21 *FROM EXCAVATIONS TO EDUCATIONAL OUTREACH: PRESENTING THE HISTORY OF HUMAN-WETLAND INTERACTION AROUND WESTERN LAGOON, BELIZE*

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Much of the Belize River East Archaeology (BREA) study area comprises a low-lying coastal zone with sizeable tracts of perennial wetlands. During 2019, BREA investigated the secondary center of Ek'tok, located about a kilometer and a half north of the large Maya center of Chau Hiix. Both sites are situated on the shore of the Western Lagoon wetland, which is part of the largest inland wetland in Belize. BREA mapped Ek'tok and performed select test excavations here and at Chulub, another wetland site on Crooked Tree Lagoon, where excavations targeted midden deposits. Our aim was to collect fauna to assess the reliance on local wetland resources. We report on these excavations along with preliminary results from a pilot project that involved coring and testing of wetland features to assess construction, function, and dates of use and how these wetland features potentially relate to neighboring sites like Ek'tok. Our wetland research was presented to the community at the Crooked Tree Museum and Cultural Heritage Center as part of a series of public programming events during the month of June 2019 to mark the year anniversary of the museum opening. BREA also teamed up with local educators to develop a teacher's workshop that introduces teachers to the artifacts on display in the museum and how to develop lessons that connect the national social studies curriculum to the archaeology presented in the Crooked Tree exhibition.

Introduction

The Belize River East Archaeology (BREA) project study area measures roughly 6000 km^2 and includes the lower half of the Belize River Watershed, stretching between Belmopan and Belize City (Figure 1). The BREA project was initiated in 2011. Since 2015, we have focused our investigations in the easternmost part of the watershed, which comprises a low-lying coastal zone with numerous small creeks and tributaries along with sizeable tracts of perennial wetlands (demarcated in bright green on Figure 1). Altun Ha and Chau Hiix are the two largest Maya site centers in this part of the BREA study area. The latter is situated along the Western Lagoon Wetland, the largest inland perennial wetland in all of Belize. Between 2014-2019, BREA conducted archaeological survey in the areas between the centers of Chau Hiix and Altun Ha and focused mapping and excavations at the large center of Jabonche, the small production site of Chulub, and the secondary center of Ek'tok (Site 84 in Figure 1), just 1.5 km north of the main site center of Chau Hiix (Harrison-Buck et al. 2016, Harrison-Buck, Clarke-Vivier et al. 2019; Harrison-Buck, Craig et al. 2017; Harrison-Buck, Willis et al. 2018; Norris et al. 2015).

While the low-lying wetlands of the lower Belize Valley might seem like inhospitable environments, we are finding that they supported dense populations who were living in the surrounding areas on slightly elevated ground, especially around the area of Western Lagoon, the largest inland wetland in all of Belize. Because much of the land surrounding these sites is inadequate for farming, I have argued that Chau Hiix, Ek'tok, Chulub and others sites in the area around Western Lagoon wetland were 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 (Harrison-Buck 2014). This year, BREA conducted two short field seasons in January and summer 2019 with several objectives in mind:

1) To carry out field work at the sites of Ek'tok and Chulub, specifically targeting household midden deposits to better understand the use of wetland animal resources;
2) To conduct several test excavations of the wetland features in the Western Lagoon wetlands;
3) To present to the community our wetland research and other public programming and educational outreach events at the Crooked Tree Museum and Cultural Heritage Center for the month of June to mark the year anniversary of the museum opening.

