5701; BC5712-19) in T5, Blue Creek. (Illustrated by Candida Lonsdale).

Table 3. Frequency of ceramic types from excavated contexts in the site core of Blue Creek.

Linda Vista Ceramic Complex																
Achiotes Unslipped	Sapote Striated	Hukup Dull	Sierra Red	Puletan Red and Unslipped	Correlo Incised Dichrome	Matamore Dichrome	Cabro Red	Tuk-Red-on-Red Trickle	Rio Bravo Red	Sacluc Black-on-Orange	Caramba Red-on-Red-orange	Yaxnik through-the-slip Incised	Cayetano Trichrome	San Antonio Golden Brown	Flor Cream	Douglas Composite
1.5%	3.0%	0.0%	17.7%	0.0%	0.0%	0.0%	0.0%	0.3%	62.0%	0.1%	0.3%	0.0%	0.0%	9.0%	6.0%	0.1%

Culbert (1993) at Tikal and found at Cerro Maya as well (Robertson 2016), in which a pattern of decoration similar to Caramba Red-on-Red-orange is then decorated with a thin black slip on sections of the vessel which are wiped off creating multiple parallel lines. The fourth vessel (see Figure 1: BC5703), found inverted over the cranial area of Burial 34, is a Yaxnik through-the-slip Incised medial flanged bowl, which was identified as a type by Robertson (1980:129) at Cerro Maya. It is a composite type with a darker orange or red-orange slip over a lighter orange to buff slip on the interior and a red over orange slip on the exterior. There is a band of specular hematite, "purple paint," applied exteriorly on the medial scalloped ridge and above to the rim. Vertical lines are incised through the slip on the upper wall on the interior, while the interior base is incised with undulating multiple fine lines. The fifth vessel (see Figure 3: BC5722) is a Correlo Incised Dichrome medial flanged bowl, established as a type at Uaxactun (Smith and Gifford 1966) in the Sierra Group, though we include its description with this final set of vessels is it consists of a similar wipe-off technique to Caramba Red-on-Red-orange, created by parallel incising through the red slip removing alternate bands of red and revealing the underlying buff color. These five vessels all employ similar decorative techniques. While the decoration mimics the Usulutan style (Demarest 1986; Forsyth 1989) these examples represent different production techniques from true Usulutan (Pring 2000), and require greater definition (Robertson 2016).

Concluding Remarks

The ceramic types represented in this burial appear to be of restricted use at Blue Creek, as they are not found in any great frequency from other excavated contexts in the Blue Creek site core, as analyzed by the senior author (see Table 3). The ceramics from this burial are most similar in form and decoration to the Tulix Complex from Cerro Maya (Robertson 1980; 1983; 2016), and the Anderson & Cook collection from Nohmul (Pring 2000; Kosakowsky 2005), and some examples from Lamanai (Powis 2002) and Colha (Valdez 1987) in nearby northern Belize. In southern Belize there is also a chultun burial at Caracol with a Sacluc Black-on-Orange vessel (Chase and Chase 1995:95-7). There are examples of some of these types present at Guatemalan sites such as Tikal (Culbert 1993), at Altar de Sacrificios (Adams 1971), at Seibal (Sabloff 1975), at El Mirador (Forsyth 1989), and in the central karstic uplands at Naachtun (Walker 2013) and Yaxnohcah (Walker 2016). These types also appear at sites in southeastern Quintana Roo, such as Ichkabal and elsewhere in the Dzibanche region (Walker personal observation 2013), and additionally at the site of Becan in Campeche, Mexico (Ball 1977).

Terminal Preclassic ceramics such as these from the chultun burial T5 at Blue Creek remain somewhat problematical due to their uneven geographical distribution and equally uneven identification and reporting (Kosakowsky 2005; Robertson 2016). As early as Smith's (1955:22) work at the site of

Uaxactun, he noted a transition from the waxy slips of the Late Preclassic to the glossier slips of the Early Classic, as evidenced in many of these Blue Creek examples. Graham (1986: 45-6) has described the ceramic technology of the Terminal Preclassic as a period in which "temperature control in firing, kiln construction, drafting controls, source clay choice, and slip formulae were changing much more rapidly than had been true in the Late Preclassic" and as Pring (2000: 39) has pointed out, "it is this very diversity and ceramic experimentation that make the pottery so hard to categorize and define." While the T5 vessels from Blue Creek are not unique, they highlight the need for more exacting descriptions of ceramics from the Terminal Preclassic throughout the Maya Lowlands.

Acknowledgements The original research on the T5 ceramics from Blue Creek was undertaken by the senior author between 2001 and 2004 under the auspices of the Blue Creek Regional Political Ecology Project, directed by Dr. Jon C. Lohse, with the gracious support of the Maya Research Program, directed by Dr. Thomas H. Guderjan. The T5 excavations were initially a salvage operation conducted by Alex Pastraña, with assistance from Demori Currid Driver, Olivia Navarro Farr, Colleen Popson and Thomas H. Guderjan. The ceramic research and beautiful illustrations done by Candida Lonsdale were supported by funding from The Ahau Foundation, under the auspices of the late Peter D. Harrison. As always, we are grateful to the support from the Institute of Archaeology, and especially to Dr. John Morris who encouraged this report, and to Antonio Beardall and Melissa Badillo who helped with access to the T5 vessels in Belmopan. We are especially grateful that Dr. Morris, and the Institute of Archaeology have allowed us to publish these tables and figures to accompany last year's text so that researchers will have access to this important data set.

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29 XNOHA: UNDERSTANDING ITS TEMPORAL AND SPATIAL DYNAMICS

Thomas Guderjan, Colleen Hanratty, Brie Deschenes, Hollie Lincoln, Morgan Moodie, Alexander Parmington, Hannah Plumer, Carlos Quiroz, Justin Telepak, and Marc Wolf

This paper summarizes several field seasons of work at the site of Xnoha in northwestern Belize. Xnoha was first recorded in 1990 and two field seasons of work were conducted in the early 21st century. For the past several years, we have renewed our efforts. The outcomes include better understanding of the relationships between Xnoha and its satellite sites of Nojol Nah, Krohnton, Tulix Muul and Mulaán. Additionally, we now have a well-established chronology beginning in the Middle Preclassic through the Terminal Classic Periods. We have also re-assessed the architecture of ritual behavior at the site.

Introduction

The site of Xnoha in northwestern Belize is the current focus of the ongoing research of the Blue Creek Archaeological Project in northwestern Belize. During the past several years, disparate pieces of our research at Xnoha and loci such as Nojol Nah and Tulix Muul have been published without clear, contextual reference to Xnoha as an integrated polity. In this paper, we attempt to remedy this situation by summarizing what we know of Xnoha's *kuík* or central precinct and nearby elite residences. In addition, we briefly examine the spatial and temporal aspects of Xnoha including the outlying central places of Tulix Muul, Nojol Nah, Mulaán and Krohnton.

The Discovery of Xnoha

Xnoha was first visited by the senior author and Froyla Salam in 1990 when Guderjan was conducting initial surveys in northwestern Belize while on a Fulbright Fellowship (Guderjan 1991: pages 58, 75 and 76). That visit was very brief and the planned return visit did not occur. Like many "discoveries", Xnoha was discovered by someone who already knew where it was showing it to an archaeologist. The visit was very brief and only the main plaza was identified. The visit was also in those dark ages before the invention of GPS technology. Consequently, the location of the site was problematic and based upon notes from the logging roads we followed. A year or so later, the forest was cut back a few hundred meters and new, edge-effect growth, made it impossible to relocate the entrance to the logging road, though several attempts were made. In one notable attempt, we drove a vehicle to the top of a hill to check the view, halted, leapt out of the vehicle only to find we had parked on top of the Caribbean Chicken factory's chicken parts dump. Yes, it was disgusting.

The next visit was by Jon Lohse in 2002, led by the same guide who previously showed the site to Guderjan. Lohse and Guderjan visited the site together and determined that it was, in fact, the same location. Despite the hours of rambling around the forest in 1990, Xnoha was located surprisingly close to road access.

Xnoha was named by Guderjan because of the proximity to "Xnoha Creek" marked on Belize topographic maps immediately north of the site and draining into the Rio Hondo valley from the north just above the Rio Hondo Canyon. The alternative spellings of "Ixnoha" or Ixno'ha" were implemented by Lohse and his colleagues. Currently we retain the "Xnoha" spelling due to its concordance with Belize topographic maps. From 2002-2005, Jon Lohse and his colleagues undertook an ambitious program of survey, mapping and test pitting in and near the central precinct resulting in part in Gonzalez's doctoral dissertation (Gonzalez 2013a, Lohse 2013).

General Description

The central precinct of Xnoha consists of a large, irregularly shaped plaza approximately 150 meters, SW-NE, and 100 meters, SE-NW (Figure 1). The east side of the plaza is well-defined by a 70 m long range building, Structure 1, with uncarved stelae on both its east and west sides. The south and west sides of the plaza are defined by the pyramidal Structures 2 and 3.

Research Reports in Belizean Archaeology, Vol. 13, 2016, pp. 317-327.

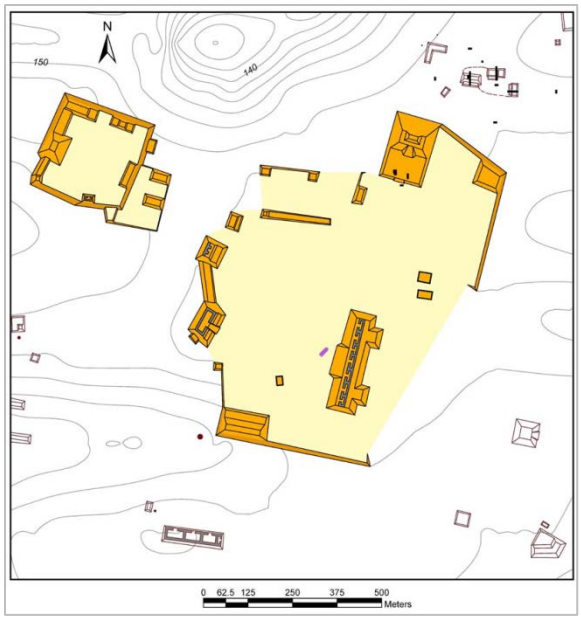

Figure 1. Map of Main Plaza of Xnoha (from Gonzalez 2013b).

The north side of the plaza is marked by the tallest and most complex building, Str. 10.

Approximately 50 meters NW of the plaza is an elevated acropolis complex dominated by the Structure 4 pyramid on its west side. At the acropolis' eastern base is a pair of residential buildings, Structures 15 and 16 which have been controversial as they were once identified as a ball court (Gonzalez 2013a, 2013 b; Lohse, Sagabiel and Barron 2013) but clearly they are not.

Approximately 100 meters east of the plaza is the Eastern Elite Residential Group (*EERG*), notably the Str. 79 Group, which is anchored symbolically to a somewhat isolated shrine built in the Late Preclassic and never modified, Str. 77. In a roughly parallel setting approximately 100 meters west of the plaza is the Western Elite Residential Group (*WERG*), a Classic period elite residential group with another Late Preclassic shrine, Str. 100, on the south end of the group. Current evidence is that this shrine, too, had not been modified after construction.

Xnoha's central precinct is situated on top of a karstic, erosional remnant hill about a kilometer south of the Rio Hondo drainage. On the south, east and west sides, the remnant gradually slopes down 40 or more meters. On the north side, there is a precipitous cliff. About a kilometer to the west is a small, relatively isolated wetland that has not yet been visited. During the rainy season, this overflows to a drainage immediately north of the central precinct and then drains to the Rio Hondo drainage just downstream of the mouth of Mexico's Xnoha Creek. All of these are normally dry drainages though some can have heavy energy floods in the rainy season.

Xnoha's location is also the highest point between the Bajo Alacranes and the Bravo Escarpement. It is also the largest center between the two locations. Rainy season water spills from the Bajo Alacranes into the same Rio Hondo drainage. To be clear the common usage for this drainage is the Rio Azul or Blue Creek, following the thinking that the Rio Azul of Guatemala which flows past the same-named site continues to flow into Belize and becomes the Mexico-Belize border. It does not do so and the headwaters of the more correctly named Rio Hondo drainage are in the Xnoha site area.

Mapping Xnoha and Previous Research

The first map of Xnoha was made by the senior author in 1990 as a sketch on the back of an envelope he had in his pocket (Guderjan 1991: 75). That map showed only five buildings and we found only two that had been looted in any way. The degree of precision of the map was such that the published north arrow points to the east! Guderjan and Salam were so skeptical of their guide that neither carried a compass that day. Other looting at the site occurred in 2002 and was discovered by Justin Telepak who brought in the BDF to secure the site. In 2002 and 2003, the central precinct of the site was mapped by Marc Wolf and in the past two years, Telepak and Wolf have been updating the previous map and extending the mapped sectors of the central precinct (Figure 2).

The Lohse-Gonzalez excavations were conducted during the period of 2002-2005 and involved transects to map settlement on the east, south and west cardinal directions and considerable amounts of test-pitting operations for dating purposes (Gonzalez 2013a, b). Test-pitting and small-scale excavations were also undertaken in the central precinct. Gonzalez used these data to compare Xnoha with La Milpa to assess whether La Milpa elites had direct

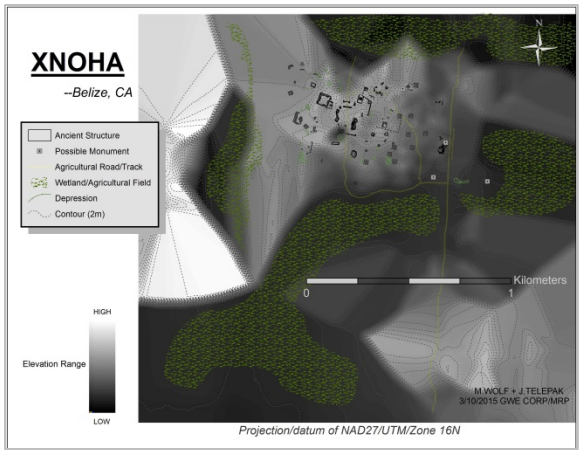

Figure 2. Map of Central Precinct of Xnoha, by Marc Wolf and Justin Telepak.

Figure 3. Middle or Late Preclassic turkey effigy vessel from Burial 14-01.

control over day to day lives of the "rural" Xnoha people. Using ceramic information and structure size, Gonzalez concludes that this was not the case. We argue that while this was an interesting study, there are reasons for concern about the utility of his proxies. Our past experience has shown that small-scale excavations, while useful when time constraints are involved often fail to allow for discovery of material remnants of ritual activity and architectural nuances and often cause misidentification of building function. Further, test pits in front of standing architecture are poor proxies for understanding the construction histories of the buildings. Lastly, while Gonzalez concludes that Xnoha had a population density of less than half of La Milpa, we find that we have not yet found Late Preclassic residences but do find monumental construction. The lack of known residences yields a population estimate of zero, which clearly was not the case.

With this in mind, we initiated our excavations in 2012 beginning with Tim Preston's stripping excavations on Structure 1 (Guderjan and Preston 2013). In 2013, we continued the Str. 1 excavations and expanded work to Strs. 15 and 16, the Str. 78 complex, and the Str. 65 group. In 2014-2016, the majority of our project's efforts were focused on Xnoha. In all cases our efforts have been on large scale stripping and well anchored probes to reduce sampling error.

Temporal Dynamics

Our understanding of the chronological development of Xnoha is still at an early stage and this will be an evolving narrative as our work progresses. While previous research revealed the general chronology of the site, it was unsurprisingly a typical Late Preclassic-Late Classic sequence. Moreover, the lack of large-scale, previous excavations caused us to be uncertain whether terminal, abandonment related deposits existed and what relative construction energetics were represented and in one case, whether a functional identification was correct. Consequently, we have begun a program of testing as many central precinct buildings as possible. While this is clearly the "hard way", the quality of data is more reliable.

Middle/Late Preclassic Period

No building construction has yet been identified that predates the Late Preclassic period. The earliest deposit so far known at Xnoha is from Burial 14-01, a poorly preserved adult of unknown sex, buried stratigraphically below a large Late Preclassic (*Sierra Red*) cache in what later became the patio for the Structure 78 patio group. This burial included a turkey effigy pot (Figure 3) which has not yet been assigned to type, a jadeite cylinder bead and two ornaments carved of red coral and a conch shell (one each) which fit together to create the "kin" symbol and lithic flakes.

Late Preclassic Period

During the Late Preclassic period, the main plaza was established, at least five monumental buildings were constructed and an

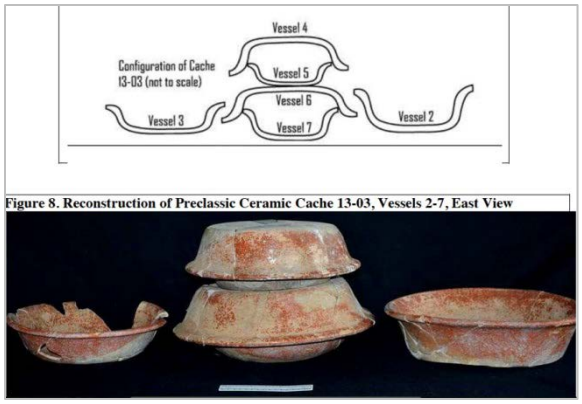

Figure 4. Reconstructed cache of Sierra Red vessels.

important residential platform was dedicated. In the patio of the Structure 78 patio group, we found an important yet not fully understood cache of Sierra Red vessels (Figure 4). This was stratigraphically above Burial 14-01 and likely was the result of a dedicatory event for the group. However, none of the existing masonry construction dates earlier than the Classic period.

Analysis of residue from inside one of the Sierra Red vessels yielded evidence of sponges having been placed inside of the vessels (Bozarth 2014). At Blue Creek, we found numerous Early Classic lip-to-lip caches with sponges, jade, coral and other objects indicating that such dedicatory caches were cosmograms of creation placed at the symbolical place of creation at the base of the *witz* mountain (Bozarth and Guderjan 2004). The discovery of sponge spicules in this cache pushes back the importation of sponges from the coast to the interior and this ritual practice to the Late Preclasssic.

In the main plaza, we have found buried construction phases dating to the Late Preclassic at three buildings, Strs. 1, 3 and 10. Figure 5 shows a two-dimensional view of a three-dimensional scan of Str. 3, showing the frontal and super-structural exposures and a pit excavated in front of the building that penetrated multiple plaza floors.

Located east and west of the main plaza are two generally delineated elite residential groups, each focused on single-construction phase, Late Preclassic shrines, Structures 77 (east) (Quiroz, Deschenes and Savoie 2016) and 100 (west) (Plumer and Lincoln 2016). While excavation of Str. 100 is not yet complete, the work at Str. 77 is nearly so and we were struck not only by the early date, which much predates the known neighboring masonry residences but by the surprise that there was no interment associated with the construction and there were no significant later modifications of the building. It seems to have been an important shrine and central place for 700-800 years without additional construction (Figure 6).

To date, we have found no Late Preclassic residences at Xnoha. Clearly, though, they did exist and we presume the population to have been significantly large to have undertaken these construction projects.

Early Classic Period

In the Early Classic, we see major remodeling of Strs. 1, 3 and 10 on the main plaza. Additionally, we see construction of most masonry residences and monumental architecture.

The residences of the Western Elite Residential Group (*WERG*) were constructed upon the same platform where the Str. 100 shrine remained, apparently un-modified, since the Late Preclassic. In the Eastern Elite Residential Group (*EERG*), the Str. 79 Patio Group (Lincoln 2016) was constructed on top of the existing Late Preclassic platform and it is also likely that most of the other residences surrounding the Str. 77 Shrine were built at this time.

On the east side of the plaza, Strs. 15 and 16 near the plaza (Mead 2015; Mead, Mastroprieto, and LeMasters 2014) were both built at this time (Figure 7). While we originally undertook the excavation of Strs. 15 and 16 to confirm their function as a ball court, our data led in other directions. These are not opulent residences but they do have full and open access to the main plaza and are located at the base of the acropolis group. If the acropolis was residential, then the residents of Strs. 15 and 16 may have been servants connected to those elites. However, while not confirmed, the acropolis does not seem to be residential, compounding the question.

A lip-to-lip, dedicatory cache was found immediately in front of the entrance to Str. 16. The upper, inverted, plate was incised with a mat

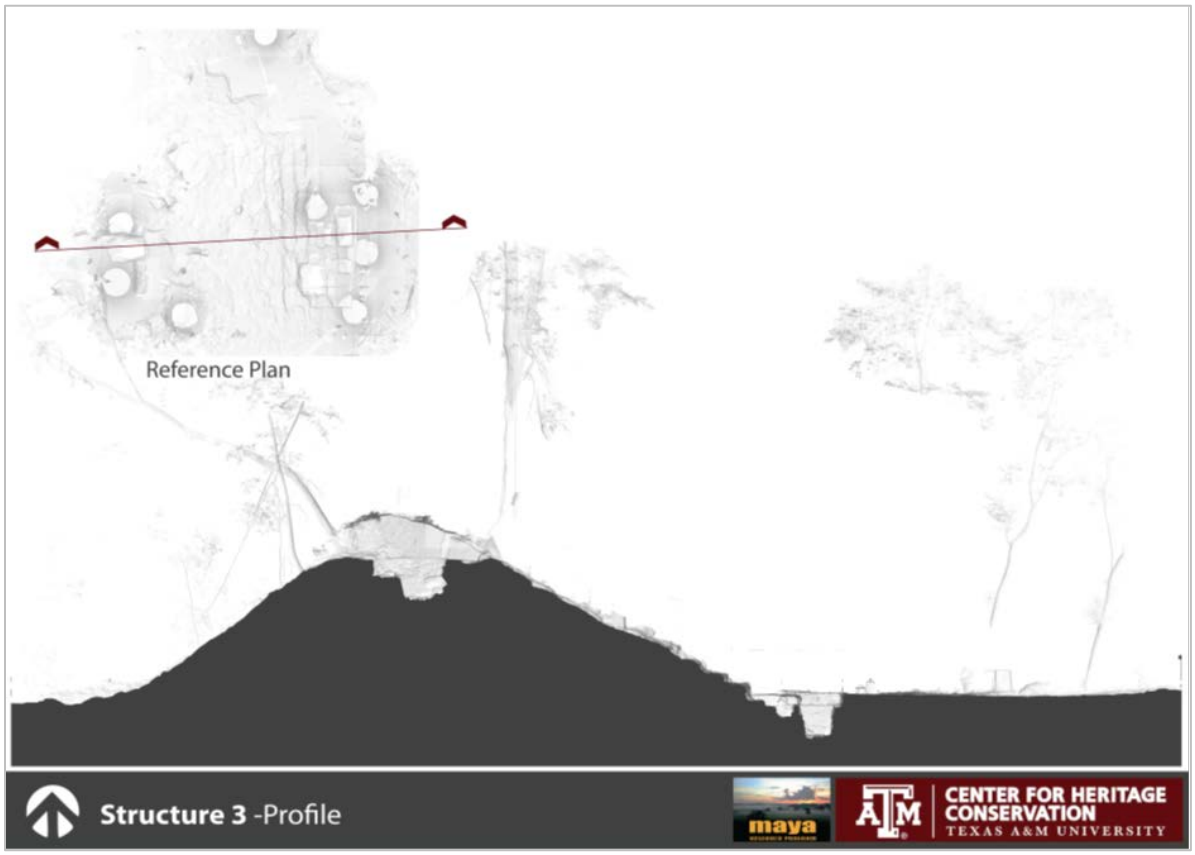

Figure 5. Digital Scan of Structure 3.

