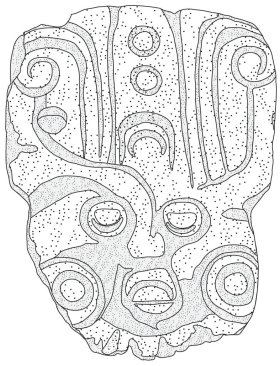
Investigations of the Belize River East Archaeology Project:
A Report of the 2020 Field Season



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Preface and Acknowledgements

Eleanor Harrison-Buck and Marieka Brouwer Burg

This report marks the tenth year of active fieldwork conducted by the Belize River East Archaeology (BREA) Project, which covers an area of 2000 km^2 spanning the mid-lower reaches of the Belize River Watershed. Our work has uncovered a wealth of information on the deep history of Belize from the Preceramic through the Colonial periods. Herein we report on the work of a three-week January 2020 field season; sadly, as was the case for all other archaeological projects, the summer component of this season was cut short by the global Covid-19 pandemic. We want to thank here a number of people who were integral to the planning and execution of the research during the January 2020 field season the results of which are reported herein.

First, we thank our talented group of hardworking staff members: David Buck, Jessica Craig, Adam Kaeding, Céline Lamb, Joe Nigro, Brian Norris, Satoru Murata, Lori Phillips, Hugh Robinson, Katie Shelhamer, and Mark Willis. They brought an incredible range of skills to our work, including archaeological survey and reconnaissance, drone and total station mapping, as well as excavation and lab analysis. We are grateful to them all for taking time to share their expertise with our University of New Hampshire (UNH) field school students. A huge thank you to all of them for their efforts. During the January 2020 field season, we had nine undergraduate students who joined us as part of the UNH "Archaeological Survey and Mapping in Belize" course: Hannah Corrow, Shannon McKelvey, Jessica Prud'homme, Sara McNamara, Sarah Jarrar, Katherine Salvatore, Emma Sauerwien, Tyler Taggett, and Audrey Waterman. These students were trained in survey and mapping as well as excavation techniques. Their field and lab work directly contributed to our overall research objectives and we appreciated their enthusiasm, patience, and hard work throughout the field season. We are also grateful for the work of Katie Titus, Geena Zick, and Fiona Haverland who digitized many of the maps and figures for this report.

Importantly, we wish to thank the many local Belizeans who made this field season such a success. Excavation and reconnaissance efforts were hugely improved through the help of Cardinal Baptiste, Rodwell Conorquie, Roman Crawford, Mark Faber, Edward Bull, Ashton Armstrong, Kenroy Wade, James Flowers, Christopher Crawford, Lawrence Bonner, Bruce Tillett, Dudley Tillett, Steve Flowers, and Charlie Wade. Lab assistance was provided by Chelsey Reneau and Icilme Crawford. We are appreciative of Marv Tillett who ferried students on various excursions and George Petkau, our amazing mechanic who continues to keep our fleet of aging vehicles operational year after year. Our work in Belize would not have gone so smoothly without the tireless efforts of our hosts at Tillett's Village Lodge, including the upkeep and maintenance of our laboratory space housed on their property. Ms. Judy Tillett kept us well fed and we are grateful for the warmth, friendship, and wonderful hospitality of their entire

family. We are so grateful to these many folks and the warm welcome from the many Crooked Tree Village residents who we encountered during our stay. This includes the village chairman, Mr. Godfrey Smith Jr., who not only facilitated our stay and our research, but also helped us maintain contact with the community during COVID and kept us up to date with the welfare of the village. During the two-year hiatus, the Village Council and members of the Museum Board managed the upkeep of the Crooked Tree Museum and Cultural Heritage Center, which remained closed throughout the pandemic. We also wish to thank Dr. Sara Clark-De Reza of Washington College who has maintained the museum social media platforms and website, including the development of an online virtual tour of the museum, which she produced with her fabulous collaborator, Raven Bishop, Instructional Technologist at Washington College. We thank all of these people for their help and support of the museum during this challenging time.

The museum and our BREA research conducted during the 2020 season would not have been possible without the generous support of the Alphawood Foundation. We are deeply grateful for the continued support of Alphawood who has provided BREA funding since 2011. Thanks to their support, BREA has been able to accomplish a tremendous amount of work over the last decade. In addition, the University of New Hampshire (UNH) sponsored the BREA archaeological field school, which provided additional support for the project. Many individuals from UNH deserve a large note of thanks for their help in facilitating the logistics and finances of this research project, namely Angela Prescott-Bell and many others in the Purchasing Department and Office of Financial Affairs at UNH. We also appreciated all the efforts and hard work of Mike Merrill, who serves as the UNH Study Abroad Coordinator and offered critical assistance in the Belize field school study abroad program. We are grateful to Emerson Doiron of the Department of Anthropology at UNH for providing continuous administrative support before, during, and after the January field season. Dr. Meghan Howey, the Chair of the UNH Anthropology Department also provided valuable support to the project, including letting us borrow her Top Con Total Station–thank you! We also wish to give a special thank you to Margaret Gilman of the Department of Anthropology at the University of Vermont for facilitating all things travel-related for Marieka Brouwer Burg. Additionally, we would like to thank the UVM College of Arts and Sciences as well as the Office of the Vice President for Research for their generous contributions to this research.

We are particularly grateful to the youngest members of the BREA team—Eliza & Natalie Buck—who joined us during our field season in 2020. They were big helpers in the field and lab and, as always, provided much joy in our camp, making us laugh each day. The archaeological permit for the BREA study area was granted by the Belizean Institute of Archaeology as part of the National Institute of Culture and History and we are grateful for their support. We would like to especially thank the Institute staff, including Melissa Badillo, Delsia Marsden, Antonio Beardall, and especially the Director of the Institute, Dr. John Morris, for all his guidance, encouragement, and continued support for our BREA project.

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Edited by Eleanor Harrison-Buck and Marieka Brouwer Burg

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Chapter 1

Introduction to the BREA 2020 Season: Investigations in the Middle and Lower Reaches of the Belize River Watershed

Eleanor Harrison-Buck and Marieka Brouwer Burg

The year 2020 marked the tenth anniversary since the Belize River East Archaeology (BREA) project was initiated. It turned out to be far from a traditional year of field work. Little did we know that shortly following the BREA January 2020 field season the world would become afflicted by the deadly COVID-19 virus and succumb to a multi-year global pandemic. This was not only a massive disruption to our normal daily lives, but also resulted in a lengthy hiatus of our fieldwork and research. The country of Belize shut down the airport and its borders and the Institute of Archaeology did not grant the renewal of any archaeological permits for the next two years. Throughout this time, the BREA project has been unable to return to Belize. Therefore, this report just documents our archaeological investigations from a single field season carried out in January 2020 and is relatively brief compared to our normal interim reports, which usually capture multiple field seasons.

The BREA investigations over the last ten years have documented a deep history, beginning thousands of years ago in the preceramic (Archaic) period. We also have documented ample Maya occupation, including their settlement, production activities, ritual ceremonies and other aspects of daily life. Between 2011-2020, the BREA project identified roughly 2500 Maya mounds and colonial period archaeological sites within the study area, most of which were not previously reported or documented archaeologically. The BREA study area encompasses the watershed of the eastern half of the Belize River Watershed, between Belmopan and Belize City, and represents an area measuring over 2,000 sq. km (**Figure 1.1**). An overall goal of this interdisciplinary research project has been to document changing human-environment interaction through time, specifically examining wetland use in this low-lying coastal zone. The BREA study area contains over 122 sq. km of perennial wetlands (28% of all wetlands in Belize) and our investigations have revealed a long history of human-wetland interactions through time. In addition to our archaeological research, we have continued our active public outreach and engagement with the local Creole community following the opening of the Crooked Tree Museum and Cultural Heritage Center in 2018 (see Harrison-Buck and Clarke-Vivier 2020; Harrison-Buck et al. 2020).

This current report of the BREA project details the results of our survey, mapping, and excavations from the January 2020 field season. While the three-week field season was relatively brief, as usual it was exceedingly productive. Since 2015, the BREA project has devoted most of our time to investigating this area in the easternmost part of the Belize River

Watershed, which comprises a low-lying coastal zone with numerous small creeks and tributaries along with sizeable tracts of perennial wetlands and lagoons (**Figures 1.1** and **1.2**). However, during January 2020 we also returned briefly to the middle reaches of the Belize River Valley where we conducted a satellite mapping project, which is described below.

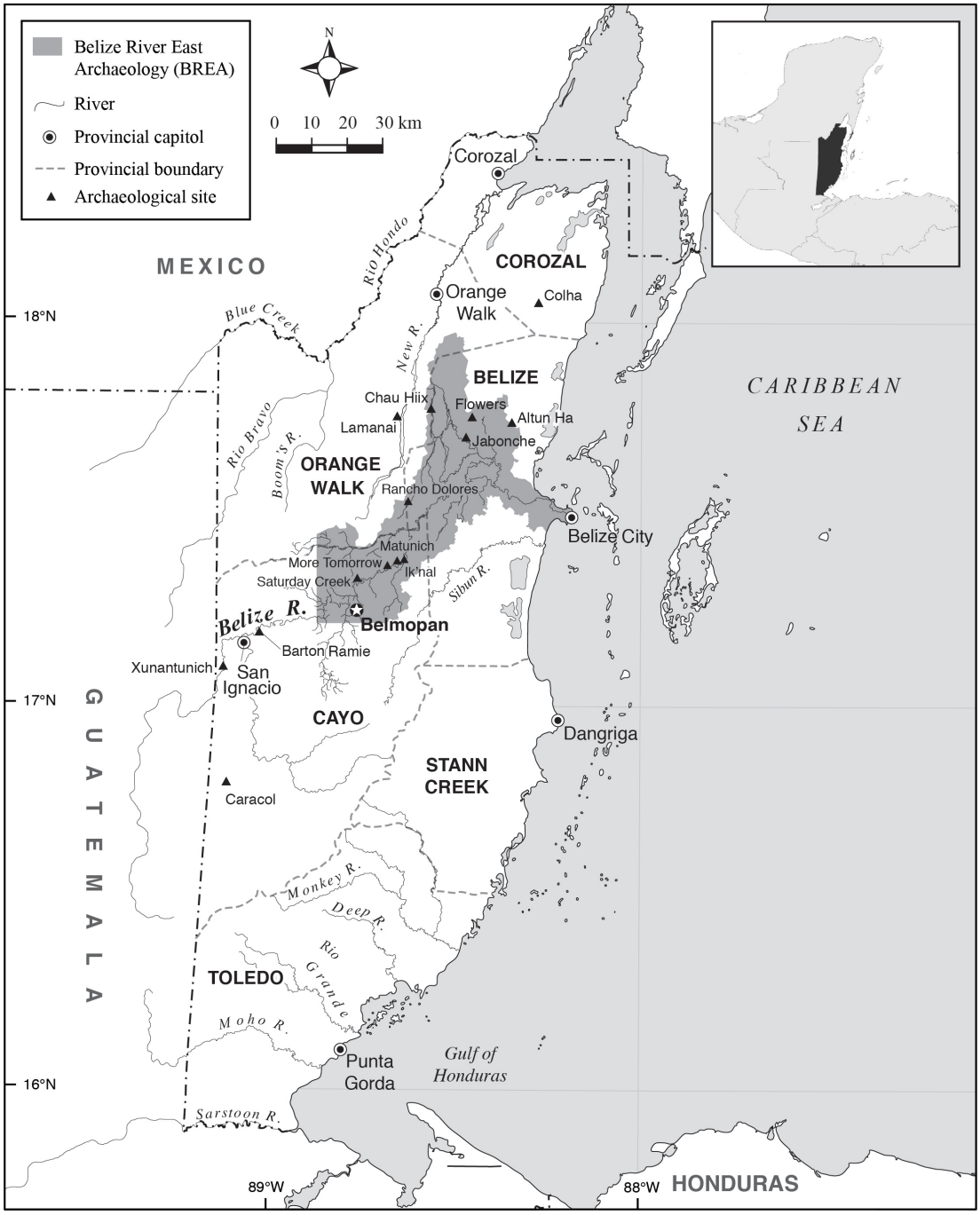

Figure 1.1 Map of Belize showing BREA study area (map prepared by M. Brouwer Burg).

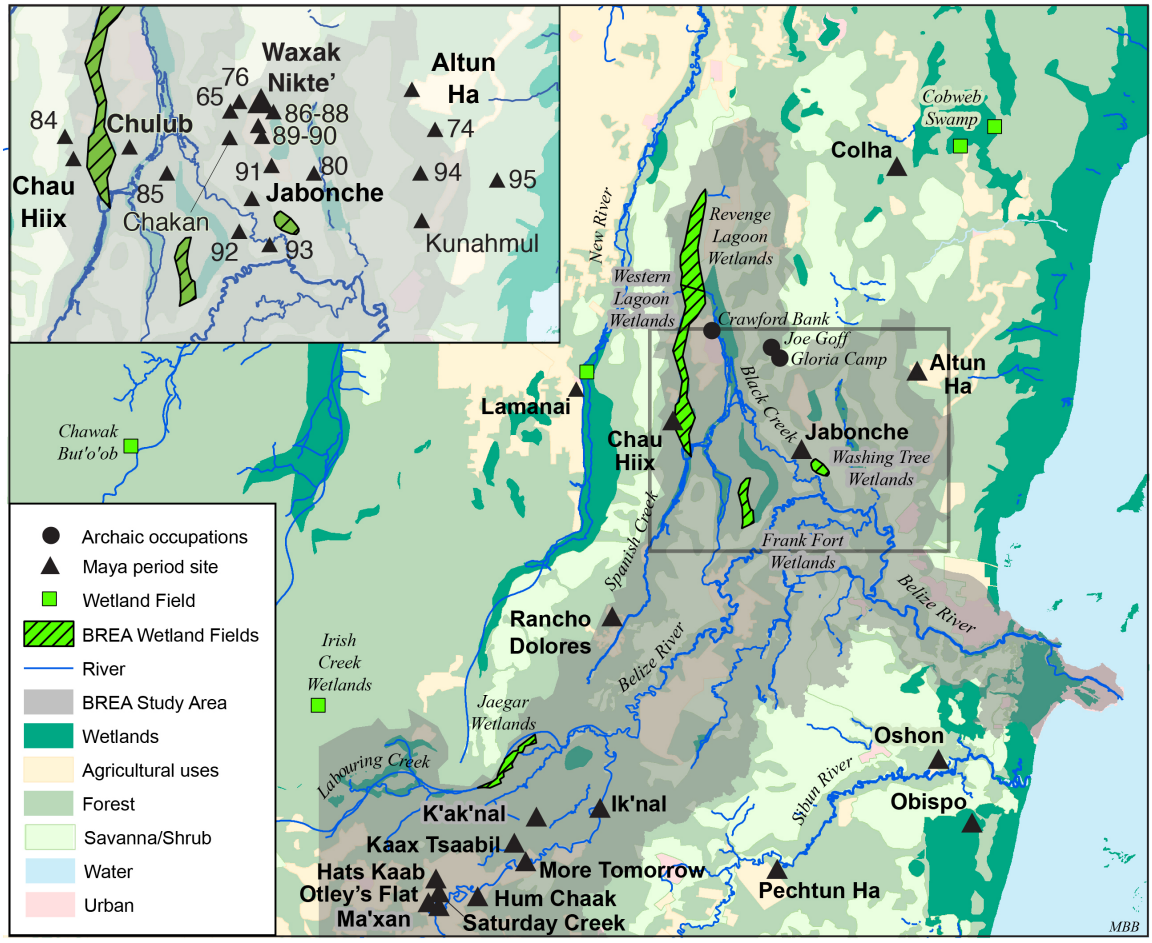

Figure 1.2 BREA study area showing Maya and Archaic sites in the middle and lower Belize River Watershed (map prepared by M. Brouwer Burg).

Background to the Research

Over the last decade, our investigations of the BREA study area have identified a dense occupation and a long history of settlement in the middle and lower Belize River Watershed (**Figure 1.2**), extending from Preceramic to Colonial times, ca. 8000 BC-AD 1950 (Brouwer Burg et al. 2014; Brouwer Burg et al. 2015; Brouwer Burg et al. 2016; Harrison-Buck 2011, 2013, 2015a, 2015b, 2018; Harrison-Buck et al. 2012, 2013, 2015, 2016a, 2016b, 2017, 2018, 2019, 2020; Runggaldier et al. 2013). The Maya sites in the BREA study area range in size, from small house lots to larger centers with ballcourts and pyramidal architecture. Using a Total Station, we have mapped a number of these sites in the farthest eastern reaches of the study area, including Waxak Nicte', Ek'Tok, and Jabonche that are more sizeable centers and Chulub, which is a smaller production site on the southern end of the Crooked Tree Island (refer to **Figure 1.1**).

In addition, these and other sites have been recorded with a handheld GPS unit and sketch mapped. All site data has been inputted into our master BREA GIS database.

The sites are primarily located along the main trunk of the Belize River, but some sites also have been found along tributary creeks and lagoons to the north and south of the river. For instance, the sites of Ek'tok and Chulub are located along the seasonally inundated lagoon and wetland systems in the Crooked Tree area (see **Figures 1.1** and **1.2**). Waxak Nicte' is more unusual in its placement in the area in between Black Creek to the west and Jones Lagoon to the east. The latter is situated closer to the coast and consists of a saline brackish lagoon while Black Creek consists of freshwater.

Unlike the uplands, we have found that settlement in this low-lying coastal zone is situated in relatively isolated pockets of higher ground. For instance, both Waxak Nicte' and Jabonche—two of the largest sites that we have identified and mapped between Chau Hiix and Altun Ha—are positioned on the few areas of high ground found east of Black Creek, a tributary of the Belize River (Harrison-Buck et al. 2016; Murata and Robinson 2015). The areas around Waxak Nicte', Jabonche and other neighboring sites, such as Chulub, Ek'tok, Chakan, and Kunahmul are surrounded by marginal land inadequate for farming. For this reason, Harrison-Buck (2014) has argued that these sites were likely heavily reliant on the wetlands for agriculture, building ditched and drained fields (visible in satellite imagery), while also relying on these biologically rich environments for hunting and aquaculture.

In addition to planting platforms, we find wetland features called "pocket bajos"—small karstic depressions that cut into bedrock that are desiccated in the dry season but become seasonally inundated during the rainy season (Dunning et al. 2015:95). We find a pattern of settlement aggregation during the Terminal Classic to Early Postclassic where structures are interspersed around and purposefully aligned with the edges of these small depressions, which may have been modified and used as temporary water storage, turtle ponds and a variety of other purposes in antiquity (see Grauer 2020; Runggaldier et al. 2020).

2020 Field Work

This report is divided into two main sections detailing the fieldwork conducted during the January 2020 field season. The chapters in "Section I" discuss fieldwork involving our archaeological survey, mapping, and reconnaissance efforts. Chapters in "Section II" report on our investigations carried out at sites in the lower Belize River Watershed. Below, we provide an overview of each of these sections and the chapter contributions included therein.

Section I: Survey, Mapping and Reconnaissance

Mapping the Middle Reaches of the Belize Valley with Drones

During January 2020, we returned to the middle reaches of the Belize River Valley for a satellite mapping project using Unmanned Aerial Vehicles (UAVs, or drones) and carried out some pedestrian survey (**Willis and Nigro, Chapter 2**). The drone mapping was concentrated in an area that has come under intensive cultivation of sugar cane in recent years by Santander Inc., among other local farmers who have cleared vast acres of property along the north side of the Belize River between the confluences with Saturday Creek and Labouring Creek drainages. Following a long period of drought in summer 2019, the first author noted an expansive network of wetland ditched and drained fields on Google Earth satellite imagery, which are most visible during dry periods when moisture is retained in the linear ditches (**Figure 1.3**). The series of ditched fields are oriented north-south and are visible primarily on the north side of the Belize River in the areas cleared of vegetation, extending across what was once a low swampy area just east of the Saturday Creek confluence. Once cleared for planting, these wetlands were drained and transformed into modern farmland; however, vestiges of the wetland fields remain intact. Notably, the fields appear directly associated with a series of small settlement clusters (see **Figure 1.4**). In their chapter, Willis and Nigro report on their drone survey and mapping efforts in this area, along with their settlement reconnaissance, which was carried out here during the January 2020 season.

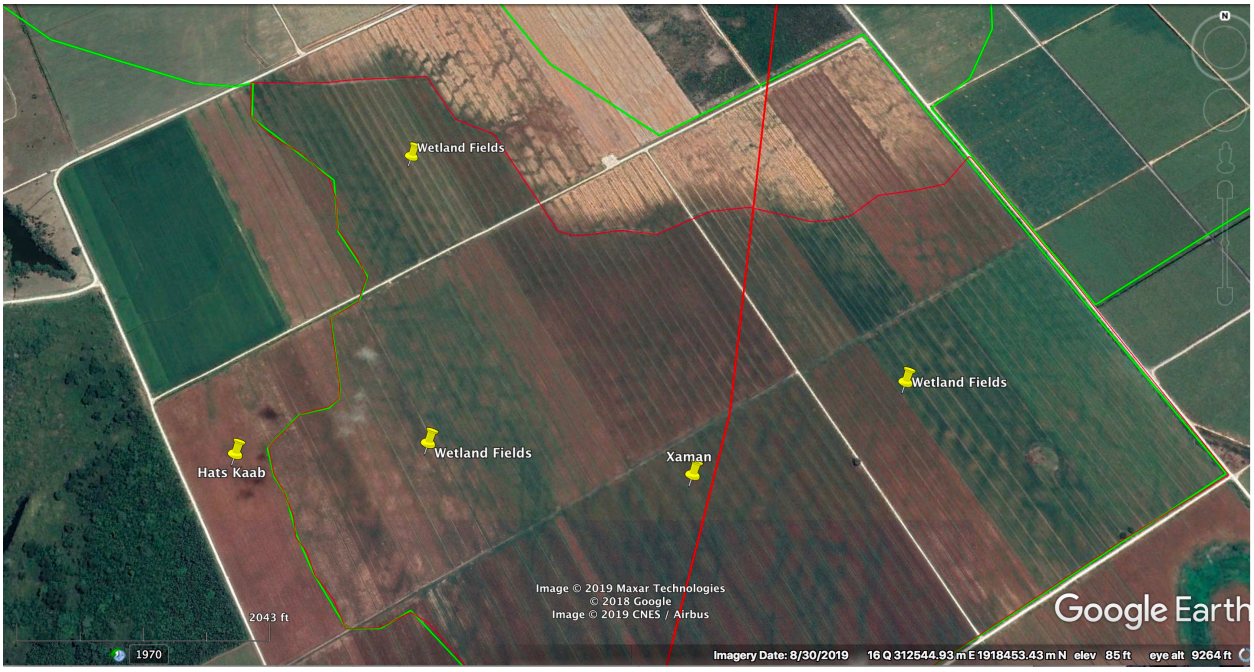

Figure 1.3. Close-up of ditched and drained fields in the middle Belize River Valley visible in Google Earth satellite imagery from August 2019.

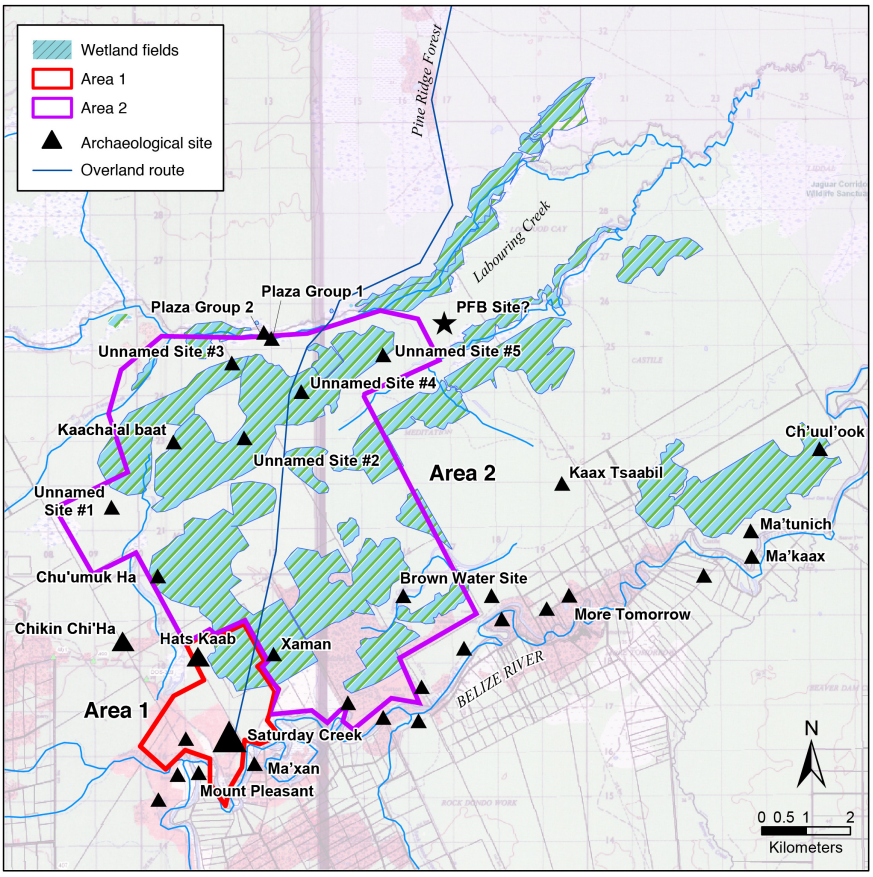

Figure 1.4. Map showing distribution of ditched and drained fields visible in Google Earth satellite imagery in the middle reaches of the Belize Valley (map by M. Brouwer Burg).

Reconnaissance and Mapping in and around Biscayne

Our survey and mapping work during January 2020 was primarily focused on the site of Waxak Nicte' (also known as the Flower's site) located in the modern village of Biscayne just off the Northern Highway. Biscayne is not far from our base camp in Crooked Tree Village. During January 2020, our reconnaissance team focused on surveying the hinterland settlement in the vicinity of Waxak Nicte' (**Buck and Robinson, Chapter 3).** The site of Waxak Nicte' has a sizeable ceremonial center but it has been heavily damaged by quarrying, apparently for road fill during the construction of the Northern Highway. The highway bisects the archaeological site, which has been further broken up by the development of farms and house lots developed by different landowners in Biscayne. As a result, our documentation of the site of Waxak Nicte' has been somewhat piecemeal. Reconnaissance in February of 2015, summer of 2016, and January 2020 documented ancient Maya settlement on the property of Enrique Quiroez, Brian and Therese Hines, Pastor Hugh Tillett, Irvine Reyes, and Charles Wade (**Buck and Robinson, Chapter 3**; Murata et al. 2018; Norris et al. 2015). Given their proximate location, this

collection of settlement probably represents satellite groups associated with the Waxak Nicte' site center.

Our survey and mapping efforts in January 2020 were concentrated in several of the plaza complexes on land owned by Irvine Reyes (**Figure 1.5**), which is to the south of the Tillett and the Jex properties where most of the larger structures once stood, although now they have been mostly gutted by large quarries (**Murata, Norris and Robinson, Chapter 4**). The intact mounds on the Reyes property were first documented and sketch mapped in the summer of 2016 (Murata et al. 2018). During January 2020, our team mapped with a Total Station all of the mounds on the Reyes property along with another satellite plaza group on the Charles Wade property father to the south. There is evidence of a possible ancient road along the northern edge of the Reyes property that may have been part of an ancient causeway connecting to the main ceremonial center to the north (see **Figure 1.5**). In addition to a topographic map, one of the complexes that we refer to as Ceiba Plaza on the Reyes property was the site of several test excavations during January 2020 (see below).

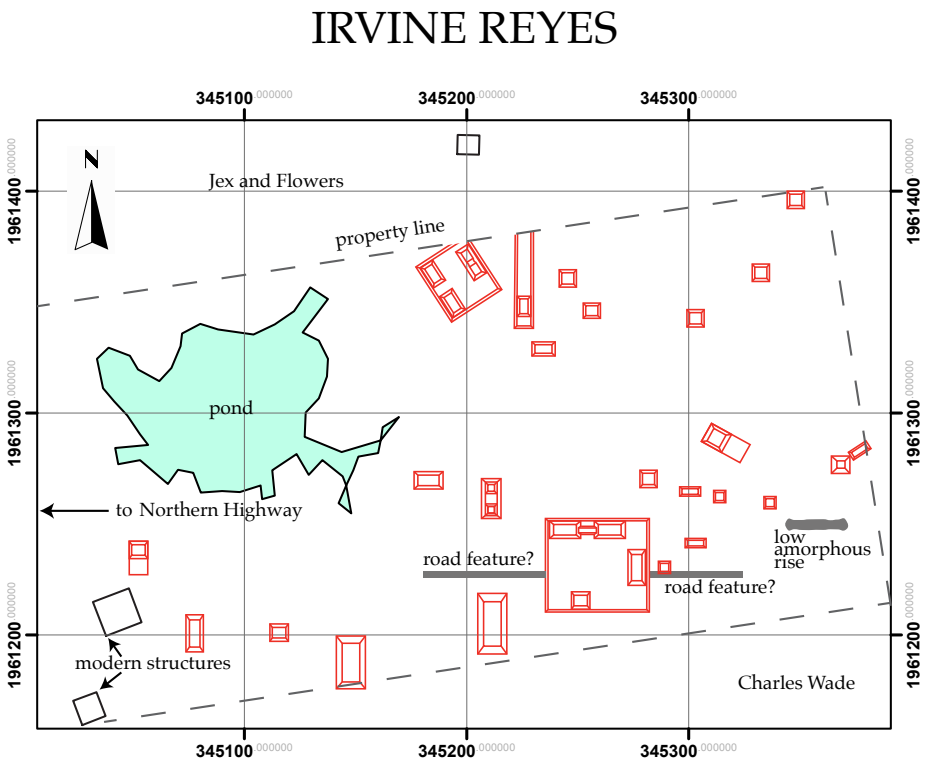

Figure 1.5 Rectified map of settlement on the Irvine Reyes property (*after* Murata et al. 2018:Fig. 4.4)

Section II: Site Investigations

During the field season of January 2020, BREA carried out test excavations at Waxak Nicte', while the site was concurrently mapped with a Total Station. In addition, we performed excavations at the Crawford Bank site on Crooked Tree Island where both historic and Preceramic occupation has been previously identified (Harrison-Buck et al. 2018). The findings from these excavations are presented in the chapters in this report and are summarized below.

Further Investigations of the Preceramic Occupation at the Crawford Bank Site

During the January 2020 field season, our investigations in the lower Belize River Watershed included a long 1-x-20 m test excavation at the Crawford Bank site (**Figure 1.2**). We devoted a little over a week of the field season to further investigate evidence of a Preceramic occupation at the Crawford Bank site on the eastern shore of Crooked Tree Island (see **Brouwer Burg, Chapter 5**). The Preceramic occupation was first revealed in excavations carried out during the summer of 2017 where investigations also further exposed an historical artifact scatter partially visible on the ground surface (Harrison-Buck et al. 2018). A dense historical occupation was also exposed in Operation 51 carried out in January 2020. While no preceramic tools were identified in the latter season, a heavy density of lithic debitage was recovered from Operation 51. In prior studies of the lithic debitage from Crawford Bank, use-wear analyses suggested that the lithics were used for the processing of hard wood, such as logwood, which grows in abundance along the shoreline of Crooked Tree Island (Stemp and Harrison-Buck 2019). While diagnostic tools from prior excavations at Crawford Bank point to a Late Archaic occupation, no charcoal was found until the January 2020 season, revealing evidence of charred wood associated with stratified deposits in Operation 51 (see **Brouwer Burg, Chapter 5**). Testing of radiocarbon dates in the future is planned and will hopefully yield a more robust chronology for the preceramic occupation on Crooked Tree Island.

Archaeological Investigations at Waxak Nicte'

We devoted all three weeks of the January 2020 season to carrying out a series of test excavations at the site of Waxak Nicte' (see **Figure 1.2**). We placed one 4-x-8 m test excavation (Operation 52) on the northern structure of the Ceiba Plaza (**Shelhamer, Harrison-Buck, and Craig, Chapter 6**). Excavation of Operation 52 exposed a passageway between two structures lining the north side of the plaza group. The southwest corner of platform Structure 1 and the southeast corner of Structure 2 were exposed, along with some of the surrounding plaza floor. Another test excavation was positioned on the center of the southern side of Structure 2 and exposed a nicely preserved facing wall and steps leading up to the platform structure (**Lamb, Chapter 7**).

Further Historical Test-Pitting Operation around Crooked Tree

One of our goals during the January 2020 season was to further refine our understanding of the historical component of Crooked Tree. Many Belizeans commonly refer to Crooked Tree as one of the oldest (if not *the* oldest) Creole community in the country. During the January 2020 field season, BREA carried out a series of shovel test-pitting, targeting potential areas reported to have historical occupation (**Kaeding, Chapter 8**). Several areas identified by local informants as possible historical areas were investigated, including areas locally referred to as "Breadnut Hill" and "Wade Bank," just south of the Baptist Church on the eastern shore of the Crooked Tree Island. These test-pitting operations were a continuation of a long-term test-pitting program BREA has carried out, beginning in January 2018 and continuing in the January 2019 field seasons (Flanagan 2020; Kaeding et al. 2020; Rybka and Kaeding 2020). Prior investigations have revealed a dense historical occupation on the grounds of the Baptist Church (Kaeding 2020). An 1868 map showed a series of dirt roads leading from the Baptist Church property to other parts of the village. One road led south-southwest along the shoreline to the area known as Wade Bank, suggesting that this locale may also have included an historical occupation. Shovel test-pitting in 2020 exposed evidence of historical material, as well as some Maya Postclassic occupation in the Wade Bank area (see **Kaeding, Chapter 8**).

A final chapter (**Brouwer Burg and Harrison-Buck, Chapter 9**) concludes the 2020 interim report, describing the longer-term goals and objectives of future research for the BREA project. While future investigations will continue to document all facets of the lengthy history in the lower Belize River Watershed, an important component of future research centers around the preceramic period, which is one of the least well-understood periods in Mesoamerican history. Our plans were originally to return to Crooked Tree in the summer of 2020. Little did we know at the time that it would be two years until we ultimately returned to Belize.

Conclusions

This report offers a comprehensive look at the results of our January 2020 fieldwork on the BREA project. The results presented here are a testament to the strength and breadth of our research, which ranges from reconnaissance, survey and mapping, test excavations, and artifact analysis. The final chapter of this report discusses our future directions and goals of the BREA project, including both the long-term and immediate plans for the upcoming season. At the end of January, we thought our next season would be in the summer of 2020. In this case, hindsight is 20/20 (pun intended!). Instead of carrying out a summer field season, our immediate plans were on hold for two years. As a result, our long-term plans in the field and in the lab with artifact processing and analysis will involve quite a bit of catch up in order to continue to expand our investigations of the lower reaches of the Belize River Watershed.

These challenges aside, our research is revealing a deep history of the middle and lower Belize River Watershed, beginning in the Preceramic and continuing through Colonial times (Brouwer Burg et al. 2014, 2015, 2016; Harrison-Buck, ed. 2011, 2013, 2015a, 2015b; Harrison-Buck et al. 2012, 2013, 2015, 2016, 2017, 2018, 2019, 2020; Harrison-Buck and Stemp 2019; Runggaldier et al. 2013). Given the long-term continual occupation, this area offers an ideal context in which to review the changes taking place during periods of significant cultural transformation—first during the Archaic to Preclassic transition, then later during the so-called Classic Maya "collapse" period, and finally during the Spanish and British Colonial periods from the sixteenth through the twentieth centuries. Through our continued investigations in the eastern half of the Belize River Watershed, we aim to expand our understanding of the social, political, and economic changes that occurred in this area through time and reveal the rich cultural and environmental diversity that this area has to offer.