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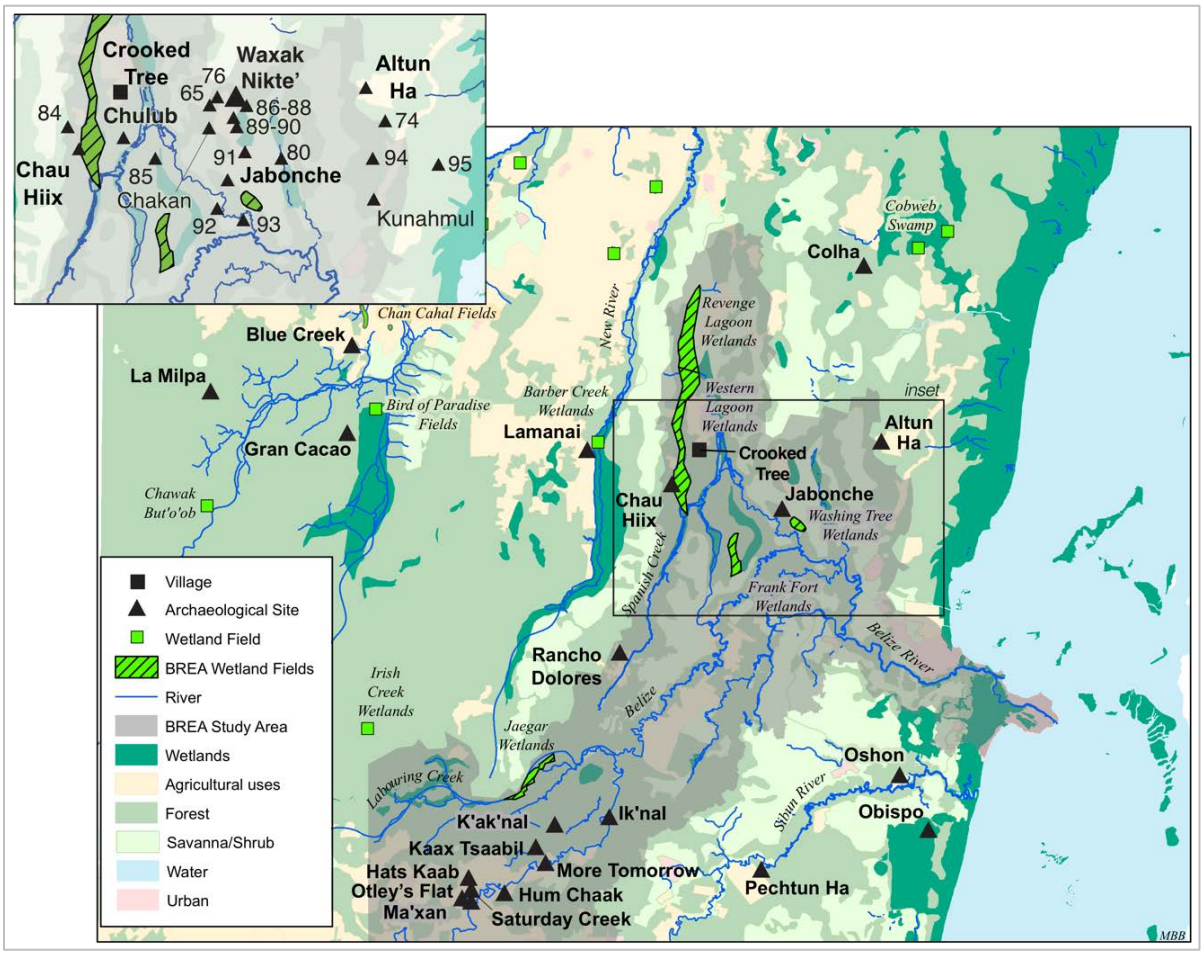

Figure 1. Map of the BREA study area with inset showing sites in the lower Belize River Watershed (map prepared by M. Brouwer Burg).

Below we begin by presenting our site investigations at Ek'tok carried out in January 2019. Figure 2 shows the drastic seasonal fluctuations in water levels of the wetlands surrounding Crooked Tree, which transform into navigable lagoons during the rainy season when floodwaters flow down the Belize River from its headwaters in Peten, Guatemala and cause the Black Creek to reverse direction and fill the lagoons (for further discussion see Pyburn 2003). Not only are the lagoons filled with water, but the roads getting to sites like Ek'tok become almost impassable. Indeed, in January 2019 at the tail end of the rainy season, one of the most exciting things about working at this site was getting there. Vehicles getting stuck in the mud was a daily occurrence and when we were not stuck, we were changing a flat tire (Figure 3).