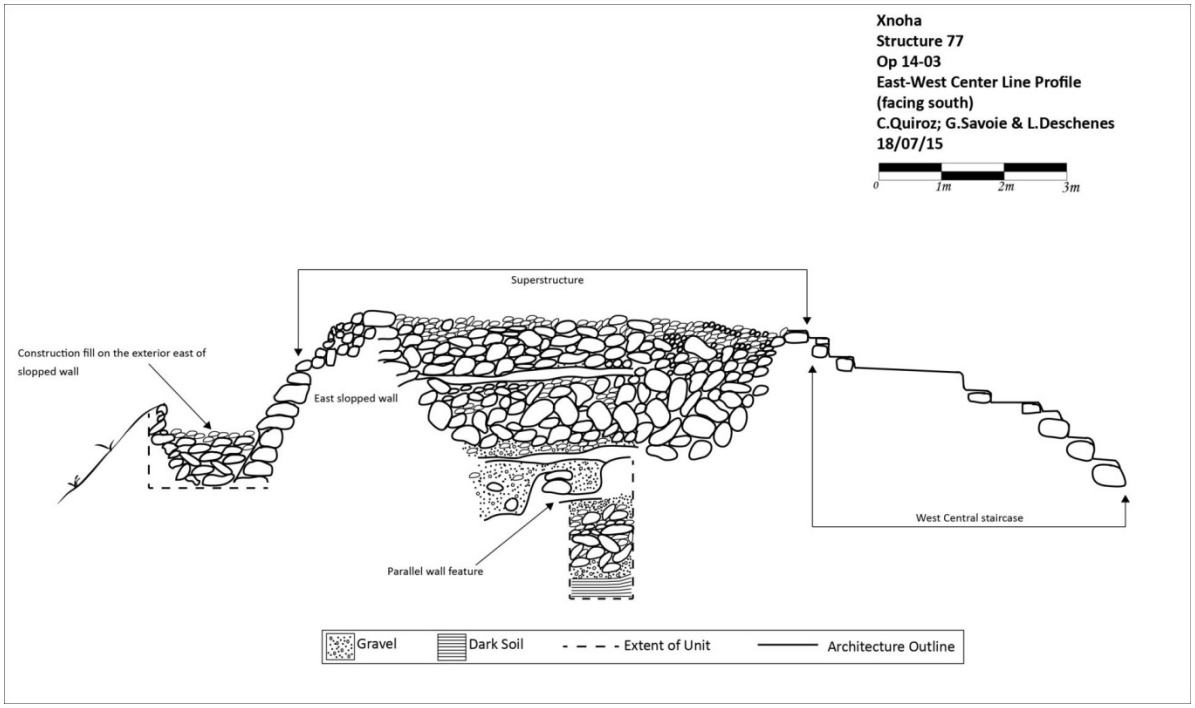

Figure 6. Profile of Str. 77, a Late Preclassic Shrine in the Eastern Elite Residential Group.

Figure 7. Overview photo of Str. 16 after excavation.

Figure 8. Mat weave design on the base of an inverted plate from a cache in front of Str. 16.

weave design (Figure 8) virtually identical to one found in the entrance to Structure 15 at Blue Creek (Guderjan 2007). The mat weave and such vessels are associated with kingship and *ahau* in the Early Classic. However, both of these are from less than kingly contexts. They may have been gifted by the *ahau* to a lower elite or servant to mark their relationship.

Late Classic Period and Abandonment

During the Late Classic, all major investigated building (Strs. 1, 3 and 10) were significantly remodeled and occupation continued at both EERG and WERG. On the south end of EERG, about 100 meters south of the Structure 77 Shrine, a new residence, the Str. 65 Patio Group was added near the end of the Late Classic Period (Plumer 2016). Surprisingly, given its relatively short lifespan, this residence was repeatedly modified.

From our experience at Blue Creek, we anticipated that we would find termination deposits at the bases of some of the buildings, especially monumental buildings. However, despite extensive basal stripping, none have yet been found. Further the final residential debris was found between Str. 16 and Str. 16a dates to the Tepeu 2/3 time frame. This, then, is our best approximation for abandonment so far.

Spatial Dimensions of Xnoha

One of the most difficult field tasks in Maya archaeology is mapping what some call a center and its hinterlands. We object to the term "hinterlands" on the same basis that others object to the term "commoners" as such terms obscure complexity and variability. We prefer to think in terms of Maya sites being large and complex with numerous discrete structural and functional units (Guderjan 2007). Further, we recognize that there is no substitute for a 100% on-the-ground, pedestrian survey, even if prior remote sensing techniques such as LiDAR have been used. Commonly used transect surveys regularly fail to expose the complexity of a Maya site's settlement patterns.

That said, we acknowledge that our spatial understanding is far from complete at Xnoha. While Telepak and Wolf are continuing to expand upon Gonzalez's transect survey, there remains much to be mapped in and near the central precinct. We have, however, identified four outlying locations with monumental architecture that are components of the Xnoha polity: Nojol Nah, Tulix Muul, Krohnton and Mulaán and have invested significant effort in two of the four. Mulaán was actually recorded in 1990 by Guderjan and Salam, who named it "moved earth" because it was being bulldozed at the time of the discovery (Guderjan 1991, pages 58, 75 and 76). Also, at the time, they had no idea of the relationship between Mulaán and Xnoha.

However, with the exception of the area east of Tulix Muul and Nojol Nah (Hammond 2015) – towards the Xnoha central precinct – most interstitial areas are not yet surveyed. Even so we can estimate the area incorporated into the Xnoha polity using the same approach used at Blue Creek (Guderjan 2007). The central precinct of Blue Creek is the largest set of public architecture or Kawik and is roughly the geographic center of an area measured variously between 100 and 150 square kilometers which is bounded in all directions by

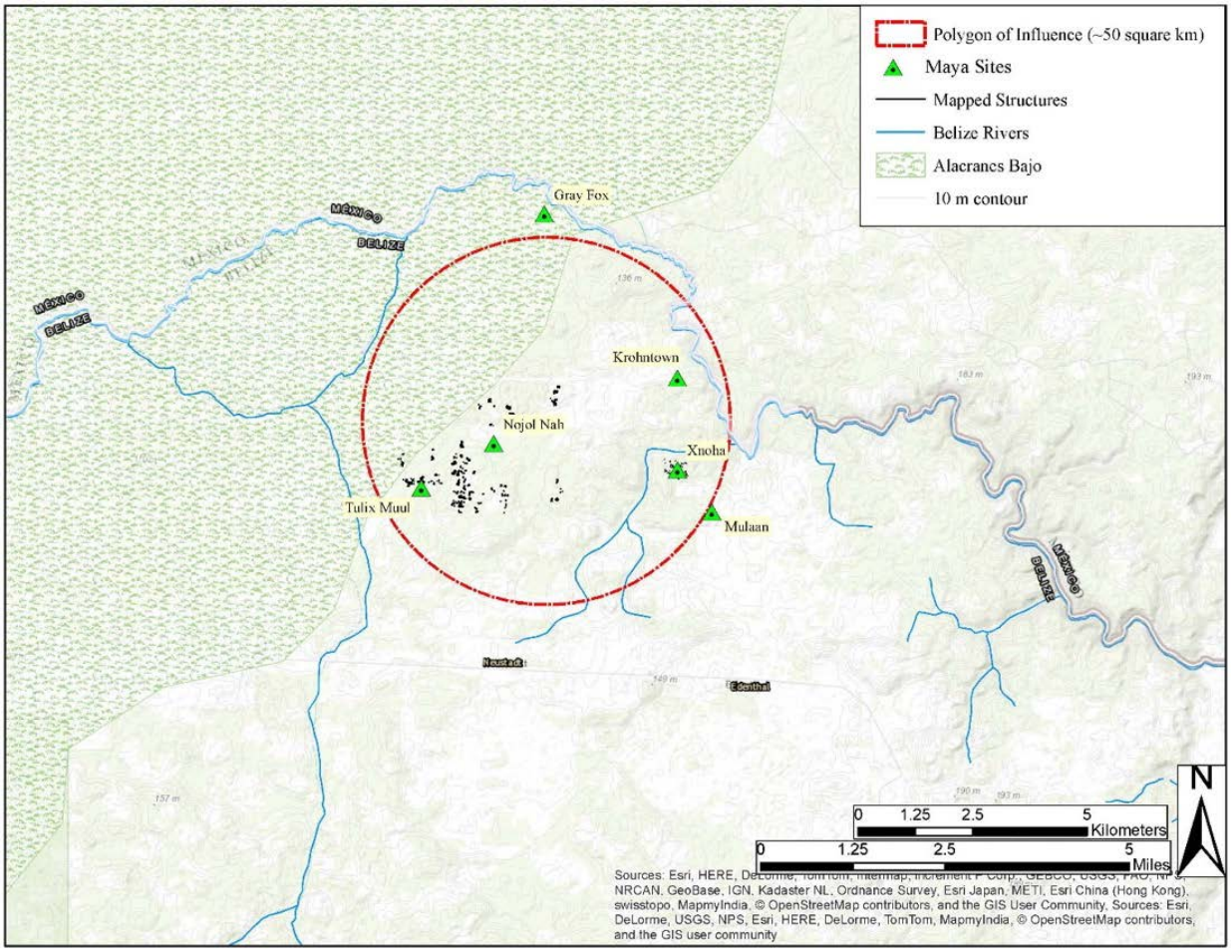

Figure 9. Approximate boundaries of Xnoha polity. Map by Samantha Krause.

physiographic barriers. In the case of Xnoha, if a circle is drawn including Tulix Muul, Nojol Nah, Krohnton and Mulaán and midway between Xnoha and the neighboring central precincts of Grey Fox and Bedrock, then the area of the Xnoha polity is approximately 50 square kilometers of about half that of Blue Creek (Figure 9). The polity does incorporate several important resources in the landscape such as numerous sources of chert raw material which have associated household level workshops (Barrett 2004) and the highly fertile soils of the eastern side of the Alacranes Bajo adjacent to Tulix Muul and Nojol Nah (Hammond 2015).

We see the relationships of the four known outlying groups not as a cosmogram as others might but rather as the result of the interaction of multi-generational lineages which interacted in ways that excluded others and mutually supported each other's wealth, power and authority. In the final section of this paper we will discuss the status of our knowledge of these groups.

Outlying Centers

We know little yet about Mulaán and Krohnton. The first was mapped in 1990 by Guderjan and Salam and has been badly damaged by bulldozing as noted earlier and the second was recently mapped by Wolf and Telepak and has been extensively looted. Local informants indicate that there may have been a mural inside a room at Krohnton which has now been destroyed. In neither case have we yet focused fieldwork. However, we have intensively investigated Nojol Nah and Tulix Muul.

Nojol Nah is located about 5 kms west of Xnoha central on the east side of the Bajo Alacranes which covers Belize's northwest corner and parts of Mexico and Guatemala. The Mexican portion has been surveyed in recent years revealing several large Maya centers and a number of smaller one. At the far south end of the bajo, in Guatemala, is the major center of Río Azul. This gave it access to extremely high quality agricultural opportunities and large deposits of cherts, from nodule to boulder-sized. Barrett investigated one of the associated household level chert workshops as part of his doctoral research (2004).

Nojol Nah was formerly known as the "Northern Group". This name derives from the relatively recent sale of approximately 15,000 acres from the Bedran family of San Ignacio to a number of people in Blue Creek. This was the northern portion of the Bedran land and is generally referred to as "the Northern area". Nojol Nah was originally located by the new landowner, Ed Reimer, who brought it to Jon Lohse's attention. The following year, Jason Barrett undertook excavations of a lithic workshop and associated residence approximately 1 kilometer east of the site core (Barrett 2004, 2005). In 2007, several project staff members visited the site and in 2008 and Jason Barrett and Bruce Dickson undertook excavations aimed at, among other things, confirming whether a possible rural ball court existed (Barrett and Brown 2009). While the ball court did not exist, continuing work at Nojol Nah has revealed a small but complex central place with significant information pertaining to many of our research domains (Barrett 2011; Brown 2010, 2011, 2013; Brown and Plumer 2012). We continue to be deeply concerned/certain that Nojol Nah will be very soon damaged by land clearing. When we arrived in 2010, many thousands of acres surrounding Nojol Nah had been recently cleared and the site was an island of forest and a biological refugium.

Nojol Nah consists of a series of complex elite residences and two open plazas clustered around a seasonally full *aguada* (Figure 10). One of the two plazas has been partially investigated, Structure 1 (in sector 3F on map) has a single Late Preclassic and Early Classic on its east side. Interestingly, there was no Late Classic construction and a large deposit of Tzakol 2/3 ceramics on the top of the building, indicating that it had been terminated at the end of the Early Classic period.

While the public building had been terminated, the many elite residences were built in the Early Classic Period but continued to be occupied through the Late Classic Period. In several of these cases, we found large-scale deposits of Tepeu 3 ceramics on their bases as material results of the kind of termination rituals we found so commonly at Blue Creek but not in the center of Xnoha.

Our general interpretation of the Nojol Nah data is that the community was the home of an incipient kingdom in the Late Preclassic and Early Classic periods until an external power, which we believe to be Xnoha, ended the ruling lineage's authority and integrated Nojol Nah into its larger political sphere.

Also importantly, in these residences we consistently found numerous sub-floor burials in each. In total, we exhumed 67 burials from Nojol Nah (Plumer, in preparation). Combined with the 18 from Tulix Muul, the 34 from Xnoha center and the five from Gail Hammond's survey and testing program (2015), the inventory of human remains from the locations considered in this paper totals 124. These, with human remains of Blue Creek are the data base for Hannah Plumer's doctoral dissertation. About 20 of the Nojol Nah burials have been subjected to strontium isotope analyses and all were consistently matched to the local background fauna.

Tulix Muul is located approximately 2 kms south of Nojol Nah, also along the eastern edge of the Bajo Alacranes. It consists of a small, Early Classic shrine group with three 5-7 meter tall structures facing a small plaza (Figure 11). Structure 1 was on the east side of the plaza, facing west and consisted of two rooms which had been built in the Early Classic and later in the Early Classic, filled with boulders and rubble. The outer room had tall, masonry walls but a perishable roof with an inner wall that once was plastered and painted. Unfortunately, there was nothing intact remaining of this painting. The inner room, though, was an intact corbelled arch room with a

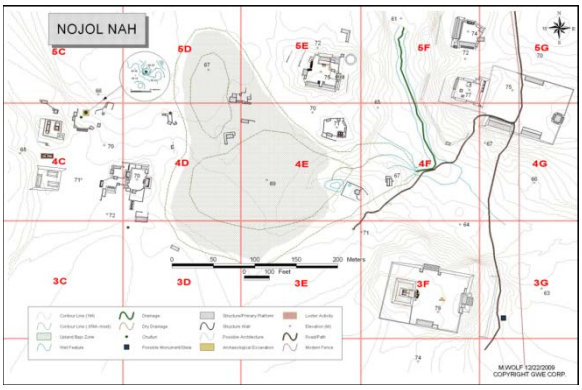

Figure 10. Map of Nojol Nah, by Mark Wolf.

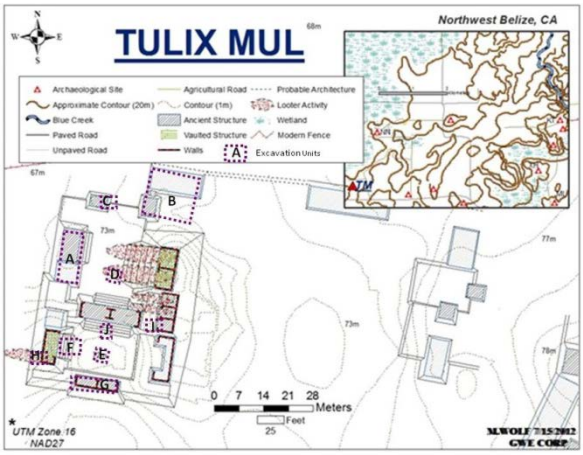

Figure 11. Map of Tulix Muul, by Mark Wolf.

long bench on the back wall. On the wall above the bench was a plaster surface that had been repeatedly painted. The outer coat was white but exfoliation of parts of that coat revealed a polychrome mural below with human figures, in the general fine-line style of San Bartolo which is only approximately 40 kms west. Supported by a generous grant from the Archaeological Institute of America, we attempted to remove the outer paint layer to expose the mural but were not able to do so. Instead, we conserved the existing surface (Figure 12) and built a wooden structure to protect the room. Importantly, the filling date for these rooms approximates the termination ritual date of Structure 1 at Nojol near the end of the Early Classic period.

In the Late Classic period, after these rooms and the rooms in their neighboring buildings were filled and the buildings repurposed, a complex of masonry, residential rooms were constructed around the shrine group. Increasingly, we think that undiscovered,

Figure 12. Pieta Graeves conducting conservation of mural at Tulix Muul.

perishable buildings were in place before their construction, but their presence shows that Tulix Muul was still the home of a multi-generational lineage after their seat of power ceased to function in the same way. Our working hypothesis is that, like Nojol Nah, Tulix Muul was integrated into the growing power and authority of Xnoha at the end of the Early Classic but continued to thrive economically and in terms of human health afterwards.

Summary

As we continue to test archaeological ideas through field work and document "at-risk" sites in northwestern Belize, our understanding of Xnoha will continue to evolve. Our future plans include continued efforts at Xnoha central, Mulaán and Krohnton. Today, we understand Xnoha as a small, independent polity with origins in the Middle and Late Preclassic periods which incorporated the homes of long-standing, multi-general lineages across a landscape of approximately 50 square kilometers.

Acknowledgements Our fieldwork at Xnoha is part of a 25-year effort by Maya Research Program in northwestern Belize and has been conducted under permits from the Institute of Archaeology of Belize. We especially want to thank the staff of IA who have become colleagues, friends, and supporters of our work. Funding for the work has come from the Archaeological Institute of America, the Botanical Research Institute of Texas, the Denver Foundation, Maya Research Program,

the Center for Social Science Research and the University of Texas at Tyler. We also thank all of the student and volunteer participants who each year give their efforts to our project and all of the members of the Blue Creek community of Belize who not only allow, enable and support our work but are one of the few communities in the world who no longer remember what it is like to not have hordes of archaeologists and other scientists descend upon them every summer.

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30 BELIZEAN TRANS-SHIPMENT MARITIME PORTS: THEIR ROLE IN CHICHÉN ITZÁ'S ECONOMY

Rafael Cobos

During the tenth and eleventh centuries, Chichén Itzá utilized for economic reasons several maritime ports along the Caribbean as well as the Gulf of Mexico coasts. The main function of these ports was to facilitate the movement of goods or merchandise imported by Chichén Itzá from different regions located within and beyond the Maya area. The goal of this paper is to explain the role played by Belizean trans-shipment seaports in Chichén Itzá´s economy during the Terminal Classic period. Also, archaeological evidence is used to elucidate about the individuals who were in charge of those coastal trans-shipment stations.

Introduction

Excavations at the coastal sites of Marco Gonzalez, San Juan, Chac Balam, and Wild Cane Cay revealed ceramics and obsidian materials that link these four coastal settlements with Chichén Itzá. For instance, Tohil Plumbate vessels found at the aforementioned sites suggests that those Belizean ports were in Chichen Itzá´s distribution sphere of such vessels, a sphere that Chichén Itzá controlled during the tenth and eleventh centuries throughout the Maya lowlands. Silho Fine orange ceramics found at San Juan as well as Chichen Slate and Red Wares uncovered at Marco Gonzalez, and obsidian from seven different sources located in western and central Mexico and the Guatemalan Highlands found at Marco Gonzalez, San Juan, Chac Balam, and Wild Cane Cay, also indicate a connection between these Belizean settlements and Chichén Itzá (Figure 1).

The ceramic and obsidian evidence found at Marco Gonzalez, San Juan, Chac Balam, and Wild Cane Cay strongly suggest that a relationship existed between these Belizean coastal sites and Chichén Itzá during the tenth and eleventh centuries, but, how can we characterize such relationship? I suggest that the Belizean coastal sites functioned as trans-shipments stations managed or controlled by Chichén Itzá. I posit that Marco Gonzalez, San Juan, Chac Balam, and Wild Cane Cay were part of a well-established and efficient coastal program that Chichén Itzá organized and managed along the Caribbean Sea and Gulf of Mexico maritime coasts. Therefore, those four Belizean sites were integrated into a larger system that allowed the transportation of objects coming from the Guatemalan Highlands and Central America along the Caribbean Sea whose final destination was the Yucatecan urban center.

A review of the evidence follows and I will focus first on a mural found at the Temple of the Warriors in Chichén Itzá. Then I will revise the archaeological evidence reported from the Gulf of Mexico and Caribbean coastal sites. I will conclude discussing about the individuals who occupied the Belizean as well as the Yucatecan coastal sites. By considering these three sources of evidence I believe that the role of the Belizean maritime trans-shipment stations can be better understood in a regional context within the Maya lowlands.