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Chapter 2

Further Reconnaissance in the Middle Reaches: A Drone and Pedestrian Survey

Mark Willis and Joseph Nigro

Introduction

As part of the fieldwork conducted in January of 2020, several areas within the BREA project area were mapped using drones and Structure from Motion (SfM) technologies. The overall goal of this mapping was to gather additional–as well as more accurate and precise–remotely sensed data in order to enhance understandings of ancient Maya landscape management. This work was a continuation of our 2014 and 2017 drone mapping projects (Harrison-Buck et al. 2015, Harrison-Buck and Willis 2018), in which we were able to demonstrate a number of benefits to the work: not only were we able to identify a large number of previously undocumented mound structures in the space of a few days, we have also been able to document the presence of large-scale wetland management structures, such as artificially-constructed canals and ponds. The utility of these remote sensing technologies, and their affordable cost, are changing on a fundamental level the ways in which archaeologists collect, process, and display data. Further, remotely sensed data is helping to refine the kinds of research questions we ask.

Drone equipment is regulated for entry into Belize as telecommunications equipment under Part IV Section 35 of the Telecommunications Act of 2002. The actual flying of the drones is regulated under the authority of the Belize Department of Civil Aviation (BDCA). We applied for and received permission to import and use three drones with the help of the staff at the Institute of Archaeology. The drone mapping project discussed below took place from January 11–19, 2020 and was located entirely within the BREA permit area. Additionally, a focused pedestrian field survey was conducted in a portion of the mapped areas for ground-truthing purposes from January 12–15, 2020. The main research objectives of these mapping missions are listed here.

Objectives

1. To identify evidence of prehistoric ditched and drained agricultural fields.
2. To locate remnants of raised earthen mounds and other related archaeological features.

Equipment and Software

As technology has evolved, drones have gotten smaller, easier to fly, and much better at collecting high quality imagery. We used three DJI Mavic 2 Pro (Mavic) drones. These aircraft weigh about 900g, have a 1 inch, 20-megapixel CMOS imaging sensor, and fold up conveniently for storage and transport (**Figure 2.1)**. The Mavic has a flight time of about 35 minutes and is operated via a remote control and smartphone adapter. In addition to the aircraft, we had 12 batteries and several battery chargers. This allowed us to fly multiple flights each day without needing to return to our accommodations to recharge batteries.

Figure 2.1 One of the Mavic 2 Pros folded and in carrying case (photo by Mark Willis).

Two sets of software were used for data acquisition and initial processing. The first, DroneDeploy, was used for planning the missions and interfacing with the drone while the second, Agisoft Metashape (Metashape) was used for processing the images for GIS analysis. DroneDeploy has both a web interface and smartphone app. The web interface was used to identify areas of interest and to plan missions in those locations. The missions were then uploaded to the smart phone app which was used in the field. DroneDeploy takes an area of interest, drawn as a polygon on an aerial photograph, and determines the optimal number of

flight transects and drone height above the ground based on the output data resolution required by the user (**Figure 2.2**). Once in the field, the app takes the area of interest and flies the drone autonomously in transects while taking multiple overlapping photographs with the camera pointed straight down. The software can pause flights for battery swaps and then resume the flights for maximum data collection efficiency.

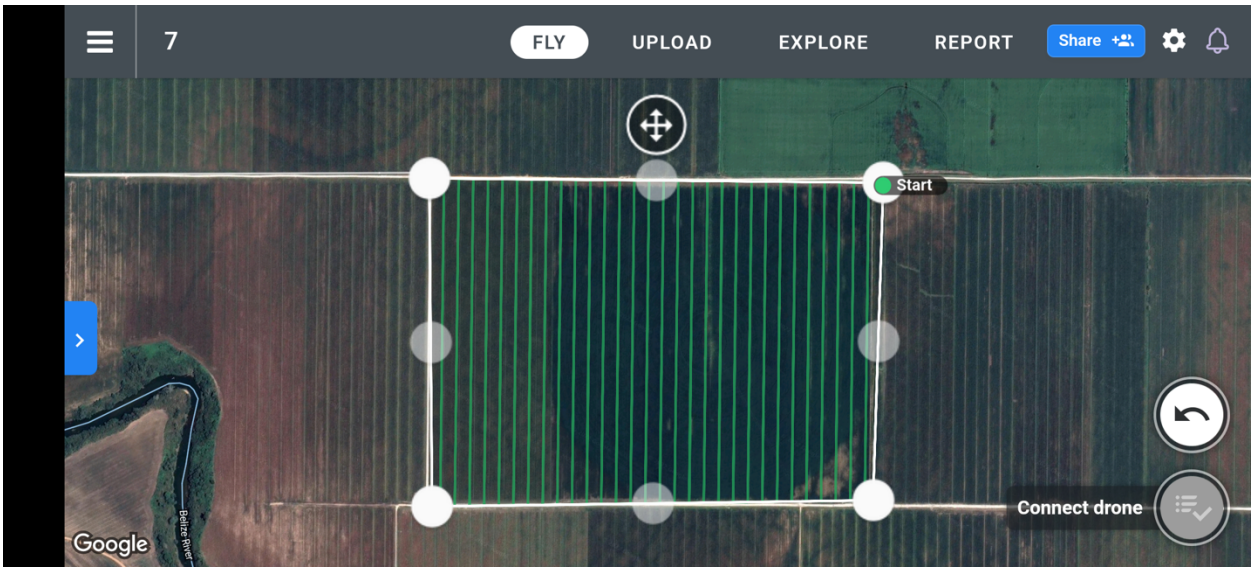

Figure 2.2 Screen capture of the DroneDeploy app with flight transects in green (image by Mark Willis).

The images captured by the drones using DroneDeploy were brought into the Windows-based Structure from Motion (SfM) package, Metashape. SfM is a technology that can create geographically accurate topographic and mosaicked imagery from multiple overlapping images. SfM can only use data in the visual spectrum and cannot image bare earth data through dense canopy. Bare earth data is the elevational data from the terrain without the presence of plants, buildings, or other non-terrain information. SfM processing is CPU intensive, as the processing of thousands of images requires a robust computer, and therefore most of this work was done after fieldwork had been completed. The products derived from Metashape include digital elevation models (DEMs) and orthographic images all accurate to within 1 m or so of true ground locations. Once processed and exported, the DEMs and orthographic images are ready for GIS analysis.

Data Collection

In general, due to the limitations of the software's ability to "see" through dense brush, we focused most of our data collection on areas where crops had not been planted or had been recently planted. We also experimented with flights over a sample of pastures with more mature

crops to see if any archaeological data could be gleaned from those environments. It turned out that many of the places we were interested in had been planted with crops two weeks to a month before our project started.

Four large areas were flown and mapped during the project (**Figure 2.3, Table 2.1**). The two largest blocks were near Saturday Creek, one was over the Canton Ranch (herein referred to as the Kanton Block), and the last over a portion of the town of Biscayne. Each day started with loading up the drones and fully charged batteries and driving to the field. We would find a safe location with a good view of the area we would be flying and then use DroneDeploy to collect data. Every 30 minutes or so, we would land the drone, swap out the batteries, and then leapfrog to a location near where the drone would be restarting its mission and fly the drone again.

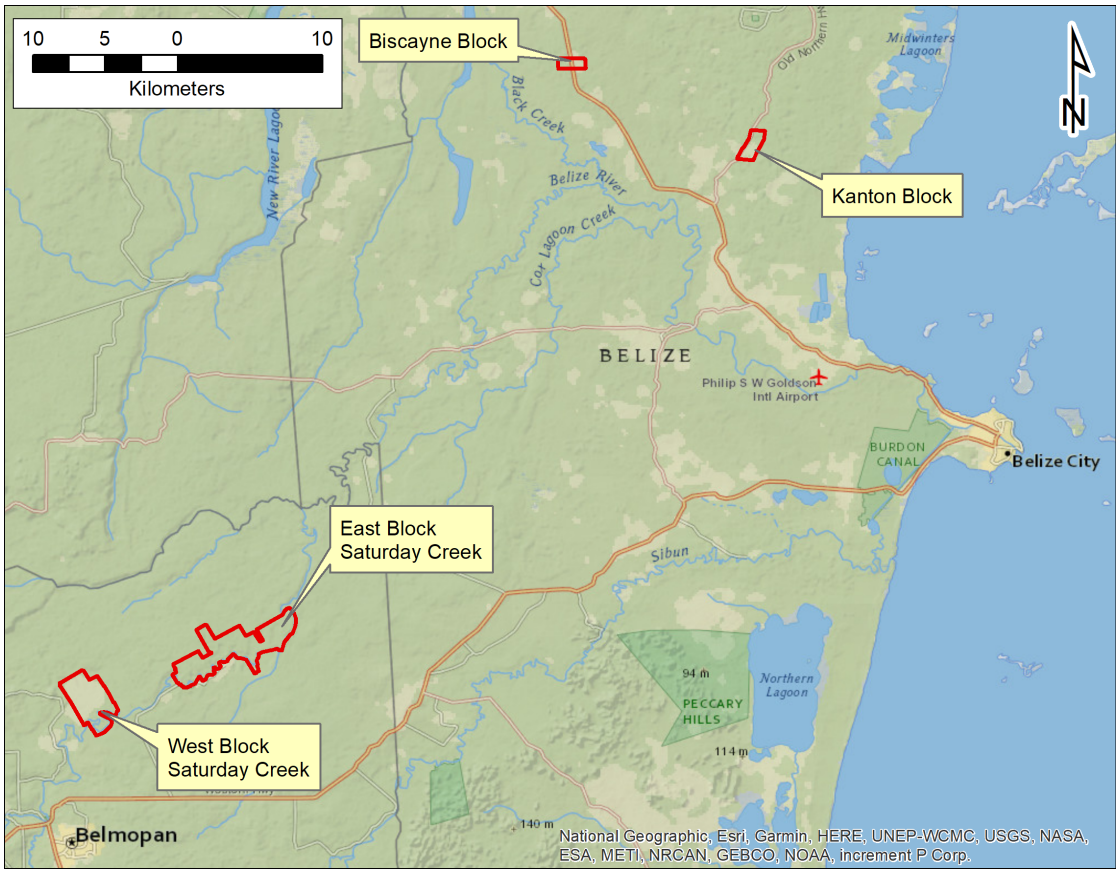

Figure 2.3 Locations of mapping blocks within BREA permit area (map prepared by Mark Willis).

Project Area	Number of Photos	Resolution (cm/pix)	Coverage (km^2)	Number of Flights
East Block Saturday Creek	6,874	4	16.4	31
West Block Saturday Creek	3,850	5	9.3	17
Kanton Block	628	5	2.12	6
Biscayne Block	428	4	1.31	4

Table 2.1 Summary of data collected at the four project locations.

The main obstacles to data collection were storms that prevented flying the drone, as well as the muddy roads that hindered access to survey areas (**Figure 2.4**). Most storms lasted less than 30 minutes and we would stop flying and wait for conditions to improve. During work near Saturday Creek, we had to land the drone when a crop duster began flying in the general area. When the pilot, Abe Rempel of Orange Walk, landed we let him know what we were doing, and we developed a plan to ensure that our work was safely away from his crop dusting flight paths. We had no close encounters with his or any other aircraft.

Figure 2.4 Examples of conditions and challenges during the project (photos by Mark Willis).

When weather precluded further flying, or we had used up the batteries, we would head back to our lodgings at Banana Bank or Tillet's Village Lodge, download the data from the drone's memory cards, and check the images for quality and proper coverage. The drones would also be cleaned and checked for any damage or mechanical problems and all the batteries were charged for use the next day.

Pedestrian Survey

While the drone survey was being conducted, a pedestrian survey was carried out in the East and West Blocks of the Saturday Creek study area to provide ground truthed information on the detection of archaeological features. The pedestrian survey took place over the course of four days riddled with rain storms making some of the areas inaccessible due to flooding and deep mud, as well as some high vegetation typical of the growing season.

Figure 2.5 Location of pedestrian surveys undertaken in both the East and West Block Saturday Creek (map prepared by Joseph Nigro).

The ground truth data collection was carried out using both a handheld Garmin eTrex 30 GPS unit as well as the Trimble GeoXH model used in previous BREA seasons. Due to the conditions, the former proved to be more consistent and reliable for satellite acquisition and less cumbersome to work with during times of downpours while navigating through densely vegetated fields. While the Trimble GeoXH has a stated accuracy of 30 cm (Environmental Equipment and Supply 2019), the accuracy of the Garmin unit is within 5 to 10 m (Garmin

2005). When compared to the corresponding Trimble locations, the Garmin was found to be sufficient for the recording of general feature locations on the landscape.

The pedestrian survey revealed evidence of mounds and some possible mounds that were identified based on elongated shapes marked by a rise in terrain elevation, which could actually represent raised fields. In a few instances, samples of lithics and pottery were also observed. The majority of features were detected in the West Block of the Saturday Creek Area (**Figures 2.6.** and **2.7**), although we note that some of the terrain in the East Block was difficult to assess due to the presence of tall, dense vegetation. In fact, there remain uninvestigated pockets within each survey area. When comparing the results of the ground truth survey to the drone imaging shown **Figure 2.11**, some coincidence between mound identification can be seen.

Figure 2.6 Features identified in pedestrian survey of areas within the West Block of the Saturday Creek Area (map prepared by Joseph Nigro).

Data Processing and Analysis

Data processing began after fieldwork was completed and we had returned to the United States. It was around this time that talk of a virus ravaging Wuhan, China was broadcast across the media and within a month the world was shut down due to the Covid-19 pandemic. We consider ourselves very lucky to have been able to complete a season of fieldwork before the nearly two-year long lockdown started.

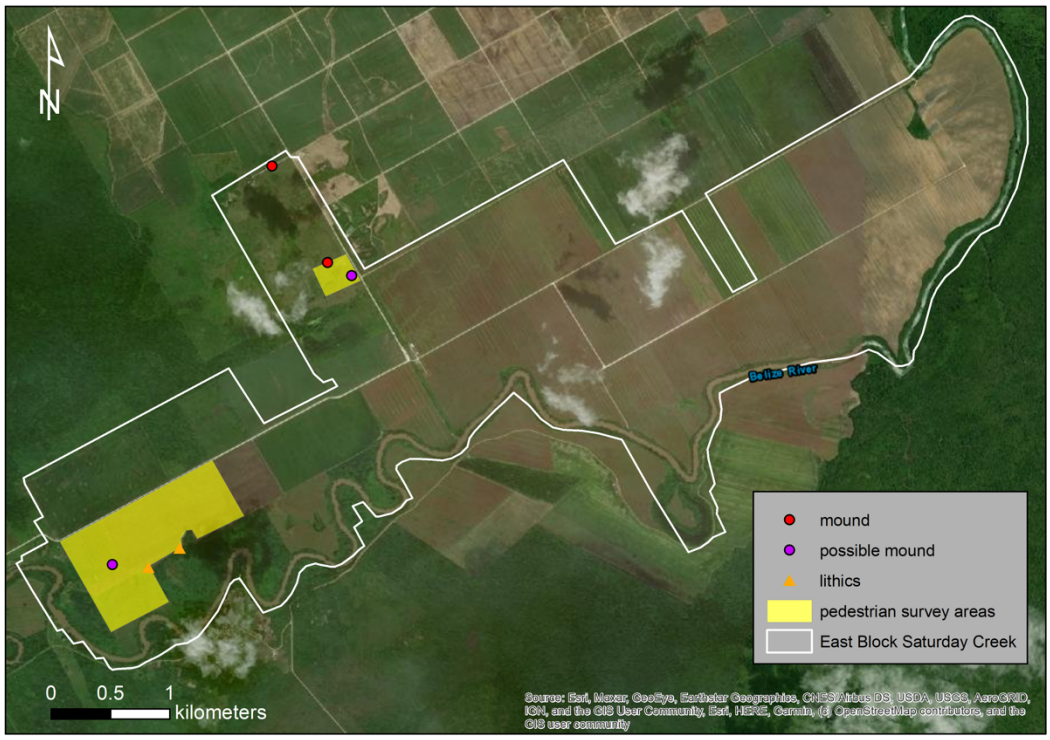

Figure 2.7 Features identified in pedestrian survey of areas within the East Block of the Saturday Creek Area (map prepared by Joseph Nigro).

The images from the four areas we flew were imported into Metashape and processed separately using a Windows based computer with 128 gigabytes or RAM, three high-end video cards, and the latest CPU processors. At the time of this writing, the computer system was considered high-end and was designed specifically for handling these types of complex data. After several hours, or in some cases several days, Metashape turned the photographs into DEMs and expansive orthographic images. These were loaded into ArcMap 10.8.2 for review. In addition, the DEMs were converted into shaded relief maps in Surfer 13 and Global Mapper 23.1. While the orthographic images are good for examining the color and texture of the mapped areas, the shaded relief models help exaggerate topography and make prehistoric mounds and other features easier to see.

East Block Saturday Creek

The East Block of Saturday Creek was the largest area surveyed and consists almost entirely of modern cultivated fields. Much of the East Block had been surveyed by the BREA team in previous field seasons (see chapters in Harrison-Buck 2011 and 2015). During the January 2020 season, a few pastures were recently planted and were mostly bare ground, but most of the fields had been planted and were well covered with vegetation, including soybeans and some sugar cane. Most of the sugar cane was over 2 m tall while the other crops ranged

from 10 cm to as much as 70 cm in height. In an ideal situation we would have flown the area before any crops were planted, but there are many variables determining when the farmers can plant and we were a little late for the best conditions. We used this as an opportunity to see if mounds could be identified within areas of crop growth. As each field was a monoculture and the plants had germinated at roughly the same time, the heights of each plant were about the same. In theory this provided a proxy for the height of the ground beneath the crops (**Figure 2.8**). We found that many mounds were identifiable within the soybean fields but that the sugarcane completely masked the underlying ground surface. More than 50 potential mounds were visible in the data from this project area. Given the results from a similar survey area without crops in 2014, one would expect there to be a great many more mounds, but the smaller ones may be obscured by the crops.

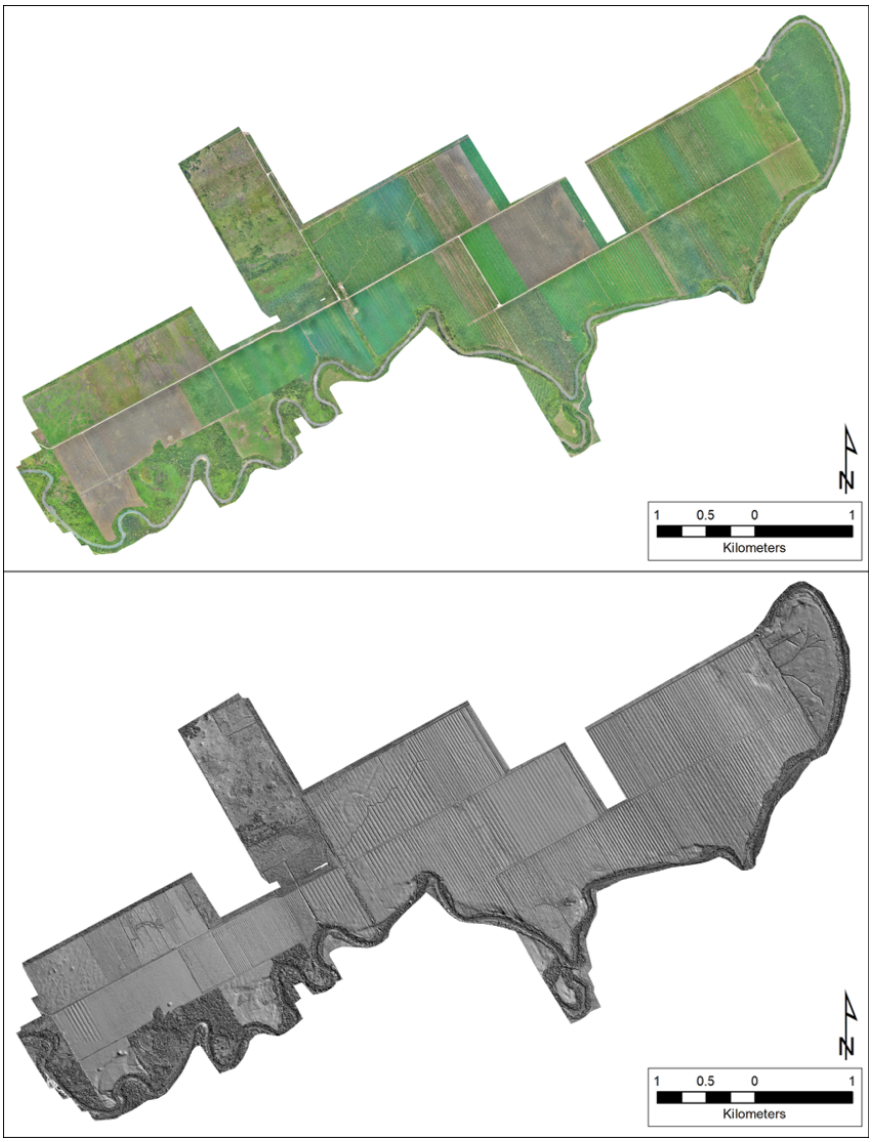

Figure 2.8 East Block of Saturday Creek: Orthoimage (top) and shaded relief model (bottom) (maps prepared by Mark Willis).

The northwesternmost part of the survey block was very recently planted with crops and was almost entirely bare, void of tall vegetation. When the orthographic data for this area was reviewed, discolorations in the soils appear to show raised prehistoric agricultural fields like those identified by Harrison-Buck (personal communication) in a pasture located about 6 km to west. Strikingly, the shaded relief model of this same area shows the topographic shape of these damaged but still detectable features (**Figure 2.9**)

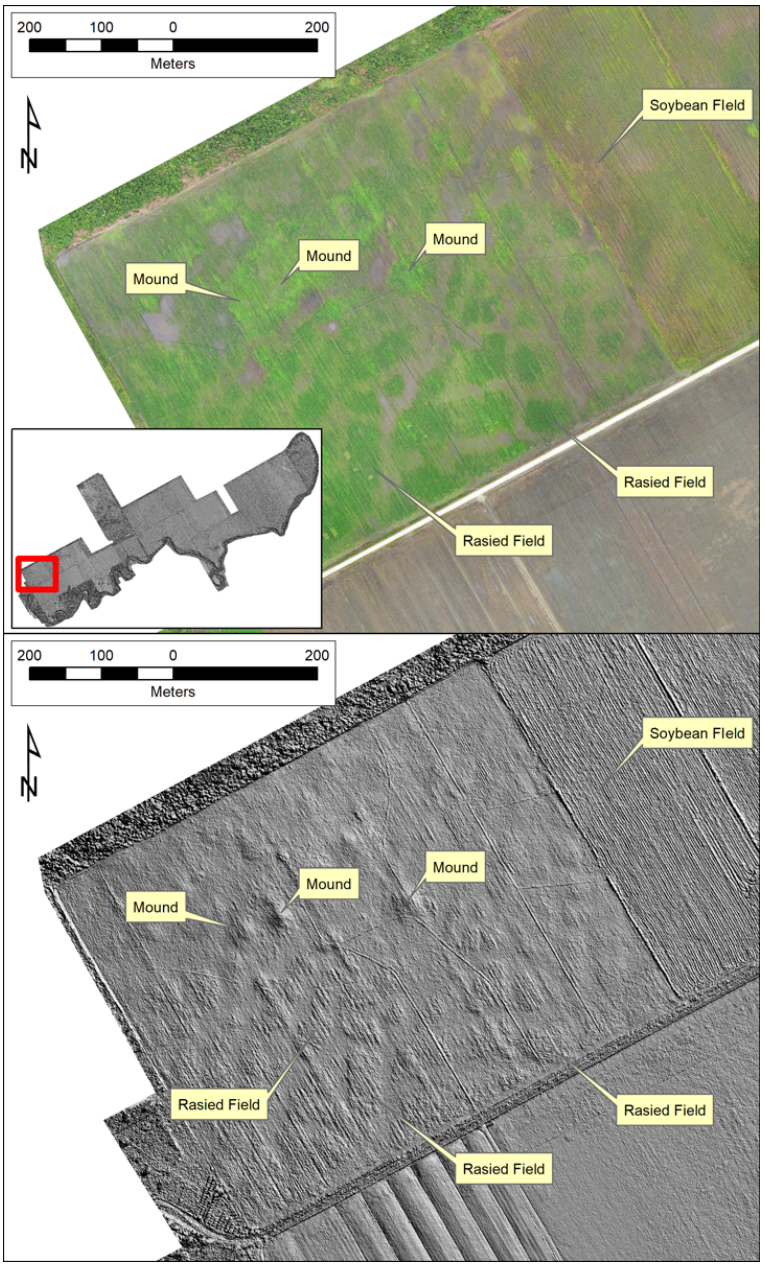

Figure 2.9 Remnants of likely raised fields in the northwest end of the East Block of Saturday Creek. Note: Not all features are identified on the maps. Dozens of features are present (maps prepared by Mark Willis).

West Block of Saturday Creek

Like the East Block, much of the West Block had been surveyed by the BREA team in previous field seasons (see chapters in Harrison-Buck 2011 and 2015). Survey and reconnaissance of this area with drones during 2014 occurred when the fields were fallow (Harrison-Buck et al. 2015, 2016, 2020; Willis and Walker 2015). Unfortunately, most of the area was covered with mature crops when we revisited in 2020. Again, we took this as an opportunity to compare the non-vegetated 2014 data against the less favorable 2020 data to give us an idea of how many features were being missed in fields with crops. **Figures 2.10** and **2.11** show the data from 2014 compared with the same from 2020. Five additional years of plowing and cultivation of the field surely had some role to play in reducing the visibility of the mounds, but as noted during surveys of other fields with crops, it is clear that the crops themselves effectively masked about 90% of the mounds that might otherwise be visible in uncultivated fields.

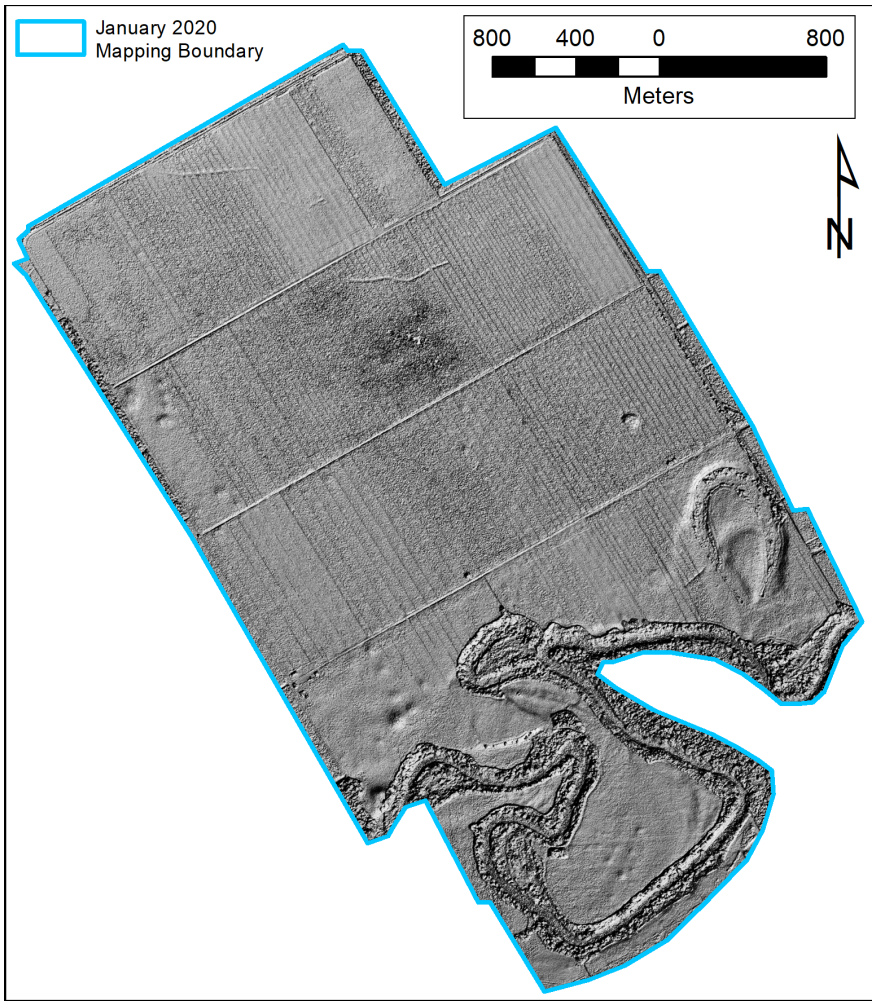

Figure 2.10 2020 mapping with crops growing in most pastures (map prepared by Mark Willis).

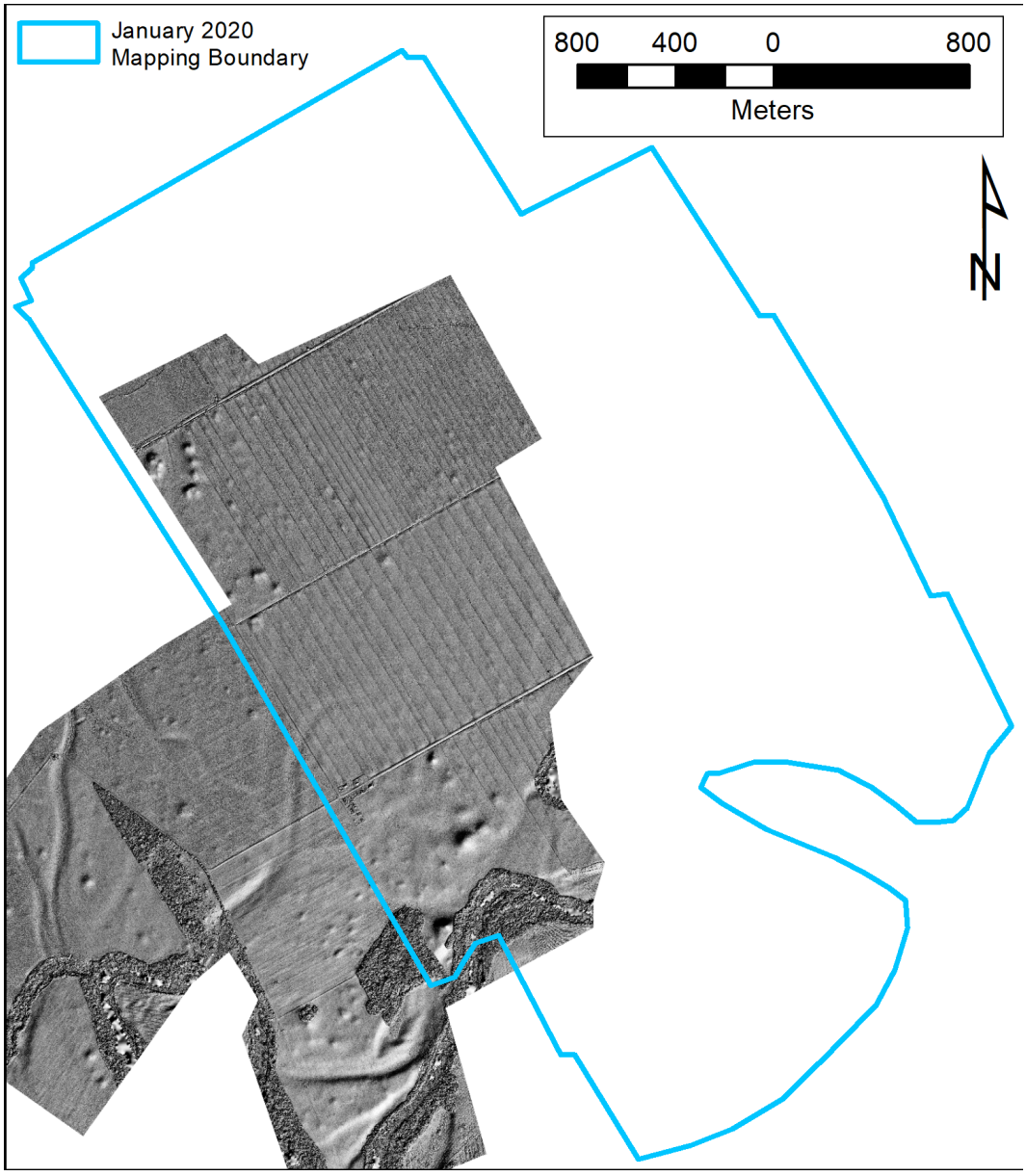

Figure 2.11 2014 mapping data with outline of 2020 mapping area from Figure 2.10 in blue. Note how much crisper the mounds are when no crops were present (map prepared by Mark Willis).

In the southern portion of the West Block, the fields were full of mature soybean crops. The soybeans were about 1 m in height and uniformly filled the fields. In this situation many larger mounds are visible and even some smaller ones (**Figure 2.12**). It would be worthwhile to fly this area again when no crops are present to see the differences in what is visible and what is not.

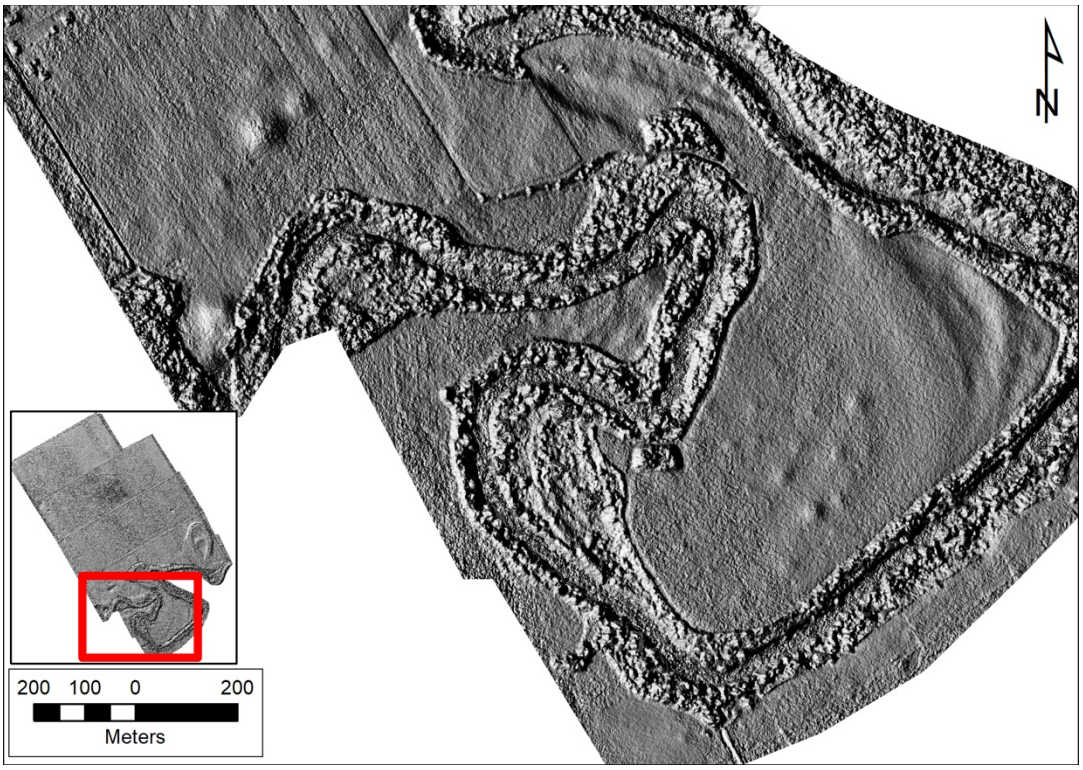

Figure 2.12 Detail of southern portion of the West Block. Many mounds are apparent even with mature crops in the fields (map prepared by Mark Willis).

Kanton (Canton) Block

The survey of this area was in a much different location than those near Saturday Creek. The Kanton (Canton) Block is located on a ranch that has had much of the natural vegetation cleared for cattle grazing. During the 2020 season, the open pasture area was flown with permission of the landowner (Mr. Gillie Canton), but the flights were conducted from the paved Old Northern Highway that runs adjacent to the property in the village of New Boston. The Canton farm was previously surveyed by BREA during the January-February 2015 field season (Norris et al. 2015). During 2015, a total of 385 mounds were identified primarily in the open pasture on the Canton property (Norris et al. 2015:Fig. 6.5). This site is probably what is labeled *Kunahmul* on the site map at the Institute of Archaeology (shown in **Figure 4.1**). It took six flights to cover the entire open pasture area of the Canton property at a resolution of 5 cm per pixel. Data was collected here because there was extra time on the last day of fieldwork and we did not want to waste the chance to collect more comparative information. Hopefully, the data collected here will prove useful for further exploration of this site in the future.