Excavations at Ek'tok

During January 2019, we devoted the entire three-week season to working on a topographic map of the site core of Ek'tok using a Total Data Station. The survey and mapping was co-directed by Satoru Murata and Adam Kaeding, who together began mapping the site in January 2017 (Murata and Kaeding 2020). Murata superimposed over their 2017 topographic map of Ek'tok the rectified map of the Chau Hiix site center that Anne Pyburn produced over 15-20 years ago (Figure 4). The compilation shows how BREA reconnaissance and mapping efforts have filled in some of the existing gaps to the north and east in a number of previously unsurveyed areas. The topographic map of Ek'tok was completed in January 2019 (Figure 5).

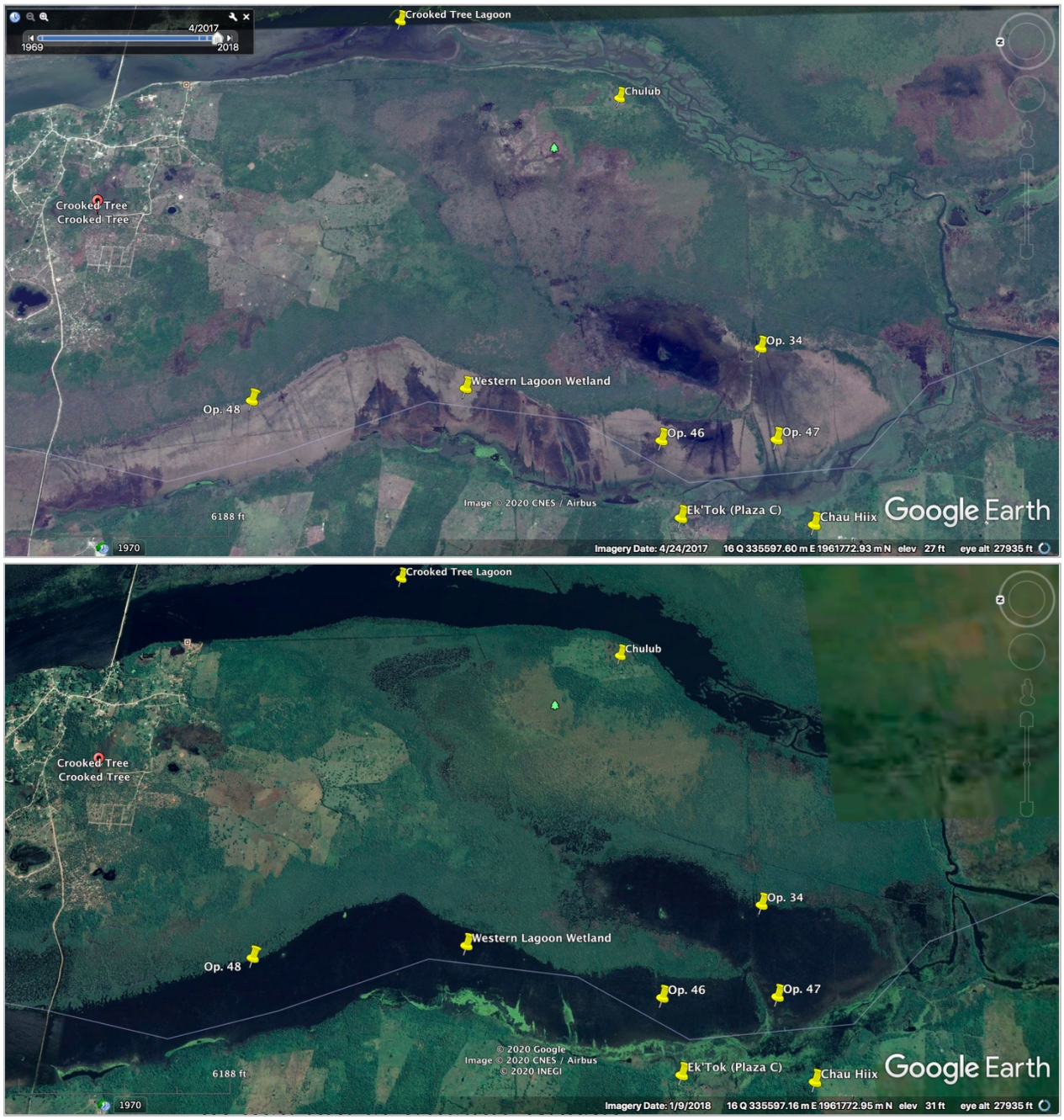

Figure 2. Google Earth satellite images taken during the dry season in April of 2017 (above) and January 2019 (below).