The Temple of the Warriors Mural

The Carnegie Institution of Washington's excavations at the Temple of the Warriors in the 1920´s at Chichén Itzá uncovered a mural at the summit of this building. The mural was entitled "*Coastal maritime community*", and it was probably painted at the end of the tenth century, or sometime during the eleventh century, at a moment in time when Chichén Itzá was the most important political unit in the northern Maya lowlands (Cobos 2011). It was during those two centuries that Chichén Itzá had several maritime ports functioning along the coasts of Yucatán and Belize (Cobos 2010).

I argue that the mural does not specifically represent or portray one of Chichén Itzá´s maritime ports. Rather, the mural is a clear allusion to the daily activities that occurred at Chichén Itzá's ports. For instance, you can see a man grinding on a flat *metate* what probably is corn or salt; a woman either cooks a

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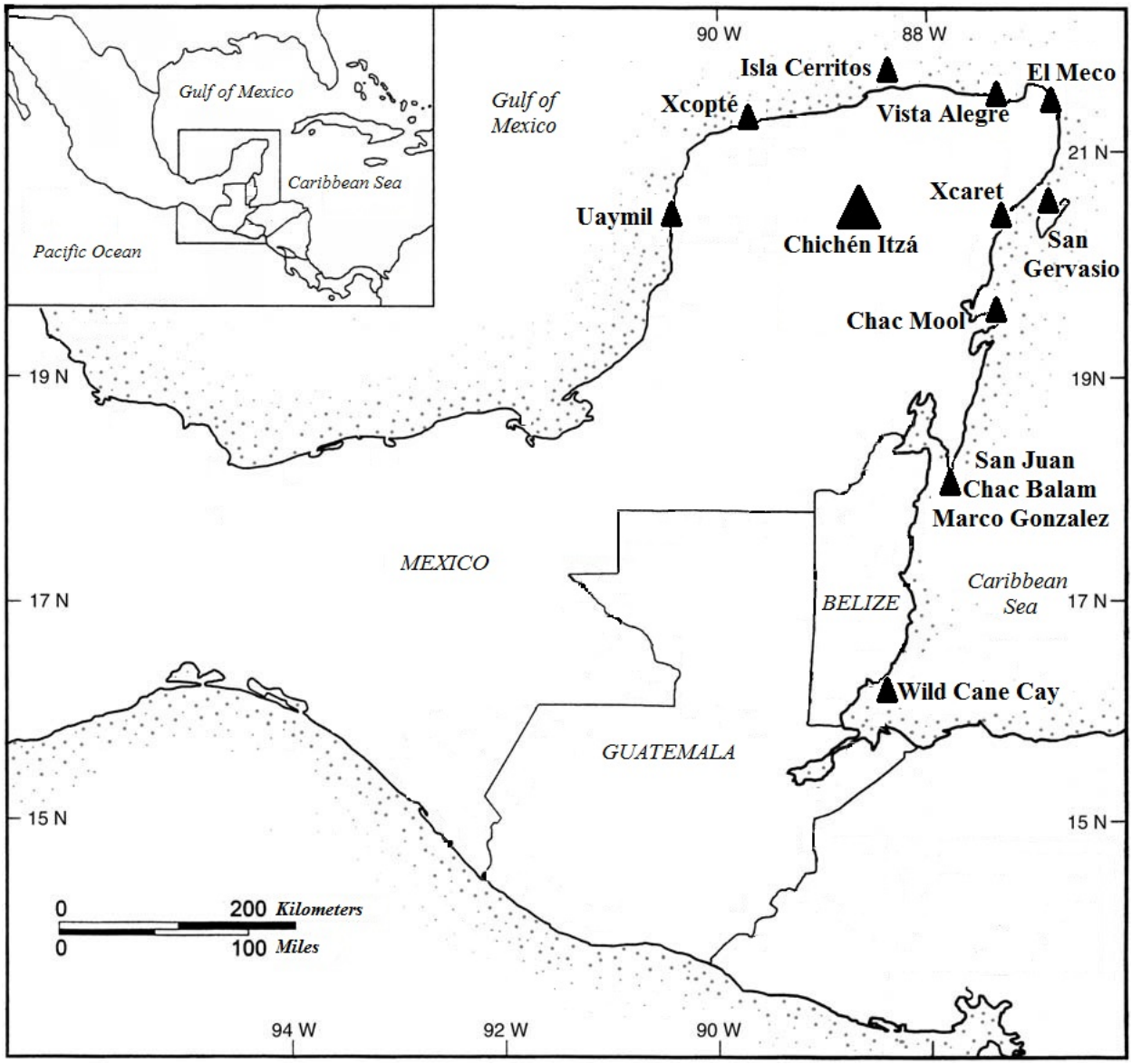

Figure 1. Location of Chichén Itzá and trans-shipment stations along the coast.

meal or salt in an open space; several traders carrying their merchandise are depicted in the upper and left parts of the mural; numerous warriors standing in canoes are also illustrated and they seem to safeguard or watch over the seacoast, which was of crucial importance for Chichen´s economy (Cobos 2011). Chichén Itzá's rulers, administrators, and merchants were aware of the vital role that Chichén´s maritime ports played. Therefore, the mural is a clear allusion to these ports functioning as trans-shipment stations within the network that Chichén Itzá efficiently maintained throughout the Belizean and Gulf of Mexico and coasts (Cobos 2011).

We do not know who was or were in charge of painting the fresco at the summit of the Temple of the Warriors, a building located 90 km from the nearest maritime coast. However, what we know is that, whoever painted such a magnificent mural, or ordered it to be painted, had first-hand or direct knowledge of the way in which Chichén Itzá´s seaports efficiently functioned during the tenth and eleventh centuries along the Gulf of Mexico and Caribbean seacoasts. This well-organized

maritime operation demanded from Chichén Itzá the construction of a resourceful and elaborate sea-front infrastructure along Yucatán's Gulf of Mexico seacoast. Down the Caribbean seacoast, instead of the resourceful and elaborate sea-front infrastructure built along the Yucatecan seacoast, Chichén Itzá made itself present in small settlements that housed simple constructions with basic internal morphologies that functioned very efficiently. The well-organized and elaborate sea-front infrastructure built in the northern and western Yucatecan seacoasts, along the efficient but simple constructions involving basic internal morphologies constructed in eastern Yucatan and Belizean seacoasts constitute the material evidence of different political and economic situations that Chichén Itzá faced contemporaneously (Cobos 2010).

Archaeological Evidence

Isla Cerritos, located in the northern Yucatan coast, is a 300 meters diameter island and houses 30 structures. Its main group is formed by a temple, a "C"-shaped structure with columns and piers. These two constructions are associated with an altar (Gallareta et al. 1989). The same spatial layout is also reported from Uaymil, another island located in the western coast of Yucatan. In a diameter of 300 meters, Uaymil houses 15 constructions, and whereby the main group includes a temple, an altar, and a "C"-shaped structure with two rows of columns (Cobos 2012b). The port of Xcopté is located in the coast of northwestern Yucatán and measures 150 meters in diameter and houses eight structures. Xcopté's internal morphology shows a temple facing an altar and these two constructions are very close to a rectangular structure (colonnaded hall?) located a few meters to the north (Robles Castellanos and Andrews 2003). Thus, the main plaza spatial layout of Isla Cerritos, Xcopté, and Uaymil replicate a similar layout albeit on a smaller scale as that reported at the center of Chichén Itzá, which comprises a temple, an altar, and a colonnaded hall.

Maritime ports housing temples, altars, and "C"-shaped structures are not found along eastern Yucatan and Belize seacoasts. Instead, coastal sites related to Chichén Itzá consist of basic rectangular platforms spatially arranged around a central plaza, or, constructions that are freely placed without being associated with a plaza. For instance, structures B-1 and D-1 in Xcaret´s Groups B and D are very similar to structures A-IV-30 from San Gervasio Cozumel and 5D6 from Chichén Itzá (Silva and Hernández 1991:35, 53, Figures 7 and 16), although Xcaret structures B-1 and D-1 have no columns in their main access. At El Meco, structures 2-sub, 7, 18, 23, and 27 date to the Terminal Classic period and their morphology did not change during the Postclassic period. Structures 18, 23, and 27 are basic rectangular platforms which supported constructions made of perishable materials (Andrews and Robles Castellanos 1986).

At San Gervasio Cozumel, Chichén Itzá-related buildings are evident in structures A-III-22a-sub, A-III-26-sub, A-IV-30-sub, and B-IV-49-sub, which are all located at Group III of this site. Structure A-III-22a-sub is an altar; A-IV-30-sub is a temple whose ground-plan resembles Chichén Itzá structure 5D6. These San Gervasio constructions share the same plaza. A-III-26-sub y B-IV-49-sub, are rectangular low platforms with a single staircase and supported constructions made of perishable materials. These two constructions share their own plaza.

The western portion of the coastal site known as Chac Mool covers an area of approximately 80 meters per side. This area was mainly occupied during the Terminal Classic period and six low rectangular platforms lay around a central plaza. Platforms L, O, Q, and R have one staircase on one of their sides, whereas platform K shows a double staircase on one of its sides. Platforms L, O, Q, and R are morphologically similar to El Meco structure 18 and San Gervasio Cozumel structures A-III-26-sub and B-IV-49-sub.

In Ambergris Caye, Marco Gonzalez is a settlement measuring approximately 350 meters by 185 meters that houses 49 structures, several of them located around various plazas (Graham and Pendergast 1989). The sites of San Juan and Chac Balam extend along 150 meters and both accommodate a few basic buildings around a plaza. For instance, six sub-structural rectangular mounds compose the site of San Juan. The site of Chac Balam also shows an

extension of 150 meters and five rectangular platforms surround a central plaza (Guderjan 1995; Guderjan and Garber 1995; Guderjan et al. 1989).

The aforementioned Terminal Classic period sites located in Belize as well as in western and eastern Yucatán functioned as trans-shipment stations in a coastal-network used by Chichén Itzá along the Gulf of Mexico and the Caribbean Sea. Proof of their role as trans-shipment stations is evident based on the exclusive presence of Tohil plumbate and Fine orange ceramics as well as Chichen red ware and Chichen slate ware found at those coastal sites. Bear in mind that all of these ceramics were exclusively used at Chichén Itzá and their regional distribution throughout the Maya lowlands is unequivocally related to the economic and political affairs that Chichén Itzá conducted in a selective matter at specific sites. Moreover, the finding of obsidian at coastal sites such as Wild Cane Cay, Marco Gonzalez, San Juan, Chac Balam, Uaymil, and San Gervasio Cozumel, added to Chichén´s ceramics reported from these sites, provides another significant element to the relationship that existed between Chichén Itzá and its trans-shipment stations (Guderjan 1995; Guderjan and Garber 1995; Guderjan et al. 1989; McKillop 2009).

Who occupied the trans-shipment stations?

Who were the people in charge of the efficient functioning of the different trans-shipment stations located along the maritime coast of the Gulf of México and the Caribbean Sea? Did Chichén Itzá send individuals born in central Yucatán to its different maritime ports to supervise trade-operations and to permanently reside at these coastal sites? Or perhaps, people in charge of the trans-shipment stations were locally born. Could it be that individuals born at places different than Chichén Itzá and the coastal settlements were sent to live at the maritime ports? For now, we can only speculate due to the fact that we still lack the analyses of skeletal remains of individuals who resided at the trans-shipment stations.

Data from Uaymil, Isla Cerritos, and Xcopté suggests that native individuals to northern and western Yucatán lived at these ports. For instance, the ceramic component of Uaymil is composed of the Nimún and Baca ceramic groups, which are part of the Canbalam ceramic sphere of western and northwestern Yucatán (Cobos 2012). Further north, at the coastal site of Xcopté, Nimún, Baca, and Koxolac ceramic groups of the Canbalam ceramic sphere coexisted with Chichén ceramics (Robles Castellanos and Andrews 2003). The Canbalam ceramic sphere lasted until the eleventh century in that region of the northern Maya lowlands. At Isla Cerritos, local residents utilized Chichén red ware, Chichén slate ware, and Chichén unslipped ware pottery for their daily activities (Robles Castellanos 1988). Also, boiling was the preferred way by which food was prepared at Isla Cerritos. This peculiar way of cooking was used by coastal Maya residents during the Late Classic period at places such as Xcambó, and its practice continued into the Terminal Classic period (Herrera Flores 2014). In eastern Yucatán, the ceramic component of Vista Alegre, El Meco, San Gervasio Cozumel, and Xcaret is well represented by Vista Alegre, Muna, and Ticul ceramic groups of the eastern Cehpech ceramics (Glover et al. 2011; Ochoa Rodríguez 2004; Peraza Lope 2005; Robles Castellanos1986).

The diet of the Terminal Classic residents at El Meco, San Gervasio Cozumel, and Xcaret was based on the consumption of seafood, corn, and meat. At Chac Mool, Terminal Classic period diet was also based on the consumption of seafood, corn, and meat obtained from dogs (Márquez Morfín and Hernández Espinosa 2006). Thus, the ceramic component as well as the ancient diet suggests that native individuals to eastern Yucatán might have been in charge of successfully administrating and operating those trans-shipment stations.

Further south, in Ambergris Caye, the ceramic materials reported from Marco Gonzalez, San Juan, and Chac Balam suggest that native individuals to northern Belize were in charge of these trans-shipment stations (Ritchie Parker 2011; Williams et al. 2009; Wrobel and Graham 2015). Early Buk phase ceramics dated to the eleventh century are reported from Marco Gonzalez, whereas San Juan and Chac Balam residents utilized Coconut Walk Plain and Striated, Achote Black, Daylight Orange, and Cayo Unslipped ceramics (Graham 1987, 1989;

Guderjan and Williams-Beck 2001; Valdez et al. 199; see also Chase 1982). Moreover, the diet of Terminal Classic Ambergris Caye residents was based on the consumption of corn, deer, and locally collected seafood.

Considering the archaeological evidence already discussed, and taking into account the iconographic reading of the coastal maritime community mural found at the Temple of the Warriors, the following can be suggested for Chichén trans-shipment stations: males ground corn or other seeds on flat grinding surfaces of metates at San Juan, Isla Cerritos, and Uaymil; women probably boiled deer meat, fish meat, or salt at Chac Balam, Wild Cane Cay, and Uaymil; merchants carrying precious commodities resumed their journey from the coast toward inland, as it was the case between Marco Gonzalez/San Juan/Chac Balam and mainland northern Belize and/or northern Petén; Uaymil and Uxmal, Isla Cerritos and Chichén Itzá; Chichén Itzá´s warriors safeguarded in their canoes the seacoast between southern Belize and northern Yucatán where Chichén Itzá had its trans-shipment stations.

To conclude, during the tenth and eleventh centuries, Chichén Itzá's ceramics along with obsidian artifacts found at several Belizean and Yucatecan coastal sites suggest that these ports were directly involved in trans-shipment activities related with Chichén Itzá. This political unit located in north-central Yucatán exercised economic and political control over those ports. As I have argued in this paper, the specific task of Chichén-related ports was to function as trans-shipment stations to support the transportation of objects and merchandise along the maritime coast whose final destination was that pre-industrial city located 90 km inland in Yucatán. Chichén Itzá´s rulers, administrators, and merchants understood the regional diversity that existed along the lowland Maya seacoasts and they were able to adapt their economic policy as well as political strategies in order to achieve successful economic relationships. A remarkable variety of Terminal Classic period objects found at Chichén Itzá that were imported from distant regions in the Maya area, Mesoamerica, and beyond Mesoamerica demonstrate such a successful economic relationships. Thus, the mural found at the Temple of the Warriors and the archaeological evidence found at the coastal Belizean sites and other Yucatecan maritime ports demonstrate how Chichén Itzá was able to extend and maintain its control and power over the seacoast of the Maya lowlands at the end of the Classic period.

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31 ARCHAEOLOGICAL INVESTIGATIONS AT KAXIL UINIC AND QUALM HILL, TWO COLONIAL PERIOD SITES IN NORTHWESTERN BELIZE

Brooke Bonorden and Brett A. Houk

In 2015, the Belize Estates Archaeological Survey Team (BEAST) conducted preliminary investigations at two sites in northwestern Belize: Qualm Hill, which was the seasonal headquarters of the British Honduras Company in the mid-1800s; and Kaxil Uinic, a San Pedro Maya village settled by Caste War refugees sometime after 1868. Although these sites may be considered two entirely separate entities with distinct histories, inhabitants, and archaeological assemblages, an exploration of the larger historical context surrounding both sites highlights their intricate relationship within a broader historical framework. Conflicts between the San Pedro Maya and British logging firms arose as a result of the two groups' differing uses of the Belizean landscape, yet both the Maya and the largely Creole labor force employed by timber companies were prohibited from owning land by colonial legislation. British logging companies were thus able to maintain vast estates and keep the general population of Belize dependent upon them for access to resources and jobs. As evidenced by the synthesis of archival and archaeological data from Qualm Hill camp and Kaxil Uinic village presented here, the loggers and the Maya, though marginalized by the colonial system, actively negotiated their identities to navigate the cultural landscape of British Honduras, sometimes in manners inconsistent with the defacto protocol dictated by the larger social groups of "colonizers" versus "colonized."

Introduction

In 2015, the Belize Estates Archaeological Survey Team (BEAST), the regional component of the Chan Chich Archaeological Project, conducted preliminary investigations at Qualm Hill camp and Kaxil Uinic village, two late colonial sites in northwestern Belize (Figure 1). The former site was a logging camp owned and operated by the British Honduras Company (BHC, later known as the Belize Estate and Produce Company [BEC]) from the 1850s into the early 1900s, and the latter was a San Pedro Maya village settled sometime after 1868 and occupied until 1931. The senior author directed investigations at the two sites as part of her thesis research. Bonorden and Smith (2015) and Bonorden and Kilgore (2015) describe the investigations of Qualm Hill camp and Kaxil Uinic village, respectively, in greater detail. This article provides a historical context for the occupation of the two sites and summarizes the results of the 2015 work at each site.

Historical Context

An initial observation of Kaxil Uinic village and Qualm Hill camp implies that the sites are two entirely separate entities with distinct histories, inhabitants, and archaeological assemblages. An exploration of the larger historical context surrounding both sites, however, highlights their intricate relationship within a broader historical framework.

The economy of Belize was based on resource extraction, exports, and imports before the country even formally existed (Ng 2007:90), with timber forming the economic backbone of the colony from its nascence (Clegern 1967:5). Mahogany, in high demand by British and colonial American furniture makers and used for the construction of ships and railway carriages, replaced logwood as the primary export from the colony around 1770, leading loggers previously concentrated along the coast farther inland (Cal 1991:116; Finamore 1994:36; Ng 2007:6). Conflicts arose between the British logging firms and both the Maya inhabiting these areas and the colonial government in the Yucatán as British logging interests pushed into northwestern Belize (Bolland 2003:104; Cal 1991:98). As part of this move deeper into the interior, BHC established Qualm Hill camp, which operated as a seasonal headquarters sometime before 1852, as evidenced by mentions of the camp in Luke Smythe O'Connor's (1852:516) travelogue produced that same year (Bonorden and Smith 2015:68).

With their sole concern being the extraction of timber, the British eventually saw the *milpa* farming techniques practiced by the Maya as a threat to valuable mahogany sources (Bolland 1977:74), while the Maya perceived

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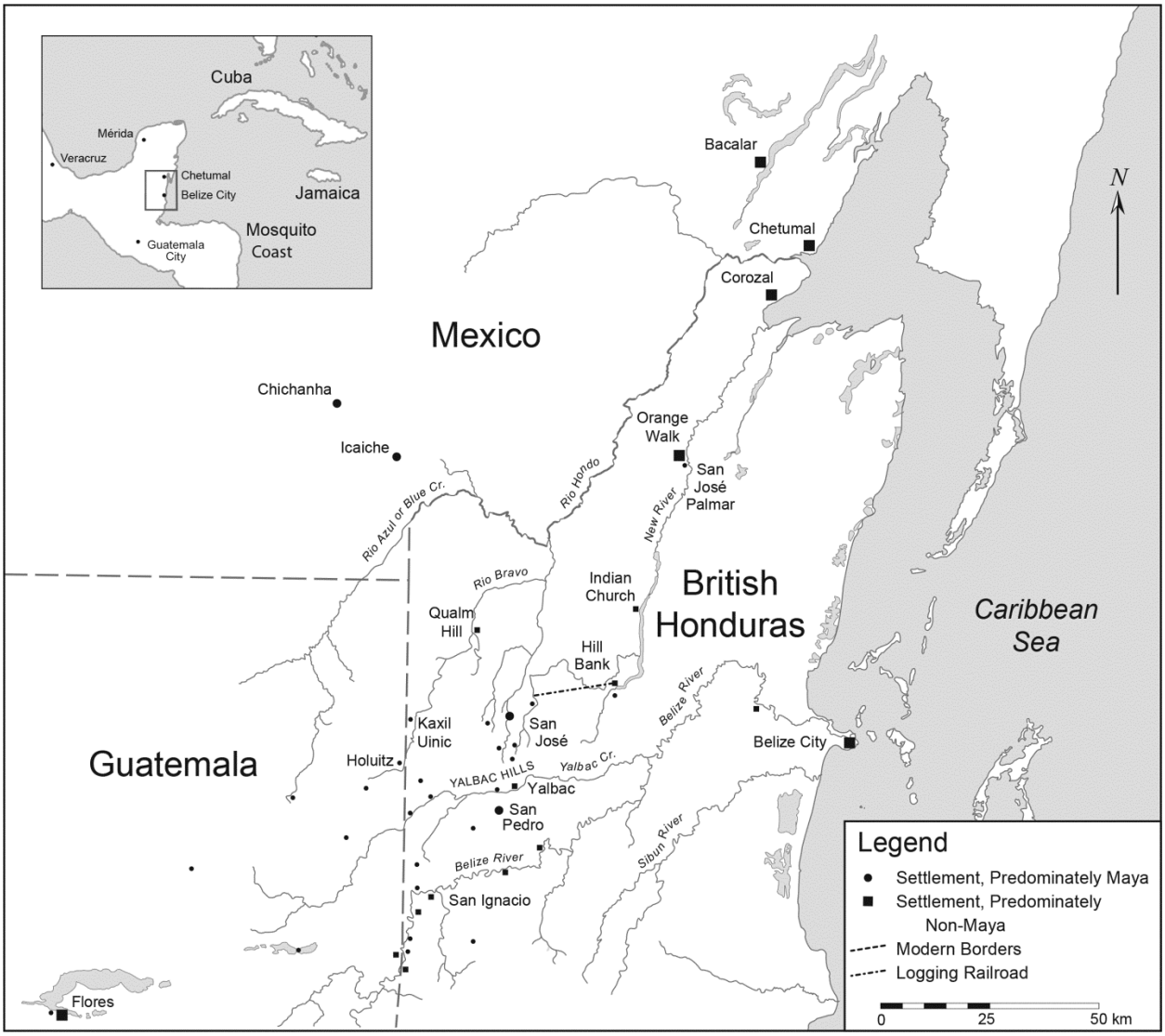

Figure 1. Map of colonial period sites in western and northwestern Belize (map courtesy of Jason Yaeger).

the British intrusion into northern Belize as a threat to their territory and independence (Bolland 2003:104). Territorial disputes between British loggers and the colonial government in the Yucatán conversely stemmed from liberal interpretations of the northern boundary of British Honduras (Ng 2007:6). In addition to its role in the overall power struggle between England and Spain for global dominance, this territorial dispute ultimately went on to create further conflicts between loggers and the Maya during the Caste War (Ng 2007:5).