The shaded relief model reveals many prehistoric as well as modern features better than the aerial view (**Figure 2.13**). Some of these are apparent when ground-truthed but the central plaza complex stands out beautifully on the map (**Figure 2.14**).

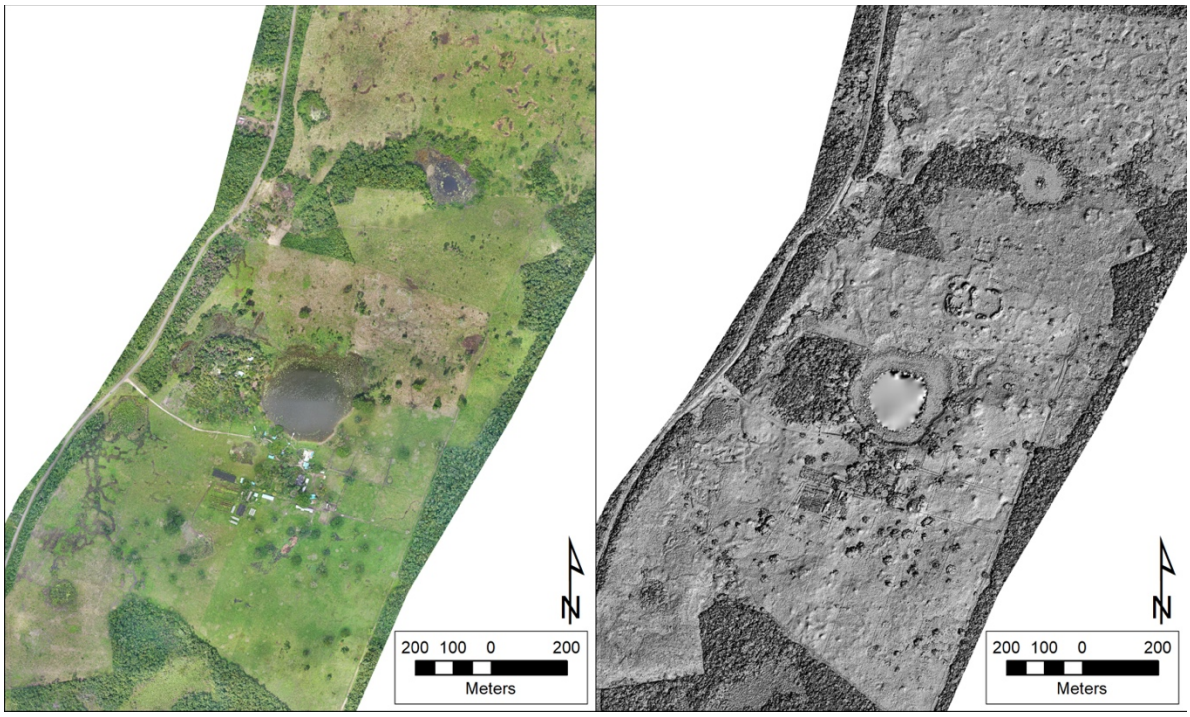

Figure 2.13 Kanton Block: Aerial (left) and shaded relief (right) maps. Numerous prehistoric features are visible on the righthand image (maps prepared by Mark Willis).

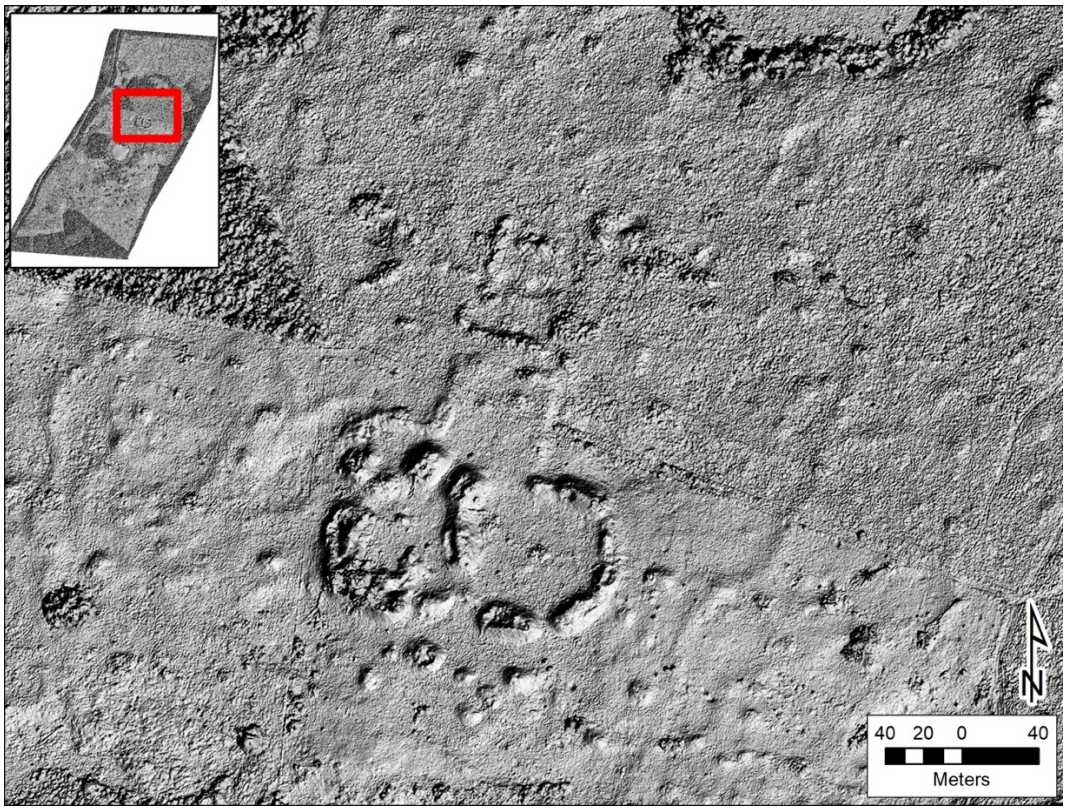

Figure 2.14 Plaza groups and well as dozens of mounds and other prehistoric features (map prepared by Mark Willis).

Biscayne Block

The mapping effort here was also conducted on the last day of fieldwork and was mainly intended to serve as an expedient map for reference of the overall area where much of the BREA fieldwork had been conducted. The area vegetation is sufficiently dense so that the shaded relief model does not show any significant presence of prehistoric features, but the orthographic image provides a snapshot of the what the area was like in 2020 and provides reference for the archeological work conducted there (**Figure 2.15**).

Figure 2.15 Biscayne Block orthographic image (map prepared by Mark Willis).

Conclusions

The drone mapping effort was effective at documenting the landscape around Saturday Creek and at other locations in the BREA permit area. If camera-based drones are going to be used for documenting and finding prehistoric features in the area, the surveys should be conducted when agricultural fields are fallow. The presence of even young crop growth appears to significantly obscure the presence of mounds as demonstrated in the comparison of the 2014 to 2020 shaded relief models (see **Figures 2.10** and **2.11**). Despite this, many mounds are visible within areas of substantial crops. These are probably the more prominent and taller mounds in a location, while the smaller and more shallow mounds that may be present are not visible. So, if there is no other option than to map fields with crops present at a particular fieldwork time, it is still worthwhile and is certainly faster than attempting to survey the location on foot.

One area of the drone mapping survey provided exceptional results and stands out from the other survey parcels – the area of possible raised fields and mounds in the northwestern end of the East Block of the Saturday Creek parcel. During mapping, this area was mostly free of vegetation and appeared to have been recently cleared of jungle growth. Both the orthographic

and shaded relief models clearly show the outlines of archaeological features. The quality of the results from this bare area shows the value that could have been gained had we been able to visit the area when it was completely fallow.

Given the presence of what appear to be raised fields in the northwest portion of the East Block, LiDAR based drone mapping and pedestrian surveys should be considered to the north and west of this area as it is still in jungle. LiDAR can map the ground surface through the vegetation and pedestrian survey would tell us more about the archaeological remains present there. This could provide a window into how fields were constructed and aligned across the landscape.

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Chapter 3

Reconnaissance in the Hinterlands around Waxak Nicte'

David G. Buck, Satoru Murata, and Hugh Robinson

Introduction

The majority of survey and reconnaissance conducted by the BREA project during the past five years has focused on areas in and adjacent to the Crooked Tree Wildlife Sanctuary with a particular focus on lands proximate to the ceremonial center of Chau Hiix (see Murata et al. 2018; Buck and Murata 2020). These efforts resulted in a much more comprehensive view of settlement patterns in the area, identifying an additional three sites (Ek Tok', Ek Tok' North, and the Bruce Tillett site) located along the Western Lagoon to the north of this ceremonial center.

During the 2020 field season, reconnaissance, survey, and excavation shifted to areas east of the Crooked Tree Lagoon, within the community of Biscayne where previous reconnaissance by the Institute of Archaeology identified two sites referred to as Jabonche and Flower's (see **Figure 4.1**). Here we summarize our further reconnaissance efforts, highlighting areas surveyed by the BREA team in 2020, including settlement found in and around the vicinity of the Flower's Group, which we refer to collectively as Waxak Nicte' (**Figure 3.1**; see also **Murata et al., Chapter 4**). Additionally, areas farther south in the vicinity of Jabonche were also surveyed by BREA and are reported herein. Other areas just east of Biscayne proximate to Jones and Mexico Lagoons were further surveyed during 2020 where local informants reported many mounds and prior reconnaissance revealed evidence of possible salt production (Murata et al. 2018; Norris et al. 2015).

Objectives

1. Conduct further reconnaissance in the vicinity of Jones and Mexico Lagoons where evidence of ancient salt-making has been previously found by our team.

2. Conduct further reconnaissance within the community of Biscayne with a focus on areas proximate to the Flower's Group and in areas farther south around the site of Jabonche.

3. Conduct initial exploration in the village of Lemonal.

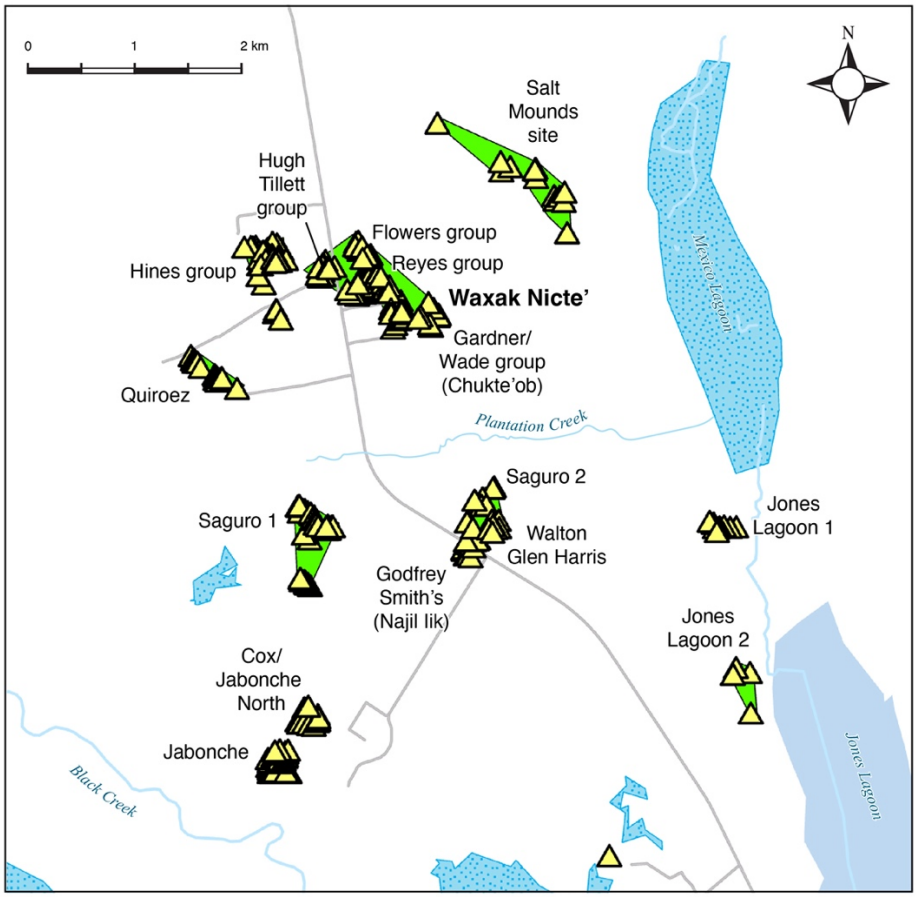

Figure 3.1 Sites and mound structures located within the vicinity of Biscayne.

Methods

Reconnaissance within the modern-day communities of Biscayne and Lemonal was conducted with the assistance of local informants. Landowners were consulted and access to private lands was granted by property owners prior to conducting any reconnaissance. Locations of archaeological mounds and other cultural features were recorded with a *Trimble GeoXH* GPS unit and approximate dimensions of mounds and features were recorded and sketch mapped.

Plantation Creek and Mexico Lagoon

Reconnaissance during the 2020 field season included an effort to access the northern- and eastern-most forested area along the western banks of Jones and Mexico Lagoons. Here, previous survey identified several areas that appear to be salt-making production sites (Norris et al. 2015; Murata et al. 2018), including what we refer to now as Jones Lagoon Sites 1 and 2 (see **Figure 3.1**). Mexico Lagoon was accessed via a network of trails adjacent to Plantation Creek, a

spring-fed but saline creek that crosses the Northern Highway and enters Mexico Lagoon from the northwest. At the mouth of Plantation Creek are a series of dirt-constructed mounds that were previously accessed via Mexico Lagoon by BREA team members and initially documented by Norris and colleagues (2015). The vegetation at the mouth of Plantation Creek included both red and black mangrove (*Rhizophora mangle* and *Avicennia germinans*, respectively).

Access to the north-eastern shores of Mexico Lagoon required crossing at the head of the lagoon through an inundated area of herbaceous sedges and rushes (**Figure 3.2**). The north-eastern shore of the lagoon rose gradually through a thicket of logwood (*Haemotoxylon campechianum*), upslope onto a cahune ridge forest. Reconnaissance through this area of higher elevation was limited by available daylight but extended approximately 1km along the eastern banks of Mexico Lagoon. No evidence of cultural material was found during this reconnaissance although a more thorough survey, potentially originating from the south during a more prominent dry than the January 2020 season may provide better access into this forested area.

Figure 3.2 Wetland area near the northern end of Mexico Lagoon.

The Saguro Site (Saguro 2)

The Saguro Site on property owned by Michael Saguro was re-designated the Saguro 2 Site so as not to be confused with the original Saguro 1 site located just to the west, which was surveyed by Norris et al. (2015) and named after a different landowner with the surname Saguro from Biscayne (see **Figure 3.1**). Saguro 2 is located within a habitat matrix of open pastures and secondary forest south of Plantation Creek. The site includes both isolated house mounds and a small plaza group sitting atop a platform that is elevated approximately 2 m in height (**Figure**

3.3). Mounds at the site ranged in size from relatively low (0.5 m height), square house mounds of approximately 4-x-4m to an extended range structure (18-x-6m) located within the plaza group that also included a small staircase. Several of the house mounds located within the open pasture were severely looted and/or impacted by bulldozer activity. The forested area adjacent to the plaza group was not surveyed in a structured manner and it is likely that there are additional mounds within that area. Future survey with an unmanned aerial vehicle (UAV) equipped with LIDAR will help confirm the presence of additional structures in this area.

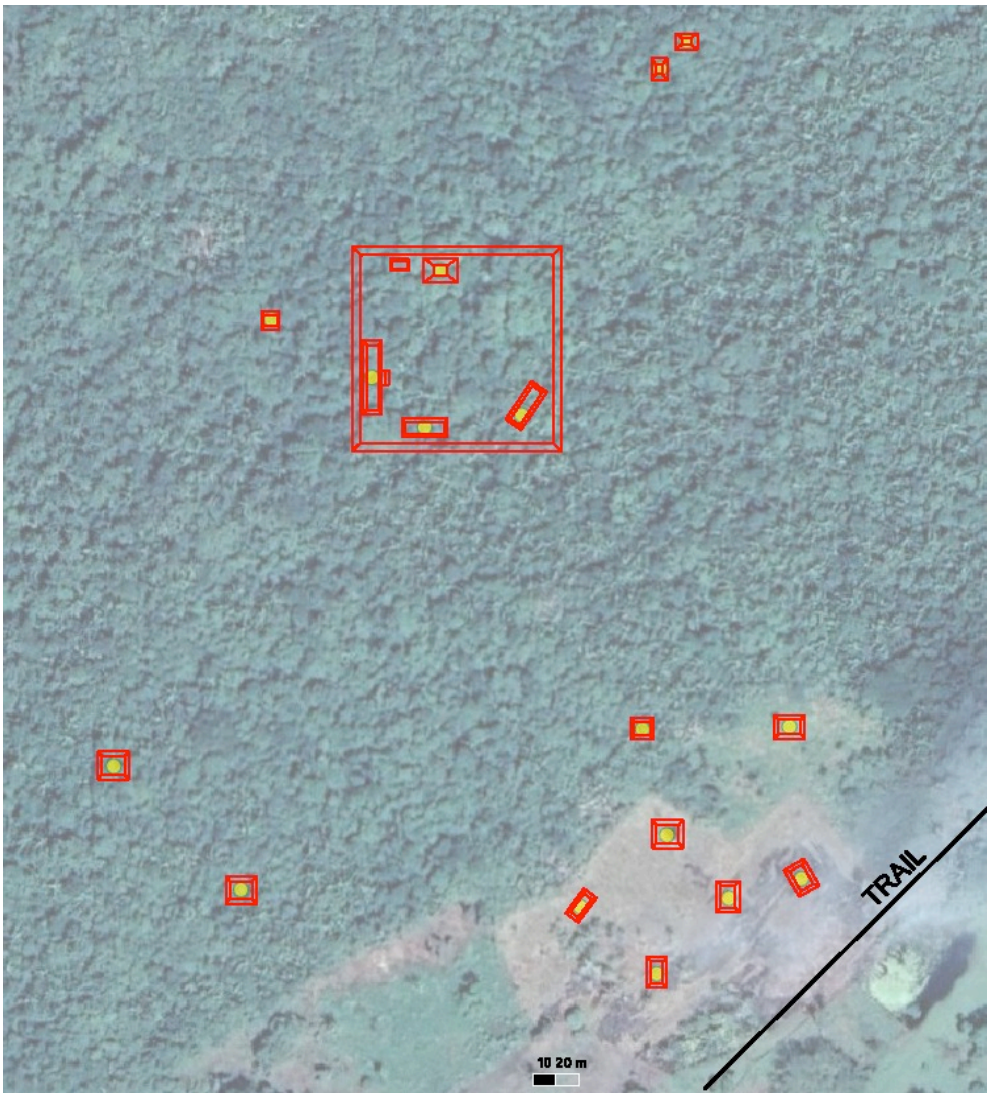

Figure 3.3 Map of the Saguro 2 Site, located on the east side of the Northern Highway in Biscayne village, consists of a scattering of house mounds and a small plaza group.

The Cox Site (Jabonche North)

Adjacent to the homestead of the Cox family are a series of small house mounds that were documented in 2020 **(Figure 3.4)**. The settlement area is located to the northeast of

Jabonche and probably represents a satellite group of this minor ceremonial center (for further discussion of Jabonche see Harrison-Buck et al. 2016). Mounds at the Cox Group were consistently oriented in a cardinal direction with the long axis either N-S or E-W and basal dimensions ranging from 4 m to 10 m in length. No mound was higher than 1 m above the ground. Of particular interest at this site were two bulldozer scars that disturbed two different mounds. One bulldozer scar exposed human bone while a second bulldozer scar exposed a mix of chert blades and fragments of a conch shell in a separate mound. A collection of artifacts of unknown provenience at the homestead included chert blades and an intact conch shell, presumably all recovered from the Cox Site property (**Figure 3.5**).

At the time of the reconnaissance, the pasture directly to the east of the settlement area was overgrown with dense grasses more than 2 m in height and was not surveyed. This area is proximate to the site of Jabonche (Harrison-Buck et al. 2016). Future survey work with an UAV will aid in confirming the full distribution of settlement in this area adjacent to the larger site of Jabonche.

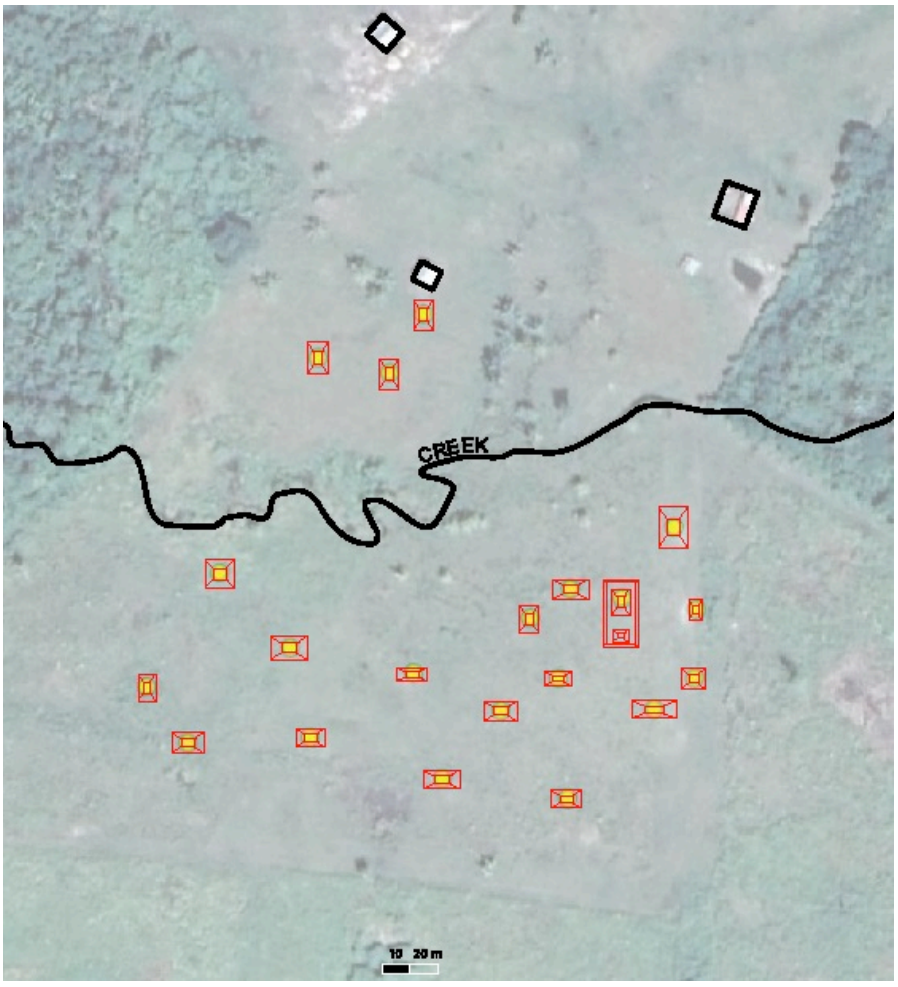

Figure 3.4 Map of the Cox Site, including a minimum of 20 house mounds of varying sizes, all oriented cardinally with scatterings of ceramic sherds and chert on the surface.

Figure 3.5 Artifacts of unknown provenience including two chert blades (top right and left), a stone mano (bottom left), and an intact conch shell (bottom right).

The Gardner Plaza (Plaza C)/Wade Group

The Gardner Plaza was originally sketch-mapped as part of the Charles Wade Site by the BREA team (see Murata et al. 2018: Figure 4.3). The Gardner Plaza consists of six structures circumscribing a central plaza. A pyramidal structure approximately 2 m in height is positioned on the southern end of the plaza group along with three other stone structures of varying sizes. The plaza group is located south and east of the site center of Waxak Nicte' next to the old Cadle family homestead. The Gardner Plaza as part of the Wade Group was later incorporated into the site map for Waxak Nicte' and is shown as Plaza C (see **Murata et al., Chapter 4, Figure 4.2**).

The Hugh Tillett Site

The Hugh Tillett Group—also known as the Tillett Group—was formally owned by Pastor Hugh Tillett of Biscayne, and is located immediately west of the Flower's Group (**Figure 3.1**). This sizeable group of mounds appears to be part of Waxak Nicte'. This recon was initially conducted without a GPS but at least seven mounds were identified. The site consists of several large, long range structures forming a plaza group that also includes two large pyramidal structures, one of which is approximately 3 m high and contains at least two separate rooms on top (**Figure 3.6**).

Figure 3.6 Map of the Hugh Tillett Group.

The Flower's Site/Flower's Group

The Flower's Site (IoA site # 34/196-2) was originally identified by the Institute of Archaeology and characterized as a minor ceremonial center. This area is located to the east of the Northern Highway in the village of Biscayne and likely represents the monumental site core of Waxak Nicte'. Subsequent reconnaissance by the BREA team has shown that this ceremonial center—referred to as the Flower's Group—is part of a larger, more extensive settlement area with multiple plaza groups (see **Figure 3.1**). The Flower's Group includes at least three large pyramidal structures atop a raised plaza (**Figure 3.7**). Estimated heights of the three pyramids range from six to 12 meters, all of stone construction. All three pyramids had signs of significant looting, particularly from the top of the structures. In addition, a large area in the southwestern corner of the main platform had been severely damaged, possibly due to stone quarrying for the Northern Highway (see below) and currently is being used as a contemporary trash pit.

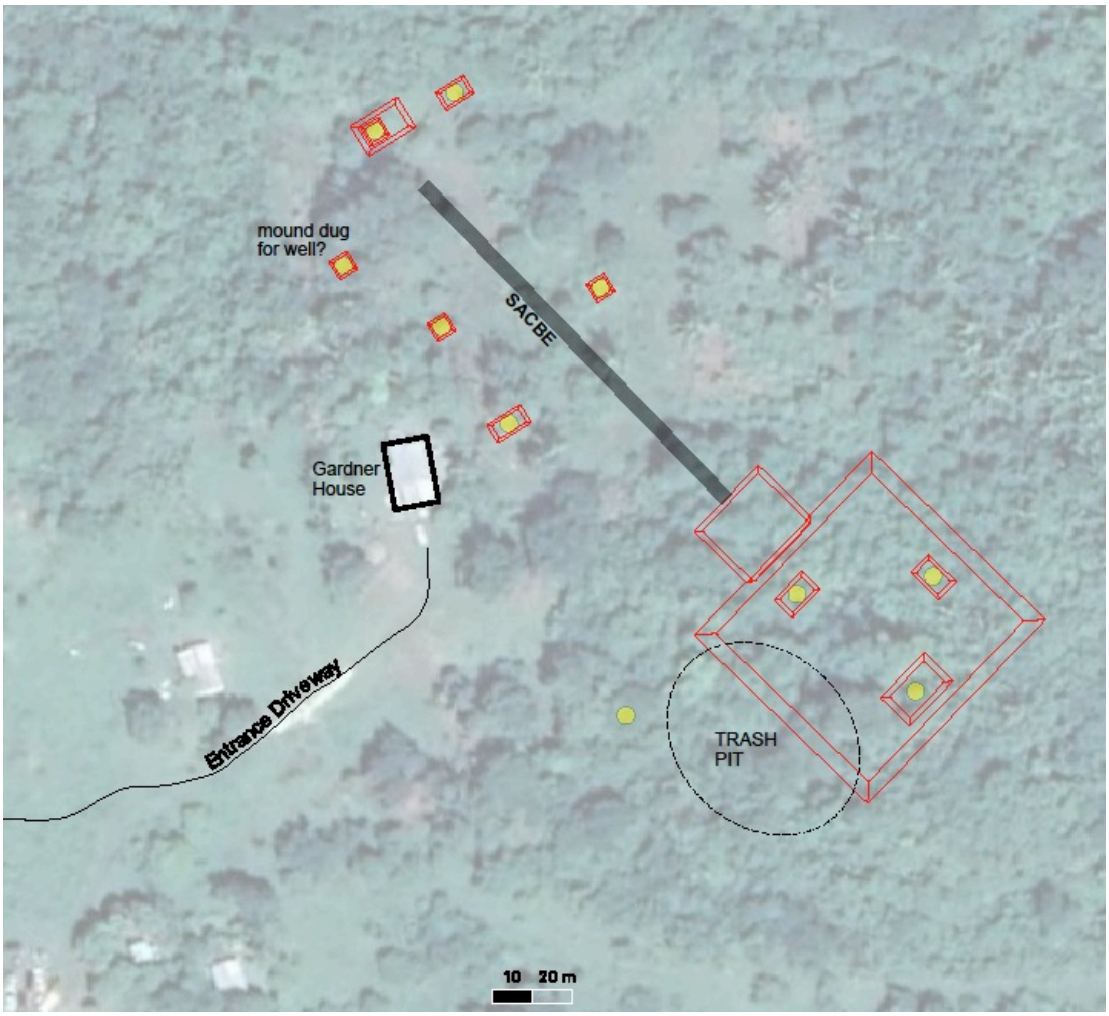

Figure 3.7 Mahlerized sketch map of the Flower's Group, including the main site center and adjacent smaller structures. A 150 m-long sacbe extends to the northwest.

A ~150 m-long sacbe linked the main site center to other smaller structures located to the northwest. This included a large (15-x-10m long, 1 m high) platform with a superstructure approximately 4-x-4 m in size and 0.5 m high. The area to the north of this platform was unsurveyed but a visual inspection from the property boundary showed a large, excavated area that was purportedly used for road fill during the construction of the Northern Highway (L. Flowers, personal communication). These large quarrying pits appear to have targeted the largest pyramidal construction at Waxak Nicte', much of which still remains to be fully surveyed and mapped by our team.

Initial Reconnaissance around Lemonal

One reconnaissance day was dedicated to exploring the area adjacent to the modern-day village of Lemonal, located along Spanish Creek farther to the south of the Crooked Tree Wildlife Sanctuary. The western banks of Spanish Creek have been the focus of reconnaissance efforts by BREA in previous seasons (Buck and Murata 2020; Harrison-Buck and Buck 2011) but none of these efforts have been conducted in the vicinity of Lemonal.

A pedestrian survey was conducted along the western banks of Spanish Creek, in an area locally referred to as Cabrera Hill. A plaza group, containing a 4 m-tall pyramidal structure along with several other smaller structures was found. The largest pyramid was severely looted, with a trench cutting east-west across the structure. A possible broken stone monument was observed at the site as well (**Figure 3.8**). Dense forest cover inhibited connection between the GPS receiver and satellites.

Future Directions for BREA Reconnaissance

Given the density of sites found in and around Biscayne, it is likely that future reconnaissance in this area will continue to reveal additional ancient Maya settlement. A comprehensive survey of the area surrounding the Flower's Group—in particular, lands located to the north and east of this area—will further inform our understanding of the nature and aerial extent of the Waxak Nicte' site center and its surrounding hinterland settlement. This includes a return to the Hugh Tillett Group with a GPS and total station, and ideally with LiDAR aerial mapping to accurately record and map this site. The Hugh Tillett Group was likely part of Waxak Nicte'—perhaps an elite residential compound that was once connected to the Flower's Group to the east before the Northern Highway was constructed and divided these two areas.

In addition, the density of large earthen mounds located at the mouth of Plantation Creek is reminiscent of both salt and ceramic production sites that have been documented elsewhere on the west side of Jones and Mexico Lagoons and elsewhere in Belize (see Murata 2011; Murata et al. 2018; Norris et al. 2015). Further reconnaissance and survey in areas adjacent to salt-tolerant

vegetation (e.g., inland mangrove areas) along the banks of Mexico and Jones Lagoons will offer a broader understanding of the nature and distribution of these types of production locales in and around this area.

As previously mentioned in Buck and Murata (2020), the western banks of Spanish Creek should also continue to be a focus of reconnaissance and survey in the future. This area is understudied yet repeated, single-day explorations by the BREA team continue to identify dense settlement along the banks of this navigable creek. A combination of on-the-ground pedestrian reconnaissance and aerial surveys (planes or UAVs ideally equipped with LiDAR) in future seasons will help confirm the extent of ancient Maya occupation in this region.

Figure 3.8 (Left) Canoe crossing to the western banks of Spanish Creek, near Lemonal; (Right) Possible stone monument, broken at its base and on the forest floor.

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Chapter 4

Survey and Mapping South of the Main Ceremonial Center at Waxak Nicte'

Satoru Murata, Brian Norris, and Hugh Robinson

Introduction

Beginning in 2014, the BREA team initiated an on-going effort to identify Maya sites accessible from the Northern Highway in and around the modern village of Biscayne. A sizable site, extending across several property lines, including the Charles Wade and Irvine Reyes properties, was identified as part of this endeavor (Murata et al. 2018a). During the 2020 field season, the team subsequently recognized the close spatial relationship of the Wade Group and Reyes Group, together with the Flower's Group to the north, and the Hugh Tillet Group and Hines Group to the west of the Northern Highway (see **Chapter 3, Figure 3.1; Chapter 9, Figure 9.4**). The BREA team applied the name Waxak Nicte' to this sprawling site complex. Waxak Nicte' likely represents the same locale as the Flower's Site, as recorded on the archaeological site map compiled by the Belize Institute of Archaeology (IA; **Figure 9.1**). During the January 2020 season, the BREA team set out to produce a detailed map of the Reyes Group portion of Waxak Nicte', situated on the Irvine Reyes property.

Figure 4.1 Institute of Archaeology map with the location of Flower's Site (photo by E. Harrison-Buck).

Objectives

The primary objective of the 2020 BREA mapping team was to produce a detailed map of the Reyes Group at Waxak Nicte' using total station data. In addition to enhancing our understanding of the architectural layout of the site, detailed mapping of the site topography and all excavation units provides a baseline for comparing the data recovered from these units within their topographic and architectural settings. Because access to the site was dictated entirely by landowner permission, it was understood from the project's inception that the 2020 map would encompass primarily the Reyes Group and be truncated by property lines. Additionally, limited scale mapping took place on the Wade property to the east and south of the Reyes Group with permission from the owner, Charlie Wade.

Methods

Mapping of Waxak Nicte' was carried out following standard BREA procedure (see Murata et al. 2018b). Station 1 was established at the north end of a prominent mound located immediately southwest of Plaza A. The Station 1 location represents a topographic high spot within the Reyes Group and provided the most suitable line of sight for the area. The UTM coordinates for Station 1 were determined using a Trimble GeoHX GPS unit, with displayed error range of less than 25 cm. A backsight (Station 2) was then established approximately 189 m to the east-northeast, near the southeastern corner of the Irvine Reyes parcel. Subsequently, Brian Norris and Hugh Robinson, along with Adam Kaeding, conducted a traverse, beginning at Station 1 and arcing clockwise around the Reyes parcel. Upon closing the traverse at Station 1, an acceptable error of 6 cm was registered. The primary traverse established a total of four new mapping stations (Stations 2–6) throughout the site, from which to conduct detailed mapping of localized architectural features. Additional mapping stations (Stations 7–13) were later established due to line-of-sight issues, based off of the original traverse stations.

Detailed topographic and architectural mapping was then carried out by two teams, led by Norris and Robinson, each supervising two to three University of New Hampshire (UNH) field school students at a time. The Norris team utilized a Nikon Total station, while the Robinson team used a Topcon. Students were trained to operate the total station and accompanying data collector prior to commencing mapping, with continued oversight of data collection techniques and cross checking of the collected data by the supervisors. The crew led by Norris focused on mapping the southeastern portion of the Reyes parcel, including the main plaza (Plaza A, also referred to as the Ceiba Plaza), while the crew directed by Robinson mapped the northern and western portions of the parcel, which includes a minor residential plaza group, or "*plazuela*" (Plaza B).

In addition to intensive mapping of the Reyes Group, field school students mapped a small, residential plaza group (designated here as Plaza C) as part of their end-of-term exam.

Plaza C is also referred to elsewhere as the Gardner Plaza and is part of the Wade Group (Murata et al. 2018a; see also **Buck et al., Chapter 3**). Data collected for Plaza C are cumulative data collected by all students, using both data collectors. Plaza C (Gardner Plaza) is part of multiple mounds located on Charlie Wade's property and is approximately 345 m southeast of Plaza A, the latter considered part of the Reyes property. Due to the distance and density of vegetation between the established mapping control points at the Reyes Group and at Plaza C at the Wade Group, time and labor constraints made a control traverse (based on line of sight) between the two plaza groups untenable during January 2020. The two areas are therefore linked by UTM data. Traverse at Plaza C consisted of three control points (Stations 1–3). The same methodology was used for establishing mapping control points at Plaza C as is described above for the Reyes Group.