During this time, we conducted several test excavations at this site in two household residential groups outside of the main pyramidal complex, including Plazas C and E (Ops. 42-44). As noted earlier, our test excavations were aimed at revealing midden deposits in an effort to recover a range of faunal material to assess the animal resources being utilized at sites proximate to the wetlands. In both Plazas C and E, we found an abundance of turtle shell, a resource still locally available in Western Lagoon today (Harrison-Buck 2020; Shelhamer and Craig 2020). Midden debris, including ceramics and faunal material was particularly dense in Op. 43 in Plaza C (Shelhamer and Craig 2020). Lori Phillips, a Ph.D. student from

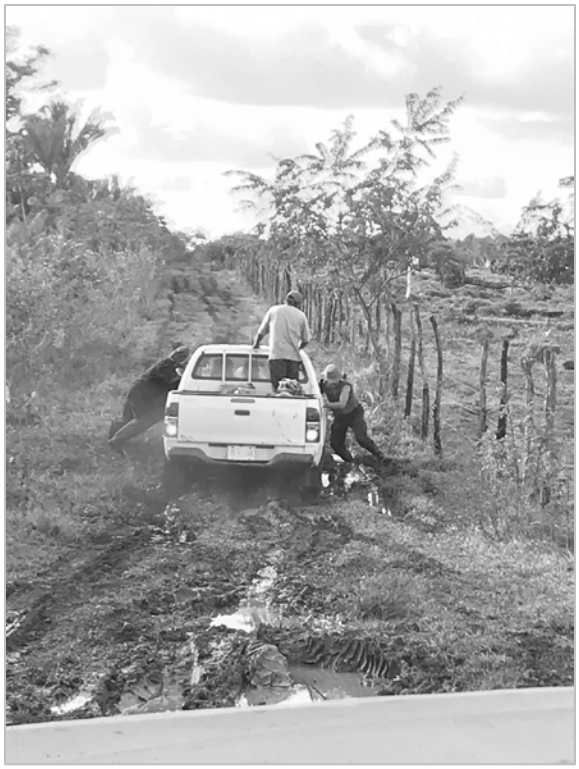

Figure 3. The daily challenges of getting in and out of the Ek'tok site.

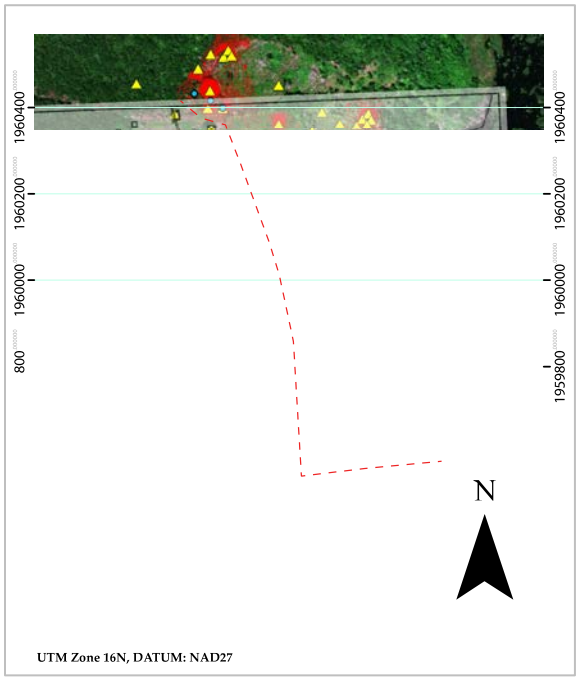

Figure 4. Partially completed map of Ek'Tok to the north with overlay of Pyburn's (2003) rectified map of Chau Hiix to the south (prepared by S. Murata and A. Kaeding).