The Caste War in the Yucatán (1847–1901) was primarily responsible for an immense population dislocation that sent thousands of refugees into northern Belize, including both Maya and Ladino groups (Clegern 1967:10). As a result of internal conflicts among various Maya factions, Asunción Ek led a group of approximately 1,000 Maya from Icaiche, Mexico into territory claimed by Guatemala and British Honduras between 1857 and 1862 (Bolland 2003:107). This group became known as the San Pedro Maya, named after their main village at San Pedro Sirís (Ng 2007:9).

At the height of their settlement history, the San Pedro Maya were dispersed throughout about 20 settlements in northwestern Belize and Guatemala over an area approximately 1,100

square kilometers in size (Jones 1977:139). The San Pedro Maya settlements were organized into three main settlement clusters: San Pedro, San José, and Holmul (Jones 1977:139; Ng 2007:9). Each of these settlement clusters comprised units of increasingly larger territory; including hamlets, small villages, and a major village center (Jones 1977:139). Kaxil Uinic was a small village within the San José settlement cluster.

Far from the principal population centers of the Yucatán, the Petén, and Belize, the only other inhabitants of this territory were the logging gangs who seasonally inhabited the mahogany camps in northwestern Belize (Jones 1977:139–141). Conflicts between the San Pedro Maya and British logging firms eventually arose as a result of the two groups' differing uses of the landscape, and rental disagreements further strained relations between the loggers and the San Pedro Maya, who believed they had ownership of land west of the Rio Bravo (Dornan 2004:89).

While Maya leaders in Icaiche conducted raids on mahogany works in northwestern Belize to coerce payment from the timber companies, Asunción Ek, *comandante* of the San Pedro Maya took a different approach, declaring his friendship with the government and maintaining peaceful relations. In exchange for "respecting" the mahogany trees in the region, the British supplied Ek's forces with ammunition, which was requested by the San Pedro Maya in anticipation of an attack by some Icaiche faction (Jones 1977:148–149).

In 1864, Marcos Canul became the *comandate general* of the Icaiche Maya faction, posing a challenge to Ek's diplomacy with both logging firms and the British colonial government (Jones 1977:145). In April of 1866, Canul lead a raid on the BHC's logging camp at Qualm Hill, burning the saw mill, taking hostages, and demanding a hefty ransom from the company to settle delinquent rent payments. Knowing that the British had sold arms and ammunition to the San Pedro Maya, colonists became fearful of their former allies in September of 1866 (Bolland 2003:138; Jones 1977:149; Ng 2007:11), as rumors that the San Pedro Maya had turned on the British began to circulate among colonial military leaders (Jones 1977:149).

In response to these rumors, the British marched on San Pedro Sirís in October of 1866 but were repelled by the Maya (Jones 1977:149). With the arrival of reinforcement troops from Jamaica in January of 1867, Lieutenant Colonel Robert William Harley led a punitive expedition into San Pedro territory, attacking San Pedro Sirís, San José Yalbac, Chunbalache, and other small villages in what became known as the Battle of San Pedro (Ng 2007:11).

Though the San Pedro Maya were dislocated and their settlements destroyed in the Battle of San Pedro, most of the villages were eventually repopulated (Jones 1977:151; Ng 2007:11). In the aftermath of the battle, Maya relations with the British colonial administration in Belize began to change (Ng 2007:12), ending the long period of hostility between the two groups over Icaiche claims to territory in the northwest (Cal 1991:361). Bolland (2003:111) designates this shift (from 1872 to 1900) as the consolidation of British jurisdiction over the Maya, with the Maya ultimately becoming incorporated into the colonial social structure. As the Anglo-Mexican border was formalized in 1893, British troops were able to occupy the San Pedro Maya settlement area without fear of reprisals from Mexico (Ng 2007:12). This event, combined with a series of epidemics that severely reduced the populations of San Pedro Maya villages, considerably diminished San Pedro autonomy (Jones 1977:151; Ng 2007:12).

According to Jones (1977:161–162), "[Kaxil Uinic] does not appear in the historical record until January 1885," although Jones speculates migrants from Holuitz, an older San Pedro Maya village to the southwest, may have founded it sometime after their village disappeared from the historical records in 1868. BEC forcibly relocated the inhabitants of Kaxil Uinic to San José Yalbac in 1931 over rumors that they were illegally harvesting *chicle* in the village (Thompson 1963:228, 233–234).

The logging camp at Qualm Hill and the San Pedro Maya village at Kaxil Uinic are thus bound not only by the conflicts that characterized relations between loggers and the Maya in northwestern Belize, but also by their associations with BHC/BEC, which ultimately

became the largest logging firm in British Honduras (Ng 2007:67). Given their proximity, it is likely the inhabitants of the village and camp interacted on occasion.

Correspondence to Sir J. Eric S. Thompson from the colonial government (Telegram to Thompson from Office of the Conservator of Forests in British Honduras, September 15, 1930, Field Museum Archives, Chicago) indicates that Kaxil Uinic village was included in BEC's land holdings by 1930, and the inhabitants paid rent to the company to use the land for their *milpas* (Bonorden and Kilgore 2015:108). Under the Honduras Land Titles Act (1859) timber companies were allowed to purchase most of the land in northwestern Belize, while the Maya were prohibited from owning it (Bolland 1977:187). Former slaves, who had comprised the majority of logging labor prior to emancipation in 1838, were also forbidden from purchasing land by colonial legislation, and, unable to acquire farmland, many of these individuals returned to the logging industry, where the advanced system notoriously forced many of them into a perpetual state of debt servitude (Cal 1991:207–208). Both Qualm Hill camp and Kaxil Uinic village were therefore located on land owned and/or operated by the same company, which managed such a vast estate that they kept the general population of Belize dependent upon them for access to resources and jobs (Bolland 1977:8).

Although Bolland's (2003) description of British-Maya relations accurately reflects the historical narrative of colonialism in Belize as constructed by archival data, the simplification of this 200+ year period of culture contact into generalized phases of indigenous resistance, avoidance, and incorporation in the colonial superstructure obscures the subaltern history of the Maya and the loggers with whom they interacted, as well as the internally variable social, political, and economic agendas of factions within the larger groups of the "colonizers" and the "colonized" (Yaeger 2008:92). A more complex analysis of how these groups negotiated the cultural landscape of Belize is therefore necessary to construct a more accurate narrative of Maya-British relations during the nineteenth-century, and supplementary data provided by archaeology has the potential to increase our understanding of the colonial experiences of these disenfranchised groups in lieu of historical documentation of events and circumstances from Maya/Creole perspectives.

Qualm Hill Camp

Qualm Hill camp is on the right bank of the Rio Bravo about 100 m east of Cedar Crossing, where the road between Gallon Jug and Blue Creek crosses the river (see Figure 1). The BEAST crew learned, to its surprise, that a group of loggers had chosen the western portion of the site as their seasonal camp in 2015, suggesting that even today the location holds certain logistical advantages for a logging base. The site appears to have been periodically reoccupied by various groups in the past, including the British Army who either camped there or used the location for jungle warfare training—our metal detector survey and excavations recovered blank rifle cartridges dating to the 1980s across the site. The presence of the loggers prompted the crew to modify the field methodology; crew members systematically walked transects radiating outward from the modern logging campsite and along the terrace of the riverbank that bounds the site to the west. Crew members used flagging tape to mark cultural material present on the ground surface, which BEAST staff later assigned Surface Find numbers and recorded using a GPS unit. The senior author selected Surface Finds representing dense artifact concentrations for the placement of test units. Based on observations by Olivia Ng (2007:111) during excavations at the San Pedro Maya village-turned-logging-camp at Holotunich, surface artifact density often correlated with denser sub-surface artifact concentrations.

BEAST crews identified 60 artifact scatters visible on the ground surface (both within and outside the boundaries of the modern logger camp) at Qualm Hill camp and excavated 19 suboperations, commonly measuring 2 x 2 m in size (Figure 2). In general, the density of artifacts was lower than we expected, given the duration of the site's use, but two factors probably account for this: First, BHC/BEC only occupied Qualm Hill camp seasonally; and, second, bottle collecting by modern visitors may

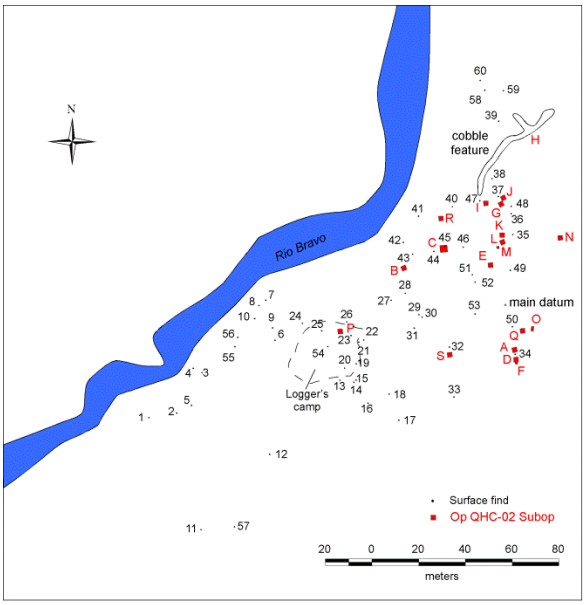

Figure 2. Map of Qualm Hill camp.

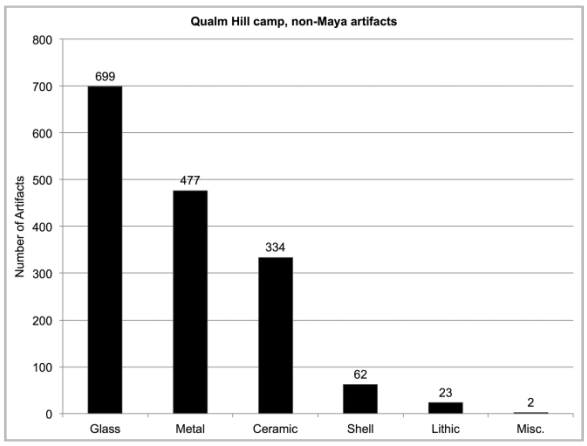

Figure 3. Summary of non-Maya artifacts recovered at Qualm Hill camp.

have affected the amount of cultural material preserved on the surface of the site.

Interestingly, the only apparent Maya artifacts encountered at the site by our investigations were a proximal side-notched arrow point fragment, two sherds of Maya pottery, and a mano fragment. It is likely the geomorphology of the site is too young to contain prehistoric Maya materials, or any prehistoric occupation is buried deeper than our test excavations penetrated.

Non-Maya materials present at the site include glass, historic ceramics, and metal in that order of frequency with lesser quantities of other artifact types (Figure 3). Unidentifiable

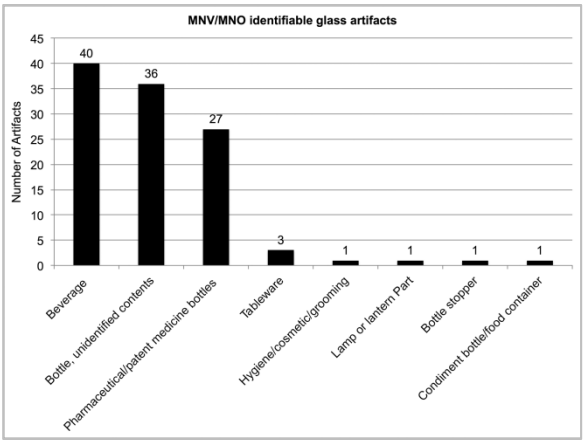

Figure 4. Identifiable glass artifacts recovered at Qualm Hill camp.

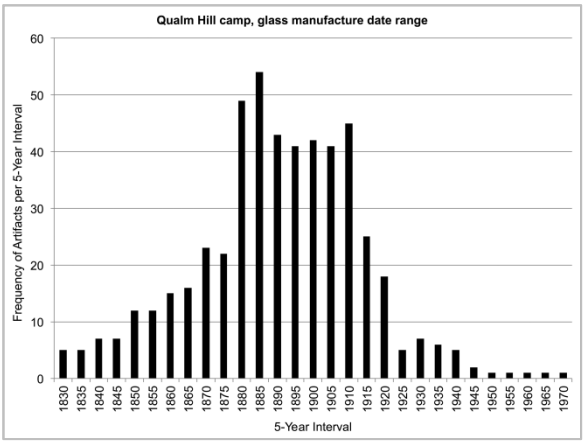

Figure 5. Manufacture date range of glass artifacts from Qualm Hill camp.

body shards constituted 39.5 percent of the glass assemblage, or 276 of the 699 glass pieces recovered from the site (Bonorden and Smith 2015:87). Identifiable glass items included beer, soda, wine, mineral water, condiment, medicinal, and perfume or cologne bottles, bottle stoppers, drinking glasses, a lamp chimney, a vial, and bottles with unknown contents (Figure 4). The glass assemblage included 27 patent medicine and/or pharmaceutical bottles. Brands identified on these bottles included: Elliman's Embrocation, Eno's Fruit Salt, C. H. Wintersmith, Barry's Pain Relief, Parker-Blake Co. Ltd., Dr. Kilmer's Swamp Root Kidney Liver and Bladder Cure, and Hamlin's Wizard Oil. The high frequency of wine (n=7), beer (n=11), and patent medicine bottles (n=27) in the assemblage is consistent with the practice of selling alcohol at logging camps and medicines

to alleviate the aches of physical labor associated with logging (Ng 2007:204). Some of the patent medicines were advertised as acceptable for use on "man or beast," and may have been applied to the animals that pulled the logging carts. The glass artifacts that could be dated have a manufacture date range spanning 1830 to 1970, with peaks in production between 1875 and 1880 and in 1910 (Figure 5). The majority of glass identified at the site was produced between 1870 and 1920, which post-dates the Icaiche raid on Qualm Hill.

A total of 334 non-Maya ceramic sherds was collected from Qualm Hill, mostly in the form of unidentifiable body sherds from unknown vessel types. The majority of the ceramic assemblage comprises imported items from Europe. Of the identifiable ceramic objects, clay tobacco pipes and plates were most common (Table 1; Figure 6). As noted by Ng (2007:216), the use life of a pipe was only several days to two weeks, which may explain the large number of broken pipes present at Qualm Hill (n=21). Ng (2007:216) also notes that smoking was considered a working-class activity in the late nineteenth century, which is consistent with the status of logging occupations in the economy of British Honduras.

Many ceramic sherds collected from Qualm Hill were such tiny fragments that no design was visible on them. For those ceramic sherds that exhibited some form of decoration, transfer whiteware seems to have been the most common form, followed by ironstone. The relatively low density of porcelain vessels recovered from the site may attest to class distinctions present in the camp, particularly between the presumably Creole loggers and British foreman. The ceramic artifacts recovered from Qualm Hill camp generally date from 1830 to 1900, with a peak in production from approximately 1840 to 1860. The earlier manufacture date range for ceramics versus glass at the site may be attributed to the fact that glass containers were discarded after consumption of the contents, while ceramic vessels were curated longer for reuse.

Of note, the ceramic assemblage included two ceramic doll fragments—one an arm and the other likely a limb, as well—recovered from the same excavation unit (see Figure 6). The toy pieces indicate the likely presence of children (or at least *a* child) at the camp.

Table 1. Non-Maya Ceramic Object Types from Qualm Hill Camp.

Object	Specimens
Clay tobacco pipes	21
Plates	10
Saucers	4
Cups and Mugs	6
Storage Vessel	1
Buttons	1
Doll Parts	2

Figure 6. Artifacts from Qualm Hill camp. A: clay pipe stem, B: ceramic doll arm, C: King George V coronation medallion, D: food can winding keys, E: proximal arrow point fragment.

Although 477 metal artifacts were recovered from Qualm Hill, most were in the form of unidentifiable metal flakes; analysts could only identify the form and/or function for 66 objects. The largest and most complete metal objects were generally surface finds. Nails/staples, gun parts, and ammunition were the most abundant metal forms present at Qualm Hill, followed by barrel hoops (Table 2). Barrel hoops were not consistently collected from surface artifact scatters due to their fragile state and are therefore underrepresented in the

Table 2. Identifiable Metal Artifacts from Qualm Hill Camp.

Object	Artifact Count
Cans (food storage)	9
Chamber pots	1
Gun parts and ammunition	16
Hardware parts	5
Cutting	2
Nails/staples	24
Chain links	1
Personal adornment	7
Logging equipment/transportation	4
Barrel hoops	14
Food preparation	9

Figure 7. Photograph of logging cart parts at Qualm Hill camp.

analyzed assemblage. Similarly, larger pieces of logging equipment were also observed rather than collected (Figure 7), and are also underrepresented in the assemblage. Can fragments were generally rectangular in shape, or identified by the winding keys used to open them (like sardine cans). According to Ng (2007:270), metal cans became common in logging camps after 1890. The small amount of cans collected from the site is surprising, considering that most food consumed by the loggers should have been pre-packaged items sold through the truck system.

Items considered to be "personal adornment" included both buttons and a medallion. Most buttons had four holes, though one appears to have been machine pressed. Ng (2007:271) asserts that metal buttons similar to those recovered from Qualm Hill were likely sewn on work dungarees or overalls. Excavations also recovered a medallion with King George V and Queen Mary in profile and the words "King George V Queen Mary" on its obverse face (see Figure 6). The reverse side shows two hands shaking in front of an olive branch with the words "Union is Strength" and "One Destiny" printed in scrolls. King George V was crowned on June 22, 1911. Ng (2007:140) found a similar item associated with the BEC occupation of Holotunich, in the form of a plate commemorating the coronation of King Edward VII (ca. 1902).

Kaxil Uinic Village

In present times, Kaxil Uinic village is a dense patch of upland forest and cohune palm forest surrounding a water lettuce-choked *aguada*. In 2010, Hurricane Richard severely damaged the forest, which is still recovering today. As a result, dense secondary growth and thicker-than-normal understory vegetation hindered our survey efforts and hampered visibility of surface remains at the site. Our research design, which called for gridding the site and excavating narrow strip trenches to identify historic house floors, was discarded in favor of opportunistic pedestrian survey to locate surface finds, which were recorded following the same methods used at Qualm Hill camp, and smaller-scale excavations, typically measuring 2 x 2 m in size.

Our surface inspection of the site identified and recorded 36 surface finds (Figure 8). In addition to the widely scattered artifacts, we documented seven three-stone hearths, three dense bottle scatters or middens, one mound, one cobble platform, and one small sinkhole-like feature scattered around the *aguada*.

Our excavations and surface collections produced a wide range of artifacts, which represent a mixture of traditional Maya material culture, such as lithics, ceramics, and faunal remains, and non-Maya materials imported to the colony, including glass, metal, and ceramic artifacts (Figures 9 and 10). Glass and ceramics are most useful in terms of establishing a chronology for the site. The manufacture date range of glass artifacts reveals two peaks in production from 1885 to 1890 and from 1905 to 1915. The majority of glass was produced between 1880 and 1930, which precisely corresponds with historical documentation of the

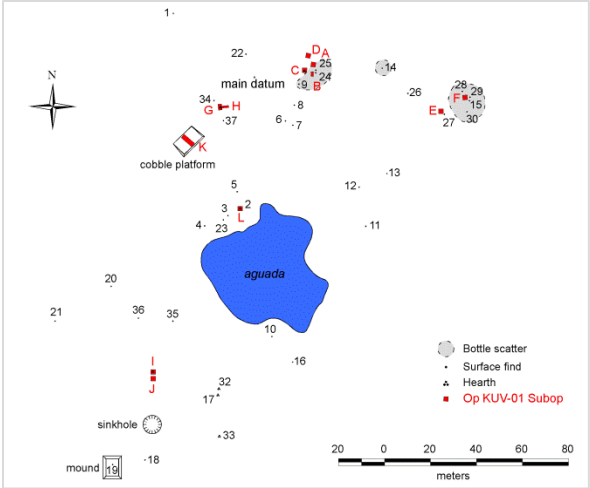

Figure 8. Map of Kaxil Uinic village.

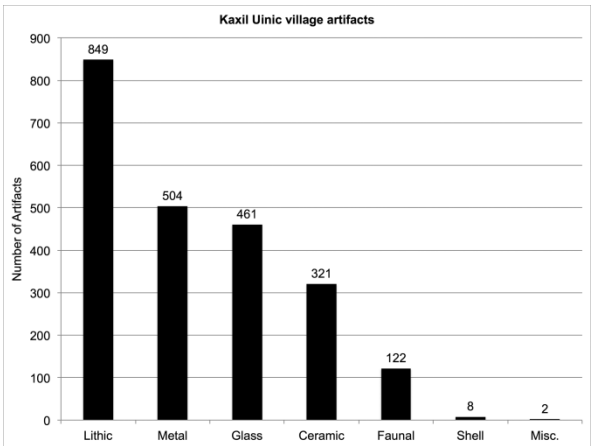

Figure 9. Summary of artifacts recovered at Kaxil Uinic village.