Upon completion of field mapping, the data from the two data collectors were combined into a single MS Excel file, which was imported into Golden Software's Surfer program to produce a topographic map. This topographic map was then exported as a PDF, which in turn was imported into Serif's Affinity Designer (a vector graphics editor software, similar to Adobe Illustrator) to produce a Mahlerized map. A similar process was followed for the Plaza C data, which have been added, together with the other structures in the Wade Group sketched by Murata in 2016 (see Murata et al. 2018), to produce the final map (**Figure 4.2**). The results and analyses of this mapping will be discussed in the following sections.

Discussion

As indicated above, the current map depicts only a fraction of the Waxak Nicte' site complex and conforms largely to the modern property boundaries of the Reyes parcel, with the notable inclusion of architecture to the east and southeast on the Wade property, which includes Plaza C (the Gardner Plaza). The architecture mapped herein generally exhibits a dispersed layout and includes a variety of forms. The architectural manifestations range from plaza groups, large mounds, a small, isolated pyramid, low residential mounds, and possible *sacbeob* (ancient Maya causeways). The architectural forms documented during this intensive mapping project are briefly discussed below.

A series of low and somewhat amorphous mounds characterizes the northeastern portion of the Reyes Group. These architectural features proved difficult to accurately map when compared with other mounds at Waxak Nicte' that exhibit a robust surface signature. The size and configuration of the mounds in this portion of the site, as currently mapped, should therefore be considered provisional. The minimal surface indications for these structures suggests limited investment in elevating the structures above natural ground level and possibly the use of perishable construction materials.

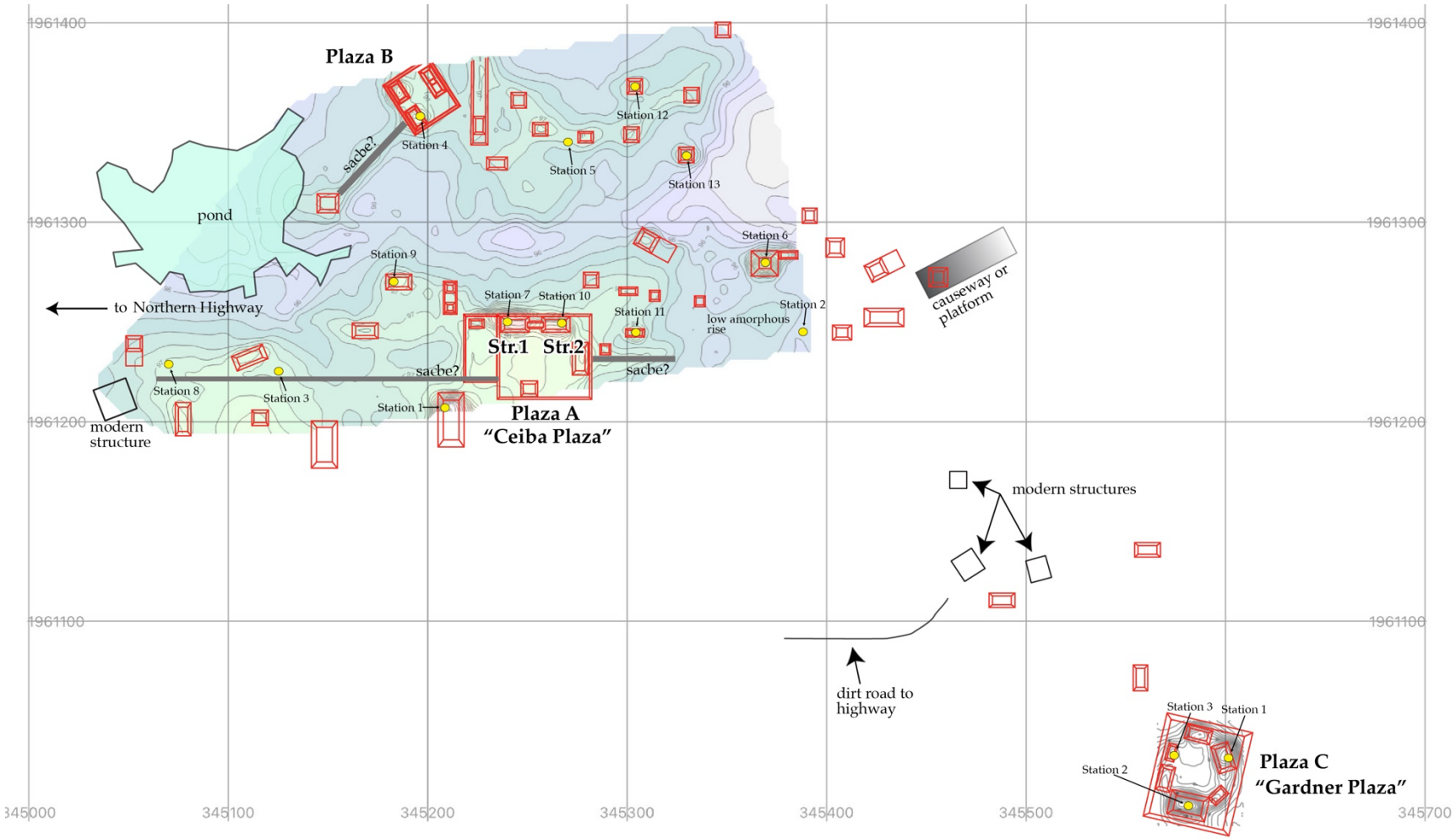

Figure 4.2 Detailed topographic and architectural map of the Reyes Group and surrounding area with the Wade Group (Plaza C/Gardner Plaza) shown in the southeast of map. Key excavation and survey areas demarcated (map by S. Murata).

Plaza A, or Ceiba Plaza, represents the focus of excavations during the 2020 field season. Excavation units were placed in association with the two structures (Structure 1 to the west and Structure 2 to the east; see **Chapters 6 and 7**) that extend along the northern edge of the raised plaza area. Another smaller structure is located along the eastern side of the plaza. A lower platform extends to the west of the main plaza area.

Linear, *sacbe*-like features extend east and west of Plaza A. The western segment, which can be traced for at least 75 m, proves topographically subtle but is demarcated by linear alignments of stone running parallel, approximately 2 m apart. The segment east of Plaza A also measures approximately 2 m in width, though no stone was observed in association with the feature. The possible *sacbe* segment east of Plaza A extends for a distance of at least 30 m.

While the majority of the structures at the site adhere to a cardinal orientation, several exceptions are present. Notably, Plaza B displays a non-cardinal orientation, with an offset of approximately 33 degrees west of north. This orientation could potentially facilitate line-of-sight between this small *plazuela* and Plaza A to the south-southeast.

A low feature containing stone construction ballast extends northeast-southwest between Plaza B and a structure adjacent to the shallow water feature that occupies the northwestern portion of the Reyes parcel. This possible *sacbe* feature exhibits a relatively steep southeastern face, but melds inconspicuously with the natural topography to the northwest. The linear feature may have provided an elevated pathway between Plaza B and the pond-oriented structure.

Plaza C, or Gardner Plaza, also exhibits a non-cardinal orientation and is offset approximately 10 degrees east of north. The structures in this plaza group circumscribe nearly the entire perimeter of the well-defined, raised platform. This distinctive, near-hermetic plaza enclosure contrasts with the open layout of Plazas A and B.

While Plaza A, in particular, represents a large and permeable space that is integrated with the surrounding architecture via *sacbeob*, Plaza C appears isolated from other architecture and evinces a layout that would have limited access to the interior plaza space. It remains an open question whether the heterogeneous architectural syntax expressed by the plazas mapped in 2020 reflect temporal and/or organizational differences.

Conclusions

As stated above, the Reyes Group at Waxak Nicte' represents a mere fraction of the entire site, with architecture continuing in all four cardinal directions, most prominently to the north with the Flower's Group. Any archaeological site located in a semi/urban setting today is at constant risk of modern destruction, either due to construction and/or looting; indeed, the Flower's portion of the site has already seen significant disturbance as a result of both over the years. For the sake of salvage, it is therefore important to thoroughly map the remaining parts of the site as soon as possible before any further degradation occurs. Because there are constraints in both resources and land access, methods more efficient and expedient than total station

mapping may be most prudent. Examples of such methods include utilization of a LiDAR-equipped drone or mapping by means of a differential GPS (e.g., Barratt et al. 2000).

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Chapter 5

Hunter Gatherers in the Wetlands: Further Investigations of a Preceramic Occupation at Crawford Bank, Crooked Tree Island

Marieka Brouwer Burg

Introduction

In June 2017, a 1-x-20 m strip trench excavation (Operation 35) was laid out perpendicular to the shoreline of Crooked Tree Island at an occupation known as the Crawford Bank archaeological site (**Figure 5.1**; Harrison-Buck et al. 2018a: Figure 13.2). The site is situated on land owned and operated by the Crooked Tree Lodge and is bordered to the east by Crooked Tree Lagoon, one of the largest in the country of Belize (see Harrison-Buck 2018: Figure 1.5). In five days of excavation, nearly 1000 lithic tools and debitage were uncovered (n = 946), some of which could be dated via their diagnostic forms to the Preceramic period (c. 2500–900 BC; Harrison-Buck et al. 2018a: Figure 13.6, 13.9, 13.10). These forms included a Lowe Point and a constricted uniface, forms that–based on current literature–are thought to bracket the early and late Archaic or Preceramic period (**Figure 5.2** and **Figure 5.3**), although recent findings from southern Belize have challenged this chronology based primarily on the seriation of tool morphology (Prufer et al. 2019). While brief, the 2017 excavation provided conclusive evidence to support local narrative accounts of regularly finding Preceramic-typed lithic remains all along the eastern shores of Crooked Tree Island.

Figure 5.1 Aerial view of Crawford Bank site showing location of Operations 35 and 51 (photo by Mark Willis).

Raw material, technology, and use wear analysis of the lithic assemblage from Crawford Bank was exported to specialist W. James Stemp (Keene State University) and the results indicated that the majority of the tools and debris were used in wood-working and hard contact activities (Stemp 2018; Stemp and Harrison-Buck 2019). Local wetland resources include such tree species as *Haematoxylon campechianum*, a valuable hardwood species locally referred to as Logwood that may have been worked in the Preceramic. Taken as a whole, the lithic assemblage excavated during the 2017 field season "likely represents one or more short-term, task-oriented preceramic hunter-gatherer occupation(s)" (Stemp and Harrison-Buck 2019:2).

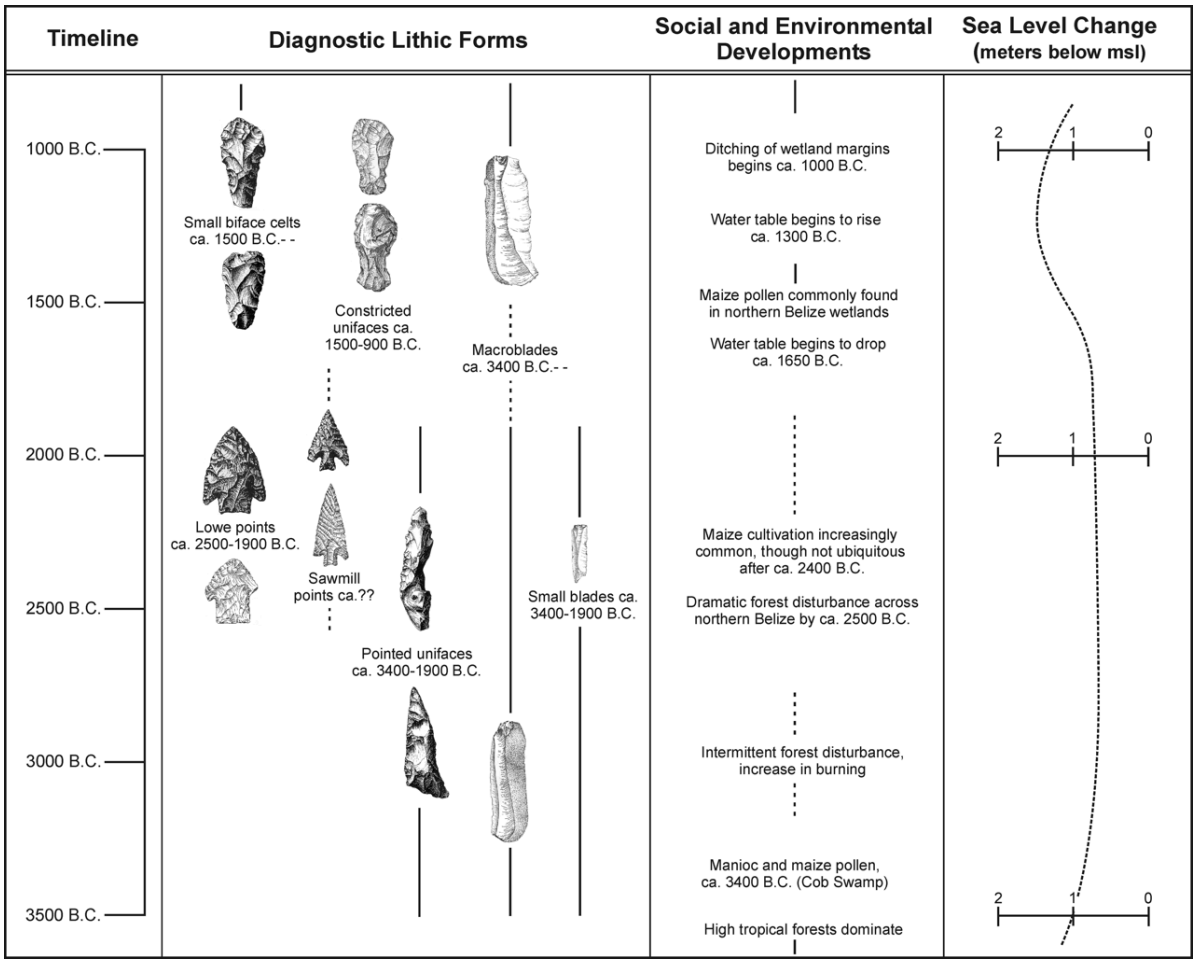

Figure 5.2 Late Archaic diagnostic tool forms from Belize (*after* Lohse et al. 2006: Fig. 8).

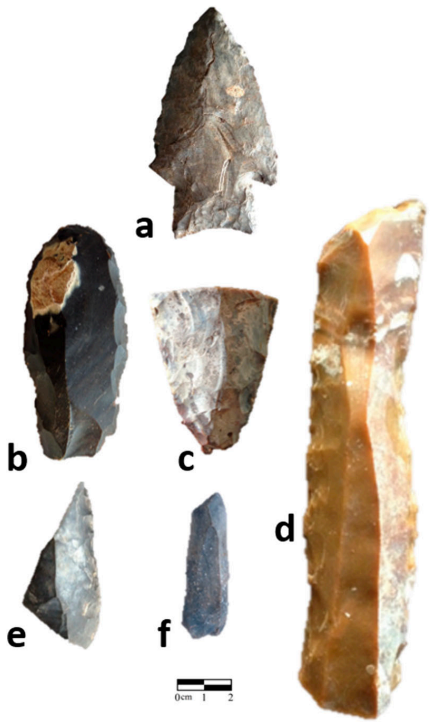

Figure 5.3 Diagnostic tool forms found at Crawford Bank Operation 35 (from Stemp and Harrison-Buck 2019:192).

Objectives

The original intent of Operation 35 was to investigate a colonial period commissary reported to have once stood on the eastern side of the island. While a light density of historic materials was recovered in the topzone, Preceramic lithics were found buried very shallowly below the modern surface, in some places only 1-2 cm below. In other places, lithics were heaped into what appeared to be naturally occurring pits formed on the uppermost limits of the underlying limestone bedrock. Further, a large quantity of *pomacea* shell was recovered from the operation in direct association with the lithics (see Harrison-Buck et al. 2018a and 2018b for further discussion of the excavations).

Given this background information, the objectives of Operation 51 at Crawford Bank were to:

1. Determine the spatial extent and nature of the Preceramic occupation.
2. Test for an undisturbed, *in-situ* deposit of Preceramic material culture.
3. Examine the stratigraphy of the so-called "dune" or ridge feature that extends along the Crooked Tree Island shoreline in a north-south direction.
4. Investigate the depositional events that led to the intermixing of historic and prehistoric artifacts.

Environmental Setting

The Crawford Bank site is located on the eastern shore of Crooked Tree Lagoon within the property bounds of Crooked Tree Lodge, LLC. The area surrounding Crooked Tree Island and Lagoon has long yielded traces of Pre-Maya artifacts in the form of diagnostic lithic tools and debitage. Various local informants have recounted opportunistic finding of Preceramic tools such as Lowe Points and Constricted Bifaces within the lagoon itself (often while fishing during the dry season) as well as from surface scatters and from within wells and other modern excavations on the island. While chert does not occur naturally on Crooked Tree Island, it lies in proximity to the Northern Belize Chert Bearing zone (NBCZ), suggesting that the past makers of these tools obtained raw materials from chert beds and naturally occurring chert cobbles in the soils surrounding the island. Pine savannas with chert-bearing soils and nodules are located between 5-10 miles to the east and west of the island (**Figure 5.4**).

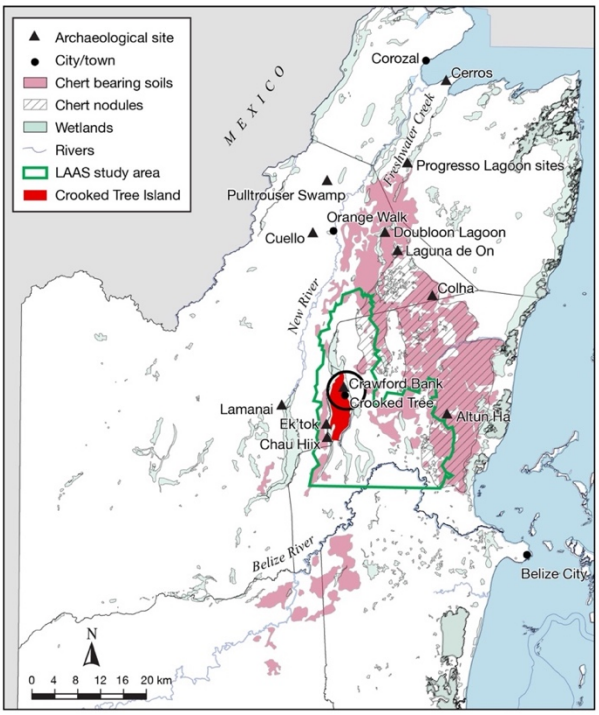

Figure 5.4 Location of Crooked Tree Island within the broader geologic context of Northern Belize (map by M. Brouwer Burg).

The Crawford Bank site is located on the shoreline of Crooked Tree Lagoon which is a freshwater lagoonal system characterized by high biodiversity. The entire area is designated as a RAMSAR wetland, and the island is part of the Audubon wildlife sanctuary. This biodiversity is in part a product of the marked seasonal fluctuations of the lagoonal waters, which can result in lake levels rising between 5 and 10 meters, creating a sizeable littoral zone (between high and low water marks). It is in this littoral zone that many chert lithic scatters can be found on the

surface during the dry season. Above the littoral zone at Crawford Bank rises a sand dune or ridge which runs roughly N-S throughout parts of the island (**Figure 5.5**).

There appear to be three post-depositional forces that have impacted artifact distribution: 1) the natural rise and fall of the water levels in the lagoon between wet and dry seasons; 2) wind and wave action as a result of the long fetch of the lagoon; and 3) bioturbation by cows and people accessing the shoreline. For example, at Crawford Bank, landowner Mr. Mick Webb informed us of significant scraping and raking of the foreshore that occurred directly in front of the Lodge when it was known as The Paradise and was owned by Mr. Rudy Crawford (pre-2006). As in 2017, Mr. Webb granted BREA permission to resume investigations within the Lodge's grounds.

Overview of the Excavation

Based on the knowledge that the Crawford Bank area had previously yielded both high quantities of historic and presumably Preceramic artifacts (based on the presence of some diagnostics), we laid out a 1-x-30 m strip trench along an east-west trajectory, such that the trench would bisect the dune feature/ridge (**Figure 5.5**). As stated above, the macrolevel goals of opening this trench were to gain clarity on a) the overall spatiotemporal distribution of historic and (possible) preceramic artifacts; and b) the depositional sequence of the area and geomorphological factors impacting the area. Our microlevel goals included a) identifying stratified deposits of (preceramic) chert lithics so that we could sample carbon-14 samples to anchor the use phases of these tools via radiocarbon dating; and b) collecting all artifacts for morphological and use wear assessment to determine what kinds of activities were carried out at this location in the past.

Units were divided into 1-x 2-m squares (A-O). Given that the operation director only had seven days to work, we chose squares strategically so as to maximize our efforts. Squares K and L were opened first, in tandem, where a slightly steeper incline to the dune/ridge occurs, with the intent of picking up interdigitated layers of sand (wind deposited) and clay/silt (water deposited). Square A was open next, just over the cusp of the dune/ridge so as to explore the vertical extent of the occupation and determine if the area was being used for different tasks. Square O followed, down in an area that is inundated during most of the year. Square M was opened to investigate the horizontal distribution of a sealed layer filled with Preceramic artifacts in Squares K and L. Finally, Square J was opened hastily on the last day of excavation for the same purpose as M.

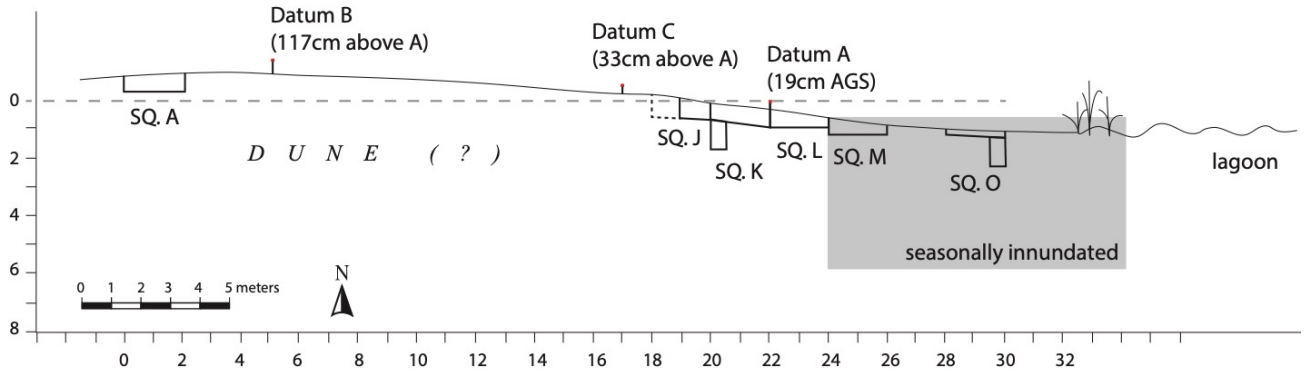

Figure 5.5 Cross-section of the dune/ridge with excavated squares indicated (drawn by M. Brouwer Burg).

Excavation Results

Excavation of this rise suggest that only the lowest reaches of the trench were influenced by seasonal fluctuations of lagoonal waters, as indicated by the presence of tiny snail shells and waterlogged deposits. Further, since a consolidated sand body has not been recovered in excavation, we believe the rise is better characterized as a natural ridge in the underlying limestone bedrock that has undergone subsequent depositional and erosional events. For clarity, we report on each excavated square alphabetically below.

Square A

This 1-x-2 m square was opened at the top of the ridge, with the intention of gaining a better understanding of the spatial distribution of chert lithics and a possible Archaic period occupation. Additionally, we wanted to gain insight into the degree of disturbance this area–adjacent to the owner's personal cabana–has experienced, and the impact on this disturbance on the subsoil. We had been told by owner Mick Webb that the area had been partially dug up when they put in a well some five years previous, and indeed, we found the intrusive trench and associated PVC pipes from this time. Within the unit, we uncovered six zones: Zone 1, 8, 9, 10, 17, and 18 (**Figure 5.6**).

Zone 1 earthen layer (Square A)

This zone measured approximately 5 cm thick and was very dark brown in color (10YR2/2). It was semi-loose in density and its texture was silty-sandy loam with lots of organics. Artifact density was low and consisted of debitage as well as historical glass and metal.

Zone 8 earthen layer (Square A)

This silty-sandy loam was dark brown (10KYR 3 / 2) in coloration and lay directly underneath the topsoil of Zone 1. It was semi-loose in density and had a number of organics within it, especially rootlets, and was roughly ~16 cm in thickness. A few historical artifacts were recovered in addition to a few pieces of chert, and one possible Maya sherd, although we not that this sherd could also be from an undecorated historical ceramic vessel. This zone was roughly ~20 cm and was ended when we encountered a lighter colored sandy sediment beneath (Zone 9).

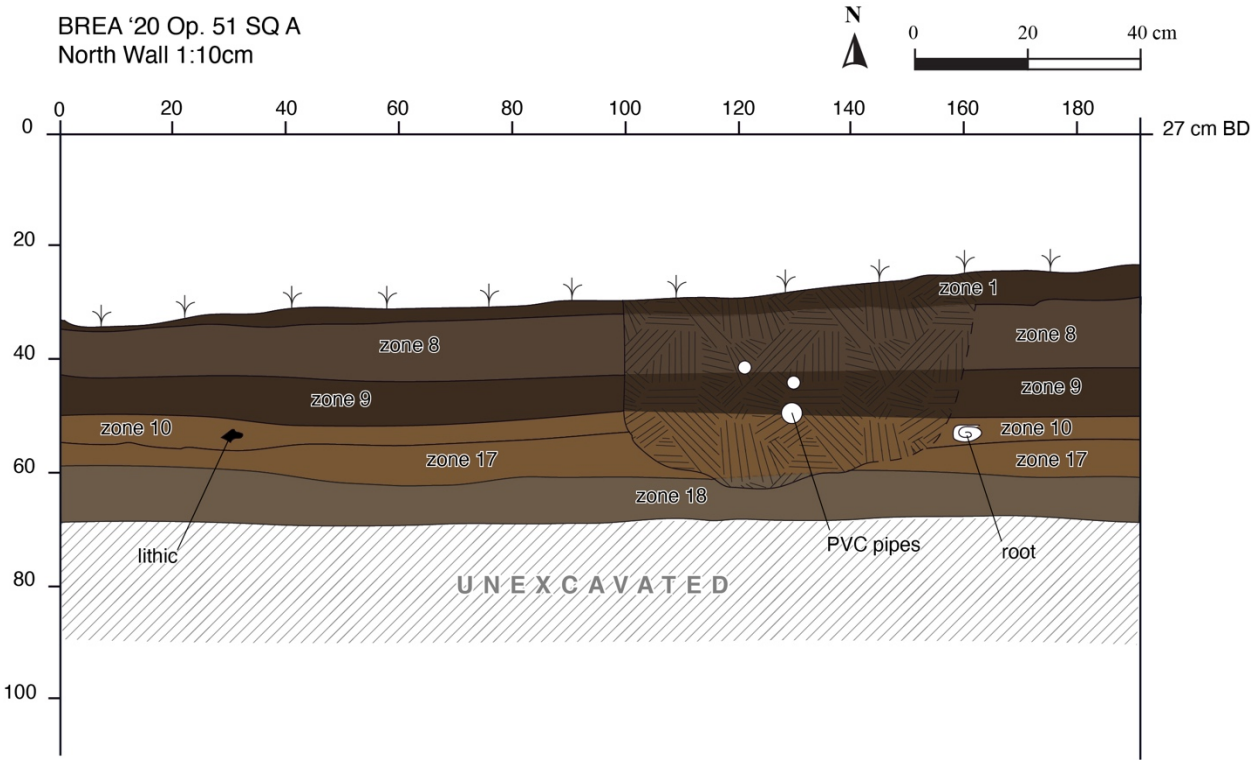

Figure 5.6 North Profile of Square A (drawn by author; digitized G. Zick).

Zone 9 earthen layer (Square A)

This ~7 cm deep layer consisted of sandy-silt, humic, semi-compact sediment. Color-wise, the layer was the same color as the topsoil (10YR 2 / 2). Three PVC pipes cut through the unit at this elevation (see **Figure 5.6**), along with a couple of big roots. These PVC pipes distribute water to and from the cabanas and the well that lies to the north, according to Mick Webb. Only a few artifacts were found in this layer, including some historical glass and ceramics, and few pieces of chert debitage. This layer contained a low density of small pebbles (1-2 cm) and small quantities of burned organic material.

Zone 10 earthen layer (Square A)

This silty-sand layer was approximately 5 cm in thickness and was characterized as medium yellowish-brown sediment (10YR 4 / 3) with flecks of black and yellow. In this level, the trench dug for laying the PVC pipe is clearly visible as it was filled with darker soil (**Figure 5.7**). We did not remove the sediment from the PVC pipe trench as a separate zone since it was not readily visible in the topmost layers and because it was related to modern disturbance. A relatively high quantity of chert debitage (n = ~50 pieces), mostly reddish-brown in color, was found here including some sitting directly on zone 17. Additionally, the level yielded some historical metal and a piece of possible slate. As far as inclusions, this layer had some smooth, ovoid pebbles between 1-2 cm in size, as well as some burned organic material (wood and cohune nut, 1-4 cm in size).

Zone 17 earthen layer (Square A)

This ~5 cm thick, yellowish-brown, silty-sand layer was distinguished from Zone 10 above because of the increased number of chert debitage found in its uppermost centimeters. In retrospect, Zones 10 and 17 could have been excavated as the same zone as they were very similar in composition and coloration. Toward the bottom of this zone, the chert lithics became lighter. The sediment contained yellow/orange flecks that became more prominent and larger as we excavated further own. This zone was closed when a new stratum was encountered (Zone 18), characterized as dense sandy-clay. The PVC trench bottomed out near the bottom elevation of Zone 17. Artifact count was light in this layer (n = ~25 pieces), with one larger fragment lying in the SW corner of the unit, directly atop Zone 18.

Zone 18 earthen layer (Square A)

This ~8 cm thick zone was predominantly dark grey (2.5Y 4 / 1) sandy clay but exhibited mottled yellowish brown (10YR 5 / 6) coloration (see **Figure 5.7**). Samantha Krause, the BREA project geoarchaeologist, has suggested that the soil is exhibiting columnar or prismatic structure, likely related to the high clay content of the soil and seasonal wetting and drying characteristic of vertisol soils (**Figure 5.8**). The zone was much denser than any of the previous zones in this unit and slowed down excavation and screening considerably. Very few artifacts were found in this layer and those that were recovered were all chert lithics that were concentrated in the western portion, especially in the SW corner. In fact, a chert macroblade was found in the SW corner lying within the sandy clay. Some rounded pebbles (1 cm) were found included in the clay, although in low densities. Square A was closed at the bottom of Zone 18 since very few artifacts (n = 9) were recovered there (**Figure 5.7**).

Figure 5.7 Opening and closing shots of Op. 51 Sq. A. Left: opening shot of Op. 51 Sq. A Zn. 2. Right: closing shot of Op. 51 Sq. A Zn. 18 (note that photo board incorrectly states that the photo is taken at midzone elevation; photos by M. Brouwer Burg).

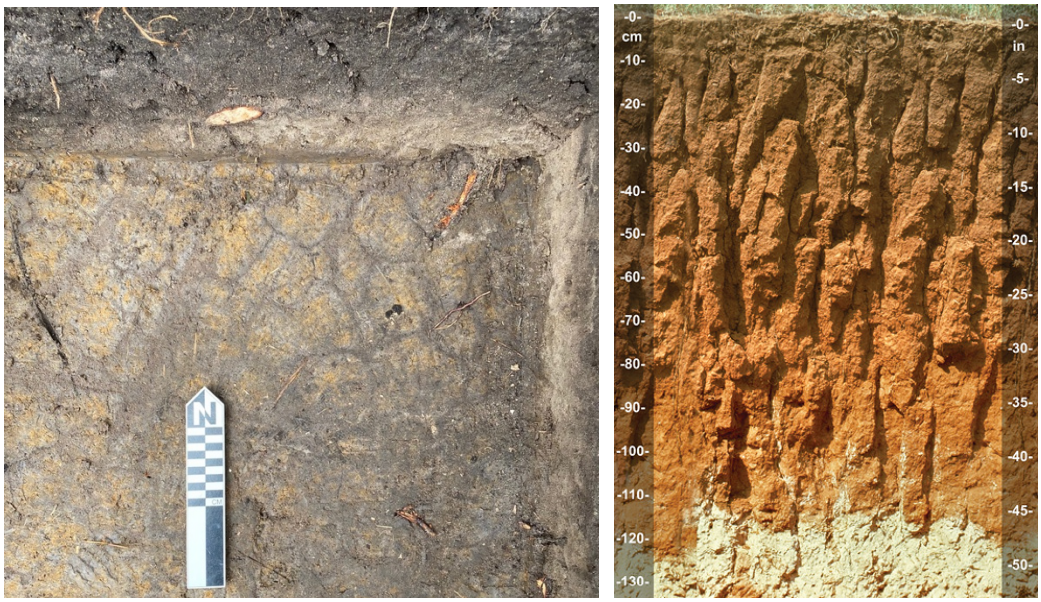

Figure 5.8 Prismatic soil structure seen (on the left) from above and (on the right) in cross-section (left photo by M. Brouwer Burg; right photo from Natural Resources Conservation Service [nrcs.usda.gov]).

Squares J, K, L, and M

Zone 1 Topsoil

Zone 1 was a thin layer (~1-5 cm) in each square, mostly very sandy and tan/light grey in color (10YR 5 / 2 and 10YR 6 / 2). This layer was visible at the surface at various places along this general elevation from the shoreline. Unlike in Square A, where the matrix was semi-compact, the matrix of this layer was loose and full of organic matter such as grass and rootlets. Very few artifacts were recovered from this surficial layer, only about 20 across the four units including animal bone, debitage, freshwater/snail shell and historic glass and pipe. Already in this zone, there were some interesting soil color changes in Squares L and M. Square L exhibited a soil color change from 10YR 5 / 2 (soft/loose sand with pebble inclusions) in the western half of the unit, to pockets of 5YR 2.5 / 1 black, humic sediment that stained the surrounding sand in the center of the unit, to a softer, more compact sand of 10YR 5 / 2 coloration. In Square M, most of the unit (from the western edge to about 175 cm east) was characterized by light brownish grey sand (10YR 6 / 2) although there was a narrow strip on the eastern edge of the unit that was darker brown (10YR 2 / 2) and more compact.

Zone 2 Earthen Layer (Squares A, J–M)

Zone 2 was another thin, ~5 cm deep earthen layer (silty-sand) characterized by lots of intermixing of historic artifacts and chert lithic debitages (**Figure 5.9**). Color and texture-wise, it was very similar to that of Zone 1 with the exception of far fewer rootlets and the presence of small (~1 cm diameter) pebbles. In addition, this layer was more compact than the topsoil. Square K, in particular, yielded a higher number of intermingled artifacts (n = 75), with about 60 artifacts found in the other three squares (total n = 135 for the zone; **Figure 5.10**). These artifacts included chert debitage, a possible chipped tool, freshwater/snail shell, and historic ceramic, glass, metal, and pipe. While Squares J and K were again uniform in sediment characteristics, Squares L and M again displayed some variation. In the eastern half of Square L, the sand became loamier and darker brown (10YR 3 / 2) and we exposed a piece of plywood lying flat on the surface of the zone in the NE corner. In the NW section of Square M, the rest of the plywood was revealed, along with a burned wooden beam lying roughly 125-x-35 cm from the NW corner of the unit. The sediment in Square M grades to darker brown/black from west to east and seems to indicate the remains of a fire or other burning event. In conversation with Mick Webb, he recounted a story of a cabana getting struck by lightning and burning to the ground. Mr. Webb suggested that perhaps Mr. Rudy Crawford (the owner at the time) pushed the burned wreckage in this area afterward, and this burned material is a product of that activity.