Washington State University, Pullman, is analyzing the animal remains as part of her doctoral dissertation research. She has identified at least one whole Hicatee (Figure 6a). Late Postclassic ceramics were found associated with this sizeable turtle deposit. Faunal remains from Ek'tok have not been fully analyzed yet, but a cursory analysis indicates not only turtle, but also white-tailed deer, peccary, and freshwater fish species. In Figure 6, you can see a peccary tooth and some examples of fish otoliths (ear bones of catfish and an unidentified freshwater fish). The highest concentration of faunal remains come from Op. 43 (Zones 3 and 5) in Plaza C. Much of the animal bone shows intensive burning. One piece of worked deer bone was recovered (Figure 6c). Analysis of the ceramics is ongoing, but there does appear to be evidence of earlier Terminal Classic occupation lower down in the excavation (Zones 8-11), and possibly earlier Classic period material.

Excavations at Chulub

During summer 2019, the BREA team also performed an additional test excavation (Op. 49) at the site of Chulub on the southern end of Crooked Tree island (Runggaldier, Harrison-Buck and Krause 2020 [Figure 7]). Previous excavations (Operations 31 and 33) at Chulub have yielded household middens with an abundance of well-preserved faunal materials (Phillips 2020). The preliminary faunal analysis indicated the presence of white-tailed deer, Central American agouti, Nine-banded armadillo, Central American River Turtle (Hicatee), mud turtle (*Kinosternon* sp.), crocodile, and freshwater fish. Aquatic resources as a whole dominant the Chulub assemblage (Figure 8). However, it is important to note these counts and percentages are based on the number of identified specimen (NISP), which tends to overestimate the actual number of individuals that were likely present especially when assemblages are highly fragmentary (as is the case with turtle carapace remains). To offset this overestimation, the minimum number of individuals (MNI) is currently being calculated but is not yet complete.

An analysis of the ceramics from Op. 31 and Op. 33 suggests that the vast majority of the material dates primarily to the Terminal Classic