Figure 10. Artifacts from Kaxil Uinic village. A: Royal Flavoring Abstract bottle, B: 1900 ½ Real coin, C: majolica sherd.

site's occupation. Beer and soda bottles dominated the assemblage of bottles and jars, and patent medicine bottles were also well represented. These types of artifacts and these ratios are similar to assemblages from other San Pedro Maya sites (Church et al. 2011; Dornan 2004; Ng 2007).

The ceramic assemblage includes locally made Maya sherds and imported colonial objects, including clay tobacco pipes and ceramic plates, saucers, cups, and jars. Almost all dateable imported ceramics in the assemblage were produced from 1830 to 1900, with a peak manufacturing range of 1880 to 1900. The earlier manufacture date range for ceramics versus glass may again be attributed to the fact villagers curated ceramics but discarded glass containers after shorter periods of use. The peak production range of this material type also corresponds well with the known occupation date range of the site.

Although 504 metal artifacts were recovered from Kaxil Uinic, most were in the form of unidentifiable metal flakes. The largest and most complete metal objects were generally found in surface collections. Food service items (utensils, bowls, cups, and so forth) comprised the most abundant metal forms, followed by food cans. Metal cups make up the majority of food service items collected from the site. Metal food service items appear to have been present at Kaxil Uinic in larger quantities than ceramic ones, possibly due to the fact that metal items were relatively inexpensive, light weight, and more durable. The most temporally diagnostic metal artifact recovered was a ½ Real coin from Guatemala that was minted in 1900. It was found in an excavation unit on a house floor, and excavators recovered two metal cups, faunal bone, debitage, glass, local ceramics, and whiteware from the same context.

In terms of subsistence, the faunal remains from the site include peccary, modern pig, deer, large birds, river turtle, and unidentified mammals. The presence of pig and bird bone in the faunal assemblage aligns with surveyor William Miller's (1887) observation that the inhabitants of the villages near the border in 1887 raised pigs and fowls, but the peccary, deer, and turtle indicate a continued reliance on traditional hunting practices. Yaeger et al.

(2003:8) further theorize that cast iron cauldrons were used to cook traditional soups, stews, and pibils. While corn is not preserved at the site, corn-processing tools were, and they show a similar pattern. In addition to traditional ground stone *manos* and *metates*, the villagers used metal grinders, choosing to adopt some British technologies that allowed them to pursue traditional activities more efficiently (Leventhal et al. 2001:14).

While there are strong similarities between the material culture documented at San Pedro Sirís by Dornan (2004) and Church and colleagues (2011) and Kaxil Uinic, the differences are perhaps most informative. At Kaxil Uinic, our initial work documented seven three-stone hearths, which are common at Tikal's colonial occupation (Meierhoff 2015), and we suspect the dense undergrowth hides more. Interestingly, only one three-stone hearth was observed at San Pedro Sirís (Dornan 2004), and Ng (2007) did not locate any at Holotunich, a contemporary San Pedro Maya village to the east of Kaxil Uinic. Other than a cobble mound of indeterminate age and thin marl floors associated with several of the hearths at Kaxil Uinic, no architectural remains were observed at the site, suggesting the village had fairly modest houses.

In terms of artifacts, the most striking difference is the high frequency of European weaponry at San Pedro compared to that at Kaxil Uinic. Church and colleagues (2011:182) report recovering "many firearm parts at San Pedro Sirís," including flintlock rifles predating 1850 and Enfield rifles postdating 1853. The British undoubtedly supplied the latter to the villagers prior to the 1866 and 1867 battles. In contrast, we only found a few shotgun shells of unknown age at Kaxil Uinic. While the disparity could be related to sampling bias and/or the manner in which weapons did or did not enter the archaeological record at the two sites, it may also reflect the decreasing ability of the Maya to acquire firearms from the British, post-conflict.

Another curious difference is the lack of toys at Kaxil Uinic. Church and colleagues (2011:189–190) found "toys throughout San Pedro, including tea sets and doll parts from both surface and excavated domestic contexts," but we found none at Kaxil Uinic. They

Figure 11. Fragment of a chicle boiling pot and a chiclero spur from Kaxil Uinic village.

concluded that the toys found at San Pedro were associated with the school there. Thus, the lack of similar artifacts at Kaxil Uinic may indicate the village did not have a school.

One large post-conflict change appears to have been the increased involvement of San Pedro Maya men in *chicle* harvesting, to the point that Thompson (1963:118) noted the villagers at San José Yalbac in 1934, which by that time included the former residents of Kaxil Uinic, imported most of their beans and corn because the men were away bleeding *chicle* and not tending *milpas*. As Christine Kray and colleagues note (personal communication, 2015), *chicle* bleeding was one way the San Pedro Maya paid rent to BEC. At Kaxil Uinic, excavations recovered several fragments of *chicle* pots and one *chiclero* spur (Figure 11), both of which may date to the San Pedro Maya occupation of the village or to *chicleros* who reused the site as a camp in the mid-twentieth century.

Discussion

Kaxil Uinic village and Qualm Hill camp represent two distinct archaeological sites in northwestern Belize, yet the occupants of each likely interacted, as they were all entangled within the complex sociopolitical landscape that characterized nineteenth-century British Honduras. Contrary to Bolland's (2003) division of "British"-"Maya" relations into generalized

phases of indigenous resistance, avoidance, and incorporation in the colonial superstructure, a critical analysis of archival and archaeological data suggests both the "British" loggers and the "Maya" villagers navigated the cultural landscape in response to external forces as necessary, sometimes in manners inconsistent with the defacto protocol dictated by their larger social groups (colonizers vs. colonized).

On one hand, the San Pedro Maya at Kaxil Uinic were at odds with the Creole loggers and British timber companies like those at Qualm Hill, as their differing uses of the landscape became incompatible and lead to oftentimes violent confrontations. On the other hand, colonial legislation prevented both groups from owning land, allowing logging companies that maintained vast estates to keep the general population of Belize dependent upon them for access to resources and jobs (Bolland 1977:8). The San Pedro Maya were thus unable to maintain their autonomy through *milpa* farming, as they needed to participate in the cash economy of the colony to pay rent for the land they inhabited. Similarly, Creole loggers had negligible purchasing power in the colonial market because their wages were mostly paid in goods rather than cash (Cal 1991:211). The two groups therefore undoubtedly defied "colonizer" vs. "colonized" dichotomy, interacting on more peaceable terms as groups equally disenfranchised under the colonial system. These notions are supported by archaeological evidence from Qualm Hill camp and Kaxil Uinic village, where it appears that the inhabitants actively negotiated their identities beyond the simplified prescriptions of instances of culture contact.

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32 THERE AND BACK AGAIN: 35 YEARS OF RESEARCH AT THE COLONIAL SITE OF TIPU

Amanda R. Harvey, Marie Elaine Danforth, Elizabeth Graham, Kitty F. Emery, James J. Aimers, Bryan Cockrell, and Mark N. Cohen

The summer of 2015 marked the 35th anniversary of excavations at Tipu, initiated in 1980. Six years of excavation uncovered a large portion of the Spanish Colonial-period town and also revealed Preclassic, Classic and Postclassic occupation. The most important features of Tipu are its Spanish Colonial-period church and associated cemetery with roughly 600 well-preserved individuals. Numerous articles, books, theses, and dissertations have been published on Tipu's archaeology, history, and human remains. Here, we highlight investigations of the skeletal collection, and suggest future research directions for this exceptional site.

Introduction

Tipu is noteworthy in Belizean history as a Spanish Colonial visita mission site (Jones 1989). The town, effectively on the colonial frontier, was administered in the 16th and 17th centuries from the Spanish provincial capital at Bacalar and subsequently Merida. Tipu served as a reduction center under Spanish rule, to which inhabitants from surrounding villages were forcibly moved; but Tipuans also welcomed refugees from the more intensively administered towns farther north in the Yucatan Peninsula. Under pressure from the efforts by Spanish authorities to control Tipu and from the Peten Itzá to reject Spanish rule, Tipuans walked a fine line between resistance and cooperation (Graham 2011; Jones 1989). Their efforts produced distinctive patterns of Maya life, as can be seen from a variety of archaeological, historical, and osteological perspectives.

In 1978, David Pendergast and Grant Jones set out to locate the site of Tipu. Although the town was listed in historical documents (see Graham 2011: 190, note 2, pp. 359-360), its exact location remained unknown. Jones, building on the work of J. Eric Thompson, pinpointed an area on a bend in the Macal River, just 10 km south of the confluence of the Mopan and Macal Rivers (Graham 2011: 190) (Fig. 1). There, on the west bank, Jones and Pendergast identified a zone of relief that was not typical of Precolumbian architecture; this would turn out, once excavations began in 1980 as the Macal-Tipu Project under the direction of Robert Kautz, to be the remains of the Spanish colonial town of Tipu (Graham 2011: 189-190; Graham et al. 1985: 206) (Fig. 2).

The site on the Macal that we know as "Tipu" was in fact occupied from the Preclassic period (ca. 300 B.C.) until 1707, when the Spaniards forcibly removed the residents to Peten (Aimers 2004b; Graham 1991: 319; Jones 1989: 14). The presence of Precolumbian artifacts from all periods confirms the long-term occupation of the site. Investigations were triggered, however, by interest in the Spanish Colonial period, most notably the mission church (Cohen et al. 1994, 1997; Graham et al. 1985; Graham et al. 1989; Jones et al. 1986).

A Brief History of Tipu

Although there were probably earlier European encounters (Graham 2011: 79), the conquest of Maya communities in Belize by the two cousins, Melchor and Alonso Pacheco, occurred in 1544 and was followed by the establishment of an administrative town or villa at Salamanca de Bacalar (Jones 1989: 98). Under the encomendia system—which demanded cacao, textiles, and labor as payments to Spanish encomenderos—Tipu, as a producer of cacao, was required to pay tribute to encomenderos based in Bacalar. Not long after 1544, a visita mission church was built at Tipu, and the town was intended to serve as a center of Christianized Maya (Graham 2011: 124-133; 189-203; Jones 1989). Tipu turned out, however, to be situated between two political spheres: the non-Christianized Itzá Maya to the west and south, and the Spanish Christianized towns to the north and east. In 1568, an entrada led by Juan de Garzón resulted in the first of many rebellions in which Tipuans took an active part (Graham 2011: 205-106; Jones 1989: 46-51.

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Figure 1. Map showing location of Tipu.

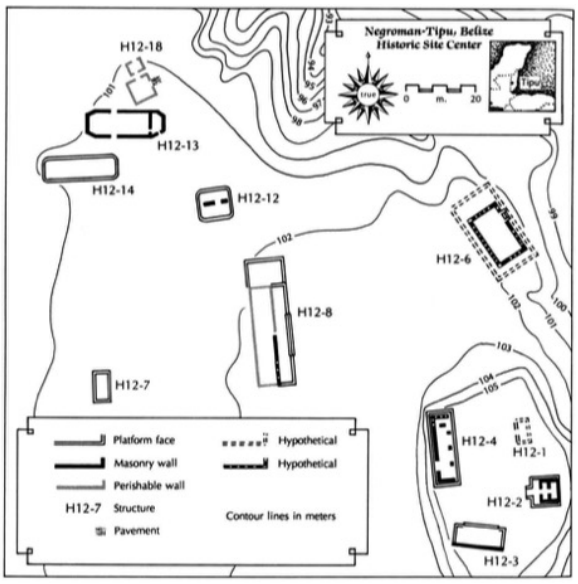


Figure 2. Map of Historic Site Center Map, with Postclassic core in southeastern corner (Graham et al. 1985).

Garzón's entradas destroyed buildings and objects believed to be anti-Christian, and initiated the forceful relocation (reduction) of communities' inhabitants. Tipu was selected by Garzón as a reduction center (Graham 2011: 205; Jones 1989: 46-51). Franciscans accompanied Garzón's entradas (Jones 1989: 51) and are assumed to have engaged the Maya at Tipu in various construction efforts, which may explain the similarities in colonial-period architecture between Tipu and Lamanai (Graham 2011: 206).

According to Jones (1989: 18), between 1568 and 1618 the Spaniards from Bacalar struggled to hold their encomienda towns in Belize, and Tipu was no exception. Because it took a priest two months to visit the communities in Belize (Jones 1989: 107), daily religious care was placed in the hands of local Maya, who taught catechism, acted as scribes, carried out rituals, and looked after the church's ritual objects (Farriss 1984 335-336, 341; Graham 2011: 207). Additional reductions centered on Tipu are known to have taken place in 1608 and 1615; however, by 1622 control of encomiendas was taken out of the hands of the exploitative encomenderos of Bacalar (Jones 1989: 18, 132). On the whole, Jones (1989: 132) characterizes the period of the early 17th century as a time when flight from encomienda towns in the Bacalar province to Belize had increased, and Bacalar's authority was nearing a state of collapse (Graham 2011: 207, 240).

After 1622, dissatisfaction with Spanish demands fueled Maya opposition and resistance. Events leading to rebellion were complicated (see references to Jones 1989 in Graham 2011: 239-247), but by 1639, what had been passive resistance turned to open rebellion (Graham 2011: 247). By 1641, Tipu leaders had joined the Petén Itzás to reject Spanish authority (Jones 1998: 49, 52-54). Thus began a period of independence from Spanish control, although Tipuans – still allied with the Itzás – occasionally cooperated in activities such as census-taking (Graham 2011: 249-250; Jones 1989: 230-240). In 1695, Tipuans changed their strategy to one of cooperation. Secular priests were sent to the community in 1696 and in 1697 the Itza stronghold of Nohpeten was attacked and the Itza routed by Spanish forces (Jones 1989: 259-67; Jones 1998). Once the Itzá were defeated, Spanish interest in Tipu waned. In 1707, the Tipuans were forcibly removed to Lake Petén Itzá (Jones 1989: 14).

Archaeological Research at Tipu

The history of archaeological research at Tipu is summarized in detail elsewhere (Graham

2011: 189-192). Briefly, Robert Kautz and Grant Jones, with the assistance of Claude Belanger, carried out investigations (Macal-Tipu Project) from 1980 to 1982. After a lull in 1983, Graham and Cohen renewed investigations (Negroman-Tipu Project) in 1984. Under the direction of Kautz, the site was mapped and a range of Precolumbian groups were excavated. Perhaps most important is a civic-ceremonial plaza group, Complex 1 (Strs. H12-1 to H12-4), which was in use at the time of Spanish Contact (Fig. 3) (Graham et al. 1985; Graham 2011: 201-202). Other structures excavated provided evidence of occupation from Preclassic to Postclassic times.

In 1982, Jones revealed the steps to what would turn out to be the sanctuary of the visita mission church; the excavation of the church was completed during the 1982 season, as was the first group of church burials. The burials became the focus of excavation in 1984 under the direction of Mark Cohen, and the structures associated with the colonial-period community center were delineated and investigated (see comprehensive list of sources in Graham 2011). The work begun in 1984 and continued in 1986-87 showed that the Spanish colonial community center had been situated in a zone of both Early (Fig. 4A) and Late Postclassic occupation; in fact, Strs. H12-6, H12-8, and H12-12 were in use at the time of the Conquest. At the end of excavations in 1987, the church walls were consolidated and reconstructed (Graham and Bennett 1989).

More recently, in 2006, Rhan-ju Song (Song and Zubrzycki 2007) resumed excavations. Nine shovel test pits and seven units were placed in the site center to the northwest, northeast, and southwest of the church. In an area southwest of the church, Song discovered a new Colonial-period structure, H12-19. In total, the site has approximately 90 structures in a 4,600 m2 mapped area, and it has the potential for future excavation of both Precolumbian and Spanish colonial-era architecture.

The material culture associated with the period of Spanish Contact is rich and varied (see Graham 2011) (Figs 4B, 5-8). There is little question that Precolumbian traditions persisted; an example is a pottery maskette found in an axial cache associated with Str. H12-7, built in colonial times (Reynolds 1985) (Figs. 2, 7B). The thurible (censer) found in a Christian burial in the nave of the church represents a blend of Maya and Christian traditions (Fig. 5), but there are also European artifacts in the form of shroud pins, coffin nails, and majolica pottery (Graham 1991).

Figure 3. Photo of church consolidation after excavations.

Figure 4A. Augustine Red jar. **Figure 4B**. Historic Yglesias-style bowl. Photos courtesy of James Aimers.

Ceramics

The ceramic assemblage, dating from the Late Preclassic period through the Colonial period, is currently housed in Belize, Southern

Figure 5. MT 96 with a censer in her hands. Photo courtesy of Marie Danforth.

Figure 6. Ring micrograph showing the etched cross section of the ring, the wire coil (two circular areas), the ring body (at very bottom), and joining material. Photo courtesy of Bryan Cockrell.

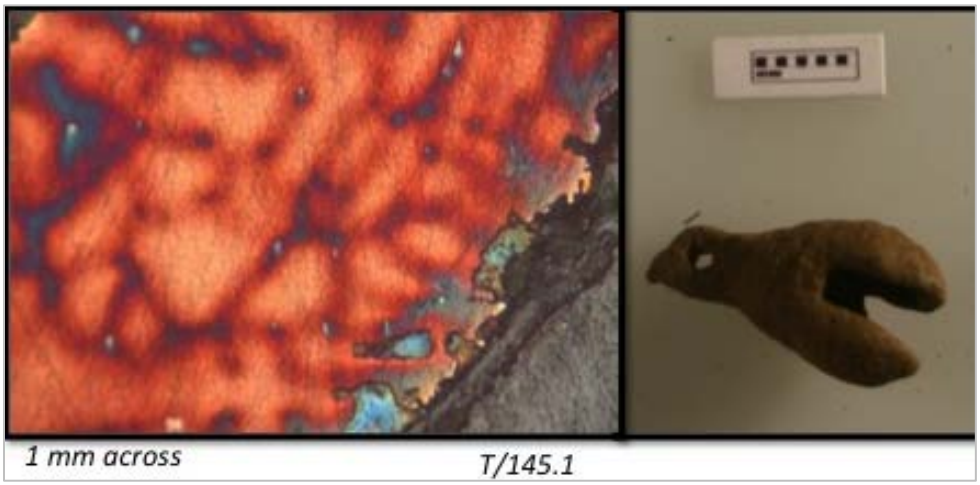


Figure 7. Bell micrograph showing the etched cross section of bell, and a dendritic microstructure; the bell was lost wax cast. Photo courtesy of Bryan Cockrell.

Illinois University, and SUNY Geneseo under the direction of James Aimers. Based on his extensive evaluation of the assemblage, Aimers has concluded that during the entire duration of Tipu's occupation, the ceramic complexes are very similar to those of the Petén Lakes region, a reflection of the close relationship between the two areas that is documented historically (Aimers 2004a, 2004b). As seen elsewhere in the Southern Lowlands, the ceramics at Tipu after the Classic period (Fig. 4) also show stylistic connections to the Northern Lowlands (Aimers 2001).

Metal and Beads

Metal artifacts from Tipu index Mesoamerican and European technological practices. The objects were recovered from church burials and middens associated with residential areas. Cockrell and colleagues (2013) examined the composition and microstructure of 61 of the 99 metals using a variety of archaeometric techniques. The Tipu bricoleurs potentially drew upon connections to metallurgists who were recycling metal and creating new objects at Lamanai and more distantly in the Yucatán, as well as mixing in the materials left by Spanish friars on their mission circuit. Thus they created a metal assemblage that took advantage of pre-existing networks while negotiating the new social circumstances of Spanish colonization.

Needles at Tipu bear design similarities to those from west Mexico; some are brass, a metal that, at the time, must have come from Europe. Lacetags – used in containing the tied ends of clothing – have cloth fibers preserved and are invariably made of brass. Rings (Fig. 6) consist of drawn wire fastened with coils, and are composed of silver-copper alloys. Bells (Fig. 7) exhibit a range of Mesoamerican forms and bronze compositions, but some have attached glass beads. Beads, from European sources, were recovered not only from burials – particularly those of children – but also from middens and structure cores and, besides glass, were made of jet, amber, and bone. They have been found to date from the early 1540s to the early 17th century (Cockrell 2013; Smith et al. 1994).

Faunal Remains

The well-preserved, highly diverse faunal assemblage at Tipu consists of approximately 30,000 specimens, representing 70+taxa and dating from Preclassic through Colonial periods (Emery 1990, 1999). Currently, Emery curates and oversees most of the research on the animal remains at the Florida Museum of Natural History.

Emery (1990, 1999) has investigated the nature of animal use at Tipu over the transition period of Spanish contact. This work revealed a continuity of Postclassic patterns of animal use into and through the Colonial period and in some cases a return to earlier Classic period activities, a pattern also recorded at neighboring Lamanai. No European domestic animals appear to have been introduced to Tipu with Spanish contact. As well, no traditional species were removed from the Tipu animal complex; even domestic dog (Canis lupus familiaris) continued to be eaten as indicated by both distribution and butcher marks. Deer (primarily the white tailed deer, Odocoileus virginianus) dominate in both pre-Hispanic and Colonial assemblages, with peccary (Tayassuidae) and intermediate-sized armadillos (Dasypus novemcinctus) and large rodents (Cuniculus paca and Dasyprocta punctata) also highly abundant. In both periods, wild game birds such as curassow (Crax rubra) and turkey (Meleagris spp) were common. As shown in Table 1, during the colonial period there is a slight increase in use of armadillo and slight decrease in use of deer. Additionally, there were fewer symbolically important wild cats (Felidae) and iguanas (primarily the green iguana, Iguana iguana) as well as more tapir (Tapirus bairdii) and monkeys, both high-forest species, as seen in Table 2. This pattern of retained animal-use practices is in contrast to the extensive introduction of European fauna in the northern Yucatan and the southeastern U.S. (e.g., Reitz 1992, Reitz and McEwan 1995, deFrance and Hanson 2008).

Using strontium isotopes, Thornton (2011a, 2011b) showed that some individual game animals, such as white tail deer and peccary, that were traditionally thought to have been locally hunted, were in fact, traded in from the Maya Mountains and regional lowland valleys, perhaps as part of ritual exchanges.

Table 1. Tipu Animals - Most Abundant Species (%MNI).