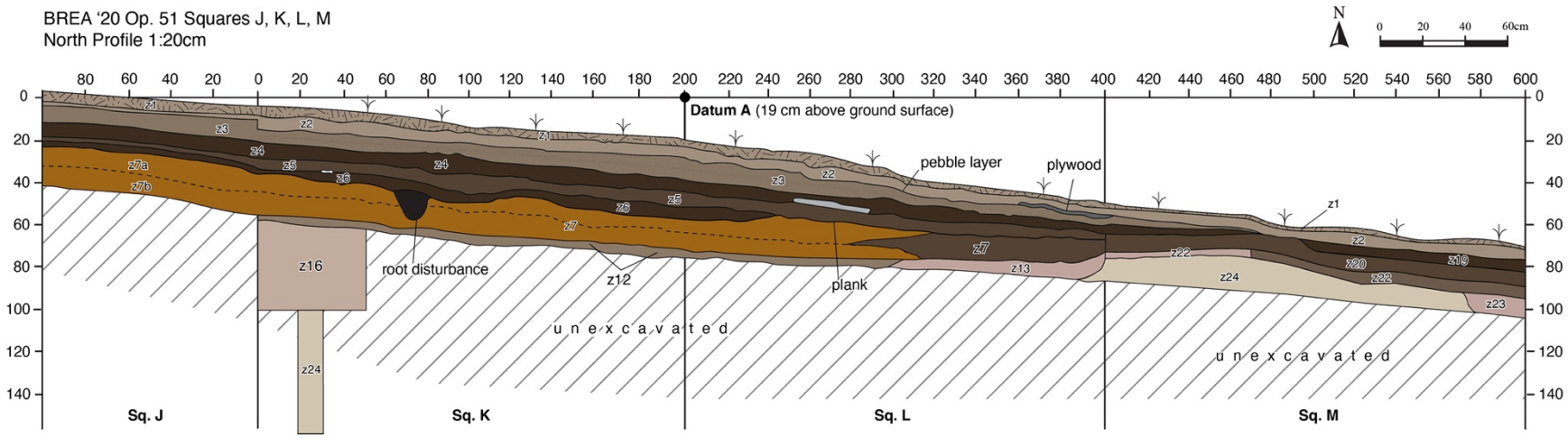

Figure 5.9 North Profile of Squares J, K, L, and M (drawn by M. Brouwer Burg; digitized by G. Zick).

Figure 5.10 Field photo showing mix of historic artifacts and chert debitage (photo by M. Brouwer Burg).

Zone 3 Earthen Layer (Squares J–M)

This ~6 cm deep silty-sand layer–light tannish/grey (10YR 5 / 2) in color–was largely indistinguishable from zone 2. The main reason it was differentiated is because it appeared somewhat darker, especially in Square M, and also toward the bottom of the zone (10YR 2 / 1 dark brown appears as we neared Zone 4) with fewer artifacts (n = ~80, including chert debitage, freshwater/snail shell, burned animal bone, and historic ceramic, glass, metal, pipe, and other). In Square L, the remains of some burned wooden beams were recovered in the western section of the unit, one with a square-head nail still embedded within it (**Figure 5.11**). Square-head nails were used in construction until the late 19th century, so this find suggests that the building the burned could have dated to the 1800s. In Square M, this zone appears to pinch out in the western half of the unit, just on top of the pile of burned wood. Interestingly, there is a thin layer (~1 cm) of pebbles between 0.5-1 cm in diameter throughout Square K and L suggesting a flood deposit. In Square M, this zone appears to pinch out about 70 cm from the western wall, on top of a layer of burned material (Zone 4).

Zone 4 Earthen Layer (Squares J–M)

This layer was distinguished from Zone 3 above by its darker coloration (10YR 2 / 1 and 2 / 2, black and very dark brown, respectively) and more clayey, compact/semi-compact composition (versus sand). This layer varied in thickness, from 10 cm deep in Square K to ~2 cm in Square M. In fact, this layer also appears to pinch out in Square M around ~70 cm from

the western wall, very similar to Zone 3. The density of artifacts in this layer increases (nearly 200 in Square K and 50 in Square L), although most are heavily burned and surrounded by a matrix filled with charcoal flecks. As with the previous zones, the artifacts were a mix of historic artifacts (ceramic, glass, metal, pipe), chert debitage (including a core), and a possible chipped tool (unifacial macroflake). In the SW corner of Square K, a dark black greasy spot was exposed, adjacent to an area of yellow sand (10YR 5 / 6). The greasy spot did not have charcoal in it and was determined not to have been a hearth but was perhaps the result of some modern dumping. In Square L, the two wide wooden planks recovered in Zone 3 were exposed and found to be ~5 cm thick. Rodwell Conorquie, who worked at the site the entire seven days, identified this wood as Santa Maria, a local Belizean hardwood. We pedestaled these planks and drew them before removal (**Figure 5.11**). Buried among the planks and burned material was a high concentration of *pomacea* shell and burned limestone. In the eastern portion of Square L, the sand peters out in favor of a darker brown sand (10YR 3 / 2).

Figure 5.11 Zone 4 in Squares K and L before (left) and after (right) lifting the Santa Maria planks. Dark, greasy spot visible in the top left of the photo (SW corner). Darker, more compact soil of Square L seen at bottom (eastern portion of unit; photos by M. Brouwer Burg).

Zone 5 earthen layer (Squares J–L)

This ~10 cm brown/grey (10YR 3 / 2) sandy-loam layer was uncovered directly beneath the dark brown/burned sediments of Zone 4. This layer contained many fewer artifacts, three in Square J, ~30 in Square K, and 20 in Square L (~n = 53 in total for the zone) and included chert debitage, freshwater/snail shell, and historic material (glass, ceramic, metal, and pipe). Some

charcoal flecking could be seen interspersed in the sand, causing the matrix in the western portion of Square K to have a darker coloration (10YR 3 / 2), versus the medium brown sand of the eastern half of Square K (10YR 5 / 2). A small green glass bottle was also found lying at the bottom of zone 5 in Square K. In Square L, the darker sediment continued in the eastern portion of the unit.

Zone 6 earthen layer (J–L)

This ~5 cm thick layer constituted another brown (10YR 5 / 3 in Square K and 10YR 5 / 4 in Square L) sandy-clay layer with many chert lithics located at the bottom of the zone. Notably, no historic or Maya artifacts were found in this layer. A couple of charcoal samples were taken from this layer although none of them survived the two-year storage period dictated by COVID-19 travel restrictions. In the southeast corner of Square L, a gravelly, yellow sandy layer (excavated as Zone 7) was exposed, with lots of artifacts sitting at the transition. These artifacts were piece plotted (**Figure 5.12**). The average elevation of chert debitage was between 70-75 cm below datum (51-56 cm below ground surface).

Zone 7 earthen layer (J–L)

This ~15 cm thick layer is comprised of a yellowish-brown (10YR 5 / 3; yellow mottles 10YR 5 / 8), sandy-clay layer with additional flecks of charcoal and orange and oxidized limestone throughout. The layer's texture is characterized as compact, clayey sand, as many small pebbles (0.5-2 cm) are embedded throughout. Lots of chert debitage was encountered in this layer, nearly 100 in Square K and perhaps roughly the same quantity in Square L. Many of these lithics were found at ~75 cm below datum. No historic or Maya artifacts were recovered.

Zone 12 earthen layer (Squares J–L)

This ~5 cm thick layer was encountered in Squares J, K, and the western half of Square L and is characterized as a brownish (10YR 5 / 2) compact clay with flecks of oxidized and non-oxidized limestone. Some root disturbance was noted. Only two pieces of chert debitage were recovered from those lying at the very top in the interchange between zones 7 and 12. The rest of the layer appeared sterile.

Zone 13 earthen layer (Square L)

This zone constituted a 46 cm wide strip from the eastern edge of the unit. We originally thought this gravelly marl layer with lithics on top might be a "heap", or a culturally significant pile of artifacts and sediment. However, with further excavation, the sediment did not look

markedly different from Zone 4 in Square M, other than having more highly eroded limestone intermixed in the strata (and hence the lighter, pinker color).

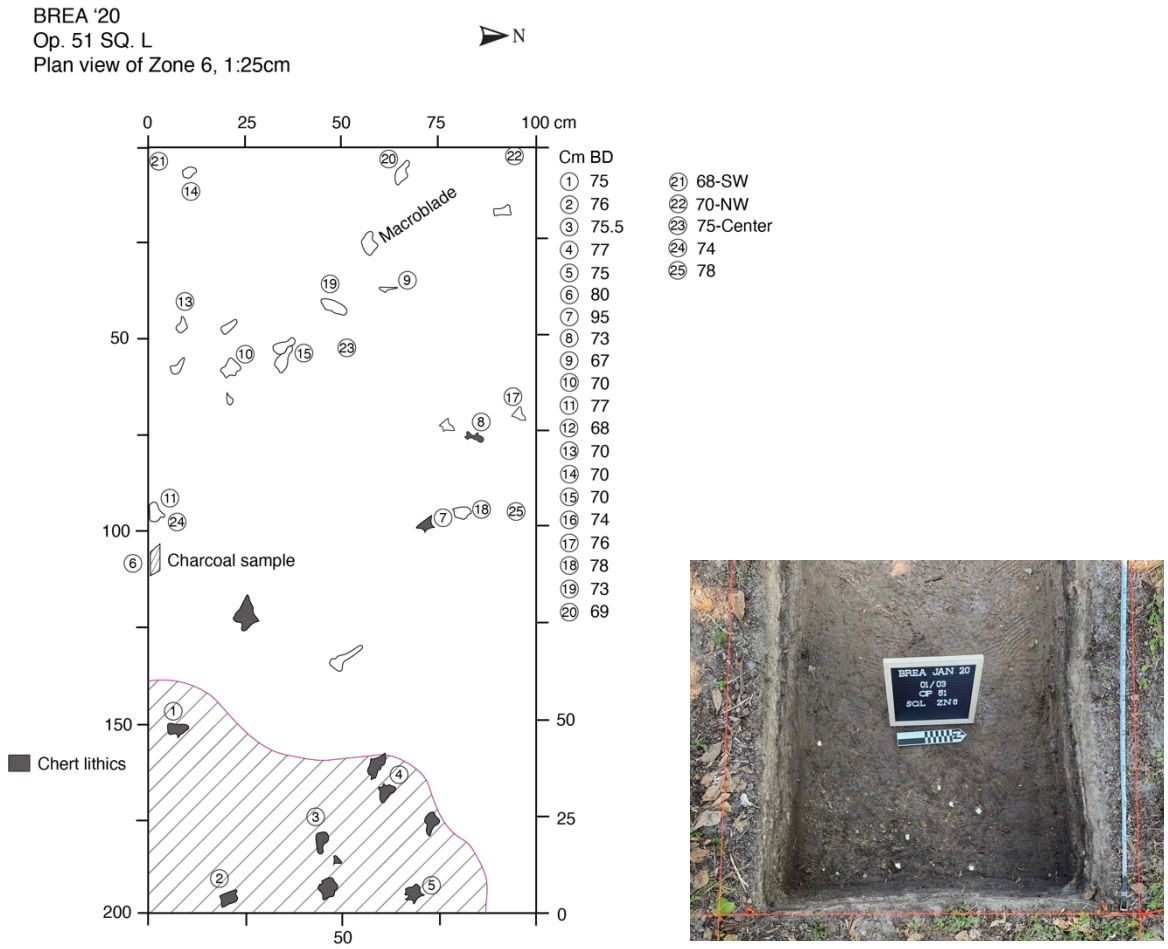

Figure 5.12 Plan map of Op. 51, Square L, Zone 6. Piece plotted chert debitage noted (drawing and photo by M. Brouwer Burg; digitized by F. Haverland).

Zone 16 earthen layer (Square K)

This zone comprised a 50-x-50 cm test pit in the SW corner of Square K, which was opened with the intention of finding hard, consolidated limestone bedrock. Zone 16 only extended about 10 cm in depth, at which point the matrix changed to white-light tan clayey matrix with chunks of degraded bedrock (zone 24). The zone did not contain any artifacts.

Zone 19 earthen layer (Square M)

This ~5 cm layer was filled with compact, burned material (sandy silt) and lay in the eastern half of Square M. Lots of ash, broken up charcoal, and two charred pieces of chert debitage were recovered here in what has been interpreted as a burn pile layer. Some small rocks were encountered (1-5 cm). Directly underneath this zone is a dark brown (10YR 2 / 2) soil layer (Zone 20). This latter layer appeared rich in shell inclusions.

Zone 20 earthen layer (Square M)

This ~20 cm thick layer was dark brown (10YR 2 / 2) in color and was semi-compact sandy-silt. This layer appears to underlie the burn pile of Zone 19 in the eastern half of the unit, as well as Zone 4 in the western half (**Figure 5.13**). The western half did have more yellow flecks in the soil matrix and contained more intermixed marl, similar to the "heap" of Zone 13. In the eastern half of the unit, many small snail shells were intermixed, with the exception of a small area in the SE corner. However, when this small pit was dug 10 cm deeper than the rest of the zone, the small shell inclusions resumed.

Zone 21 earthen layer (Square M)

This zone consists of the western portion of Square M with Zone 22 to the east at the same elevation. Zone 21 was distinguished from Zone 22 by a lack of very small snail shells (present in Zone 22). Here, only chert debitage was recovered (n = 17; 181.5 g). It appears to be an extension of what was designated as Zone 13 (the "heap" or cultural material) in Square L and was also full of artifacts.

Zone 22 earthen layer (Square M)

This layer (~5 cm thick) consists of a medium brown sandy clay and extends from 70 cm to 200 cm from the western wall. The layer is replete with tiny white snail shells, indicative of a flood event. Like Zone 21, only chert debitage was recovered here (n = 42; 465.6 g). This layer was closed when a compact, sterile, marl layer was encountered (Zone 24).

Zone 23 earthen layer (Square M)

This ~5 cm thick zone (tan-grey 10YR 5 / 2) defined a small 30-x-35 cm pit placed in the SE corner of the unit. Initially we thought this could have been a pit, but upon encountering a degraded limestone surface, we concluded that the depression was a natural feature of the underlying bedrock layer. Some *pomacea* shell was found in this pit along with few chert flakes.

Zone 24 earthen layer (Squares K and M)

This ~50 cm thick zone was encountered in both Squares K and M. In Square K, the zone was excavated below Zone 16 to determine if any consolidated bedrock was present. When no such hard bedrock was found, we dug another 64 cm with a post hole. Finally, a chaining pin was pushed down another 30+ cm and still no consolidated rock was found. The sediment recovered was all characterized as marl and is considered to be the remnants of highly eroded limestone bedrock. This marl layer revealed no cultural materials. In Square M, Zone 24 was found directly under Zones 21 and 22. It was characterized as dense marl and was taken down to a consolidated bedrock outcrop. A charcoal sample was taken from the center of the western half of Square M at 93.5 cm below datum A. Unfortunately, this sample did not survive for export.

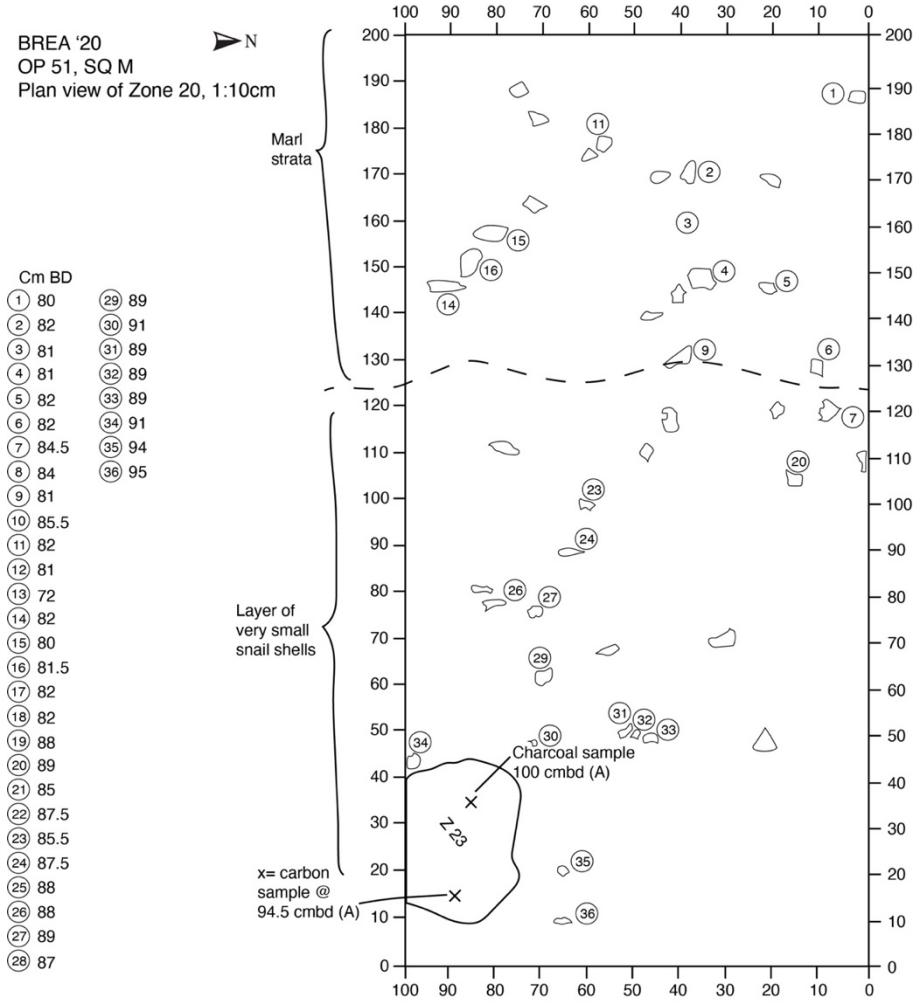

Figure 5.13 Plan drawing of Op. 51, Square M, Zone 20. Piece plotted chert debitage noted (drawing by M. Brouwer Burg; digitized by F. Haverland).

SQUARE O

This 1-x-2 m square was opened at the bottom of the ridge within the littoral zone. Both Mick Webb and Rubin Crawford confirmed that this area is fully submerged during the wet season, when lagoon levels rise. The goal of opening this square was to understand a) the spatial distribution of chert lithics and preceramic occupation; and b) the sedimentation sequence in the littoral zone and the degree to which this facilitates preservation of artifacts in the subsurface. Within this unit, we uncovered four zones: Zone 1, 11, 14, and 15 (**Figure 5.14**).

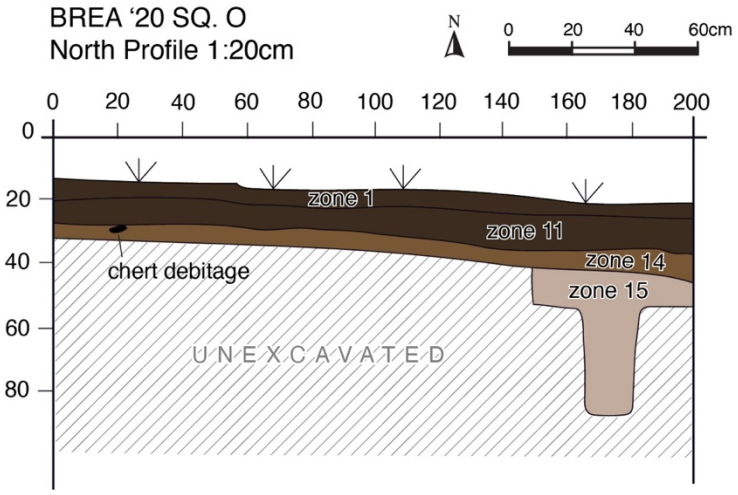

Figure 5.14 North Profile of Square O (drawn by M. Brouwer Burg; digitized by G. Zick).

Zone 1 earthen layer (Square A)

This zone measured approximately 5 cm in thickness and constituted a very dark brown (10YR 2 / 1) humic layer–loose in density and sandy-silt in texture. Artifact density was low (n = ~25 pieces), including debitage and historical ceramic, glass, and metal.

Zone 11 earthen layer (Square O)

This ~13 cm thick layer consisted of dark brown (10YR 2 / 1), thick clayey sediment. A few artifacts were recovered in this zone, mostly at the transition between this zone and Zone 14 below. These artifacts included some lithic debitage, one possible chert tool, freshwater/snail shell, a piece of historic glass, and a Maya period pottery sherd. The zone was closed when a layer of tiny snail shell was recovered (**Figure 5.15**).

Figure 5.15. Closing shot of Operation (Op.) 51, Square O. *Left*: Op. 51, Square O, Zone 11 closing; remnants of tiny snail shells are just visible. *Right*: Op. 51, Square O, Zone 14 closing (photos by M. Brouwer Burg).

Zone 14 earthen layer (Square O)

This ~5 cm thick zone consisted of the tiny snail shell layer encountered at the bottom of zone 11, which covered the entire square. The presence of this layer indicates that this area was submerged during the time when these shells were deposited and was perhaps the result of a high energy flooding event or hurricane. This brown layer (10YR 4 / 3) had a compact density and clayey texture. Apart from the many tiny snail shells (<1 cm), there were also a number of small marly limestone inclusions (~1 cm) within the layer, indicating the bedrock or eroding bedrock would be encountered soon.

Zone 15 earthen layer (Square O)

This roughly 10 cm thick zone was taken down in the SE corner of SQ. O as a 50-x-50 cm test pit. The goal was to determine if we could find bedrock. While we did not succeed in finding hard, compact bedrock, we did find soft eroding limestone, likely bedrock in the process of dissolving. A post hole probe measuring 153 cm BD also did not reveal hard bedrock, but did reveal the water table at roughly 125 cm BD. No artifacts were found in this compact marly

layer. Inclusions were small bits of degraded limestone. The zone was closed at this point (**Figure 5.16**).

Figure 5.16 Closing shot of Operation 51, Square O, Zones 14 and 15. Zone 14 is the 50 x 50 cm test unit in the SE corner and Zone 15 is the probe (photo by M. Brouwer Burg).

Interpretation and Conclusion

As with many such broad exposure excavations, this trench was dug in a piecemeal fashion. Initially, we excavated Squares K and L down to their closing zones. Then, we opened Square M to the east and finally, Square J to the west. Square M was opened in order to better understand the stratigraphic sequence of Squares K and L, especially as they descend eastward toward the lagoon. Square J was opened in order to recover more lithic artifacts and to see if Zone 7 continued westward from the shoreline. Additionally, the operation director/author had to leave after only seven days of excavation and another operation director took over for the final few days. Finally, Square J was hurriedly completed on the afternoon and evening of the last day of the field season.

As such, even during excavation it was not immediately clear how the different stratigraphic layers related to one another. In preparing this manuscript and drafting the field drawings, relationships between these layers were clarified. First, it is clear that a significant burning event took place in the past that led to the deposition of Zones 4 and 19–these could, in

hindsight, probably be called the same layer–as well as Zone 6. These burned lenses are interlaced by thin, more loosely consolidated sandy layers (e.g., Zones 2, 3, 5, and 20). This seems to suggest that after each burning event, the burned material was left exposed, and that natural sedimentation occurred through the process of windblown sand accumulation. We do not, as yet, have radiocarbon dates to anchor these burning events, but given the abundance of historic artifacts in these layers, we assume that the events date to the 18th and 19th centuries, when archival data indicates that logwood cutters began visiting the island to extract this valuable commodity, followed by early inhabitants of the island in the mid-late 1800s (Harrison-Buck et al. 2019).

Zones 5, 7, and 20 all share similar coloration, texture, and artifact densities. It could be these zones were all part of a single depositional sequence. Zone 7, by contrast, is a thick layer that contained many pieces of chert debitage and a few possible tool fragments/preforms. This layer was unique in the high number of lithics found within it. Many of these lithics display patination, a glossy sheen that is perhaps the result of weathering. Additionally, it is worth reiterating that almost all of the lithics found within Square O–which lies within the littoral zone of the lagoon–are marked by a distinctive blackish tint. It is thought that this might be the result of the lithics being subjected to the brackish waters and elevated calcium levels of the lagoon for many months at a time before their eventual burial (Stemp, pers. comm.).

The limestone bedrock underlying Crawford Bank is uneven, likely eaten away by the percolation of rainwater and season lagoonal rises over time. Zones 16 and 24 in this trench are interpreted as degraded limestone bedrock, at various stages of becoming dissolved into the surrounding soils. Likely Zones 13 and 22 are also involved in this process, although the presence of many artifacts within these zones suggest that perhaps some activities involving lithic tool production and use took place directly atop of outcrop bedrock, or bedrock overlain by a thin layer of soil. The presence of Zones 12 and 7 superseding the degrading bedrock layers suggests that periods of higher lake levels may have resulted in the deposition of these clayey sediments.

A preliminary note on artifacts

A total of 1791 artifacts, weighing 11.3 kg were recovered during the excavation of Op. 51 (**Figure 5.17; Table 1**). Of these, the overwhelming majority (both in count and weight) was chert debitage (62.4%). This is a critical finding: while plenty of historic artifacts were recovered, the sheer volume of chert debitage underscores just how important this resource was during Archaic times, not to mention how widely used this resource must have been. Recall that there is no native chert on Crooked Tree Island, which indicates that all chert found on the island must have been imported. By contrast, historic materials comprised only 27.6% of the assemblage. Probable Maya artifacts make up the smallest percentage at 0.28%, representing two rims, six small body sherds, and three pieces of ceramic non-pottery (or baked clay material).

The rest of the assemblage consisted primarily of freshwater/snail shell (5.9%), some fire-cracked rock, and some unidentified stone and mortar.

Some notable trends arise as we look at the distribution of artifacts vertically and horizontally. Since the trench itself was cut into a rise, it was expected that the majority of artifacts would be found at the bottom of the rise as a result of gravity and water action. Ostensibly, if artifacts were distributed by water action, we expect to find fewer artifacts further up the rise, since highwater levels occur only temporarily throughout the year. What we found was that the rise itself did seem to impact the distribution of artifacts to some degree. All of the lower squares, closer to the water's edge, contained elevated levels of artifacts, whereas the squares higher up the rise contained fewer artifacts. For example, while Square O yielded 29% of overall artifact weight, Square A only yielded 7%. While this seems to suggest that fewer artifacts were deposited higher up the rise, the lack of artifacts in Square A could also be a results of other depositional processes like wind and human interference.

When we look at the distribution of chert debitage in the excavated squares, another interesting trend emerges: the greatest concentration of debitage occurs in Squares K (27%) and M (23%). These squares occur along the midline of the rise, suggesting that this area, close to the water but not in the water, was a preferred location for knapping and refurbishing chert tools. A Harris Matrix indicates that all squares yielded significant quantities of chert debitage. Square J (only partially excavated) yielded the smallest percentage of debitage, but this amount still constituted 10% of the overall sample. What is clear from this preliminary analysis is that while there are some areas with greater concentrations of debitage in the area, debitage in general is widespread throughout.

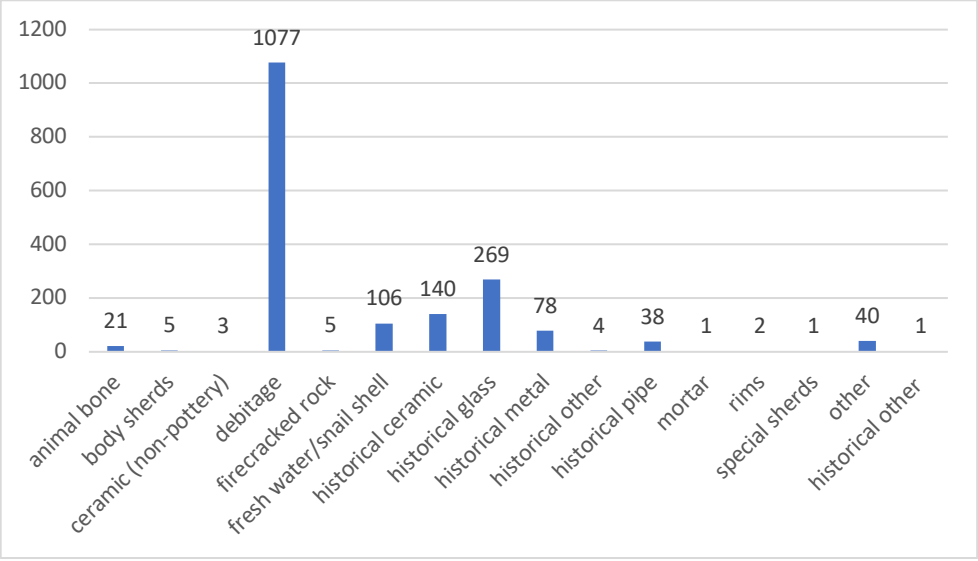

Figure 5.17 Total count of artifacts by type.

Row Labels	Sum of Count	Sum of Weight	Percentage of Weight
animal bone	21	38.7	0.34%
body sherds	5	16.2	0.14%
ceramic (non-pottery)	3	1.9	0.02%
debitage	1077	7050.4	62.41%
firecracked rock	5	203.6	1.80%
fresh water/snail shell	106	666.1	5.90%
historical ceramic	140	446.7	3.95%
historical glass	269	1532.37	13.57%
historical metal	78	1035.8	9.17%
historical other	4	55.1	0.49%
historical pipe	38	53.4	0.47%
mortar	1	2.2	0.02%
rims	2	13	0.12%
special sherds	1	0.1	0.00%
other	40	180	1.59%
historical other	1	0.8	0.01%
Grand Total	**1791**	**11296.37**	**100.00%**

Table 5.1 Total count and weight of artifacts by type.

When we look at the vertical distribution of artifacts, we see that while there is much mixing of chert debitage and historical materials in the upper levels of each square, once we dug beneath these intermixed layers we found stratified deposits of chert. The depths at which we encountered these stratified, presumably Archaic layers differed over the length of the rise, lying deeper in the upper areas and shallower in the lower layers. If we assume that eroded bedrock underlies the area, this suggests that the Archaic occupation layers should be closer to the surface as we get nearer to the shoreline. This finding will very much impact future research strategies.

What remains unclear is the degree to which the lithic artifacts–and any possible Preceramic occupation–were disturbed after their initial deposition, which is critical to establish in order to understand whether the scatters recovered were *in situ*. As indicated above, it seems likely that there were multiple post-depositional events involving periodic flooding as a result of contracted weather events, most protracted highwater stands, and aeolian wind deposition that have shaped this area over time. What is also worth pointing out is that this geographic rise that was bisected by this trench should not be considered a dune but rather a ridge, as it is composed of sediment of various different textures including, but not limited to, sand. The sandiest layers are those near the top of the stratigraphic column – Zones 1-3 – underscoring the more recent appearance of wind-blown sand in the area. Below the sandy layers are clayey layers, which suggest that the whole rise may have been inundated for long periods of time in the deeper past.

This would suggest that the rise itself is a former or relic lake shoreline, which could account for the presence of the clayey layers (e.g., Zones 12 and 7), although we are left wondering how lithics artifacts made their way into these clayey layers. Certainly, the presence of historic artifacts and chert debitage throughout much of the stratigraphic sequence suggests extensive reworking of the geomorophology of this shoreline area, leading to a certain degree of vertical mixing as a result. Bioturbation may also have contributed to this mixing but in more discrete loci (e.g., from root disturbance and/or animal disturbance). The near ubiquitous presence of apple snails throughout the trench suggest that these creatures may also have had some part to play, although we cannot also rule out the possibility that the apple snail was also a subsistence resource at certain times.

Further research is needed at Crawford Bank to establish for certain two important points: 1) the geomorphological sequence of the shoreline, which can be accomplished through geoarchaeological soil characterization, radiocarbon dating of different stratigraphic layers, and consultation with geomorphologists familiar with lagoonal dynamics; and 2) the character of deposits containing Preceramic lithics (whether *in* situ or a secondary deposit and stratified (i.e., unmixed) or unstratified), as well as their age ranges, which will require the collection and analysis of multiple radiocarbon dates. We hope to accomplish these goals in future research at this important occupation adjacent to the lagoon.

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Chapter 6

Test Excavations at the Entrance to Ceiba Plaza at Waxak Nicte' (Operation 52)

Katherine Shelhamer, Jessica H. Craig, and Eleanor Harrison-Buck

Introduction

Excavations at Waxak Nicte' during the January 2020 season were focused on Plaza A, also known as the Ceiba Plaza, which included a raised plaza surrounded by several low, long-range structures (see **Chapter 4, Figure 4.2**). One notable feature of this plaza group was a northern access point, characterized by a low "saddle" in between two structures—each roughly 20 m long by 10 m wide—running east-west along the northern edge of the plaza. The overall goal of Operation (Op.) 52 was to better understand this access point, its surrounding structures, and the plaza itself. The western Structure (Str.) 1 was roughly ~2 m in height, while the eastern Structure 2 was roughly ~1 m in height (**Figure 6.1**). One other excavation was also completed at the Ceiba Plaza on the south facing side of Structure 2 (see **Chapter 7**). Upon arriving at the site in 2020, Waxak Nicte' was largely covered by dense tall grasses which required extensive clearing before excavation could begin. It is also worth noting that Waxak Nicte' has likely been affected by minor bulldozing due to its modern-day agricultural use. Although the overall structures remain intact, this could have affected the topmost layer of cultural material.

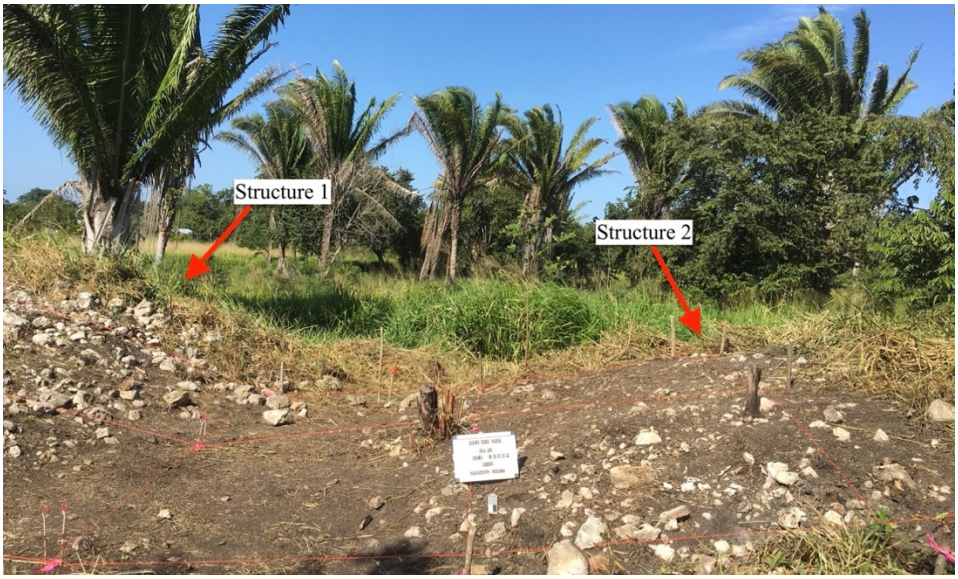

Figure 6.1 Op. 52 opening shot showing plaza access point between Structure 1 and 2, facing north (photo by J. Craig).

Objectives

1. Determine the architectural layout of Structures 1 and 2 and define the intervening corridor.
2. Identify the construction phases of these structures.
3. Find and define the plaza floor and its' orientation to the structures.
4. Reveal any terminal deposits located in the corridor between Structure 1 and 2.

Description of the Research and Methods Used

As previously mentioned, Op. 52 focused on two structures located along the northern edge of Plaza A or the Ceiba Plaza and the low-lying access point in between the two northern structures. To gather as much contextual information about this area as possible the excavation unit was placed starting on the eastern edge of Structure 1 spanning eastward across the access point and ending on the western edge of Structure 2 (see **Figure 6.1**). To remove overburden and subsequent sediment, handpicks, trowels, and five-gallon buckets were used, along with picks in more compact matrices and wooden skewers for bone and other delicate materials. One hundred percent of sediment was screened through a 0.25-inch mesh. Zones were excavated arbitrarily at approximately 20 cm depths, or when a color or texture change was noted.