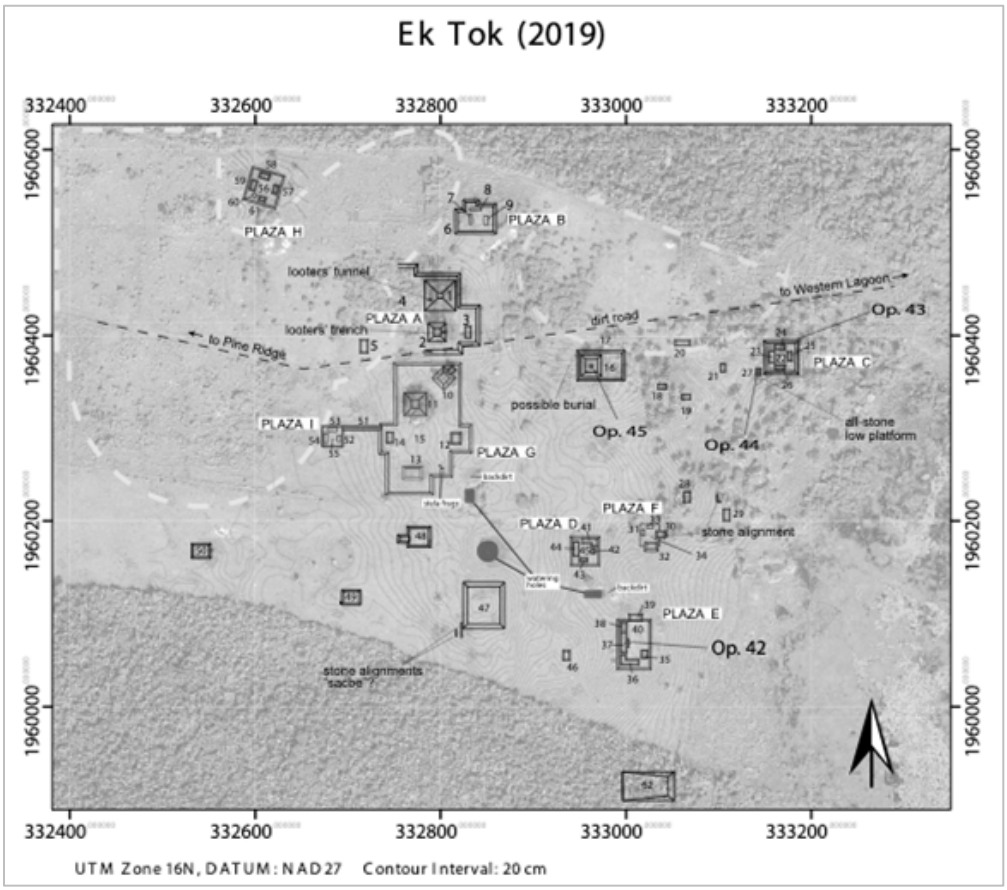

Figure 5. Rectified map of Ek Tok with underlying topo, combining data from the January 2017 and 2019 seasons (map prepared by S. Murata and A. Kaeding).

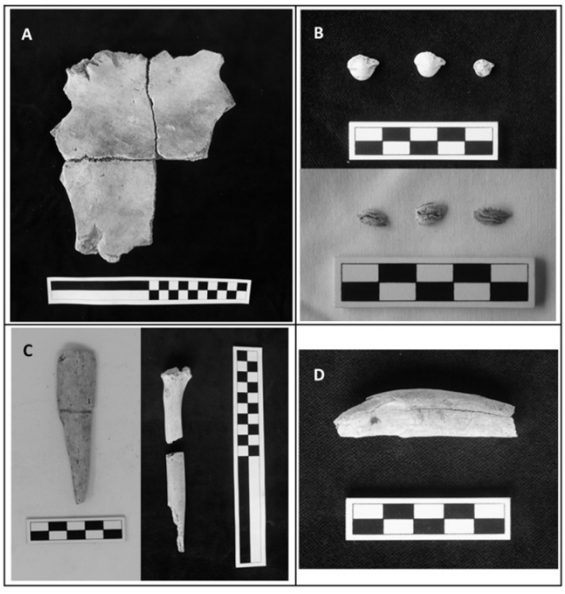

Figure 6. a. Hicatee turtle; b. fish otoliths; c. worked and unworked deer bone; d. peccary tooth (photos by L. Phillips).

period, ca. AD 800-950 (Figure 9). One interesting find is the remains of a torch holder, which is strikingly similar to one found by the first author in a Terminal Classic context at Pakal Na in the Sibun Valley (Figure 9a). General ceramic types include a lot of bowls, such as Garbutt Creek Red, Dolphin Head Red, and Vaca Falls Red, various jar forms including Sibun Red Neck, Tu-tu Camp Striated, and what may be Chambel Striated jars. While there are very few Roaring Creek Red dishes, there is an abundance of Zakpah Orange-red dish and chalice forms (Figure 9c), a type that is thought to straddle the Terminal Classic to Early Postclassic (ca. 900-1200). We also have what appear to be tan, cream and red slateware bowls and jars (Figure 9d-e).

What is noteworthy about Chulub are a series of depressions found throughout the site that are positioned between the ancient Maya mounds (Figure 7). While there has been some