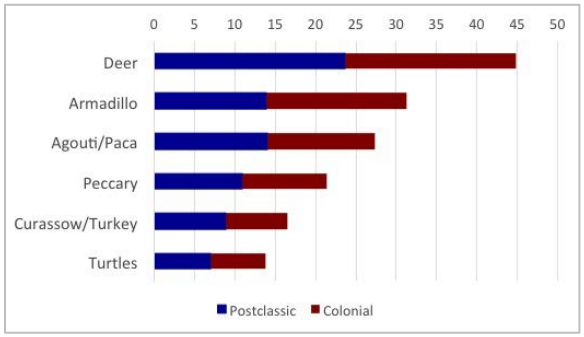
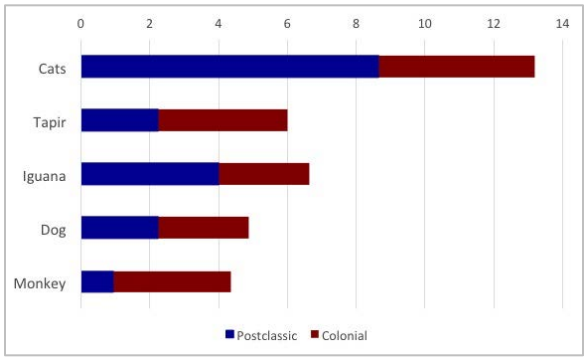


Table 2. Tipu Animals - Other Important Species (%MNI).



Together, these studies demonstrate the value of the faunal remains for understanding how the Tipu Maya used animals as political, religious, and ethnic symbols during cultural negotiations both before and during contact.

Human Osteological Research at Tipu

Currently curated at the University of Southern Mississippi under the direction of Marie Danforth, the skeletal collection from Tipu consists of approximately 600 Colonial burials and 19 pre-Columbian burials. Among the Colonial burials, there are 176 males, 119 females, 47 adults of unknown sex, and 249 juveniles (Cohen et al. 1994, 1997). Noticeably underrepresented are infants. Infants could possibly be buried elsewhere, as they would not have been part of the Christian population, or preservation was too poor for their delicate bones to remain over the 400+ year timeframe. With only a few exceptions, nearly all were buried in a Christian mortuary pattern in a supine position, with their heads to the west, and hands placed over their waists or chests (Fig. 8). Musselwhite (2015) used rib samples from 140 adults to test fluorine isotopes for burial

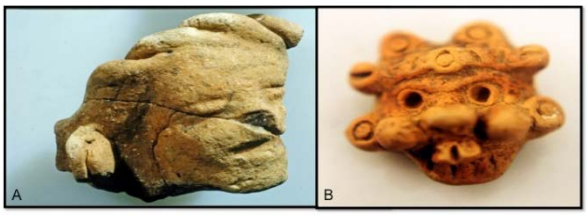


Figure 8A. Lacandon style effigy fragment, H12-18. **Figure 8B**. Effigy from H12-07. Photos courtesy of James Aimers.

sequence. Results show no strong patterns in spatial and demographic distributions over time, yet the majority of the earliest burials are inside the church and burials are more equally distributed spatially in the later time periods.

According to traditional age indicators, such as tooth wear, auricular surface morphology, and suture closure, the great majority of individuals buried in the church cemetery were under age 30, with fewer than 5% reaching age 40 (Cohen et al. 1994, 1997). Wright (1989) analyzed patterns of cemental annulation, and her findings support the young age at death of most in the cemetery. Some have argued that the atypical age distribution may represent an epidemic population (O'Connor 1985), but there were no mass or multiple burials to support such a contention. It also might reflect the fact that Tipu served as a refugee center at some points during its history (Farriss 1984), most of whom likely would have been young adult males.

Childhood Stress and Disease

Childhood patterns of stress and disease among the Tipu inhabitants have been fairly extensively studied. Danforth (1989) investigated patterns of formation of two microenamel defects, Wilson bands and striae of Retzius, and Harvey (2011) investigated the macro enamel defects known as hypoplasias. Both concluded that while childhood stress was frequent at Tipu, it was less severe in comparison to levels seen at other Colonial sites such as Lamanai or Campeche and also Late Classic sites such as Tikal and Ceibal.

In another study examining childhood stress and disease rates, Danforth et al. (1985) found regular subadult cortical bone appositional growth, or the formation of cortical bone at the bone surface. This corresponds to a later

assessment of subadult long bone longitudinal growth by Danforth and colleagues (2009), which concluded that Tipuan children followed typical childhood growth curves. This suggest that children living at Tipu enjoyed adequate nutritional intake.

Isotopic Research

Isotopic results have also provided insight into patterns of juvenile stress and adult foodways. Heirs (2014) analyzed C, N, and O isotopes from rib fragments from individuals aged between birth to six years old in order to investigate whether age at weaning might have changed with Spanish contact. She determined weaning generally took place between ages one to three, which is similar to what has been seen in populations dating to earlier time periods (Williams et al. 2005) and does not concur with de Landa's (1566) report of an age of weaning of 3-4years old.

Isotope analysis has also been used to examine adult dietary practices at Tipu. Using the novel proxy of dental calculus to evaluate carbon and nitrogen isotopes, Harvey (n.d.) found that the diets of Tipuans were not maize dominant with carbon isotopes values at -14.7‰ and nitrogen at 7.7‰, unlike Colonial Lamanai (Table 3). Rather they had diets more similar to Late Classic individuals from Lamanai at -14.1‰ (White 1997; White and Schwarcz 1989), and exactly like the inhabitants of Middle Preclassic K'axob who subsisted primarily on C3 plant domesticates supplemented by deer and riverine fish (Henderson 1998, 2003

Activity Patterns

Several studies have also explored the physical activity patterns of those who lived at Tipu, and in particular whether they changed with missionization. Armstrong (1989) evaluated arthritis in the population, but given the young age at death of most, it was not surprising that the condition was relatively rare.

Ballinger (1999) applied traditional morphometric techniques to a sample of shoulder and upper limb bones from Tipu as well as Late Classic Copan and Altar de Sacrificios. She found that individuals from Tipu were slightly less robust, but overall there was no indication of any significant change in activity patterns over time. Ballinger also evaluated cross-sectional geometry of the humerus, which essentially confirmed her findings from morphometrics.

Table 3. Carbon and nitrogen isotopic values of Tipu and other sites.

Site	Period	N	Mean δ13C collagen (±1SD)	Mean δ15N collagen (±1SD)	Citation
Tipu	Colonial	18	-14.7 (±1.6)	7.7 (±0.8)	Harvey n.d.
Cahal Pech	Preclassic	16	-10.6 (±1.4)	9.2 (±1.0)	Piehl, 2005; Freiwald, 2011
K'axob	Mid. Preclassic	4	-14.7 (±0.5)	9.3 (±0.3)	Henderson, 1998; Henderson, 2003
Lamanai	Late Classic	3	-14.1 (±0.9)	10.4 (±0.1)	White and Schwarcz, 1989; White, 1997
Lamanai	Colonial	11	-9.5 (±0.6)	9.7 (±0.6)	White and Schwarcz, 1989; White, 1997

More recently, Noldner (2013) looked at cross-sectional geometry of long bones and muscle attachment site morphology using 3-D imaging. Her research examined whether there was any evidence of status at Tipu as revealed by burial location relative to the church. She found no discernable intrasite variability, suggesting that if status differences were present, they were not discernible through activity patterns.

Given the sometimes contentious relationship with the Spanish at Tipu (Graham 2011), one area in which the effects of contact might be expected to be present is in the patterns of trauma. However, Armstrong (1989) concluded that traumatic lesions were infrequent, affectingly fewer than 2% of individuals. Periosteal reactions were even slightly less common with fewer than 0.1% of all bones showing lesions. He suggested that Tipuans experienced occasional violence, but not endemic political strife.

Genetic Structuring

As mentioned before, Tipu, at times, was a refugee center for those escaping Spanish domination several hundred miles away in northern Yucatán. Assuming that the refugees

might represent a distinct gene pool compared to that of the local population, Jacobi (1996, 2000) evaluated on biodistance using dental morphology and metrics. He determined that the Tipu population was homogeneous with no patterns of metric or non-metric differences between individuals buried within and outside of the church walls, yet there are possible family group plots suggested within parts of the cemetery.

Nancy Elwess and colleagues (2015) are currently analyzing patterns of mtDNA at Tipu. Thus far, they have evaluated 25 individuals. The sample is still too small to determine whether haplotype frequencies are related to burial location or to Jacobi's hypothesis of family groupings, but she has found that all are of Native American ancestry, exhibiting 0% of A haplogroup, 8% of B haplogroup, 64% of C haplogroup, and 28% of D haplogroup. These results are similar to those from Copán (Merriwether et al. 1997) where the majority of individuals (89%) exhibit haplogroup C, and are contrary to findings from Xcaret (González-Oliver et al., 2001) and a contemporary Maya population (Torronei et al., 1992), which found most individuals exhibiting Haplogroup A (Elwess et al. 2015).

In general, both the earlier studies of the Tipu population (Cohen et al. 1994, 1997) as well as those more recently conducted have shown the Tipuans to have experienced childhood stress patterns much like those of their precontact ancestors. Inhabitants demonstrate low rates of enamel defects and followed typical childhood growth curve. Adults also exhibit low rates of stress and disease. There is infrequent trauma and no significant change in activity patterns over time. In general, there was no evidence of increased stress or disease loads associated with contact present in any portion of the mortuary population.

Conclusions

Faunal, Ceramic, and Dating Research

Ongoing studies of the faunal remains under Emery include isotopic and aDNA studies of Tipu turkeys to understand early husbandry, metric analysis of deer by Rick Cantryll of University College London-which reconstructs the impact of hunting and environmental change on deer morphology-and aDNA analysis of dogs as part of a study of circum-Caribbean dog genealogy by Corinne Hoffmann and colleagues from the University of Leiden in the Netherlands. With the ceramics, Jim Aimers has moved from type-variety analysis to various materials science techniques. Along with some of his undergraduate students, he continues to explore new avenues of ceramic research through SRF, SRD, SEM and petrography (Aimers et al. 2012). Lastly, Julie Hoggarth at Baylor University will be using Carbon 14 to better understand the time frame of cemetery use.

Bioarchaeological Research

Among the current bioarchaeological studies, Willa Trask (n.d) is examining migration patterns through strontium and oxygen isotopes for her dissertation. Emmalea Gomberg (n.d.) is reassessing patterns of cranial porosity for anemia and scurvy for her Master's thesis. Amanda Harvey (n.d) is researching food consumption patterns as told by dental pathological conditions and carbon and nitrogen isotopes for her dissertation. And, Marie Danforth is conducting a formal mortuary pattern assessment.

Tipu: A Colonial Gem in Belize

As shown by the research at the site, Tipu offers a fertile setting in which to explore the effects of contact on the Petén Maya. Bioarchaeological analysis suggests a population with relatively few stressors and low disease rates; and archaeological data indicate cultural continuity. The cultural record indicates that Tipuans had the power to negotiate much of their interactions with Europeans, which appears to have offered them some protection as they adapted to this New World.

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33 THE EARLY ENGLISH CEMETERY ON ST. GEORGE'S CAYE REVISITED: DNA ANALYSIS AND REASSESSMENT OF BURIAL COUNTS AND CHRONOLOGY

Lauren C. Springs, James F. Garber, Deborah A. Bolnick, Lauren A. Sullivan and Jacob H. Bentley

While investigations of the Maya have traditionally dominated the archaeological research of Belize, there is a growing effort to uncover the recent archaeological history of the nation. Excavations beginning in 2009 at St. George's Caye have revealed the oldest known English colonial cemetery in Belize. To date, the St. George's Caye Archaeological Project has investigated a total of 39 historic burials dating to the mid-18th to 19th centuries. Ongoing analysis of burial styles, grave goods, and skeletal remains has increased the understanding of the demographic patterns and mortuary traditions of the early European settlers. Excavations have shown that there are considerably more burials in the cemetery than had been indicated in the historical record or shown on early maps. These unmarked graves lie beneath the level of the previously known burials. Additionally, the extraction of mitochondrial DNA for a subset (n=20) of the burials was carried out to assess the potential of the colonial sample for genetic analysis. Despite the inherent difficulties of ancient DNA preservation, initial extractions of genetic material in the cemetery have proven to be successful. This article presents an analysis of the matrilineal genetic data and situates the results within that of previous investigations in the cemetery.

Introduction

St. George's Caye played a critical role in the history and independence of Belize functioning as the country's first capital. Historical records indicate that the cemetery on the island is the nation's first English burial ground and that very little is left preserved due to the ravages of storms and hurricanes (Campbell 2003:181). However, excavations have shown that this burial ground is considerably earlier and more extensive than the historic records indicate. The uppermost burials have been severely disturbed by hurricanes but a previously unknown layer of earlier burials exhibit superb preservation.

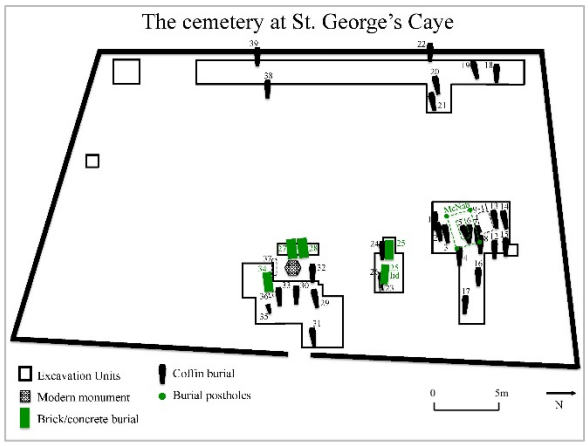

Figure 1. Plan map of Cemetery on St. George's Cay showing burials revealed by archaeological excavation.

Summary of Burials Excavated to Date

Between 2009 and 2014, a total of 39 burials have been located in the cemetery at St. George's Caye (Figure 1). Each burial was analyzed to determine the minimum number of individuals represented, their degree of preservation, mortuary style, and biological profile (including the individual's age at death, biological sex, stature, and pathology). All of the burials in the cemetery are oriented with their heads to the west and feet to the east in the traditional Christian mortuary style and unless otherwise noted, burials in coffins were constructed with mahogany, Santa Maria, or dark reddish-brown hardwood.

In the initial 2009 season, four excavation units were placed in the cemetery. While a number of loose skeletal elements were recovered, only one discrete burial structure was identified. The burial included an empty cement sarcophagus located just northeast of the center of the cemetery. This cement enclosure was in all likelihood the below surface portion of a typical above surface brick box grave. Because the 2009 season lasted only one week, the burial was mapped and relocated in 2010 for further excavation.

In 2010, the cement sarcophagus (noted as Burial 25) and five additional burials were excavated, but were not catalogued or analyzed

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until 2012. Further excavations of Burial 25 revealed it to be in a highly disturbed context. The tomb lid was found displaced and upturned just east of the burial, and the skeletal contents washed out and fragmented. Only a partial cranium was in clear association with the burial structure. The size and degree of suture fusion in the partial cranium suggest that the individual was an adult at the time of death, but no estimation of sex or pathology could be completed.

Three additional burials (numbered 23, 24, and 26) were located within the same excavation area as the sarcophagus and were interred in hexagonal coffins. The north edge of Burial 24 extended beneath the sarcophagus from Burial 25. Only the skull could be reliably allocated to this burial as the majority of the postcrania were highly fragmented and commingled with the skeletal elements washed out from Burial 25. Based on analysis of the cranium, Burial 24 was estimated to be an adult male. Burials 23 and 26 were located underneath the displaced lid of Burial 25, and included the remains of a child and an adult, respectively, that were buried in hexagonal wooden coffins. Significantly, the smaller coffin of Burial 23 was placed inside the larger Burial 26 coffin for interment. The skeletal remains for the individuals appear to be from an adult female and a subadult of unknown sex, likely between three and five years of age.

The remaining two burials (Burials 27 and 28) from 2010 were located in separate excavation units just east of the cemetery center and extending beneath a modern cemetery monument commemorating the Battle of St. George's Caye. Both graves were constructed brick tombs and found in association with at least three commingled individuals. However, the taphonomically disturbed and highly fragmentary nature of the skeletal elements prevented the general assessment of age, sex, and pathology.

In 2011, 18 individuals were excavated from 15 burials in the cemetery at St. George's Caye. An additional two burials were located extending beyond the margins of the excavation area but were not excavated. With the exception of Burials 9-11, all of the burials excavated in 2011 appear to have been interred in coffins.

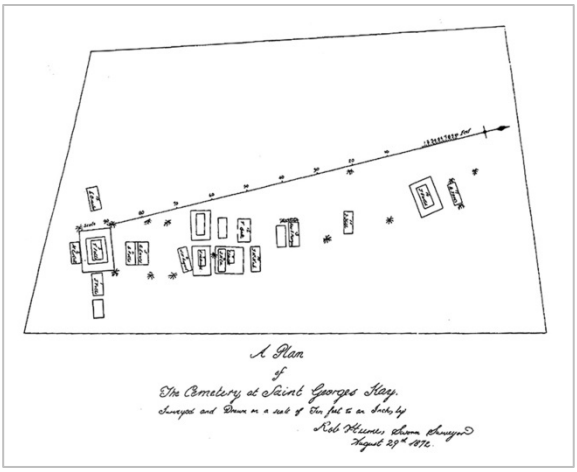

Figure 2. 1872 plan map of St. George's Cay Cemetery by Rob Hume.

Figure 3. Photo showing probable location and remains of James Bartlett box-grave burial.

Additionally, four postholes and scattered bricks were excavated and most likely correspond to the mapped and dated above-ground burial of James Bartlett (Hume 1872, Usher 1907) (see Figures 1, 2 and 3). A majority of burials lacked adornments and associated artifacts, although three exhibited unique mortuary traditions. Burial 1 included a heart-shaped metal coffin plate with an etched and partially legible epitaph, Burial 3 had a coin adhered with cloth to the frontal bone of the individual's cranium, and Burial 11 was marked by a collection of conch shells that were aligned over the body of the interment (Figure 4).

The burials excavated in 2011 contained the remains of eight adult males, two adult females, three subadults, and four additional adults of unknown sex. One additional individual was represented solely by a fragmentary fibula and was therefore not

Figure 4. Photo of coffin burials – note conch shells in central burial.

included in the analysis of biological profiles. The type and incidence of skeletal and dental pathologies present in the cemetery indicated that the historic population was relatively healthy in comparison to contemporaneous burial populations in the Americas and Europe. For a more complete description of these burials see Springs (2013).

In 2012, six units were excavated along the western wall of the cemetery in the north corner. Five burials were located within these units and four were fully excavated. The fifth was left in situ because the majority of the burial extended under the cemetery wall preventing a full excavation. With the exception of Burial 19, which was interred in a rectangular pine coffin, the individuals were all buried in hexagonal coffins made of native mahogany, Santa Maria, or dark reddish-brown wood. The coffin and skeletal remains in Burial 21 were exceptionally well preserved, and the burial is the only one excavated to date that has an upholstered coffin. Three of the four excavated burials belonged to adult males while the last (Burial 20) belonged to an adult female. The only pathologies observed included dental calculus and caries in all of the individuals, and joint lipping and fusion likely associated with advanced age in Burials 20 and 21.

In 2013, four burials were located directly west of the cemetery entrance in coffins, and three of these (Burials 29-31) were excavated. Burial 32, which was found along the margins of the excavation area during the last week of the field season, was left unexcavated. Burial 31 was made of pine and is the only coffin built with horizontal and vertical support planks installed along the coffin base and walls. The coffin from Burial 30 was resting on two wooden beams placed at the head and toe of the burial that were likely used while lowering the coffin through the grave shaft.

All three of the individuals were inferred to be adult males. In addition to exhibiting pathologies common to this cemetery population (e.g. caries, dental hypoplasia, periostitis), traumatic and unusual pathologies were observed in all three individuals. Burial 29 exhibited evidence of healed fractures to a first metacarpal and the right femur, and Burial 30 had a healed fracture on the right clavicle. The mandibular right incisors of Burial 30 each have a depressed horizontal line similar to a hypoplasia running across the crown of the teeth. However, the lack of corresponding hypoplastic defects anywhere else in the dental arcade or the left mandibular incisors suggests that the presence of the anomalies may have an unusual or non-pathological etiology. Burial 31 did not have traumatic pathology, but did exhibit otherwise uncommon pathologies. The arch of the seventh cervical vertebra for Burial 31 was not fused to the transverse process on the left side and appears have twisted during the growth for reasons unknown. In addition, Burial 31's right maxillary canine was unerupted and impacted into the right first maxillary incisor. The deciduous canine was lost antemortem and the alveolus resorbed.

During 2014, a total of five burials were located directly south of the 2013 units and an additional two were located along the western wall of the cemetery. The two along the western wall of the cemetery (Burials 38 and 39) were left in situ because only their head and feet, respectively, extended through the sidewalls of the excavated unit. No osteological analyses were performed on these burials, and both appear to have been interred in coffins.

Of the five burials located at the entrance to the cemetery (Burials 33-37), two were interred in coffins, one in a brick grave, and the final two showed no evidence of having been interred with any burial architecture. This region of the cemetery was highly disturbed and as a result, burial and mortuary analysis was more limited. Burial 33 included the remains of

an adult male placed in a coffin. Burial 34 is composed of a brick grave base and partial walls with only one associated skeletal element – a partial humeral shaft. The relative placement of the burial is consistent with the 1863 burial of James McNab, whose burial location and identifying information were recorded in relation to an 1872 map by Rob Hume and an epitaph recording by Usher (1907) (see Figures 1 and 2). His grave is located just southwest of Burial 33 and because many of the elements from the right side of Burial 34 are missing, it is likely that the elements were displaced or destroyed as a result of the deposition of Burial 33 in such close proximity.