Op. 52 was originally set up as a 4-x-8 m excavation unit oriented cardinally with the length of the unit running east-west. The unit was subdivided into eight squares (A-H) measuring 2-x-2 m each. To expose more of the area off structure and find the plaza floor, two additional 2-x-2 m squares (I and J) were later added south of squares E and F. This led to a total of ten 2-x-2 m squares, although only six squares (B, C, E, F, I, J) were excavated during the January 2020 season (see **Figure 6.2** and **Figure 6.3**). Below, we describe each zone in detail.

Zone 1 – Topsoil

Zone 1 was a dark (10YR 2 / 1), organic-rich soil layer densely packed with small and medium sized stones. This zone was removed from all six squares (B, C, E, F, I, and J) that were excavated during the 2020 season. Due to the abundance of building collapse directly on the surface this zone is incredibly shallow, only 2-5 cm deep at any point. Minor root disturbance can be found across all squares, with larger tree disturbance present in Squares C, E, and J. Very little cultural material was gathered from this zone.

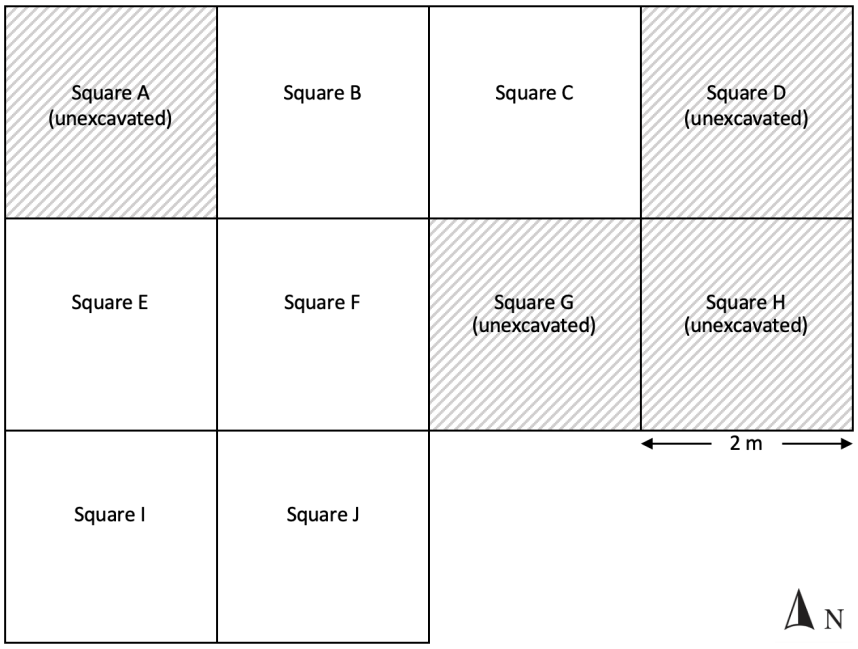

Figure 6.2 Overview of Op. 52 showing layout of all squares (created by K. Shelhamer).

Zone 2 – Collapse Debris

Located just below Zone 1, Zone 2 consisted of dark (10YR 2 / 1), silty, semi-compact soil with stones of varying size spread throughout. The stones in this zone ranged from baseball sized to larger architectural tumble. This layer was identifiable by a heavy density of collapse debris and increased artifact density compared to Zone 1, mainly ceramic sherds and lithic debitage. Zone 2 represented the latest layer of structural collapse and was removed from all six squares (B, C, E, F, I, and J) that were excavated during the 2020 season. This zone continued until you hit either Zone 3 (off structure) or Zone 5 (on the structure) (see **Figure 6.4**).

Zone 3 – Collapse Debris

Zone 3 was the collapse debris surrounding the exterior of Structures 1 and 2 (see **Figure 6.4**). It was characterized by silty clay-like soil with a lighter grey color (10YR 3 / 1), chunks of limestone and plaster, and a decrease in artifact density. Zone 3 was about 20 cm deep in Squares B and C, but is much shallower outside of the corridor in Squares I and J. This layer started beneath Zone 2 and ended with the plaza floor (Zone 4). Since this zone existed solely above the floor, it was only removed from Squares B, C, F, I, and J—in areas outside of the terrace walls (Zone 6).

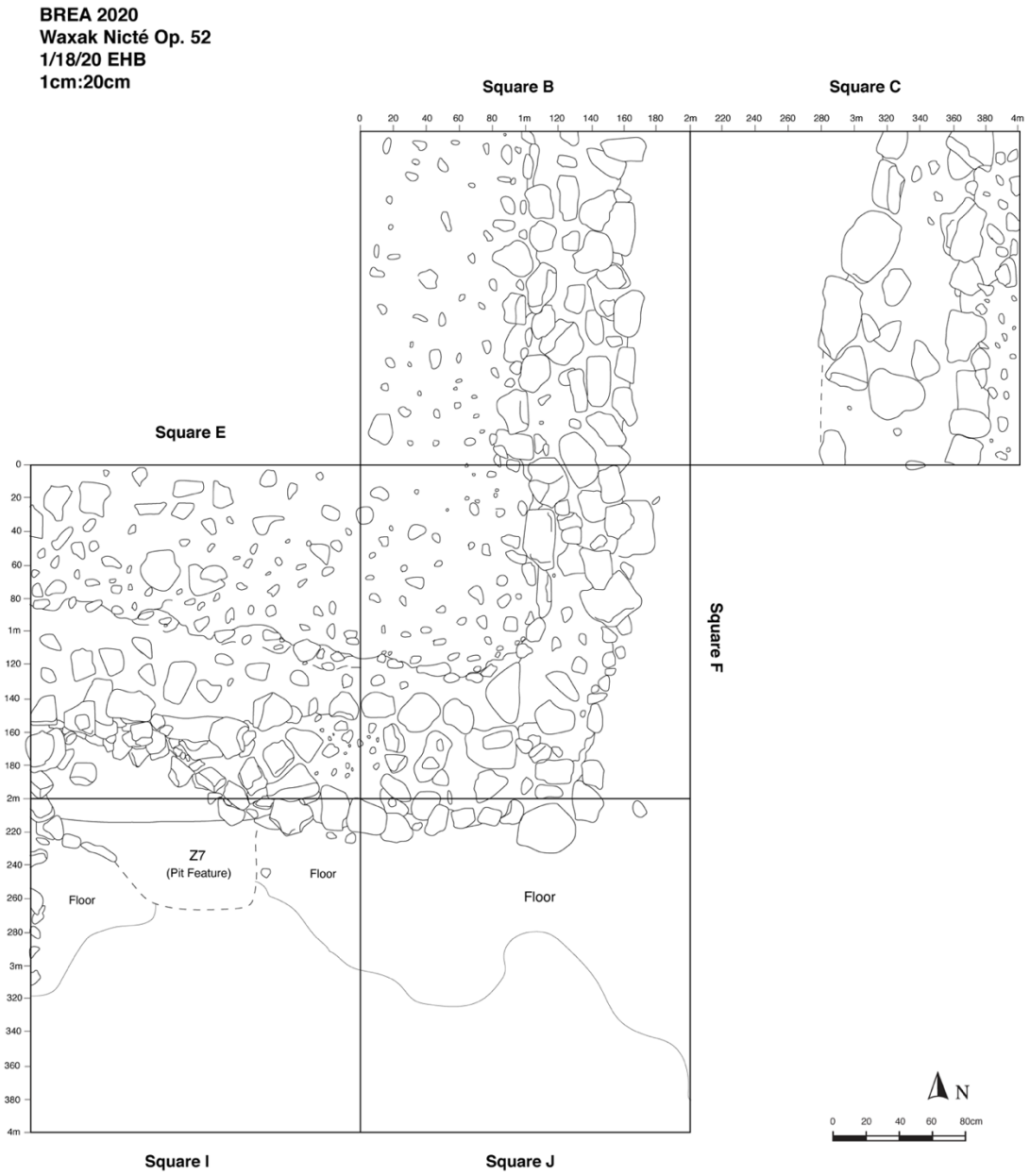

Figure 6.3 Final plan view of Op. 52 showing excavated squares. Southeastern corner of Structure 1 is visible in Squares J and F; corridor between Structures 1 and 2 visible in Squares B and C (drawn by E. Harrison-Buck, digitized by K. Titus).

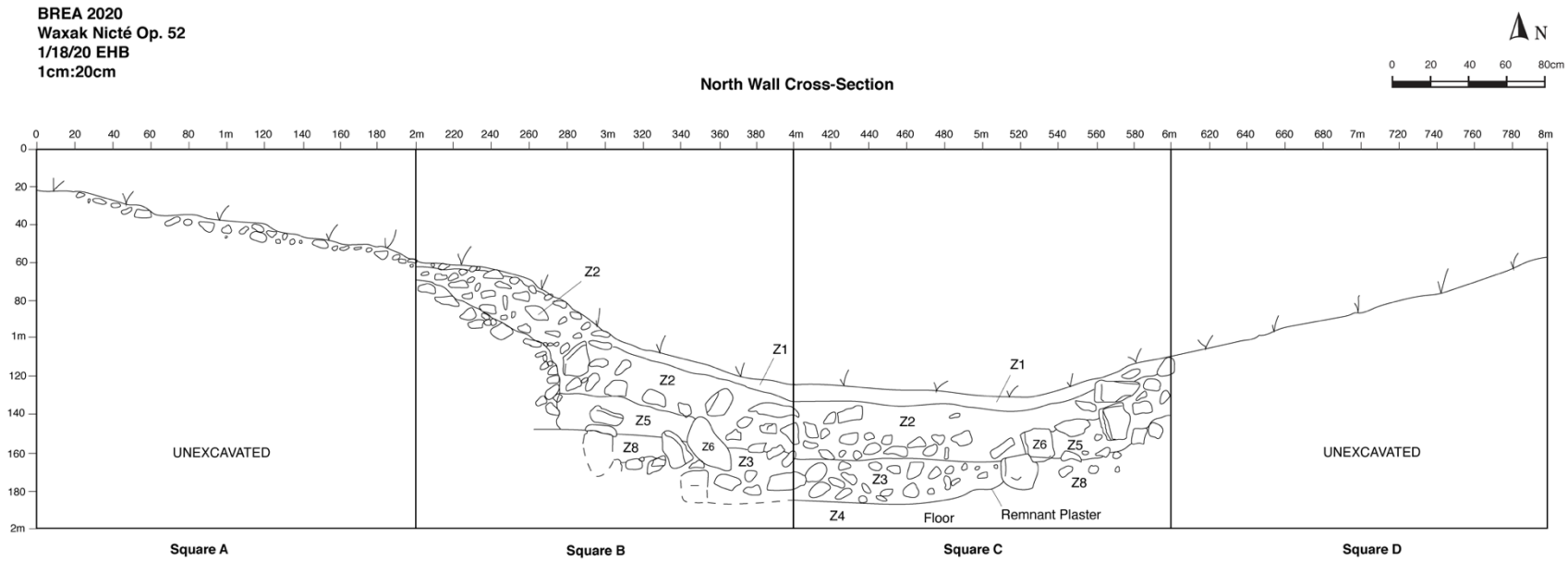

Figure 6.4 Final cross section of northern profile showing corridor between Structures 1 and 2 (drawn by E. Harrison-Buck, digitized by K. Titus).

Zone 4 – Floor

Zone 4 consisted of the plaster floor itself. No artifacts were collected as only the actual preserved floor is included in this zone and it was not excavated. This zone was best preserved close to Structure 1 on the northern end of Squares I and J (see **Figure 6.5**). Tree disturbance affected this zone in several places, causing what is left of the plaster floor to be significantly uneven and undulatory. Remnants of plaster were also present in Squares B, C, and F in the areas outside the terrace walls, but was nowhere close to a true articulated floor.

Figure 6.5 Exposed plaster floor (Zone 4) in Squares I and J (photo by K. Shelhamer).

Zone 5 – Collapse Debris

Zone 5 was collapse debris above the terrace platform of Structures 1 and 2 (see **Figure 6.4**). It was characterized by large collapse stones as well as a slightly greyer (10YR 4 / 1) and less speckled soil. This zone was only removed from Squares B and C where it was easily recognizable. Even though we continued to excavate Square F, Zone 5 was not used as the layer was much less distinct. We must also note that artifacts collected as Zone 5 in Square C may have mixed context due to the zone being slightly over-excavated in this square. This could have led to mixing of material from the top of the terrace fill (Zone 8).

Zone 6 – Wall

Zone 6 was an architectural zone consisting of the outer retaining wall on the lower terrace of Structures 1 and 2. It was made up of large limestone and chert stones, some with a cut facing surface. Zone 6 separated the inside and outside of the terrace and retained Zone 8

(terrace fill; see **Figure 6.6**). This zone was found in Squares B, C, E, and F and no artifacts were collected as only the actual wall stones were included in this zone. The zone was particularly difficult to define due to the large amount of overlying collapse obscuring the original lines of the structure. Excavating across a broad area in several squares helped to reveal the bigger construction and refurbishment picture, and get a better grasp of the true orientation of this wall (see **Figure 6.3**).

Figure 6.6 Progress picture showing the excavation of Zone 6 and 8 on Structure 1 in Square B (photo by K. Shelhamer).

Zone 7 – Pit Feature

Zone 7 was a pit feature at the base of the terrace wall (Zone 6) in the northwest corner of Square I (see **Figure 6.3**). It consisted of soft silty clay soil (10YR 4 / 2) surrounded by a concentration of artifacts and several large stones along the southwestern edge of the pit. This zone was dug as an aggressive "punch down" since no significant contextual change was noted. The zone returned a consistent density of pottery at first, but it gradually decreased until there was almost no cultural material being found.

Zone 8 – Construction Fill

Zone 8 was the construction fill contained by Zone 6 (terrace wall) in Squares B, C, and F (see **Figure 6.6**). It was characterized by a lighter yellow-grey color (10YR 4 / 1) with no

limestone or plaster speckling and small cobbles dispersed throughout. As previously noted, some of the artifacts from this context may have gotten mixed with Zone 5 due to minor over excavation in Square C, but the overall artifact density of this zone is very light.

Zone 9 – Posthole

Zone 9 was a small pit feature contained solely within the context of Zone 8 in the southern end of Square C. It consisted of extremely dark, fluffy soil that was completely devoid of artifacts. Zone 9 measured about 15 cm in diameter and 29 cm in depth. All characteristics point to this being a posthole cut into the lower terrace fill (Zone 8) of Structure 2.

Zone 10 – Construction Fill

Zone 10 was arbitrarily assigned after the end of the season to refer to the unexcavated construction fill sitting on top the lower terrace (Zone 8) of Structure 1. This zone consisted of densely packed, baseball sized stones in Squares B, E, and F (see **Figure 6.7**). It appeared to be a later phase of construction in the form of an upper platform that may have at one time been contained by larger architectural stones. At the time of excavation, no clear retaining wall was found, and Zone 10 appeared to be slumping down onto Zone 5. This zone was discovered early in the season due to being so close to the surface but was then left alone and never excavated.

Figure 6.7 Zone 10 unexcavated in Square F (photo by K. Shelhamer).

Interpretations and Conclusions

At the end of the day, Op. 52 was a confusing excavation. The high volume of collapse debris and lack of larger, definitive architectural stones left us struggling to articulate the core structure. We believe this may be due in part to the robbing of larger architectural stones in antiquity or possibly in modern times. Zone 10 enforces this idea through its' complete lack of a retaining wall. Even before breaking ground there were very few larger stones visible on the surface and we did not find them as we continued to dig deeper. This leads us to believe that we did not miss these stones, but rather that they were not there at the time of excavation.

Fortunately, we were still able to succeed in most of our objectives by identifying distinct construction phases, finding the plaza floor, and gaining an improved understanding of the plaza's northern access point. We did not locate a terminal deposit, but this could be due to the fairly broad (versus deep) nature of the excavation. Hopefully further laboratory analysis of the artifacts gathered from Op. 52 will help us even better understand these structures in the future.

Chapter 7

Further Testing on the North Structure of Ceiba Plaza, Waxak Nicte' (Operation 53)

Céline Lamb

Introduction

Operation 53 consisted of excavations of Structure (Str.) 2 in the Ceiba Plaza, otherwise known as Plaza A group, at Waxak Nicte' (see **Chapter 4, Figure 4.2**). Structure 2, located on the north side of the plaza, was comprised of a rectangular building oriented east-west and extending roughly 20 m long (east-west), 10 m wide (north south), and ~1 m in height. Cut stone visibly protruding from the ground surface suggested intact terraces or a staircase leading to the top of the building, which may once have supported a perishable structure with a stone foundation (based on the presence of cut stone on the summit of the mound). Structure 2 was selected for excavation as it represents a modest-size residence within a large civic-ceremonial site. With this work, our aim was to establish chronological control through ceramic serration as well as to collect carbon samples for AMS testing. Further, we hoped to recover evidence of ritual behaviors in the form of special deposits in the terminal architecture of the building.

Objectives

1. To test a modest-size elite residence.
2. To expose a portion of the terminal architecture of this structure and any earlier phases of construction and occupation.
3. To obtain ceramic and/or carbon samples from each construction phase for use in chronological analysis of the building's development.
4. To record any associated special deposits to identify ritual activity and assess any changing patterns in such activity from the Classic to Postclassic periods.

Operation 53 at Waxak Nicte'

Operation (Op.) 53 is a cardinally oriented unit that measured 4 m north-south by 4 m east-west and was divided into two 2-x-2 m squares (A and B) and one 2-x-1 m square (C) (**Figure 7.1**). All three squares were excavated during the January 2020 field season. Squares A

and B, representing a 2-x-4 m trench along the central axis of the building, were initially opened to expose a portion of the structure's architecture (through Square A) and the plaza floor directly in front of it (Square B; **Figure 7.2**). Square C, located to the east of Squares A and B, was later opened to further expose an architectural feature (Zone 5, the southern stair) identified in Square A.

To meet objectives 2, 3, and 4 listed above, a "punch-down" excavation was conducted in the approximate center of Squares A and B (see **Figure 7.1**). This punch-down was placed to capture the construction fill of Str. 2's southernmost stair as well as the plaza directly in front of the plaza.

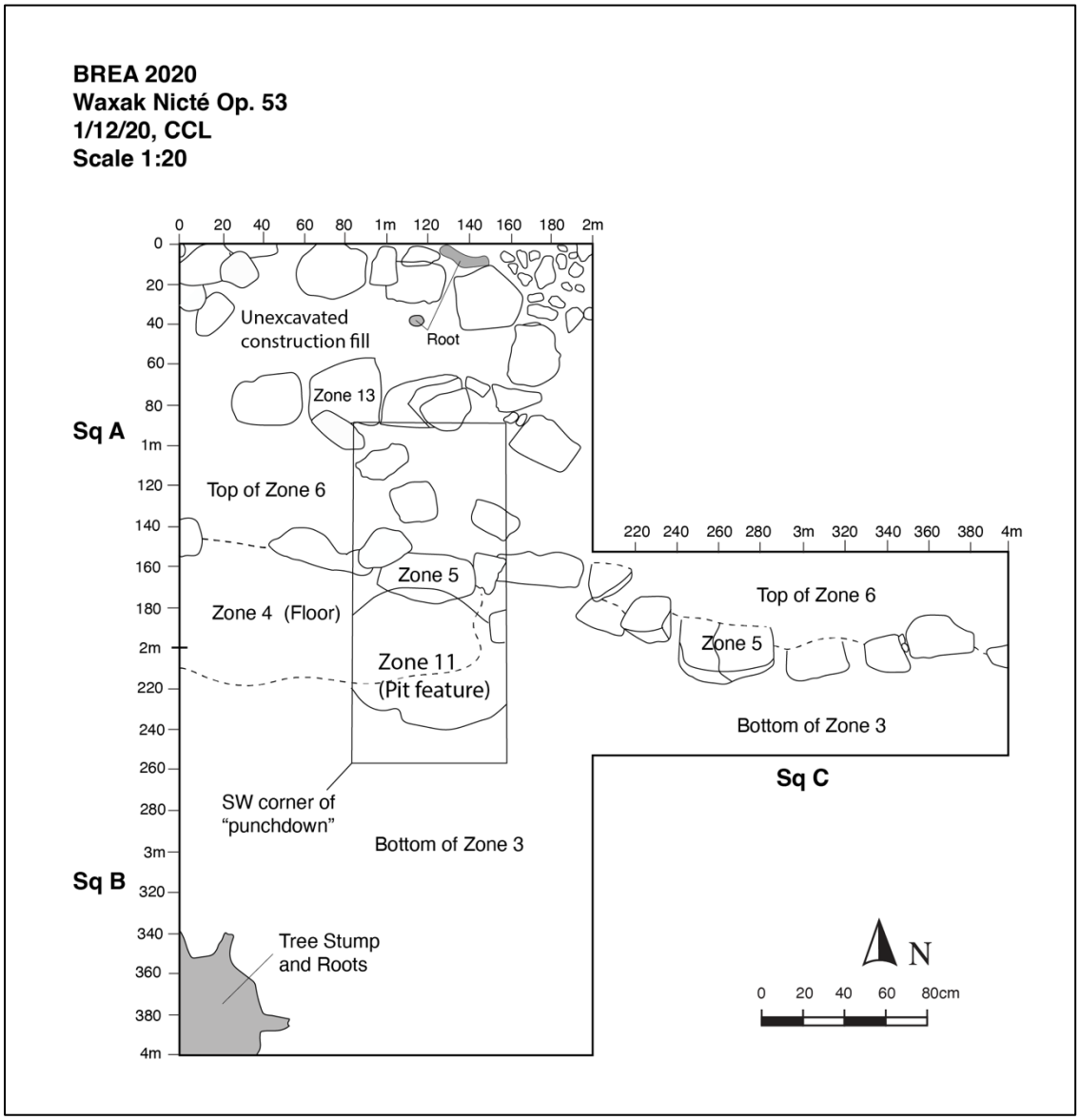

Figure 7.1 Plan view of Operation 53 (Drawn by C. Lamb; digitized by K. Titus).

Although ceramic analysis is ongoing, preliminary studies of the artifacts recovered from surface levels and lower levels of excavation suggest that the final construction of Str. 2—as well as the terminal occupation—dates to the Terminal Classic. Only one phase of construction was identified for Str. 2; limited size of the punch-down excavation did not reveal any further construction phases. A pit feature (Zone 11) was exposed along the center axis of the structure, directly in front of the terminal building in Squares A and B, representing a burial deposit. This deposit was exposed and drawn but was not excavated due to time constraints.

Figure 7.2 Opening photo of Op. 53, Squares A and B, prior to excavation and its placement on Structure 2. Photo facing north (photo by C. Lamb).

Excavation Methods

Handpicks, trowels, and five-gallon buckets were used to remove all soil, rocks, and other materials from the unit. Picks served to remove the overburden while trowels were used to define architecture, pit features, and *in situ* artifacts. Delicate materials such as bone identified in the pit feature were defined using wooden skewers. All soils and other matrix materials recovered from excavations were screened on site through a 0.25-inch mesh screen. Zones were separated either arbitrarily at approximately 20 cm depths, or when a color or texture change was

noted. Zones were also attributed to discrete architectural features, such as plaster floors and retaining walls.

Vertical measurements throughout excavation were taken from a temporary datum point (Datum A, located directly northeast of the northeast corner of Square A), which was logged in absolute elevations with the Total Station. The Total Station was also used to map the edges of all excavations and record their UTM coordinates. Architecture and cultural features such as the Zone 11 pit were recorded through photographs and drawings, including plan view and profiles. These features were drawn by hand on graph paper at a 1:20 cm scale and later digitized using Adobe Illustrator. In the remainder of this chapter, excavations are described by zone, the smallest unit of excavation used, organized by the Squares in which zones were recorded.

Zone 1 Humic Layer (Top-zone)

Zone 1 was the thin humic layer found throughout the unit and excavated across all three Squares (A–C; **Figure 7.3**). This topzone consisted of a semi-loose, black (10YR 2 / 1) silty loam matrix filled with fine roots, grass, and leaf litter. The matrix contained a low density of small angular stones (2-4 cm) and pebbles (>2 cm) consisting mostly in limestone as well as chert nodules and nodule fragments. The artifact density in Zone 1 was very low. Artifacts recovered included small amounts of animal bone, chert debitage, and ceramic sherds.

In Squares A and C, the topzone was removed to expose a stone alignment running east-west through these Squares. The tops of two series of large facing stones were exposed, making up the retaining walls of two terraces or possibly stairs leading to the top of the Str. 2. The topzone was removed in Square B as part of excavations aiming to uncover the plaza floor directly in front of Str. 2.

Zone 2 Collapse Debris

Zone 2 consisted of semi-loose, very dark grayish brown (10YR 3 / 2) silty loam with small limestone flecks (**Figure 7.3**). The matrix contained a low to medium density of angular limestone and chert inclusions, including small boulders (~20-30 cm), small and large cobbles (~2-20 cm), and pebbles (>2 cm). In Square A, inclusions, which consisted mostly of small cobbles and pebbles, were concentrated in the northeast of the Square. In Square B, inclusions were concentrated in the northern portion of the Square, up against the southern stair/terrace of the structure, and included cut stones that likely collapsed from the stairs/terrace retaining walls or superstructure foundations. Artifact density in Zone 2 was low and included small amounts of ceramic sherds and chert debitage. Small plaster fragments were also found in Zone 2 in Squares B and C. Removal of Zone 2 collapse debris clearly exposed the southernmost stair-terrace retaining wall (Zone 5), described below.

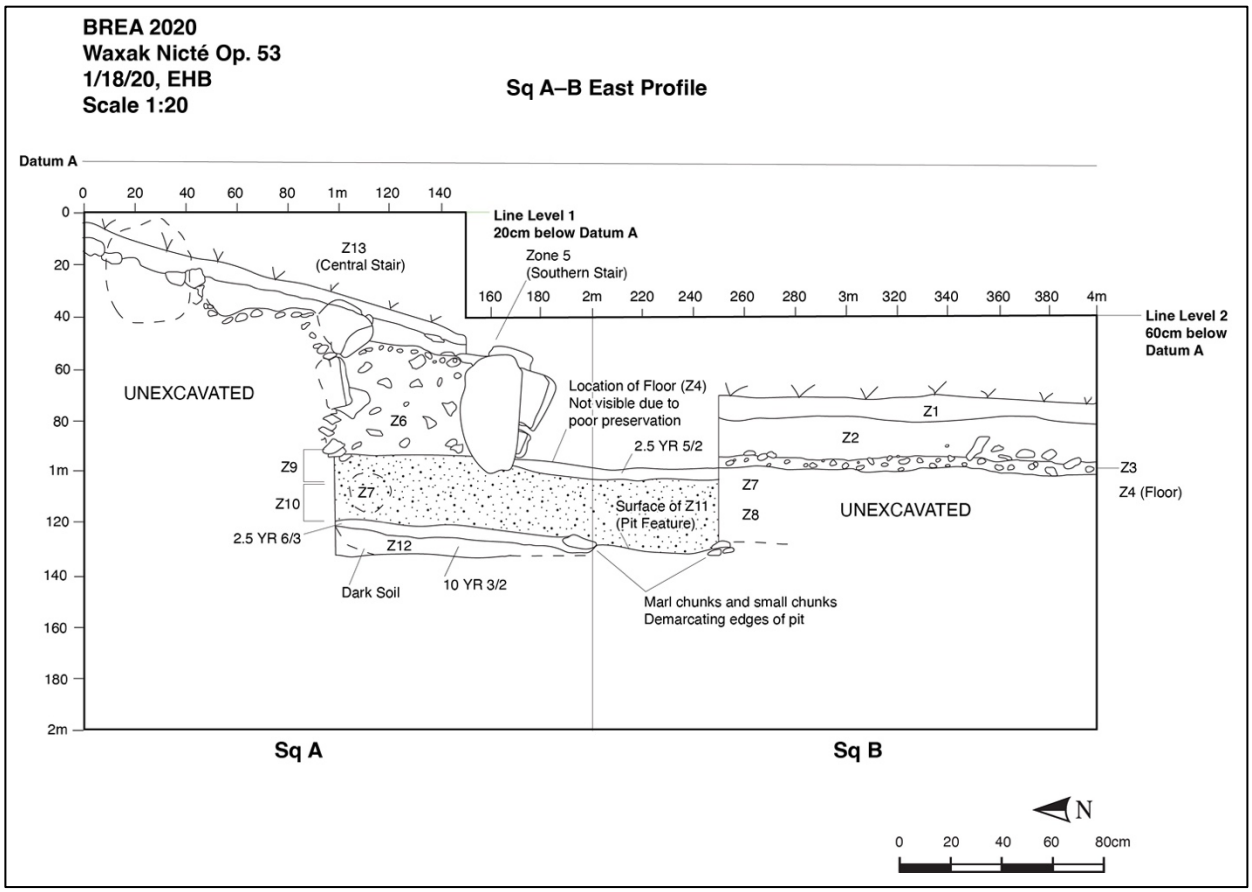

Figure 7.3 Cross-section of Operation 53
(drawn by E. Harrison-Buck, digitized by K. Titus).

Zone 3 Possible Ballast

Zone 3 was interpreted as the ballast of an unpreserved plaster floor and was found in Squares B and C. Zone 3 consisted of a loose, brown (10YR 4 / 3) gravely clay loam matrix, with small (>7 cm) limestone and chert cobble and pebble inclusions (**Figures 7.3** and **7.4**). Artifact density was low to medium, and recovered artifacts consisted of ceramic sherds. A large flat plaster fragment as well as a sherd lying flat was found at 106 cm below Datum, while the bottom of two collapsed cut stones were found at 108 cm below Datum. These depths coincide approximately with the change in matrix and inclusions that consist of Zone 3, all of which suggest there may have been a flat surface, such as a floor, and that this layer of inclusions served as a ballast. If this interpretation is correct, Zone 3 would represent the latest plaza floor associated with Str. 2. However, there is a possibility that zone consists of finer collapsed debris that had run-off the structure prior to larger materials collapsing. This possible interpretation is based on the presence of other pieces of plaster, besides the large flat lying fragment, found lying in various directions, as well as the fact that Zone 3 is thickest closest of the edge of the stair/terrace retaining wall and becomes thinner further south.

Figure 7.4 Opening shot of Zone 3, with a portion of Zone 4 plaster floor exposed in the northwest of visible excavations (photo by C. Lamb).

Zone 4 Plaster Plaza Floor

Zone 4 consisted of a plaza plaster floor found to the south of Str. 2 (**Figure 7.1** and **7.5**). This zone was encountered directly underlining Zone 3 in the northwest portion of Square B and southwest portion of Square A. The floor was poorly preserved and was not encountered in Square C or in the southern portion of Square B. The plaster floor was found abutting the southernmost stair/terrace retaining wall of Str. 2 and was not found on the inside of the structure, suggesting that the plaster floor was built after the retaining walls of Str. (rather than Str. 2 having been built on top of Zone 4).

Zone 5 Southern Stair Retaining Wall

Zone 5 represented the southern-most stair of Str. 2, which retains the fill of Zone 6 (described below). The front or exterior of this retaining stair/wall was exposed in Squares A and C only. This retaining wall consisted of a single course of stones, many of which are large (roughly 40 cm long) cut limestone facing stones placed upright (**Figure 7.1**, **7.3**, and **7.6**) and runs at 100 degrees (or 10 degrees south of east). While some of the large facing stones were found intact in Square A, those exposed in Square C have slumped forward and a stone appears to have been dislodged in the western-most portion of the exposed retaining wall. During excavation, the central stone exposed in Square A, which was slumping when exposed, fell out of place. We

therefore chose this location to excavate a punch-down with the aim of gaining materials to date the construction of Str. 2 and identifying possible earlier construction phases.

Figure 7.5 View of Op. 53, including plaza plaster floor (Zone 4) abutting the southern stair/terrace retaining wall (Zone 5) of Structure 2 (photo by C. Lamb).

Zone 6 Southern Stair Construction Fill

Zone 6 was the construction fill retained by Zone 5 in Square A, the retaining wall of the southernmost stair of Str. 2 (**Figure 7.1**). The matrix of Zone 6 was a semi-loose, slightly compact, brown (10YR 5 / 3) silty-marly clay. Inclusions in the matrix included gravel (>2 cm), small angular limestone and chert fragments (2-7 cm), as well as small amounts of larger angular limestone and chert fragments (~10-15 cm) and soft marl chunks. Artifact density was medium to high, and artifacts recovered consisted in ceramic sherds, including diagnostic rim sherds and sherds with well adhered slip.

Zone 7 Plaza Fill, Possible Floor Ballast

Zone 7 measured approximately 6 cm in depth and lies directly below the Zone 4 plaster floor and was encountered south of Str. 2 in the punch-down excavation (**Figure 7.3**). The

matrix of this zone consisted of a greyish brown (2.5Y 5 / 2) semi-loose, silty-marly-clay. The matrix contained a low-to-medium density of limestone pebble (<2 cm) and cobble (2-7 cm) size inclusions. Artifact density was medium to high. Ceramic sherds were recovered from this zone, including diagnostic rim and base fragments and sherds with well adhered slip. Because this zone was found directly below a plaster floor and is relatively thin, and because the amount of stone inclusions drops drastically with the soil change found below it (Zone 8), it is likely that Zone 7 represents the ballast for the plaza floor of Str. 2.

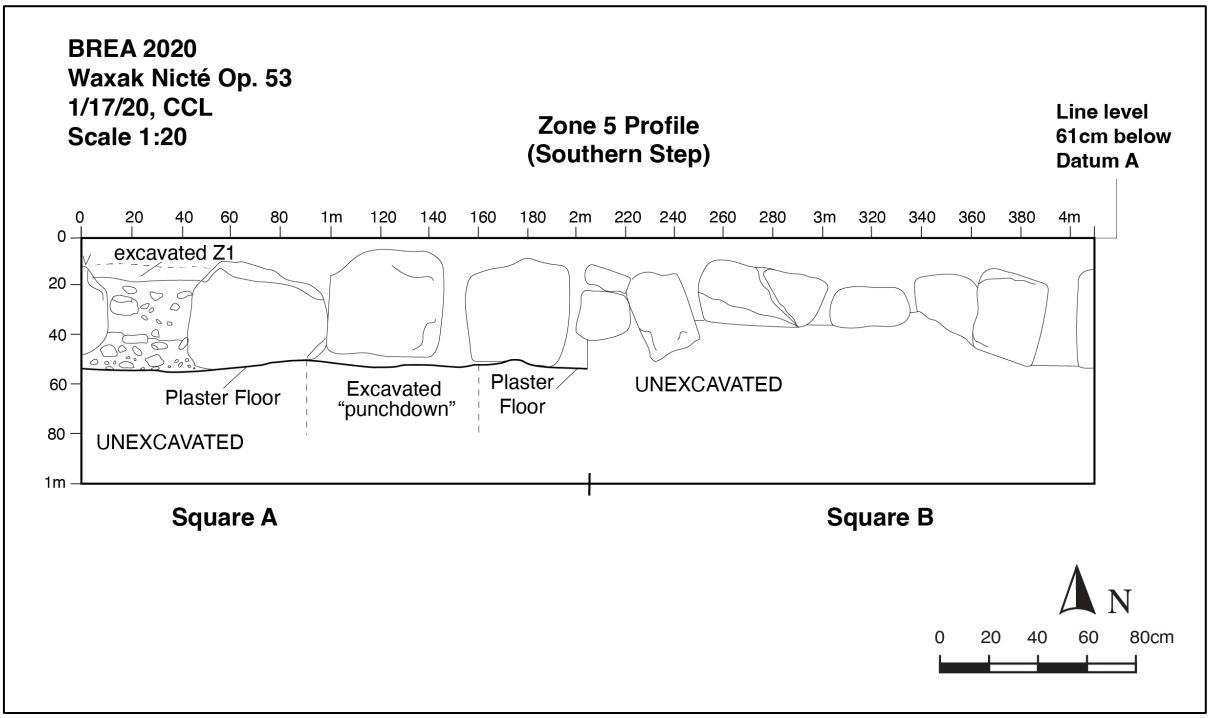

Figure 7.6 Profile of Zone 5 Southern Stair of Structure 2 (facing 10 degrees East of North; drawing by C. Lamb, digitized by K. Titus).