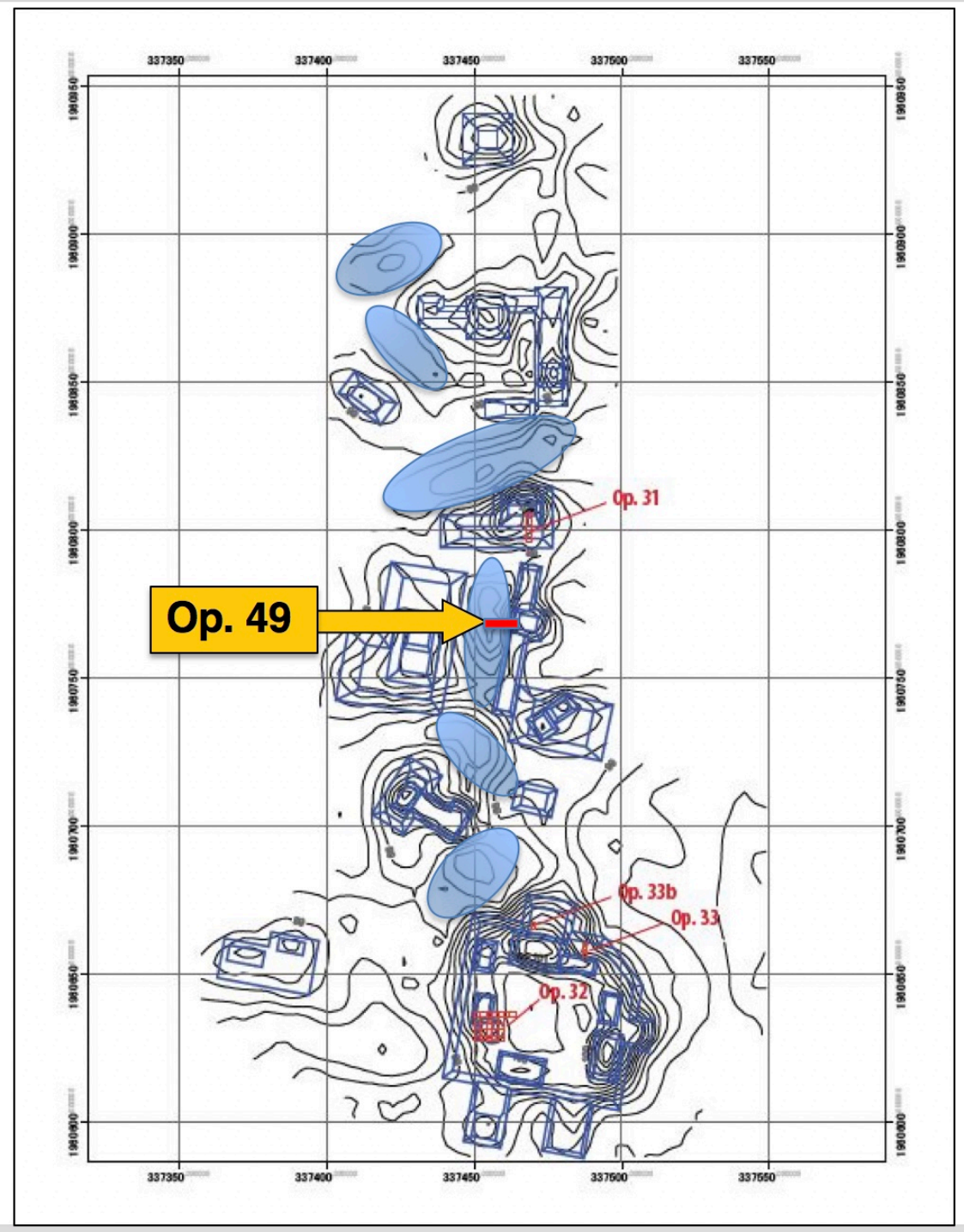

Figure 7. Site of Chulub showing Operations and pond features (in blue).

modern disturbance the landowners confirmed that most of these features pre-date the contemporary occupation. The depressions cut into bedrock and are seasonally inundated during the rainy season and become desiccated in the dry season, resembling what others have defined elsewhere as pocket *bajos*, which by definition measure less than 2 km^2 (Dunning et al. 2015:95). Some of the largest Classic Maya sites, such as Tikal, are situated at the edge of