Burials 35 and 36 were both highly fragmentary and poorly preserved. While there was a small soil stain that indicated coffin use in Burial 35, there were no such indicators for Burial 36. However, it is possible that due to the highly incomplete nature of the burial, the coffin remains may have been taphonomically destroyed prior to excavation. Burial 36 included only the partial lower legs, ankles, and feet of an individual whose burial was likely destroyed by the placement of Burial 34, which was interred directly on top of Burial 36 and obscured everything superior to the individual's knee. Burial 35 was also very fragmentary and included the partial remains of the pelvis and lower limbs of an individual. It is unknown why the upper body of the burial was not recovered, although the burial was situated directly underneath a modern refuse pile and an abundance of loose brick, so the area was clearly disturbed post-interment. Age and sex could not be estimated for the two burials, but the size of the lower limb bones indicate that they were likely adults. Finally, Burial 37 was identified but not fully excavated during the 2014 season. The burial was located between Burial 34 and a modern cemetery monument just north of the excavation units. No coffin remains were recovered and the majority of the burial extended into the north and west sidewalls, preventing further excavation.

In sum, between 2010 and 2014, we located a total of 39 burials, 35 of which have been excavated and assessed for skeletal indicators of age, sex, and health when possible. A range of burial styles including rectangular or hexagonal coffins, brick box graves, and cement tombs have been uncovered as have a few instances of burial adornments and personalization. Demographically, the cemetery appears to be composed primarily of adult males. The burial population exhibited a typical frequency of pathologies and disease processes, for this time period, indicating that members of this society did not suffer from abnormally poor health during their lives.

Cultural and Genetic Population Affinities

We estimated the most likely ancestral affiliations for individuals in the cemetery using a variety of methods and multiple lines of evidence in order to infer ancestral affiliations in this historic population. Written records documenting the history of the cemetery are sparse, but we were able to create a working hypothesis of the settlers' national identities from the accounts of historians and the analysis of colonial documents and maps. It is known that the early colonial settlement was a British outpost (Anon. 1829, Gibbs 1883, Henderson 1811), and that St. George's Caye in particular was an important seat of government where many of the colonial merchants and elite resided. In addition, we used three important archival records of the island to assess the settler's potential national and ancestral identities. A 1764 map of the caye (in Craig 1966) is significant for not only noting the presence of British homesteads, but also for marking the designation of a section of the island as a "negro quarters". This is the earliest written evidence of individuals with non-European ancestry living on the caye during the colonial encounter.

In addition, an 1872 cemetery map by Rob Hume and an early 20th century collection of epitaph recordings (Usher 1907) were used to ascertain the relative locations of the historic elevated brick and stone tombs, identifying information for those interred, and dates of use for the cemetery, which fall largely within the early 19th century. Five of the epitaph inscriptions also indicated the places of birth for the deceased. Two of these individuals were born in Scotland, one in England, and the other two in Russia and Africa. The remaining 16 epitaphs included a total of 14 unique surnames, which were researched genealogically to

ascertain their likely cultural origins. All surnames were identified as English, Scottish, Irish, or Welsh in derivation. While the historical literature does not mention the presence of below ground coffin burials in the cemetery, and thus says nothing about the ancestry or nationality of the individuals buried in those coffins, the individuals that are mentioned in the historical literature appear to be almost exclusively British in origin. Therefore, we used the archival data to infer that the historic burial population was a predominately British community situated within a larger island population, which was home to both British colonists and either free or enslaved Africans. It is important to note that the previously unknown layer of coffin burials suggests a much larger cemetery population than the historic record indicates (Figure 5).

We also analyzed mortuary styles as a second approach to inferring the ancestral affiliations of individuals buried in this cemetery. As previously noted above, archaeological excavations at the site have uncovered the material remains of multiple layers of interments in the cemetery. The organization and mortuary styles were largely consistent with historical evidence of British cultural affinity. General coffin styles, placement, and décor all aligned with Christian burial practices and paralleled trends in 18th-19th century English and colonial North American cemeteries (Elverson 2013). However, the personalization of individual bodies and graves within the cemetery indicates that the colonists were more biologically and culturally diverse. During the 2010 field season, six culturally modified teeth were found buried in shallow dirt near the cement sarcophagus of Burial 25. The teeth had been modified by filing the occlusal surfaces so that the teeth tapered into points mesially and distally. To our knowledge, there are no known instances of intentional dental filing in 18th century British populations. However, this practice has previously been linked to both African and Maya cultural traditions.

There is additional archaeological evidence that identities in the settler community were not culturally homogenous. For example, the single coin found adhered to the cranium of

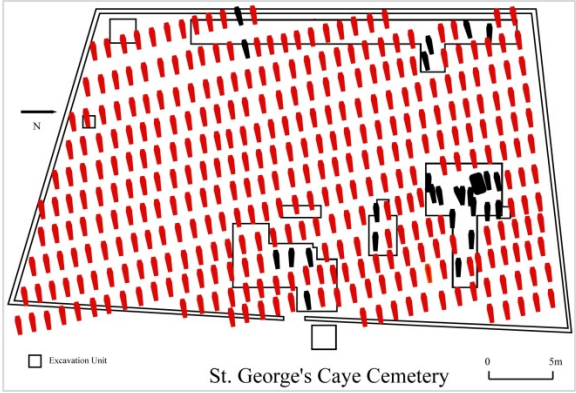

Figure 5. Map of coffin burials; known coffins shown in black, projected coffins shown in red.

Burial 3 might be indicative of an African cultural tradition. While the act of placing a coin in association with the deceased is not considered African in origin, the frequency of this practice in historic African-American cemeteries of the US and Caribbean has led archaeologists to hypothesize that it indicates the presence of African or syncretic cultural affiliations (Fennell 2011, Haviser and MacDonald 2006). Likewise, the collection of conch shells found laid over the body of Burial 11 could be associated with non-British mortuary tradition. This practice is commonly linked to African American traditions and has also been inferred as an indigenous burial custom where excavations of indigenous burial sites have produced whole conch shells and conch artifacts (e.g. Brooks 2011, Jacobi 2000, Moore 1903, "Mortuary Traditions" 2015, Novotny 2007). The material remains of potentially African or indigenous cultural traditions in a British cemetery are significant, and could be indicative of either cultural appropriation by the British settlers or the inclusion of colonized individuals within a traditionally British space.

Finally, genetic analyses of the burial population were used to assess genetic ancestry of each individual and the demographic composition at the site. We amplified and sequenced 372 base pairs (bp) of the first hypervariable region of the mitochondrial DNA (mtDNA) to assess DNA preservation and to identify the maternally-inherited lineage of each individual. Beginning in 2012, we started sampling the dentition from ongoing burial

excavations and from individuals previously excavated in 2010 and 2011. Because ancient DNA is usually degraded, present in small amounts, and easily obscured by contamination from exogenous sources, field precautions were undertaken to minimize the potential risk of sample contamination. In particular, all students and staff left the burial units as soon as skeletal or dental elements were found so Springs could remove samples for genetic analysis quickly and with as little contact as possible with potential contaminating agents (such as DNA from researchers, plants, and fauna). Permanent molars and premolars were targeted for sample selection, and two samples were removed when possible from each burial while in situ. New gloves and a facemask were worn when excavating and removing samples for each individual, and samples were immediately placed in individual sterile bags stored separately from all other artifacts until they could be exported for genetic analysis. Standard procedures were followed at all stages of the laboratory analysis to minimize contamination and ensure the authenticity of sample results (Paabo et al. 2004, Shapiro and Hofreiter 2012), although at this stage of analysis we have not gotten independent replication and confirmation of our findings. We extracted DNA from each sample using a non-destructive extraction method (Bolnick et al. 2012) to help minimize damage to the samples and followed the methods of Mata- Míguez et al. (2012) to amplify the mitochondrial DNA.

The preservation of mitochondrial DNA in samples from St. George's Caye proved to be excellent and yielded further insight into the ancestral affinities of the individuals interred in the cemetery. Because mtDNA is only passed down maternally, our analysis provides insight into just one of the ancestral lineages present in each individual. In 18 of the 20 samples studied, all 372 bp of the target mtDNA were successfully sequenced; lineage assignments (reflecting the presence of diagnostic mutations in the mtDNA sequence) were possible for 17 of the 20 individuals. These initial mtDNA data reveal that the early historic matrilines present at St. George's Caye were primarily derived from lineages that are common in Britain and widespread throughout Europe. Two non-European mitochondrial lineages were identified, from Burial 2 and Burial 23, that are commonly found in individuals of indigenous American and African descent, respectively. Thus, these analyses indicate that the majority of individuals interred at St. George's Caye can trace their maternal ancestry to British or other European populations, although some other ancestral lineages are also present. Interestingly, the mitochondrial patterns we observed sometimes yielded a different inference about ancestry than archaeological signals of cultural affinity. For example, while Burial 11 exhibited a mitochondrial lineage indicative of European ancestry, the mortuary style of this burial (including conch shells laid over the body) was consistent with African or indigenous American cultural traditions. Furthermore, the two individuals who exhibited African or indigenous mitochondrial lineages were interred with only British and Christian mortuary practices. The disconnect between genetic and cultural signals of ancestral affiliation in these burials may indicate biological and cultural fluidity within this burial population.

Thus, our final analysis of cultural and biological affinities in this historic settlement was informed by historical, archaeological, and genetic evidence. The archival documentation suggests a British cultural identity. Archaeological and genetic analyses are largely consistent with that inference, but indicate that African and indigenous cultural and biological identities were also present in the population. Perhaps most interesting, the different lines of evidence are not necessarily correlated.

Further genetic inquiry into patrilineal and autosomal ancestries would provide additional information regarding the complex demography of this burial population and help clarify the biological and cultural ancestries of the individuals interred at St. George's Caye. We therefore also assessed the degree of nuclear DNA preservation in each DNA extract. We used the PowerPlex® 16 HS System (Promega) to (a) assess a length dimorphism in the amelogenin gene on the X and Y chromosomes (used to determine the genetic sex of each individual), and (b) target 15 autosomal short tandem repeat (STR) loci for amplification and fragment analysis. In only two samples were

there no indications of nuclear DNA preservation. We successfully amplified a portion of the amelogenin locus in five samples, allowing us to confirm the osteological sex estimations for those individuals. We also successfully amplified and genotyped two to fourteen STR loci in 18 samples. These data indicate that additional autosomal or genome-wide analyses are feasible, and we plan to undertake such analyses in the future using the St. George's Caye samples.

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34 TURTLERS, PIRATES AND TRADE: A HISTORY OF SEA TURTLE EXPLOITATION ON ST. GEORGE'S CAYE

J. Heath Bentley, James Garber, Norbert Stanchly, Linda Searle and Lauren Springs

Historic literature frequently mentions the exploitation of sea turtles throughout the Caribbean by indigenous populations and early settlers alike. Large and abundant, these animals provided a readily accessible protein source for European and African populations as they traveled and inhabited coastal and island settlements. An exploration of documents held by the Belize Archives and Records Service reveals that sea turtle capture and sale was once a sufficient contributor to Belize's coastal economy. Commonly called "turtlers", 25% of the population was involved in the capture and sale of sea turtles by the late 18th century. Offshore reconnaissance during the 2014 field season of the St. George's Caye Archaeology Project located and recovered sea turtle remains from at least two of four turtle corrals that were documented on a 1764 map. An analysis of the faunal material recovered from the island since 2009 indicated that 74.6% of the number of identified specimens comprised at least two different species of marine turtle. Turtle species varied in their preference by people as a food item, the method of capture used, and their role in the economy. The analysis of the distribution of turtle bone across the island has given us insight into which species were held in the respective corrals.

Introduction

The capture of sea turtles, commonly called "turtling", has been recognized as a major secondary economic activity behind the logging industry in Belize's early history when it was known as "British Honduras" (Thomson 2004). Belize was heavily involved in sea turtle capture, consumption and trade, and the animals composed a large portion of the colonial diet in the country until the population declined to their endangered status (Campbell 2003; Craig 1966; Everitt 1986; Henderson 1811; Smith et al. 1992). Turtling has been called "the most important form of colonial fishing" in Belize and at its peak was very profitable for those individuals engaged in it, known as "turtlers" (Craig 1966; Henderson 1811). The 1764 map of St. George's Caye that is featured on the Belize Five Dollar bill shows four "Turtle Corrals" along the island's coast (Figure 1). These corrals, called "crawls" or "kraals", are squared enclosures that were built in shallow water and used to hold live sea turtles until they were ready for feast or sale (Craig 1966; Dampier 1697). To better understand the role that turtling played in the lives of the early inhabitants of St. George's Caye, we looked to historic documents as well as material recovered through archaeological investigations on the island.

The Caribbean Sea is home to the largest sea turtle nesting grounds in the Western hemisphere (Smith 1985). Historic accounts describe sea turtle populations in great abundance throughout the world (Bjorndal 1995; Exquemelin 1969; Dampier 1697; Smith 1985). Green sea turtles were abundant throughout Belize coastal waters (Baldwin 1778; Henderson 1811), what some had called "inexhaustible" (Smith et al. 1992). The abundance of sea

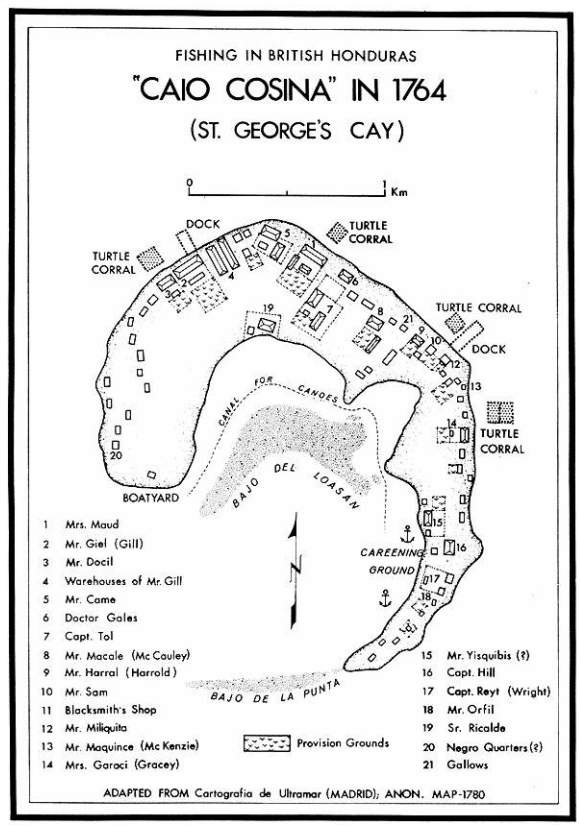

Figure 1. 1764 map of St. George's Caye, depicting four turtle corrals (Craig 1966).

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turtles provided a steady supply of protein for sailors and settlers that helped enable their movement through the Caribbean Sea (Bjorndal 1995; Craig 1966; Smith 1985). While sailing across the Caribbean, and coasting near beaches explorers would often capture sea turtles and smoke their meat (Exquemelin 1969) or bring them on board where they could be held alive for up to a month (Bjorndal 1995; Craig 1966; Smith 1985).

For each species of exploited sea turtle, there were different methods of capture involved, and a different use and value as a local food source and export commodity (Bjorndal 1995; Craig 1966; Henderson 1811; Smith 1985). Three species of marine turtle were primarily hunted by the settlers of the Bay of Honduras (Craig 1966; Henderson 1811; Smith et al. 1992). The green turtle (Chelonia mydas), was once a major local food source in the early settlement (Craig 1966; Henderson 1811). Uniquely, these turtles would almost exclusively feed on sea grass (Bjorndal 1995; Craig 1966; Smith 1985). They have been highly prized over all others for the quality of their meat (Bjorndal 1995; Dampier 1697; Exquemelin 1969; Henderson 1811; Nietschmann 1972), which has been called "extremely good to eat" (Exquemelin 1969) and "the sweetest of all the kinds" (Dampier 1697). As early as the late 1800s, these turtles were exported to canning facilities where their meat and calipee was turned into turtle soup (Bjorndal 1995; Craig 1966). The hawksbill sea turtle (Eretmochelys imbricata) was less common at meals, but was widely exploited for its beautiful, translucent shell. The outer plates of their carapace, called "scutes", were sold under the label "tortoiseshell" and were widely distributed as material for crafting such things as combs, jewelry, eye glasses and home goods (Smith 1985). The loggerhead sea turtle (Caretta caretta) was a common local food item (Craig 1966; Bjorndal 1969; Henderson 1811; Metzgen & Cain 1925), though we did not find any record that they were ever exported.

By looking at which of these species of sea turtle is more prominently represented by the faunal material recovered from St. George's Caye, we can make assumptions about early turtling activity on the island and the settlers' place in the greater turtling industry of Belize. The distribution of each species across the island can also reveal how involvement in these activities might have differed spatially.

Methodology

The use of historic documents was crucial to the interpretation of the archaeological material recovered from St. George's Caye. The island has been struck by several hurricanes throughout its history that have displaced much of the buried material (Garber 2009), which makes it difficult to interpret its chronology. In effect, the historical literature seemed to be the most reliable source to understand the role that turtling played in the early settlement of St. George's Caye by British buccaneers and to examine the ways in which the turtling industry progressed and changed through time on the Caye and the mainland of British Honduras.

We consulted research conducted by contemporary historians, colonial literary accounts, and a series of historic documents that are currently curated by the Belize Archives and Records Service in Belmopan. Early ethnographic accounts from the Bay of Honduras and the Miskito Coast were used in order to understand historic turtling methods. Two previous studies on the subject include portions of Alan Craig's (1966) book *"A Geography of Fishing in British Honduras"* and a section of a report created by WIDECAST and members of the Belize Audubon Society (Smith et al. 1992).

We also decided to investigate the current locations of the four turtle corrals from the 1764 map of St. George's Caye. The purpose of this was to recover faunal bone that might be present in their current locations, and to determine what species of marine turtle are represented by the remains in each corral. In order to investigate these features we created a map from an overlay of the 1764 map with current satellite imagery of the Caye. This map was used in order to locate these features in the field during the 2014 season.

Norbert Stanchly, of AS&G Consulting, conducted the analysis of all of the faunal bone that was recovered throughout the course of the St. George's Caye Archaeology Project, from 2009 to 2014, during the summer of 2014. The

compiled data from the faunal analysis from all areas of the island was analyzed in order to understand the distribution of the faunal material across the island.

The History of Turtling in Belize

The geography of Belize's shallow coastal waters and barrier reef provided a safe haven for English pirates that were plundering nearby Spanish ships and settlements, and historians have made strong claims that some of the earliest colonial inhabitants of the Belize coast and cayes were British buccaneers (Campbell 2003; Everitt 1986; Henderson 1811; Thomson 2004). Settlement on St. George's Caye goes back at least to the 1550s, and was the center of operations for the pirate Captain Bartholomew Sharp and his crew by the 1670s (Campbell 2003).

As with other settlers and travellers, sea turtles were a steady food source for pirates, and it enabled their operation, as they would hide out in areas officially unoccupied by governing forces (Campbell 2003; Exquemelin 1969; Johnson 1724; Smith 1985). Marine turtle composed most of the buccaneer diet during a voyage (Exquemelin 1969), and famous pirates such as Blackbeard and Charles Vane often encountered turtlers among the keys of the Bay of Honduras (Johnson 2014). St. George's Caye's original Spanish name "Cayo Casina" was misspelled as "key cocina", "kitchen key" in Spanish, on 18th century British maps. The historian Mavis Campbell (2003) has suggested that this could have been altered because the island was originally established as an outpost for smoking meat, a common practice by buccaneers in order to prepare turtle meat for a voyage (Exquemelin 1969).

According to William Dampier (1697) when he and his crew would choose a place to careen their ships, they would most often pick one where there were plenty of sea turtle and manatee that they could kill for food. The 1764 map of the island depicts an area along the western coast of the key that is labeled as a "Careening Ground" (Figure 1). In addition to the island's strategic position and good careening waters, its abundance of sea turtles could have further established it as an ideal location for settlement.

During the colonial era, natives of the Miskito Coast of present day Honduras and Nicaragua had an ongoing relationship with the Bay of Honduras settlement. Up until the mid 1700s, settlers of St. George's Caye would often travel to and from the British settlement on Miskito Coast in order to seek refuge from sporadic attacks by the Spanish (Campbell 2003; Henderson 1811). Given the relationship between the Miskito Coast and St. George's Caye, some inferences about turtling methods along the Belize coast might be gained by looking at those of the Miskito Coast.

The indigenous Miskito have been notoriously skilled turtlers from the colonial era up to the 20th century (Conzemius 1932; Dampier 1697; Nietschmann 1972). William Dampier (1697) reported that the Miskito were "esteemed and coveted by all privateers" because of their skill at catching turtle and manatee. Their unrivaled skill at the hunt was so highly prized that they were often taken on board of British naval and privateering vessels in order to provide food for the crew (Baldwin 1778; Dampier 1697).

The Miskito used a combination of methods that were reported to be in use from the 1600s at least until 1970. The Miskito mainly focused on the capture of green sea turtles, which by meat weight comprised 70% of their diet during the peak season (Nietschmann 1972). Large nets with wide mesh were hung over beds of sea grass with one end anchored, and the other afloat so that when the feeding turtles surfaced for air, they would become trapped (Conzemius 1932; Nietschmann 1972). When hunting turtles in water, two turtlers would usually go out together in a dugout canoe: one to row the boat and the other, the "striker", would direct the rower towards the animals and then harpoon them (Conzemius 1932). Harpooning turtles was the traditional way to catch them, and nets were not introduced until the 1700s when turtles were caught in large numbers for export (Craig 1966).

The 1786 Convention of London extended the settlers' log cutting rights on the Belize mainland in exchange for a Spanish claim to the Miskito Coast. After this, most of the British inhabitants of the Miskito Coast resettled in British Honduras, whereby they quickly

accounted for more than 75% of the population (Everitt 1986). A map created for the 1786 Convention by "a Bay Man" includes some areas between the Belize keys labeled as "turtle grass" (Belize maps 2015). This is a common name for the type of sea grass (Thalassia testudinum) that can be found beneath Belize's coastal waters today, and it was likely named after the animals that feed on it.

In 1790 a British poll documented that almost 25% of the free population was employed in turtling. This included "master turtlers" who owned nets and boats, and those employed by them (Bolland 2004). According to George Henderson (1811) turtlers were generally mobile inhabitants of the keys who would travel in parties of four or five to catch turtles.