Zone 8 Plaza Fill

Zone 8 was encountered directly below Zone 7 during excavations of the southern portion of the punch-down (south of Str. 2; **Figure 7.3**). Zone 8 represents plaza construction fill below Zone 4 plaster floor. Zone 8 was distinguished from Zone 7 by its slightly lighter color and change in inclusions. The matrix of Zone 8 was a light yellowish brown (2.5Y 6 / 3), semi-loose silty-gravely-clay and inclusions consisted of small (<1 cm) pebbles and chunks of marl of various sizes (1-10 cm). No artifacts were found in Zone 8.

Zone 9 Construction Fill (might be the same as Zone 8)

Zone 9 lay directly below Zone 6, in other words below the construction fill of Str. 2's southernmost stair (**Figure 7.3**). The matrix of Zone 9 consisted in a semi-loose silty-gravely clay with inclusions of marl chunks (1-8 cm). This Zone was excavated down to and closed at the same level as the Zone 4 plaster floor in case this floor, in fact, continued beneath Str. 2. However, no continuation of Zone 4 plaster floor was found north of the southernmost stair (Zone 5) of Str. 2. The matrix and inclusions of Zones 8 and 9 were extremely similar, and no horizontal distinction was found between them beneath Zone 5, suggesting that Zones 8 and 9 are in fact the same construction fill of this portion of basal platform of the Ceiba Plaza Group.

Zone 10 Construction Fill (might be the same as Zone 8)

Zone 10 lay directly below Zone 9 and was excavated in Square A, north of and below where the Zone 5 retaining wall once stood (**Figure 7.3**). The matrix of Zone 10 was a light yellowish brown (2.5Y 6 / 3) semi-loose silty-gravely clay with inclusions consisting of small pebbles (<1 cm) and marl chunks (up to 10 cm). Artifact density was very low, with very few amounts of sherds having been recovered. It is most likely that Zones 8, 9, and 10 are in fact the same construction event representing the construction fill of this portion of the Ceiba Plaza Group basal platform upon which Str. 2 was built.

Zone 10 was closed when a poorly preserved bone was encountered at the interface between Zone 10 and a much darker matrix (Zone 11 pit feature, see below).

Zone 11 Possible Burial Pit Feature

Zone 11 wa a pit feature that appears to represent a burial deposit, found in Squares A and B (**Figure 7.3**, **7.7**, and **7.8**) during the punch-down excavations. The western and eastern limits of the punch-down made it impossible to clearly define the east and west edges of the Zone 11 pit feature, although enough had been exposed to extrapolate its extent. The pit seemed to be associated with the Zone 5 southernmost stair and Str. 2 in its terminal form based on its placement directly in front of Str. 2 and on its central axis. However, because no evidence of a cut was found in Zones 4, 7, and 8, and because Str. 2 sits above these zones, this suggests that the Zone 11 pit and associated deposit predates the construction of Str. 2 and the plaza plaster floor (Zone 4) associated with it. The location of the Zone 11 pit suggests that the construction of Str. 2 took place shortly after residents deposited Zone 11 or that the memory of the location of the Zone 11 pit and burial was maintained over time until Str. 2 was built.

The Zone 11 pit intruded into Zone 12 and was filled with a matrix that is a semi-compact, very dark grayish brown (10YR 3 / 2) silty-clay loam. The southern and northeast edges of pit are defined not only by a cut into Zone 12, but also small stones and marl chunks found along the edges of the pit (see **Figure 7.3**). The surface and edges of the cut were defined,

photographed (**Figure 7.7**) and drawn in plan view (**Figure 7.1** and **7.8**) and profile (**Figure 7.3**). The pit contains one poorly preserved bone approximately 6 cm long and a concentration of smaller, as well as poorly preserved burnt bone fragments within a greyish brown (10YR 5 / 2) ashy deposit at the center of the pit, flanked by two ceramic sherds (**Figure 7.8**). Whether the bone fragments are animal or human is unclear without further lab analysis.

Figure 7.7 Photographs of Zone 11 pit feature. Left: excavations in progress; Right: deposit fully defined (photo by C. Lamb).

Zone 12

Zone 12 surrounds—and was cut into—by the Zone 11 pit feature and was distinguished from Zone 11 by its slightly darker and more brown (less grey) soil color as well as its greater organic-loam content. The matrix of Zone 12 was a very dark greyish brown (10YR 3 / 2) and slightly compact silty-clay loam. Inclusions include small limestone fragments and marl chunks (1-6 cm). The dark and organic characteristics of Zone 12 suggest this zone may represent a naturally occurring *in-situ* matrix upon which the Ceiba Plaza Group was built. Zone 12, encountered higher up to the north of Square A and sloping down slightly toward the south in Square B, was excavated to an approximate depth of 4 to 12 cm before closing excavations due to time constraints. However, the horizontal and vertical extent of Zone 12 is unknown without further excavation.

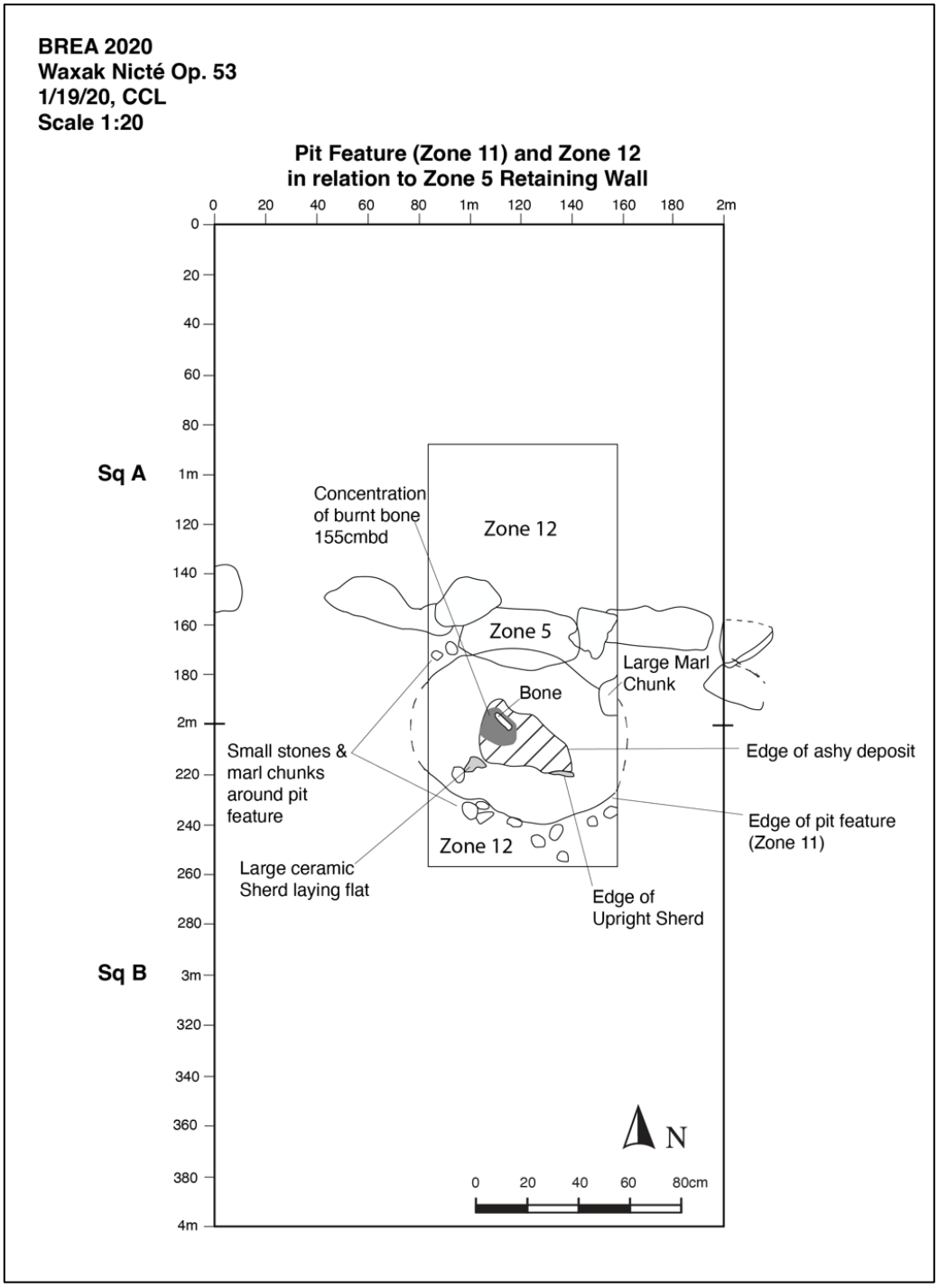

Figure 7.8 Plan view of Zone 11 pit feature in association with Zone 5 retaining wall (drawing by C. Lamb, digitized by K. Titus).

Zone 13 Second Stair Retaining Wall

Zone 13 represented the retaining wall of the second stair from the southern edge of Square A. This wall was identified at the approximate center of Square A, the northeast corner of Square C (see **Figures 7.1** and **7.3)** and was also visible between the two Squares at the surface of the mound (**Figure 7.9**). This retaining wall consisted of a single course of stones, many of which are large (roughly 30 to 40 cm long) cut limestone facing stones placed upright (**Figure 7.3** and **7.7**). Like the Zone 5 southern stair, this second stair runs at 100 degrees (or 10 degrees south of east).

Figure 7.9 Closing shot of Operation 53, with zones 1 -3 removed (photo by C. Lamb).

Zone 14 Possible Third Stair Retaining Wall

Zone 14 represented a possible third stair retaining wall (third from the southernmost in Square A) on the south side of Str. 2. This zone was designated as a possible, rather than certain, stair retaining wall because only three stones were found in alignment and, unlike Zones 5 and 13, no aligned stones were visible at the surface of the mound. However, the location and orientation of these small alignments–approximately 40 cm north of Zone 13–were similar to Zone 5 in relation to Zone 13, which strongly suggests that Zone 14 represents a poorly preserved retaining wall of a stair. Because Zone 14 was downslope from the top of the Str. 2 mound, it is likely that another stair existed and was covered by collapsed debris.

Conclusions

The limited excavations conducted during the 2019 season suggest that Str. 2 was a building oriented 10 degrees east of north, similar to what has been found throughout the BREA study area, with a possible central axis staircase of at least three stairs or three terraces. The portion of the plaza directly south of Str. 2 was covered with a plaster floor (Zone 4), as the entirety of the Ceiba Plaza surface likely was.

Based on a cursory study of the artifacts recovered during excavation, ceramics found lying directly above the Zone 4 plaza floor, as well as ceramics found associated with the construction fill of this floor (Zone 7) and the southern-most stair (Zone 6) appear to date to the Terminal Classic period (ca. A.D. 800-950). Thus, the construction of Str. 2 and of the basal platform upon which it was built, as well as its time of occupation, appear to date to the Terminal Classic. Further excavation is necessary, however, to clarify the chronology of this residential complex and identify possible earlier construction phases.

Zone 11 appears to have been an intrusive pit and may represent a burial deposit based on the evidence of bone and ash and its placement along the central axis of Str. 2, directly in front of its lowest stair. Its placement in relation to Str. 2, and the lack of cuts found above the feature, suggest that this pit is contemporaneous with the construction of Str. 2. Because this feature was encountered on the second to last day before the end of the season and would have required us to extend the unit to fully uncover the pit, we halted excavations once the pit feature and its contents were defined within the bounds of the punch-down and the deposit remained unexcavated during the 2019 season. Future excavations will provide greater information on the nature of this deposit and its relation to Str. 2 and the Zone 4 plaza floor.

Chapter 8

Shovel Testing for Historical Sites in Crooked Tree Village and Results from a Test Excavation at Wade Bank (Operation 54)

Adam R. Kaeding

Introduction

One of the primary research goals of the BREA project has been to identify, document, and investigate historic period archaeological signatures throughout the survey area. In and around Crooked Tree Village, this has provided insight into land use during the British Colonial period, origins of the Kriol culture, and limited ephemeral evidence of Spanish Colonial presence. This search for historical sites has employed several different methods and incorporated data from various sources. This chapter will discuss the methods and results of those efforts to date and introduce some interpretations of those results within the Crooked Tree area.

Historical period sites are, of course, different in many ways from most of the ancient Maya sites that the BREA project has investigated. However, the fundamental differences—with the most substantial implications for a survey project—are that most of the historical period sites do not include any extant architecture or other above-ground features. A notable exception in the Crooked Tree area is the Baptist Church, recognized by community members as the site of one of the oldest wooden buildings in the village, dating to the early nineteenth century (Harrison-Buck et al. 2019). Unsurprisingly, excavations in the lot surrounding the church yielded a tremendous amount of archaeological data that help inform and populate the early days of the Kriol culture (Kaeding et al. 2020). Most historical buildings, however, disappeared from the landscape long ago. According to local informants and historical documentation, it seems likely that most colonial period structures in the area would have been clapboard or thatched roof "cabbage" houses, often on stilts. These construction methods are well suited to the environment in many ways, but longevity without dedicated maintenance is not one of their qualities. Therefore, while reconnaissance survey seeking to identify and characterize ancient Maya sites can be guided largely by topographical features, the search for historical period sites cannot. This section describes the methods used in the pursuit of this BREA research objective and how and where they have been employed throughout the Crooked Tree area.

Objectives

1. Identify areas of possible historic period occupation through archival records, local informant knowledge, and other sources.
2. Document the presence of historic period occupation using pedestrian survey and other lightly invasive field methods (e.g., shovel-test pitting).
3. Investigate the spatiotemporal distribution of historic period archaeological signatures through excavation.

Description of Research Methods

Local Informants and Historical Documentation

The most consistently reliable means of locating ancient Maya sites is through identifying community members that have extensive and intensive familiarity with the wider area. Though historical sites lack the topographical prominence of Maya sites, they are often characterized instead by substantial artifact scatters. Many of the artifacts that constitute historic period sites are distinct and so local informants are aware of places where such artifacts have been recovered and historical scatters have been identified. Similarly, some community members retain an intimate understanding of the historical land use in the area—including the residential and activity areas of the previous generations of Kriol ancestors. Accordingly, a primary survey method for identifying historic period sites has been to identify those individuals who are willing to share that information and able to guide us to those locations.

BREA archival research has yielded a historical map depicting the Tilletton site—the lot of the Baptist Church investigated during the 2018 January season (Kaeding et al. 2020; see also Harrison-Buck et al. 2019). The map marks the donation of this plot of land to the church, so naturally the lot itself and its associated structures are the focus of the document. However, there is additional information included that helps reconstruct the surrounding area at the time. Specifically, outside of the Tilletton property, this map depicts natural landscape features and lot lines with ownership information, appearing to show several transportation routes—trails or old dirt roads, some which still exist and are used by villagers today. What these trails or roads connected to in the past from the Tilletton site remains unclear, but it seems reasonable to assume that Tilletton was an area of elevated significance for this early settlement (**Figure 8.1**). Survey was guided by both background research methods—interviews with local informants, and analysis of historical documentation.

Figure 8.1 Map of William Tillett's property from 1868 ("Tilletton" site) in Crooked Tree Village (courtesy of the Belize National Archives).

Pedestrian Survey

While local information and historical documents provided primary guidance for the historical site survey, other methods were employed as well. One of these was pedestrian survey of the sandy beach area running along the shore of Crooked Tree Lagoon. Local informants have long noted that many historical artifacts have been recovered from the lagoon-side. However, the distribution of historical artifacts along the lagoon is not uniform; there are areas of higher concentration and other areas where no artifacts are present. Additionally, it is unclear where, when, and to what degree these artifact concentrations are being deposited and

redeposited by water action; moved onto dry land from initial deposit in the lake bottom; or washed out from higher interior locations. One method used to better assess the distribution of the historical archaeological signature has been to walk the lagoon-side in areas of high to total ground surface visibility and identify artifact concentrations. The assumption underlying this methodology that is along that particular axis—parallel to the north-south oriented lagoon—the distribution of artifact concentrations is likely to reflect the general distribution of historical activities in the area. To date, lagoon-side pedestrian survey has been employed opportunistically and non-systematically as a more of an exploration of the potential utility of the approach rather than a standalone survey method.

Pedestrian survey is also the method employed in the initial investigation of areas identified by local informants. When areas have been identified as potential historical archaeological site locations based on oral tradition of historical land use patterns, there is always the possibility of misidentification, flawed recollection, and/or issues of scale (i.e., the understanding that activities or sites had been located generally in a certain part of the landscape, but no information regarding the exact, precise locations). Similarly, a sample of the areas identified for further investigation through input from local informants are areas where interesting artifacts had been previously collected by community members. Assuming that our informants are correctly recalling the precise locations of these former occupations, the one thing that can be securely established is that the collected artifacts are *not* currently located there. In these situations, the next step in the historical site survey is the pedestrian survey of the area. Like the lagoon-side pedestrian survey, this has generally been executed in only a minimally systematic fashion: BREA survey team members generally radiate outward from the specific area identified by the informant and scan the ground surface to identify any historical artifacts that may exist. It is worth nothing that while the pedestrian survey efforts in these situations have proved useful in guiding additional investigation, it can only really help characterize a site when ground surface visibility is high, an environmental circumstance that characterizes a small proportion of the Crooked Tree area.

Shovel Testing

The information gathered from historical documents, local informants, and pedestrian survey collectively provide wide scale and hypothetical indications of where intact historical archaeological resources may potentially exist. However, even in situations where pedestrian survey has identified surface artifact scatters, the subsurface integrity of those deposits is unknown. For example, as mentioned above, surface artifact scatters from the lagoon-side may represent any number of taphonomic processes, many of which would result in mixed-context archaeological signatures with diminished ability to inform on historic land use. As such, in the same way that local informants provide key data necessary in identifying potential site locations, shovel testing is the key method used for investigating the information potential of identified sites.

Because this BREA survey method seeks the same objectives, yields similar data, and faces similar limitations as the approach more commonly referred to as 'shovel testing' the same term is employed. However, it is worth noting that the BREA team rarely actually uses shovels for this testing, relying instead on posthole diggers which are considerably better suited to the environmental circumstances and soil profiles that characterize much of the area. The BREA posthole/shovel testing involves the systematic distribution of small circular excavation units approximately 20 to 30 centimeter (cm) in diameter, reaching generally about a meter below the surface at most. Depending on the nature of the area under investigation, these excavations may be spread out at an approximate 5-, 10-, or 15-meter (m) intervals. The soil excavated from these units is passed through a ¼ inch hardware mesh and artifacts from each test are collected in accordance with their provenience. Shovel test contexts are documented according to 'Series.' Series refer to discrete research objectives; for example, shovel tests investigating whether archaeological sites exist in a certain area would receive a Series number; shovel tests refining the understanding of artifact distribution within a known site would receive its own Series number. While shovel testing only provides very limited vertical excavation control, efforts are made to record the approximate depths of artifact recovery, and soil profiles are documented according to color and characteristics. In BREA historical contexts, this method has been employed in many areas to quickly characterize a site vertically and horizontally in terms of general artifact assemblage, identify areas of higher artifact concentration, and suggest any patterning in distribution of different artifact types. Information from this stage of investigation then becomes critical in guiding the placement of larger, more formal units excavated using methodology better suited to greater vertical control.

Based on the data gathered through the methods described above, several areas have been further investigated through the distribution of shovel tests. These include locations along the lagoon-side where artifact concentrations have been identified as a result of non-systematic pedestrian survey. These shovel testing surveys were completed in earlier seasons and presented in previous reports and so will not be discussed in greater detail here. They include testing in areas identified as Nicholson's Landing (Flanagan 2020), and Crawford Bank (Harrison-Buck et al. 2018). The areas more immediately related to the data presented in this report include the lot that houses the village health clinic, the yard located immediately behind (west of) the clinic, and the lot across the street from (north of) the clinic. Each of these lots was considered a potential location for whatever may have been connected to the Tilletton Site according to the 1868 map – potentially including the residential quarters for the enslaved population – and had been reported as areas where colonial artifacts including bottles had been collected. Parts of this investigation around the clinic have been presented in a previous BREA report (Rybka and Kaeding 2020). Shovel tests were also distributed in the yards that constitute 'Breadnut Hill', a location long owned by the Flowers family and commonly understood to have been a central focus of village activity for past generations and also an area where a cache of intact bottles is reported to have been collected; a path adjacent and running parallel to the lagoon; and a residential yard just south of the Baptist Church in an area known as Wade Bank.

Excavation Units

In historical archaeological sites that seem to possess subsurface integrity and substantial information potential, the next stage is the placement and excavation of formal units. In these historical contexts, the objective of the excavation units is primarily to investigate the vertical distribution of archaeological data in a more controlled fashion than that provided by the shovel testing method. Standardized excavation units are generally placed in the portions of sites that have the most information potential: areas with the greatest density of artifacts, the greatest diversity of assemblages, the highest potential for diagnostic artifacts or features, or the most extensive and potentially intact stratified vertical profile. The units are excavated with a combination of horizontal shovel and mattock skimming, hand-picking, and trowel digging. Generally, units are excavated in 5 to 10 cm arbitrary levels, natural stratigraphic levels, or a combination where natural strata are sectioned into arbitrary levels, depending on which approach is best suited to capture potential differences in the vertical distribution of data. Artifacts recovered from each level are collected according to provenience and the characteristics (soil color, soil inclusions, artifact content, level of disturbance, etc.) of each level are documented in standardized forms. Notable characteristics such as features, observable natural strata changes, and *in situ* diagnostics are documented via digital photography and field drawings as appropriate. Excavation is continued until two consecutive archaeologically sterile levels are documented or a natural impasse—usually bedrock or very compact archaeologically sterile clay—is encountered. After completion of excavation at least one representative unit profile wall is drawn and photographed.

Outside of the Baptist Church lot investigation involving Operations 36-40 (Kaeding et al. 2020), other units that have been excavated as components of the historical site survey include Operation 41 at Nicholson's Landing (Flanagan 2020) and Operation 35 at Crawford Bank (Harrison-Buck et al. 2018). The survey efforts presented in this report include one excavation unit, Operation 54, excavated at the site identified as Wade Bank to the south of the Baptist Church. Results of the excavation of Operation 54 are presented below.

Overview of 2020 Investigations

The section above details the methods that are employed by the BREA survey team in the effort to identify and investigate historical sites in the Crooked Tree area. This section will present an overview of the investigations of those sites that met the threshold of information potential to warrant at least subsurface investigation via shovel testing and, ultimately, a broader horizontal test excavation (Operation 54). That means necessarily that some of the results of the pre-shovel testing methods described above are not presented here; however, some of the more general patterns and lessons learned from those methods are discussed in the Interpretations and Conclusions section below. As discussed above, our shovel testing efforts have targeted four

general locations: the Clinic Area, the lagoon-side, Breadnut Hill, and Wade Bank. Results from the shovel test pits (STPs) at these four locations are discussed below, followed by the results of the Operation 54 excavation at Wade Bank.

Clinic Area STPs

As described above and in previous reporting (Rybka and Kaeding 2020), several sources of information indicated that the lot containing–and the lots surrounding–the current health clinic may have been the location of the residential quarters of the enslaved laborers that worked in the Tillett operation. The first shovel testing effort, Series 008, was executed within the clinic lot itself and resulted in very low densities of artifacts, no diagnostics, and no clear distribution patterning (Rybka and Kaeding 2020). While these results demonstrated that the clinic lot was not the location of an intact signature of substantial historical activity, they do not necessarily refute the data that point in this direction as an area of interest. Accordingly, shovel testing continued in the lot behind the clinic and the lot across the street. This is an area of higher ground commonly recognized by community members as one of the relatively few locations in the village that never floods regardless of how high the water levels reach. BREA team members refer to this area as Judith's Hill—named for the resident who lives and operates a shop and restaurant on the lot—and the testing here was documented as Series 012 (**Figure 8.2**).

Fifty-four shovel tests were excavated in this area, generally distributed at a 5 m interval. The soil profiles of Series 012 shovel tests were similar throughout the area with darker silt transitioning to compact gray and yellow mottled clay. Several shovel tests were excavated into the clay layer to confirm that this marked the vertical extent of the potential archaeological profile. Once that was established, most of the remaining shovel tests were terminated upon encountering the clay layer. Series 012 yielded modern refuse and a very small sample of historical artifacts comprised of nails and ceramic sherds. None of the shovel testing indicated any areas of artifact concentrations, potential for intact features, or distribution patterns that would warrant additional investigation.

Lagoon-side STPs

Historic artifact scatters are frequently prominent on the surface in the exposed lagoon-side soils east of the Baptist Church, extending north at least into the area of Nicholson's Landing and showing up in pockets stretching south along the walking paths connecting this area to Breadnut Hill. Pedestrian survey was employed along this north-south expanse and surface concentrations were documented with sub-meter GPS. A representative sample of this surface signature was further investigated via shovel testing documented as Series 014 (**Figure 8.3**).

Like elsewhere, shovel test locations were identified at a 5 m interval, though several test locations were skipped due to obstructions at the surface. The testing transects were oriented north-south but were staggered to generally follow the pedestrian path running parallel to the lagoon. As a result of that staggering, the testing area shifted approximately 25 m east as the survey continued to the south. The typical Series 014 shovel test was characterized by loose white/gray sand in the uppermost level, switching to a yellowish-brown sandy clay and ultimately terminating in whitish gray compact or semi-compact clay, often also encountering the water table.

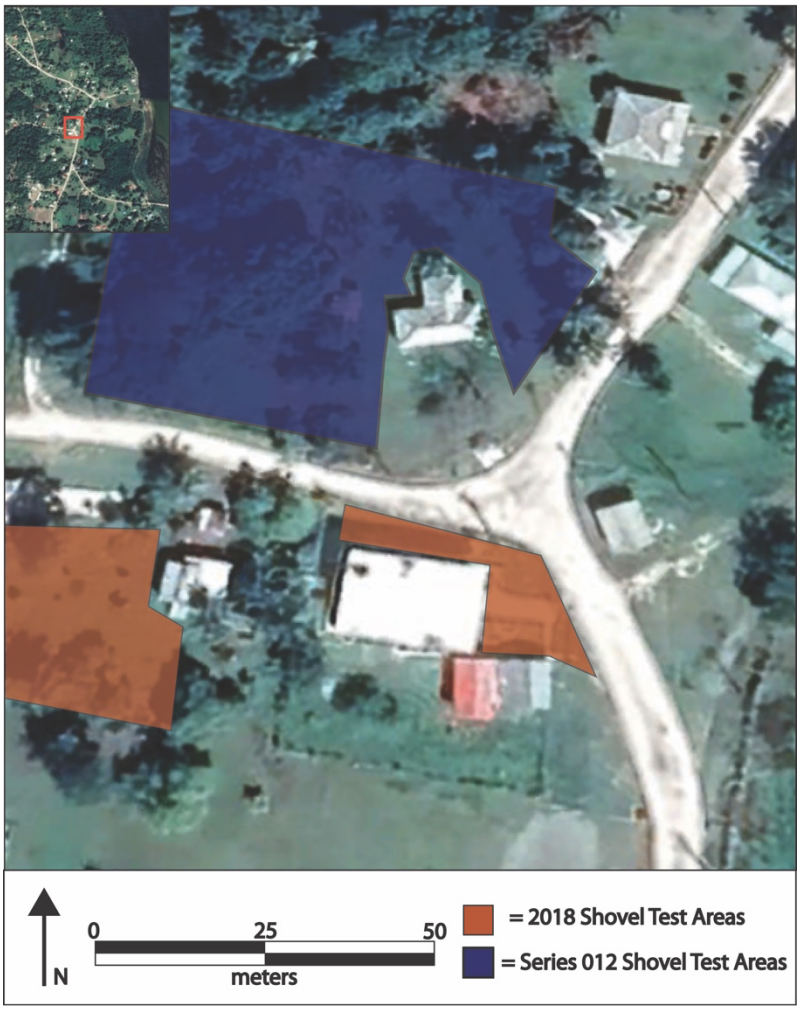

Figure 8.2 Clinic Area Series 012 Testing Location (map by A. Kaeding).

Twenty shovel test pits were excavated as Series 014. Artifact recovery largely reflected surface distribution patterns observed from pedestrian survey. Most of the historical materials appear to have been recovered from near the surface. None of the shovel testing in Series 014 indicated areas with substantial intact subsurface deposits, particularly high artifact concentrations, significant artifact diversity, or areas with high potential for intact features. As

discussed below, the horizontal distribution of artifact scatters may be indicative of historical land-use patterns further inland, but none of the Series 014 results suggested that more intensive investigation through unit excavation would be warranted in this location.

Figure 8.3 Lagoon-side Series 014 Testing Location (map by A. Kaeding).

Breadnut Hill STPs

The area just south of where the eastern causeway enters the village is known as Breadnut Hill. It is a slightly higher elevation than most of the rest of the area and is historically understood to be a ferry landing location. It has also been reported that a cache of intact early

colonial bottles was discovered in the area, although this could not be verified by the BREA team.

The first portion of Breadnut Hill investigated was the yard immediately west of the lagoon. The shovel test pit operation here was documented as Series 013 (**Figure 8.4**). Opportunistic pedestrian survey of the exposed sand of the lagoon-side yielded colonial sherds and glass fragments. As noted above, it is not yet clear whether lagoon-side archaeological signatures reflect re-distribution of artifacts initially deposited within the lake, the erosion of overburden that had previously obscured and preserved artifacts initially deposited in that actual lagoon-side location, or the re-distribution of artifacts initially deposited further inland. The Series 013 shovel testing effort most directly investigated the last of those three possibilities, testing west of and upslope from the lagoon and the artifacts observed at the lagoon-side.

In order to most efficiently and effectively investigate the area for potentially intact subsurface deposits and to further characterize them if identified, shovel tests were distributed at a 5 m interval, but only every other test was initially excavated. This allowed for testing to target areas of data concentration as warranted but meant that much of the area was effectively tested at a 10 m shovel test interval.

Shovel tests were distributed in three transects running parallel to the lagoon (generally north to south) within and running the length of the residential yard. Upon completing those testing transects, one additional transect was extended from the yard to the lagoon (generally east to west). Ultimately, 25 shovel tests were excavated as Series 013. Typical shovel tests in this area were characterized by a layer of darker loose, loamy organic soils, followed by looser lighter sands, terminating in compact or semi-compact clay or white marl deposits.

While many of the Series 013 shovel tests yielded chert debitage, almost no historical artifacts were recovered. Though there may be isolated historical artifacts and artifact scatters on the east, lagoon-side of the Breadnut Hill area, this testing suggests that there is very low potential for any substantial, intact subsurface deposits representing informative historical period sites here.

Though the low-density historical artifact scatter from the lagoon-side surface inspired the testing on the east side of Breadnut Hill, the primary testable area of interest on the hill was within one residential lot on the west side of the hill. The colonial bottle cache described by several Crooked Tree residents is reported to have been recovered from this lot. This area was tested with shovel tests distributed as Series 015 (**Figure 8.4**). Series 015 included 39 shovel tests distributed at a 5 m interval oriented on a cardinal grid across the open, manicured lawn. Series 015 covered approximately 60 m north to south and approximately 30 m east to west. Typical shovel tests were loose dark sandy soils transitioning to lighter sandy soils before terminating in semi-compact or compact clay often at the depth of the water table. Like shovel testing elsewhere in Crooked Tree, Series 015 yielded only a small, sparse sample of historical materials – no areas were identified as having an elevated potential to contain intact, substantial deposits warranting additional investigation.

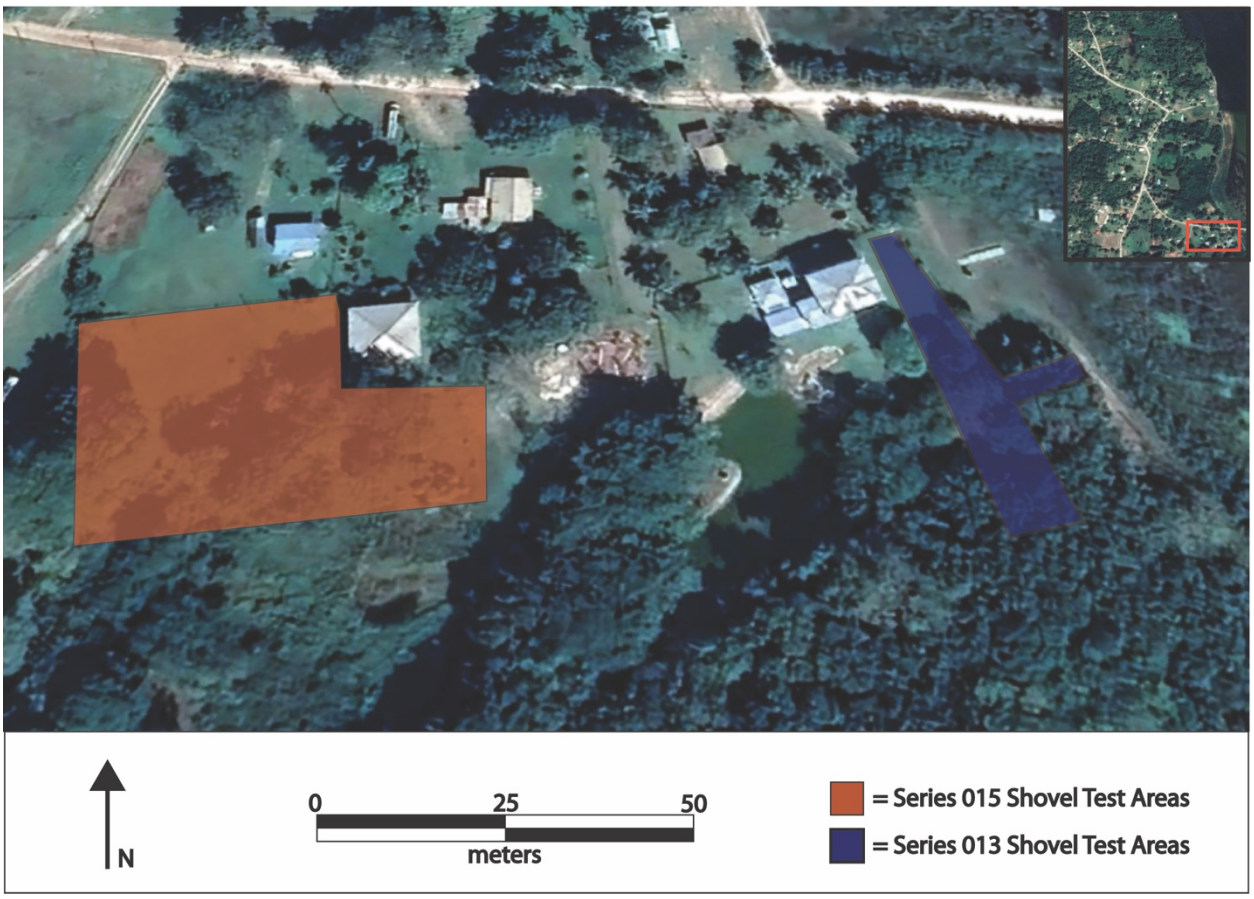

Figure 8.4 Breadnut Hill Series 013 and Series 015 Testing Locations (map by A. Kaeding).

Wade Bank STPs

As discussed above, several sources of information indicated that the lots surrounding the current health clinic may have been the location of the residential quarters of enslaved laborers that worked in the Tillett operation centered at the Baptist Church lot. Having extensively investigated the clinic area and finding no evidence that this location hosted substantial historical period activities or occupation, the 1868 map was revisited for possible alternative interpretations. One such interpretation suggested that the road/path documented in the historical map potentially did not extend as far west as the clinic and that its extension to the south may be more relevant. To that end, the focus of the historical site survey was centered on the area known as Wade Bank, an area located about 100 m south of the Baptist Church. As a reflection of landowner access conditions, to date this effort has been restricted to the residential lot of James Flowers and was documented through a shovel test pit operation known as Series 016.

Series 016 included 42 shovel tests distributed at a 5 m interval along cardinally oriented transects covering the front, back and side yards of the residential lot (**Figure 8.5**). The typical shovel test in this area was characterized by loose, dark sandy loam at the surface transitioning to

lighter brown semi-compact sandy clay and ending in compact white or gray clay sometimes encountering the water table.

Series 016 tests yielded extensive results, largely representing Postclassic Maya occupation, but also a higher concentration of historical period artifacts than has been noted in any of the other areas discussed here. Given artifact density and distribution throughout the residential yard – particularly historical artifacts – one area was selected for a more extensive and controlled investigation through the excavation of a formal unit documented as Operation 54.