By the end of the 1790s, almost 2,000 lbs. of tortoise shell was exported from Belize every year (Thomson 2004). By the 1830s, live green turtles were exported from British Honduras (Craig 1966) and by the late 1800s between 2,000 and 6,000 green turtles were shipped to London every year (Smith et al. 1992). Around this time, turtling had expanded on the coast of the mainland with the erection of a "kraal" alongside Fort George (Belize Archives and Records Service, Belmopan, [BARS], Correspondence, Isaiah Simmins to Superintendent, 21 July, 1852, 39R287), and many market regulations were passed that applied specifically to turtle (BARS, Acts, 19 Victoria Cap. 6, 23 February, 1856; BARS, Acts, 24 Victoria Regina, Cap. 9, 2 April, 1861). The Central American River turtle, known as the "hickatee" was also a popular local food source (Henderson 1811). Though not a marine turtle, this inland river dweller has been called "a very delicious dish". In high demand when it was available, the meat of these turtles would sell at market for up to $4 per pound in 1925 (Metzgen & Cain 1925).

The heavy exploitation of green turtles began to diminish the local population by the 1880s (BARS, Acts, British Honduras Legislative Council, Ordinance [O.] No. 16, 1881; BARS, Minute Papers, Orange Walk District Commissioner to Colonial Secretary, 10 July, 1918, 2205-18). Regulations for their protection began to be passed in British Honduras from the 1880s (BARS, O. No. 16, 1881; O. No. 12, 1926; O. No. 14, 1928) at the same time that over 2,000 green turtles were imported into British Honduras in order to meet local demand (Bristowe & Wright 1889). By the 1890s green turtle exports had decreased to 50-150 turtles annually (Smith et al. 1992).

Despite the decline of the green turtle population, hawksbill tortoise shell trade continued steadily in Belize into the 20th Century (BARS, Minute Papers, James Brodie & Co., Ltd to the Colonial Secretary, 3 September 1918, 2678-18) (Craig 1966; Metzgen & Cain 1925). Over 4,000 lbs. of it were exported in 1919 (Metzgen & Cain 1925), a quantity that would require the processing of between 1,000 and 2,500 hawksbill turtles (Dampier 1697). Much of this shell was used locally but the greater proportion was exported (Metzgen & Cain 1925), until the eventual decline of the hawksbill population (Craig 1966; Smith et al. 1992) and their change in status to a protected species.

The Distribution of Deposited Faunal Remains Across St. George's Caye

The analysed faunal collection consisted of 3,670 individual specimens of faunal bone of various sizes. The analysis aimed to assign each individual specimen to a bone type, and a zoological class. Those species represented in the faunal collection include domesticates such as cattle, pig and goat with the addition of marine turtle, inland turtle, fish and West Indian Manatee.

Divided by zoological class, reptile (i.e. turtle) remains make up 77.5% of the specimens recovered, while mammals comprised 17.1%, and the remainder included bird, fish, and marine invertebrate remains (Table 1). Of the turtle remains, 44.6% were fragments of turtle bone that were unidentifiable by species. These fragments were most likely green and loggerhead turtle, and possibly hawksbill. The majority of the identified turtle bone was loggerhead, at least 27.8% of all turtle specimens, while the Central American River turtle, known as the hickatee, comprised 2.8%, and the green turtle 2.2%. Of the loggerhead bones, 99.8% are fragments of the shell, both the plastron and the carapace, while one loggerhead limb bone was identified.

Table 1. List of Identified Taxa.

Taxon	Common Name	NISP	%
Class Reptilia			
Caretta caretta	Loggerhead	657	27.8
Chelonia mydas	Green Turtle	51	2.2
Dermatemys mawii	C. American River Turtle	67	2.8
Order Testudines	Indeterminate turtle	1,053	44.6
Class Reptilia	Unidentified reptile	3	0.1
Class Mammalia			
Bos taurus	Domestic Cow	15	0.6
Capra hircus	Domestic Goat	3	0.1
Sus scrofa	Domestic Pig	8	0.3
Order Artiodactyla	Ungulate (likely domestic)	12	0.5
Family Cricetidae	Mouse or Rat Family	1	< 0.1
Trichechus manatus	West Indian Manatee	17	0.7
Class Mammalia	Unidentified mammal	349	14.8
Class Osteichthyes			
Order Sparisoma	Parrotfish	1	< 0.1
Class Osteichthyes	Unidentified bony fish	89	3.8
Class Aves	Unidentified bird	19	0.8
Class Malacostraca			
Order Decapoda	Unidentified crab	16	0.7
Class Bivalvia	Unidentified marine bivalve	1	< 0.1
Class Gastropoda	Unidentified marine univalve	1	< 0.1
Total		**2,363**	**99.8**

To study the distribution of faunal types across the island, we divided the faunal data according to areas that have been excavated across the island and within the cemetery (Table 2). Turtle bone accounts for most of the remains across all terrestrial areas of the island, with a range of 82.7 to 62.7 percent of all identified remains by each area. Loggerhead turtle remains account for the greatest proportion of turtle species in terrestrial areas of the caye with the exception of the Fuzy property. Excavations were conducted on the Fuzy property in the 2010 and 2012 field seasons (Garber 2011, 2013) and of the turtle bone recovered, loggerhead remains account for the least amount of those identified by species, while green turtle and hickatee make up the greater proportion. Loggerhead remains recovered from within the cemetery and the Habet property account for a range of 14 to 41.4 percent of identified faunal remains. Within these areas green turtle and hickatee remains each accounted for similar proportions of the remaining identified turtle bone. A stand-alone 1x1 meter excavation unit from the cemetery, XU6, provided the largest proportion of hickatee bone anywhere on the island at 20%, near equal to the proportion of loggerhead bone.

Offshore Testing Along the Coast of St. George's Caye

During the 2014 field season, offshore survey was conducted along the coast of St. George's Caye in order to test the predicted locations of the four turtle corrals and two associated docks depicted on the 1764 map (Figure 1). The new map that was used to predict and locate these features was created through ArcGIS software that overlaid the 1764 map with current Google Earth satellite imagery, and aligned them based on identifiable contours in the island's shoreline. Each predicted feature was titled "TC" for turtle corral and "D" for dock, and numbered sequentially. A series of 24 offshore shovel test pits were dug in roughly waist-deep to chest-deep water and the matrix was water screened using a box screen with 1/4 inch steel mesh. The results of these tests varied

Table 2. Distribution of Identified Faunal Bone Across St. George's Caye.

		PROPORTION OF REMAINS BY LOCATION								
		Cem. Rear	Cem. XU6	Cem. OP1	Cem. Entrance	Fuzy	Habet	TC1	TC2	TC4
CLASSIFICATION OF REMAINS	Loggerhead	41.4%	28.7%	24.1%	21.2%	6.7%	14.0%	1.3%	36.2%	54.4%
	Green Turtle	0.9%	-	1.7%	1.2%	12.0%	2.0%	6.2%	-	-
	Hickatee	0.9%	20.0%	0.9%	1.2%	12.0%	5.0%	1.0%	18.4%	1.9%
	Indeterminate Turtle	31.4%	14.0%	46.6%	59.1%	52.0%	43.0%	82.2%	45.5%	25.2%
	Manatee	0.5%	2.0%	-	0.7%	-	6.0%	0.3%	-	-
	Bird	0.6%	1.3%	1.7%	0.7%	-	1.0%	1.0%	-	1.0%
	Bony Fish	5.1%	0.7%	-	2.3%	2.7%	1.0%	3.6%	-	8.7%
	Parrot Fish	-	-	0.9%	-	-	-	-	-	-
	Crab	0.4%	2.0%	-	0.7%	-	-	0.3%	-	4.9%
	Indeterminate Ungulate	0.2%	-	-	0.7%	-	7.0%	-	-	-
	Domestic Pig	0.4%	-	-	-	-	3.0%	0.3%	-	-
	Domestic Cow	1.0%	-	-	0.7%	-	2.0%	-	-	-
	Domestic Goat	-	-	-	0.2%	-	2.0%	-	-	-
	Indeterminate Mammal	17.2%	31.3%	24.1%	11.4%	14.7%	14.0%	3.9%	-	3.9%
	Indeterminate Reptile	0.1%	-	-	-	-	-	-	-	-

with each area. Positive tests that produced historic material are labeled on the map, as well as negative tests that did not produce historic material (Figure 2).

The seafloor of the areas tested consisted of a thick bed of turtle grass, the roots of which extended through the upper 10 cm of matrix. This zone was composed of white sandy clay. Immediately below this area, the matrix changed to white sand with 60% marine shell fragment inclusions and continued down vertically beyond the termination of each test pit. All historic material was recovered from throughout this lower zone. TC2 and TC4 contained areas adjacent to mangroves with a soft, silt clay matrix that was easily penetrable and slightly colloid that continued to roughly 120 cm below the seafloor. We did not attempt to test much of these areas, and test locations around these features were selected in favor of stable sediment that would be more likely to preserve historic material.

The faunal material recovered from offshore tests had differences in the distribution among the historic corrals. Most of the faunal material from these areas was recovered from TC1, which made up 76.9% and TC4, which comprised 21.6% of the offshore faunal collection (Table 3). Tests placed around TC2 recovered 1.4% of the offshore faunal bone. TC3 was not included in the distribution analysis because there were only two small pieces of unidentified faunal bone recovered from this area. Historic artifacts were present at every predicted feature location, though the highest quantity was recovered from the two positive

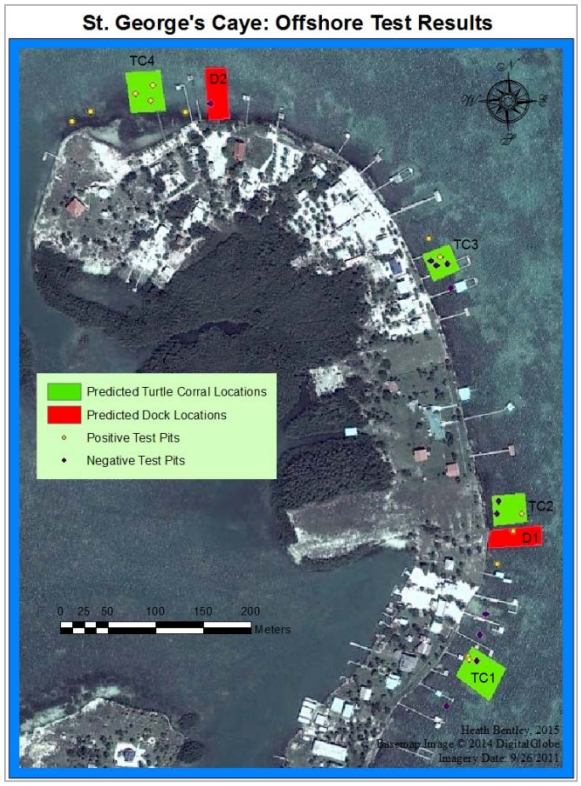
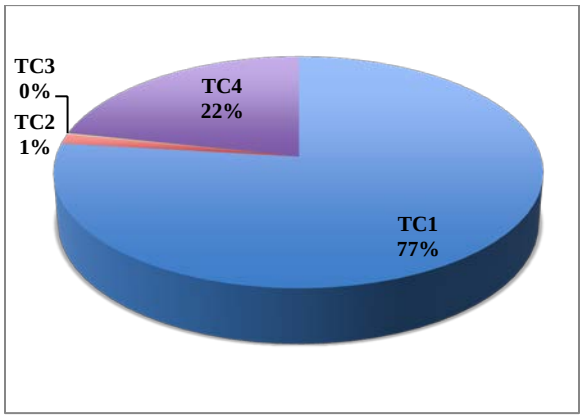


Figure 2. Results of 2014 offshore archaeological testing in predicted locations of historic turtle corrals and associated docks.

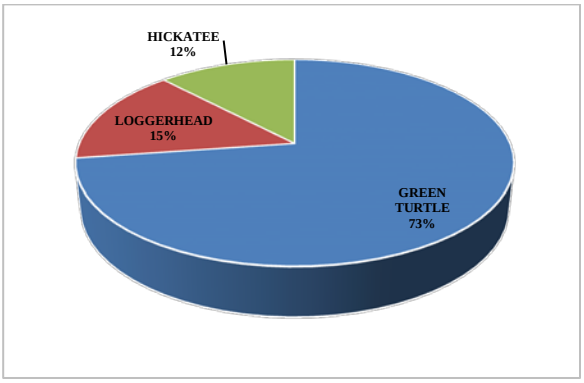
Table 3. Proportions of All Faunal Bone Recovered from Predicted Turtle Corrals.



tests in the TC1 area. These included bottle glass, ceramics and metal.

TC1 is the most southern of the historic corrals shown on the 1764 map (Figures 1 and 2). Among offshore areas, the highest quantity and concentration of faunal bone was recovered from TC1, in the two test pits on the west inside edge of the predicted boundaries. Total turtle specimens make up over 90% of the faunal

Table 4. Proportions of Turtle Species Remains Recovered from TC1.



material recovered from TC1. Green turtle remains make up 72.7% of the identified turtle specimens, with loggerhead at 15.2% and hickatee at 12.1% (Table 4). This makes the TC1 area unique on the key because it is the only location investigated thus far in which green turtle remains make up over a 50% majority of identified turtle species.

TC2 is located alongside the location of a historic dock, D1 (Figures 1 and 2). A large subsurface ballast stone pile was discovered in the summer of 2009 south of the proposed location of D1, which is likely associated with the historic dock. It produced several pieces of marine turtle carapace, and historic artifacts (Garber 2010). The positive test pits from the 2014 field season produced additional historic artifacts, which included bottle glass, ceramics and faunal bone.

Very little historic material was recovered from only 2 of the 6 test pits implemented in TC3. Modern refuse was encountered near the surface in most test pits and the few small historic ceramic sherds that were recovered were followed vertically by a zone that was sterile of cultural material, with the exception of one test pit. This test pit, placed north of the TC3 zone, encountered a large subsurface collection of coral stone with the base of a historic glass bottle.

Testing at TC4, on the north end of St. George's Caye in what is Fisherman Town today, produced historic artifacts with a fairly wide distribution across the area. The highest concentration of faunal bone was recovered from within the predicted TC4 boundary. Offshore tests placed west of this zone produced a higher

quantity of historic glass and ceramic fragments. Loggerhead turtle bone accounts for the greatest proportion of identified turtle remains recovered from TC2 and TC4.

Conclusion

Turtling played an important role in providing sustenance to the early buccaneers who settled in the Bay of Honduras, and was an important aspect of Belize's early economy that provided a large portion of the settlers' diet. Turtling also provides a commonality that links the early settlers of Belize with the inhabitants of the Miskito Coast.

Overall, turtle remains comprise over three-quarters of all identified faunal remains on the St. George's Caye. Loggerhead turtle bone makes up 84% of the turtle specimens that were identified by species across the island, and no hawksbill turtle remains were identified anywhere on the island. The greater proportion of turtle bone present on St. George's Caye could be the result of the way turtles are butchered: the shell is removed in shallow water and discarded on site (Craig 1966). Also, it could be due to the greater proportion of bone on the animals' body compared to other types of animals. The prevalence of loggerhead remains, and limited presence of green turtle remains on the island could be due to the fact that green turtles were exported, and also their slaughter for sale was restricted to the market and the slaughterhouse on the mainland (BARS, Acts, 19 Victoria Cap. 6, 23 February, 1856; BARS, Acts, 24 Victoria Regina, Cap. 9, 2 April, 1861). The presence of green turtle remains in TC1 could indicate that at least at one point in the island's history, these turtles were captured and carried to St. George's Caye, where they met their end.

As green turtles declined in numbers by the late 1800s, those that remained around St. George's Caye could have been capitalized by professional turtlers, limiting their accessibility by local sport & subsistence turtlers. This may have left loggerhead turtles as the most available for local catch, because they occupy a separate niche and feed in separate areas. Loggerhead feed on crabs along the reef (Craig 1966), as opposed to the shallowly submerged grassy meadows occupied by green turtles (Bjorndal 1995; Craig 1966; Dampier 1697).

Additionally, as green turtles were sold live at the market and used for soup, the lesser quality meat of loggerhead turtles may have had a separate treatment. Green turtles may have been consumed widely as documents indicate, and their slaughter and processing may have been restricted to separate quarters than that of the loggerhead. It is quite possible that green turtle meat was butchered at market for sale, and even canned locally. The lesser quality meat of the loggerhead could have been reserved for smoking. Thus, it's possible that these turtles were brought to St. George's Caye, butchered, their meat smoked on site and bones discarded across the island, resulting in a greater proportion of loggerhead bone on the island.

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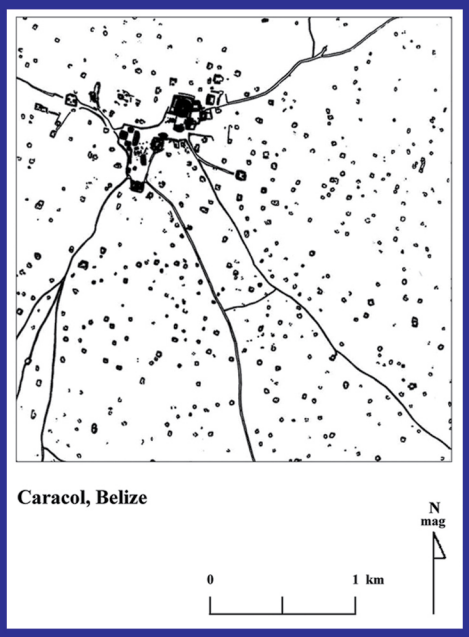

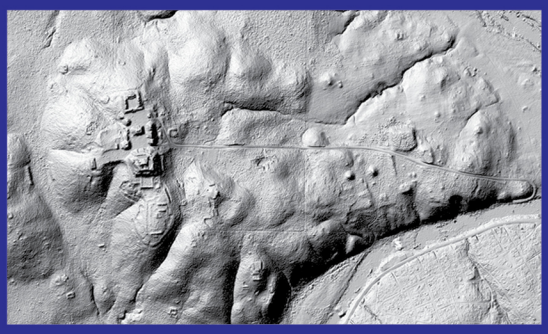

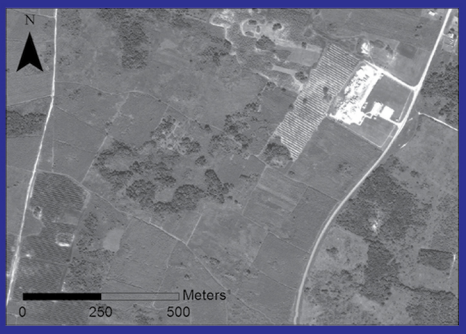

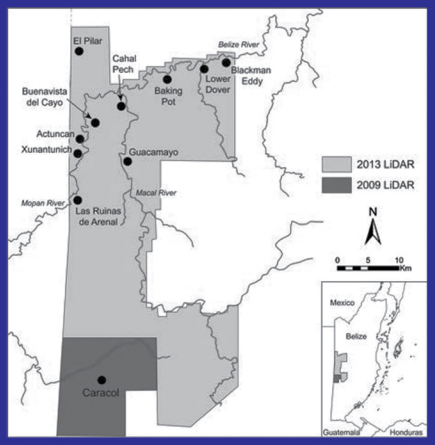

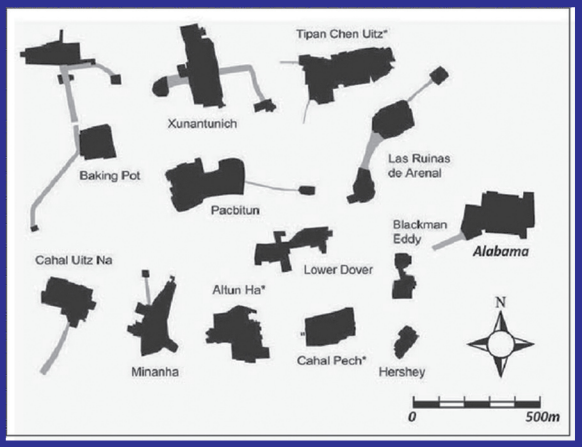

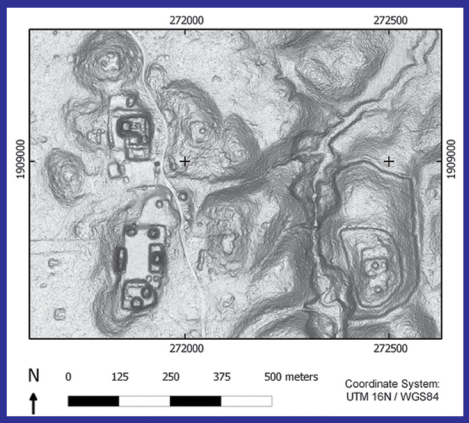

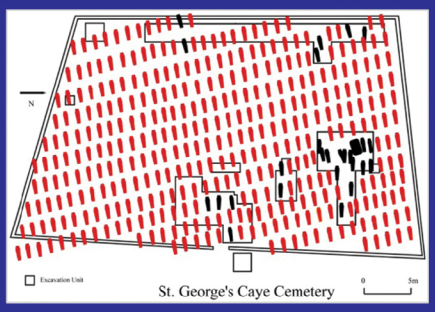

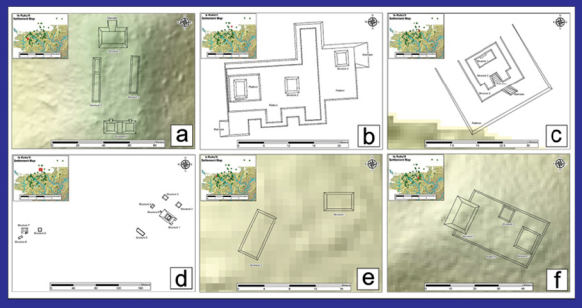

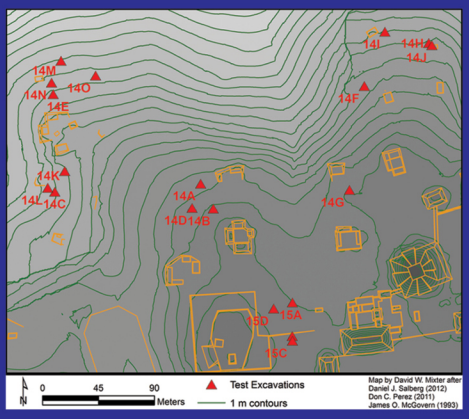

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