Figure 8.5 Series 016 Wade Bank Testing and Operation 54 Locations (map by A. Kaeding).

Operation 54 Excavation

Operation 54 (Op. 54) was a 1-x-2 m excavation unit placed in the area of Shovel Tests 13 and 18, in the front yard east of the modern-day house occupied by James Flowers. The primary objective of Op. 54 was to investigate whether an intact, distinct colonial period deposit could be identified and recovered. Accordingly, the unit was excavated in levels reflecting natural stratigraphy as much as possible but switching arbitrarily when observations even slightly suggested potential changes in context. As a result, the average level thickness was 5 cm. A total of four zones (**Table 8.4**) were excavated and documented until the unit reached the uniform compact white clay noted throughout Series 016 shovel testing; for Op. 54, this was at approximately 52 cm below the unit datum. Artifact density had greatly diminished in the final level (Zone 4) and no artifacts or other archaeological signatures were observed at the base of the unit.

Table 8.4 Operation 54 Results.

Zone	Soil Matrix		Contents (Density: Artifact Classes)
	Color	Texture	
1	10YR 2 / 1	Loose Sand	Animal Bone, Ceramic, Lithic Debitage, Historical Ceramic, Historical Glass, Historical Metal, Historical Pipe, Modern Refuse
2	10YR 3 / 1	Loose Sand	Animal Bone (turtle), Historical Ceramic, Historical Metal, Historical Glass, Historical Pipe, Maya Ceramic, Lithic Debitage
3	10YR 3 / 2	Semi-loose Sandy Silt	Lithic Debitage, Historical Ceramic, Historical Glass, Obsidian, Maya Ceramic
4	10YR 3 / 3	Loose Silt	Maya Ceramic, Historical Ceramic, Lithic Debitage
Bottom of Unit	10YR 5 / 6 10 YR 3 / 2 10 YR 2 / 2	Compact Sandy Clay	Not excavated

As noted above, the excavation strategy of Op. 54 was designed to capture the transition between modern, colonial, and ancient Maya deposits in the hopes of isolating each assemblage. Unfortunately, no clear break reflecting those transitions was identified though the general vertical distribution pattern does suggest an overall integrity of the deposit. Zone 1 was characterized by modern refuse mixed with historical artifacts, Zone 2 was colonial material mixed with Postclassic Maya artifacts, Zone 3 was largely ancient Maya artifacts with a dramatic decrease in the colonial component, and the artifact density overall dramatically decreased in

Zone 4. There was some relatively heavy root disturbance especially within Zone 2. The impact of that bioturbation was evidenced by the high density of artifacts concentrated around the large root itself. Distribution observed and documented elsewhere in the unit suggests that while heavy root disturbance in the southern end of Op. 54 may be responsible for some mixing of contexts, it did not substantially alter the overall vertical pattern.

Interpretations and Conclusions

Analysis of the artifacts and other data recovered during the efforts described above is currently underway. However, even the preliminary results of the shovel testing investigations and Operation 54 presented here contribute to several potential interpretations and conclusions regarding methodology, historical site distribution, and historical site characterization. This section will summarize those preliminary interpretations, though continued research is needed to further explore and refine them.

The extensive shovel testing of different locations throughout the village has allowed the BREA project to establish preliminary site identification information. As discussed above, the fact that historical period sites are likely to be characterized almost exclusively by surface and subsurface archaeological signatures rather than above-ground features means necessarily that site identification methods are different than those used for ancient Maya period sites. To date, testing has been guided by a combination of historical documentation and information provided by residents. Our testing efforts have proven that both of those sources have considerable limitations. Five of the six shovel test locations mentioned in this report proved to be essentially fruitless although widespread observation of chert debitage is informative for our research focused on the Archaic Period (see **Chapter 5**). Negative historical data is certainly valuable, and these efforts have very slightly increased our colonial period artifact assemblage, but none of those five shovel tests yielded any indication of potentially intact subsurface archaeological deposits that could represent historical sites with high information potential. The primary reason that historical documentation has not yielded more valuable direction is likely because the documentation itself is so scarce—especially documentation including spatial/locational information. The documentation that has been recovered has been extremely informative regarding the area to which it refers—specifically the Baptist Church lot—suggesting that continued archival research within and outside of Belize could be very valuable.

Local informants continue to be our best source of input for all BREA survey efforts. However, it does seem that historical archaeological sites are considerably less likely to register as notable to Crooked Tree residents. Essentially, surface or subsurface colonial assemblages are refuse deposits that are not particularly different from modern trash—the artifacts are familiar enough to whoever may encounter them that they may not stand out. Accordingly, BREA informants cannot as readily call to mind the locations of those archaeological signatures. The exception is local familiarity with locations where particularly notable artifacts were identified—

intact bottles, bottle caches, larger objects, and items of perceived monetary value. As mentioned above, the one thing that can be confidently known about the sites reported as yielding such materials is that the materials themselves are no longer there. While it is reasonable to assume that an associated archaeological signature may remain intact in the locations from which the 'high value' objects were collected, this has not yet proven to be the case in any of the historical survey efforts. Local information regarding more general historical land use rather than find spots has been more useful. For example, information regarding where families used to live or where different activities used to be centered has led to a better understanding of the historical period and with some associated archaeological recovery. As survey efforts continue, this broader lens of historical information should continue to be pursued while re-identification of former find spots should potentially receive less attention.

Shovel testing survey has begun to suggest some wide scale site and artifact distribution patterns. Historical site survey has investigated areas within about 500 m west of the lagoon. Put very generally, results to date suggest that the potential for historical archaeological resources is higher closest to the water but set back far enough to avoid high water levels. This is not surprising, of course, as the lagoon itself was so critical for the history of the village, but it is one notable difference between the historic and current settlement patterns (the village now extends much further inland/west than historical archaeological data has yet been observed). The data collected so far suggests that while mainly extractive activities were taking place throughout the island and beyond, settlement seems to have been focused on the water's edge. Settlement locations are far more likely to include dense, diverse archaeological signatures with high information potential. While survey should still be designed to seek and recognize the more dispersed sites associated with the extractive activities inland, focus should be maintained on the areas within approximately 300 m from the lagoon.

The historical archaeological evidence documented so far suggests that colonial period settlement sites may manifest in at least two ways: 1) the intact subsurface deposits representing residential activities, likely located within about 300 m from the lagoon, but set back from the waterside and on high enough ground to minimize flooding issues; and 2) a linear east-west scatter of artifacts leading from those residential areas to the lagoon itself, presumably routes of particularly high traffic of people and materials as the lagoon was the main hub of transportation, communication, trade, etc. This may be reflected in the distribution of artifact scatters identified in the exposed sands and in the Series 014 testing along the lagoon-side. A more comprehensive and systematic pedestrian survey of the lagoon-side carefully documenting those scatters may help to indicate areas inland where settlement-related deposits may exist intact.

The investigations presented may also provide some expectations for how historic sites are likely to manifest where they are identified. Particularly, outside of features, the colonial signature is likely to be thin and near the surface. It appears that the combination of a) what seems to be fairly slow soil accumulation and b) a relatively small and dispersed colonial population, has led to a fairly ephemeral footprint. As seen in Operation 54, this may mean that substantial archaeological strata from the colonial period may be difficult if not impossible to

isolate. Instead, it seems likely that colonial contexts will suffer some degree of content mixing with later modern refuse, but also with earlier material (i.e., chert tools and debris from the Archaic). Similarly, Operation 54 also suggests that there may be an elevated potential for the colonial period materials to be mixed with earlier Postclassic Maya artifacts. Throughout all the testing presented in this report, only Wade Bank yielded a substantial historical signature. The same is true of the Postclassic Maya data—it was similarly sparse throughout test locations but abundant at Wade Bank. This suggests that colonial settlement patterns may reasonably have followed the Postclassic Maya precursors and potentially that material culture prominent during the Postclassic persisted into the historical period. If either or both of these is true, then it is likely that colonial and Postclassic deposits will continue to co-occur wherever additional sites are identified.

To summarize, the results of the archaeological investigations presented in this report have contributed to our understanding of the historical period occupation of Crooked Tree and suggest several specific routes for future research: continued documentation of wide-scale historical land use information available from village residents, continued archival research, comprehensive and systematic pedestrian survey of any lagoon-side areas where ground surface visibility is sufficient, and systematic shovel testing of areas inland from lagoon-side scatters (presumably within approximately 300 m, ideally proceeding to higher elevations, and with testing distributed initially at 10 to 15 m intervals). Additionally, ongoing artifact analysis should aid in refining our understanding of the period. Specifically, do changes in the artifact assemblages recovered from different locations reflect changes over time, differences in the activities or status of residents of the different locations, or perhaps personal preferences? Finally, similar survey methods should be applied outside of the area to investigate whether any of the patterns that are becoming evident through these investigations are Crooked Tree-specific or may be reflective of more general and wide-spread colonial period behaviors.

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Chapter 9

Future Directions for BREA

Marieka Brouwer Burg and Eleanor Harrison-Buck

Author's note: At the conclusion of the January 2020 season, as we packed away artifacts and equipment in preparation for our return in the Summer of 2020, no one could have foreseen that we would not return to Crooked Tree Island for two full years. As such, this report is a truncated version of what we would have reported on had there been no COVID-19 pandemic and travel restrictions for most of 2020 and 2021. Nevertheless, the January 2020 field season was a productive one that generated many research questions for future work, albeit work that was temporarily put on hold. In the following, we outline the future research we had planned at the close of the January 2020 field season and note that these aims did not change drastically despite the two-year hiatus of field work.

The significance of the research conducted by the BREA project and the tremendous data it has generated is multi-scalar and multivalent. In the past ten years, the project has documented over 2500 mound structures and over 100 archaeological sites, most of which had not been previously recorded archaeologically. We have documented a deep history of occupation in this area, reaching back as far as 10,000 years ago, from the Archaic through historic times. We have and continue to bring together researchers from various backgrounds in order to foster interdisciplinary collaboration and expand the range of data we collect to enrich our interpretations. Some of these consultants include geomorphologists, geoarchaeologists, soil scientists, ecologists, wildlife biologists, and remote sensing specialists. The project has made a major contribution to new knowledge about ancient human occupation in the middle and lower reaches of the Belize River Valley and has reversed thinking about the habitability and diverse human uses of the past landscape across multiple temporalities.

The Groundwork for Future Research

Our future research objectives, described further below, fall into three categories—the preceramic, Maya, and historical occupations. While these categories are delineated primarily based on temporal distinctions, these three occupations are closely interrelated through the prevailing environmental and geological characteristics of the study area and are united by a common overarching objective of the BREA project, which is aimed at reconstructing human-environment interactions through time. Over the last decade, this overarching objective has guided the research of the BREA Project in the middle and lower reaches of the Belize River Watershed.

Our future work will continue to build on this larger research objective, with our attention focused on the easternmost part of the BREA study area. This region is well-suited to pursuing such questions, as it is "spatially and seasonally diverse" (Carr and Fradkin 2008:149), replete with many plant and animal species, as well as inorganic resources like tool stone. Much of the eastern (lower) Belize River Watershed comprises a low-lying coastal zone that consists of perennial lagoons, creeks, swamps, and marshes. Today, a large portion of this area is presently part of the 16,000+ acres of the Crooked Tree Wildlife Sanctuary (CTWS)(The Ramsar Convention Secretariat 2014; Pinelo 2000). Today and in the recent past, the CTWS is characterized by a number of proximate microenvironments: lowland broadleaf moist forest, moist scrub forest, shrubland, savanna, and mangrove/littoral forest (Meerman and Sabido 2001; Meerman and Clabaugh 2017).

We assume that this environmental and resource richness was also present in the past, and our research findings are beginning to indicate the manifold ways that historic and early groups made use of this patchwork landscape. For example, our earliest data suggest that hunter-gatherer-fisher-farmers utilized various loci within the landscape for targeted activities, including stone tool procurement, manufacture and maintenance, wood working, small scale seasonal horticulture, fishing, fowling, and perhaps even salt making. We assume that in the transition to sedentism and village life in the Preclassic periods, many of these activities did not change drastically, although technology adapted to include new types of lithic tools as well as pottery and other innovations; this includes large-scale fish-trapping facilities and ditched and drained wetland fields, which would have enhanced food procurement strategies and supported larger year-round populations (see Harrison-Buck 2014; Harrison-Buck et al. 2018b; Pyburn 2003).

Surrounding the wetlands of the CTWS are moist scrub forests, characterized by "hog-wallow" micro relief and wetlands that become seasonally inundated and thus not conducive to agriculture without some significant hydrological engineering in the form of ditching and draining to create planting platforms—vestiges of which have been found in the middle and lower Belize River Watershed (see Harrison-Buck 2014 for a fuller discussion). In contrast, the broadleaf moist forest biotic zone tends to be well-drained for at least parts of the year and could have supported agriculture without such substantial modification. It is perhaps no coincidence that most Maya-period settlements in the region are predominantly found in this forest type, which is also conducive environments for tapir, peccary, and other large and small game animals. The Maya settlement patterns are suggestive of "a scenario integrating animal resource procurement into the scheduling of cultivation strategies throughout the year" (Carr and Fradkin 2008:149).

The lowland savanna—characterized by high acidity and nutrient scarcity—was less conducive to agriculture and Maya settlement, but was attractive to large game like deer which are hunted in these biomes today. Of the other ecological niches present in the vicinity of the CTWS, some environments facilitated non-residential activities such as salt making (e.g., brackish mangrove zones), as well as fishing and aquaculture in the perennial and seasonal wetlands (see Harrison-Buck 2014, 2018; Harrison-Buck et al. 2018b; Pyburn 2003). Ongoing

water chemistry testing by the BREA project in the Western and Crooked Tree Lagoons will hopefully shed light on the agricultural potential of these areas. Although maize has been shown to have considerable tolerance for growing conditions, increased levels of salinity, chloride, and total dissolved solids (TDS) greatly "limit intensive, irrigated, pot agriculture and orchard crops" (Luzzadder-Beach et al. 2020:164).

Future research conducted by the BREA team will build on our previous work in this area, as outlined below. We will maintain our base in Crooked Tree Village for at least the next two years. We have been in touch with the village chairman throughout the pandemic to assure that he and the village are still aligned with our research initiatives. Our plans for future work will continue to involve collaboration with the locals of Crooked Tree Village, both in the field and laboratory, as well as the Crooked Tree Museum and Cultural Heritage Center (CTMCHC), which was established by BREA in partnership with the community (see Harrison-Buck and Clarke-Vivier 2020; Harrison-Buck et al. 2020).

Future Research Objectives

Our future research objectives described below fall into three main categories—the preceramic, Maya, and historical occupations. These three research areas overlap in a number of ways, as described above. As research initiatives, they are also complementary, as we often find that knowledge gained in the pursuit of one research area will have important implications for the other research areas. We frequently find that when we target an area for one research initiative, we (in many cases inadvertently) collect data that overlaps with another occupational period and that helps to inform our understanding of transitional periods in time and the presence of certain persistent places in the landscape. For example, we have long been interested in ancient Maya salt production locations, and one of us has sought to understand the production and resource management of this material (i.e., Murata 2011). Recent survey indicates that Archaic sites often are located proximate to Maya salt production sites in Belize, perhaps indicating that salting meat and fish roots earlier in pre-Maya times. While our research objectives are presented as separate categories below, this example shows how our future research agendas can productively overlap, how testing or surveying a particular area may reveal multiple occupational sequences and address more than one research agenda at any one time. These synergies between our separate but related research initiatives—where our team is always on the lookout for multiple occupational sequences—are contributing to a richer and more nuanced understanding of Belize's deep history of human-environment interaction through time.

Future Research on the Preceramic Period

During the 2017 and 2020 field seasons, the BREA team documented the presence of a preceramic occupation (Operations 35 and 51) in the vicinity of Crawford Bank (Harrison-Buck

et al. 2018a; Harrison-Buck et al. 2018b; Stemp and Harrison-Buck 2019; **Brouwer Burg, Chapter 5**). While the 2020 season's investigation did not yield any formal tools, we did find evidence of expedient tool production and ample chert debitage. This lithic scatter was found mixed with historical material, but farther down there was evidence of lithics within a stratified deposit, suggesting that further excavation has the potential to yield both diagnostic tools and associated organic assays for radiocarbon dating. We collected a handful of charcoal samples for AMS analysis from this stratified deposit; sadly, these samples did not survive the 2-year Covid hiatus, their packaging having become compromised by insects. Thus, in our future research, we plan to open at least one excavation unit adjacent to the 2020 trench in an effort to recover some organic materials for dating.

To further explore Archaic land use and mobility—remotely, during the pandemic—we conducted a series of geospatial analyses. We consulted a modern floodwater interpolation map (floodmap.net) to identify areas within the landscape that might have served as important "high and dry" refugia to hunter-gatherers, especially during very wet seasons. The flood map shows how much land would be submerged in the low-lying coastal zone of Belize in the event of sea level rise (**Figure 9.1**). It would have widespread and profound effects on this part of Belize, with nearly half of contemporary dryland inundated by 15 m of sea level rise. These projections are useful for reasons beyond their alarming qualities, as they represent persistently elevated

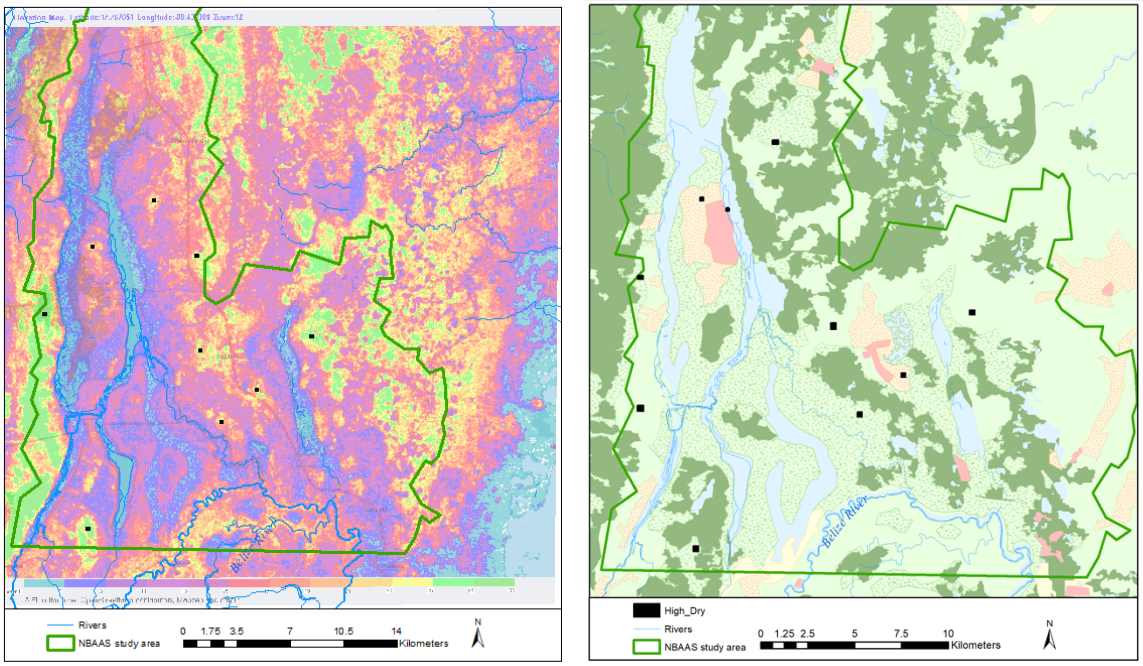

Figure 9.1 Elevation map (left) and ecosystems map (right) for the areas around Crooked Tree Island. NBAAS stands for "Northern Belize Archaic Adaptive Strategies" and is a subproject of the BREA project headed by M. Brouwer Burg (maps by M. Brouwer Burg).

areas that were likely high and dry in antiquity. It is here in these locations that we might expect to find remains of Archaic behavior focused on hunting and settlement, especially during the wet season. When these interpolated floodmap surfaces are overlain with an ecosystem map layer, these areas all correlate with broadleaf moist/scrub forest, highlighting the important role that high and dry forests likely played as refugia in this area during extremely wet periods.

Figure 9.1 depicts elevation and ecosystems maps with nine potential locations for future testing in high and dry areas. To further explore the subsistence potentials of the area around Crooked Tree Island, a preliminary multicriteria geospatial analysis was conducted, executed on slope, soil drainage, and ecosystem type data layers. The resulting map indicates that areas highly conducive to agriculture lie within a short distance of the island (~5 km) to the southwest and east. While this mapping experiment provides only a preliminary understanding of agricultural potential, it will help guide future surface reconnaissance, shovel test survey, and excavation. We will focus in particular on a 20 km^2 east-west transect, which spans areas of varying agricultural potential and multiple biotic zones and is anchored on either end by dated core profiles and archaeological sites (Chau Hiix and Altun Ha) with long-term occupations beginning in the early Middle Preclassic when agriculture became well established as the primary subsistence strategy (Andres 2009; Pendergast 1982; Pyburn 2003).

Figure 9.2 indicates areas that have been identified as possible areas to test for incipient agriculture within the east-west transect. These results will help us to identify areas to focus upon for our future research. Our near-term goals are to conduct a) surface reconnaissance along the eastern shore of Crooked Tree Island in order to get a sense of the distribution of Archaic occupation; b) reconnaissance over a handful of other areas that share similar landform criteria as the Crawford Bank site (i.e., similar proximity to water, ecosystem, elevation, slope, and soil); and c) shovel test surveys in areas of high archaeological potential as identified through the surface surveys. Ultimately, our goal is to recover diagnostic lithics (i.e., Lowe points or other stemmed bifaces or constricted unifaces) from reliable stratigraphic contexts with associated radiocarbon dates. This will allow us to date occupations within the period and region, clarifying the chronological record and the lithic sequence in Belize as a whole.

Future Research on Ancient Maya Occupation

Alluded to above, we will continue to investigate the history of ancient Maya occupation in the lower Belize Watershed, specifically focusing on questions of site placement within the landscape, function, and significance. As our previous work in the area has demonstrated, the isolated pockets of high ground in the low-lying coastal zone are packed with ancient Maya settlement, a testament to thousands of people living in and around minor centers with pyramids, ball courts, and other architectural trappings of sociopolitical complexity. Centers like Chau Hiix and Jabonche seem to have had a broad nexus of connections to nearby sites, as evidenced by the presence of long sacbeob connected to minor centers like Ek'tok and the Saguro site, respectively (see Murata et al. 2018; Murata and Kaeding 2020; Norris et al. 2014). From a

practical standpoint, the use of raised causeways in the low-lying coastal zone must have been critical for navigating between sites, especially during the wet seasons. Much of the surrounding hinterland is filled with low-lying swamps or pocket *bajos* and seasonally wet lagoons all of which were probably intensively managed by the ancient Maya for fish, turtle, mollusks and other wetland resources (Harrison-Buck 2014; Harrison-Buck et al. 2018b; Runggaldier et al. 2020). Therefore, an overarching goal of the BREA project that is central to our long-term research is to expand on our investigations of the settlement and production locales that surround the wetlands and lagoons to determine their relationship and use and how they are associated chronologically with one another.

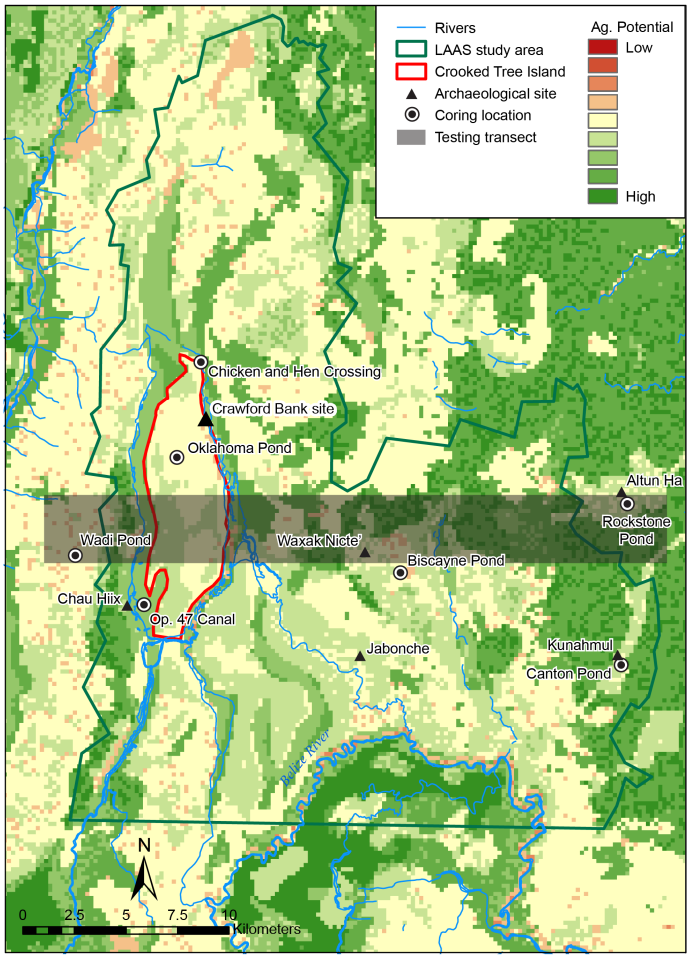

Figure 9.2 Areas of varying agricultural potential (map by M. Brouwer Burg).

While we have completed extensive survey just north of the site center of Chau Hiix, at the site of Ek'Tok (Murata et al. 2018; Murata and Kaeding 2020), we hope to continue sketch mapping and collecting GPS coordinates for the many ancient Maya mounds that have been reported to us by local informants along Spanish Creek that continue to the south near the Creole villages of Lemonal and Rancho Dolores (see Buck and Murata 2020; Harrison-Buck and Buck 2011; see also **Buck, Robinson, and Murata, Chapter 3**). We also plan to collect drone

imagery (both photogrammetric images as well as Lidar) in order to further assess the extent of a series of channels and associated ponds that are found throughout much of the 19 km long Western and Revenge Lagoons (Harrison-Buck 2014, 2021; Willis and Murata 2018). These linear zigzag channels and pond features resemble extensive pre-Columbian fish-trapping facilities found elsewhere in the world, including Zambia and the Amazon (Erickson 2000; Harrison-Buck 2021; McKey et al. 2017). Prior excavations of three of these channels in the Western Lagoon was performed in 2017 (Krause et al. 2020). Subsequent geomorphological study of the soils and associated radiocarbon dates suggest a long history of use, beginning right at the interface of Archaic-Maya occupation (Krause et al. 2021). Additional geomorphological studies are planned for future seasons that will build on these prior investigations of the Western Lagoon and expand on our understanding of the environmental and cultural changes taking place at this key transitional time.

While the Western Lagoon is a seasonal freshwater body and may have been used for fish-trapping, there are a number of brackish lagoons, such as Jones and Mexico Lagoons that are directly associated with dozens of large mounds suggestive of salt-making (Murata et al. 2016). Future reconnaissance will help elucidate which microbiomes were focused upon for different procurement and settlement strategies. We assume that higher and dryer ground (see green patches on **Figure 9.3**) would have been sought after locations for the placement of habitation sites. In contrast, the brackish lagoons may have served only as production sites, providing the ancient Maya (and perhaps also the pre-Maya) with a ready supply of salty water for producing salt as a preservative for foods, like meat and fish. We anticipate that further reconnaissance and test excavation of these wetland and lagoon features and their associated structures will help us to better understand this range of human-environment interaction in the coastal zone over time and space.

In fieldwork to come, we also plan to continue investigating the Maya archaeological sites that surround these wetland and lagoon features, performing further reconnaissance within an east-west transect that extends from Chau Hiix to Altun Ha. As described in **Chapters 3, 4** and **7**, we have identified the sizeable ancient Maya center of Waxak Nicte' (**Figure 9.3**). Significant effort was spent this season investigating parts of the site center. While the monumental site core of Waxak Nicte' (the Flowers Group) was largely gutted by quarrying activity for the Northern Highway, the Wade and Reyes Groups to the south are relatively intact (**Figure 9.4**). These areas of the site were the focus of mapping and documentation with a Total Station in January 2020 (**Chapters 3** and **4**). Other parts of the Waxak Nicte' site to the west include the Hines and Hugh Tillett Groups (see **Figure 9.4**).

In future field seasons, we plan to conduct further survey, mapping, and test excavations at the settlement associated with Waxak Nicte' as well as the hinterland settlement proximate to Jabonche, including Najil Iik (see **Figure 3.1**). Najil Iik is a small plazuela group that was first documented as the "Godfrey Site" by the BREA project in Biscayne (see Murata et al. 2018). Najil Iik is roughly 2 km east of Jabonche and is located right on the west side of the Northern

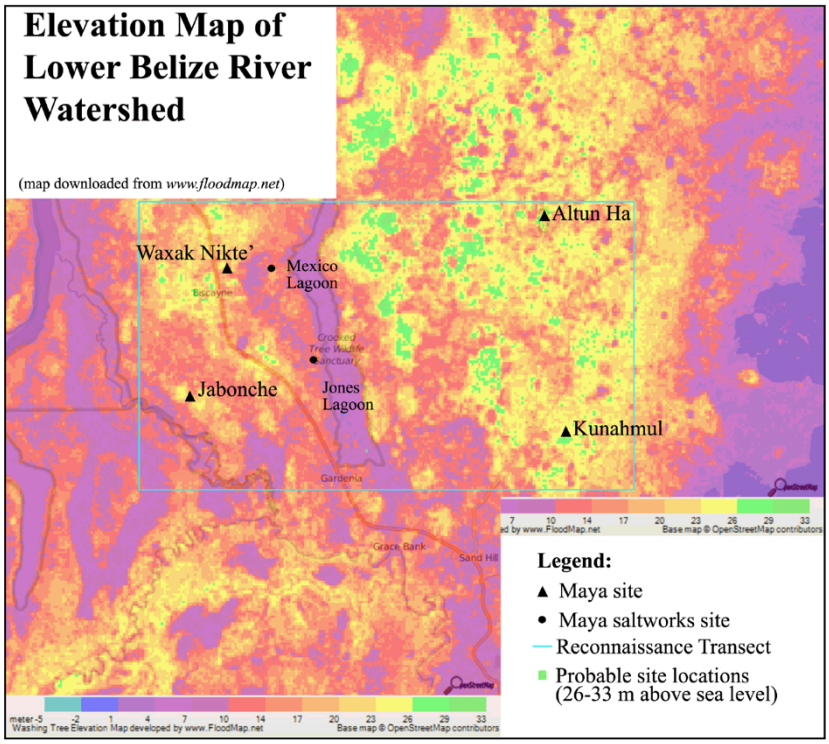

Figure 9.3 Elevation above sea level of the Lower Belize Watershed (map courtesy of www.floodmap.net, adapted by E. Harrison-Buck).

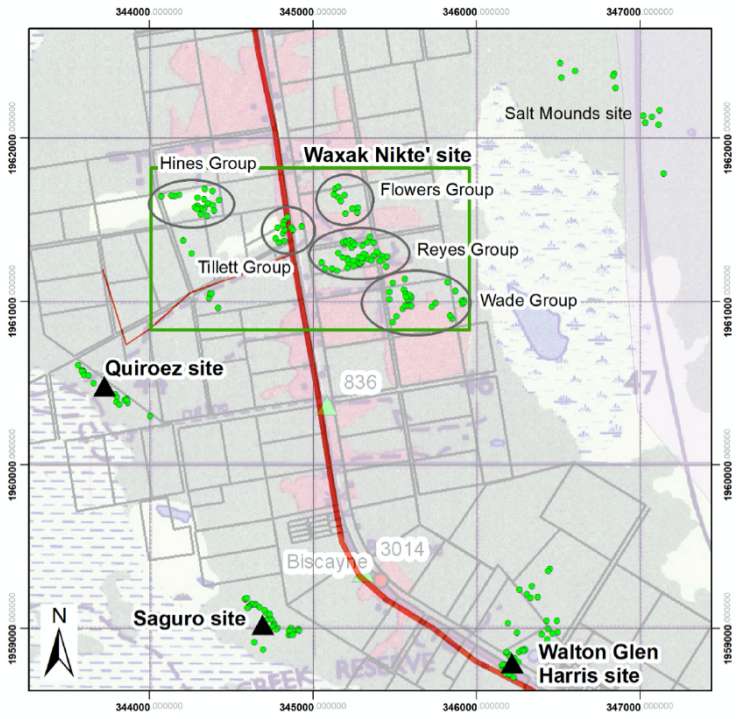

Figure 9.4 Waxak Nicte' site and associated groups (map by M. Brouwer Burg).

Highway where salvage efforts would go a long way toward documenting the significance of these small platforms. Here, the hinterland settlement in this low-lying area lies in close proximity to a series of wetland depressions, which resemble pocket *bajo* features. Structures that are directly associated with such wetland depressions have also found at Chulub on the southern end of Crooked Tree Island (Murata et al. 2018: Figure 5.3). These small seasonally inundated wetland features, while perhaps containing nutrient poor soil, may have been augmented by ancient ditching and draining technology for planting and/or managed in some way as a productive resource. These shallow depressions hold water during the rainy season and therefore, it is possible they may also have been used for seasonal storage of turtle or some other wetland resource (see Runggaldier et al. 2020; for other examples in northern Belize see Grauer 2020). In future seasons, we plan to return to one or more of these hinterland sites around Jabonche and Waxak Nicte' to further understand the chronology and function of these rural hamlets and their associations with these larger ceremonial centers.

Future Research on the British Colonial Period and the History of Kriol Occupation

As with the Preceramic period, the Historic period has received comparably less attention in Belize compared to research devoted to the ancient Maya (e.g., Andres 2009; Andres and Pyburn 2004; Harrison-Buck 2015; Harrison-Buck et al. 2016; Harrison-Buck et al. 2020; Harrison-Buck et al. 2017; Harrison-Buck et al. 2018; Pyburn 2003). In particular, the area around Crooked Tree Island is replete with early colonial settlement and the village of Crooked Tree is considered one of the oldest Kriol settlements in Belize. The earliest settlement, known as "Old Crooked Tree," is purportedly located on the northern part of the island. According to locals, this historical occupation was initially settled as a British logging camp where enslaved Africans were put to work by their British expatriate owners and overseers. Later during the early 1800s, the community was moved to location of the current village of Crooked Tree, which was identified on the Baptist Church grounds and excavated by BREA during January 2018 (Harrison-Buck et al. 2019; Kaeding et al. 2020). The BREA project has continued to compile information on this early colonial occupation, documenting historic sites at the Baptist Church, Crooked Tree Waterside, and Wade Bank (see **Kaeding, Chapter 8**).

Today, members of the Kriol community in Belize, a former British colony, define themselves as descendants of enslaved African people and Europeans who have been living in the area since the eighteenth century. Over the past 200-300 years, members of this community have gained tremendous knowledge of their landscape and through their oral traditions, have preserved a wealth of information about the colonial period and traditional ways of living. BREA historical archaeological and archival research has been corroborated through local Kriol oral histories. In partnership with initiatives underway at the Crooked Tree Museum and Cultural Heritage Center, we plan to continue investigating the rich story of Belize's colonial history. Two main activities will facilitate this endeavor:

1. Historical archaeological research, including shovel test pitting and targeted excavation in and around Crooked Tree village.
2. Kriol oral history interviews conducted alongside archival research to guide our excavations and provide a fuller understanding of the past.

With permission from the village chairman, in future seasons we plan to carry out further shovel test survey and excavation north of modern-day Crooked Tree Village in an effort to document the location of the first village of Crooked Tree (referred to locally as "Old Crooked Tree"). Informants have indicated that we might find the remains of this old village up near the property that is today owned by the Cadle Family.

Concluding Thoughts

COVID-19 related travel restrictions were a bitter pill to swallow, but did allow some of our project members time away from the field to pursue important auxiliary activities, such as grant writing, artifact analysis, and interpretation through publication. We convened a special virtual session at the 2021 Society for American Archaeology meetings in April 2021 that focused on the past decade of research in the BREA project area with the long-term goal of publishing an edited volume on this compendium of BREA research results. The hiatus was challenging for everyone, but it allowed BREA project members to take stock of a decade of prior research in the lower Belize River Watershed and it brought into greater focus our future goals for the project.

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