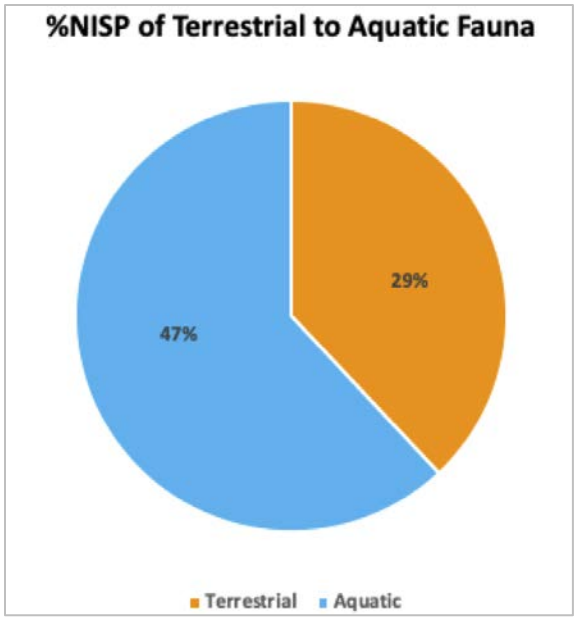

Figure 8. Pie chart showing heavier distribution of aquatic species from excavations at Chulub (prepared by L. Phillips).

pocket *bajos*. Despite the high clay content in the soils, the carbon isotopic studies from these karstic depressions have led scholars to suggest these low-lying areas were used for maize cultivation and that neighboring reservoirs may have been used for irrigation during periods of drought (Dunning et al. 2015:118). The pocket *bajos* that Dunning and colleagues (2015) define around Tikal are directly associated with the site but are substantially larger than the pocket *bajos* found around Chulub. The latter more closely resemble the size and layout of pocket *bajos* identified at the site of Aventura in northern Belize (Grauer 2020). Here, the depressions are smaller, averaging around 150-250 meters across and are found dispersed within and between mounds (see Grauer 2020:Fig. 2). The depressions at Chulub are similar in that the features are an integral part of the site layout, directly abutting the structures. While Aventura is a large city center, Chulub is a small rural settlement with only one "formal" plaza group and no monumental architecture. Unlike the pocket *bajos* at Aventura, the depression features at Chulub are long and linear and overall are smaller in size, extending around 15 m in width and roughly 40-60 m in length (see Figure 7).

In January 2017 when BREA mapped Chulub, the depressions were filled with water, but in June 2019 with the exceptionally dry weather they were not holding any water so we decided to investigate one of them (Runggaldier, Harrison-Buck and Krause 2020). Operation 49 was a 1.5 m x 6 m unit aimed at exposing a cross-section of one of the depressions and its association with a long linear platform to the east (see Figure 7). The excavation revealed that the initial occupation in this part of the site was built directly upon a natural karstic bedrock with only a thin layer of soil over top. Op. 49 showed this undulating surface sloping downward to the west to form the karstic depression (Figure 10). The natural, undulating bedrock surface exposed in the excavations of pocket *bajos* at Aventura bears a striking resemblance to what we found at Chulub (see Grauer 2020:Fig. 4 right image). In some cases, at Aventura the soft bedrock was cut to create steps that led down into the pocket *bajos* (Grauer 2020:85). Grauer (2020) concludes that while these karstic depressions may be primarily natural formations, there is clear evidence that they were features modified to some extent by the Maya when they constructed the surrounding site of Aventura. To assess the extent of human modification in the pocket *bajos* at Chulub, BREA geoarchaeologist Dr. Samantha Krause collected soil samples from the deepest part of the depression in Op. 49. The forthcoming data will quantify not only the extent of human modification, but the duration and intensity of this feature's use over time (Flanagan, Runggalider, and Krause 2020).

The archaeological evidence collected from the excavations of Op. 49 support a cultural use for the feature in the form of a dense midden deposit. A thick heap of trash debris was found overlying the eroded bedrock surface, which sloped downward into the depression where it tapered out (Figure 10). High densities of ceramics and faunal material as well as some lithics and obsidian were found in the midden heap. A cursory inspection of the ceramics from Op. 49 (Figure 9f-h) suggests that the use of this feature and probably the associated structure to the east date to the Terminal Classic period, similar to the midden deposits from Ops. 31 and 33 at Chulub discussed above. Ceramic types that were identified include a lot of jars,

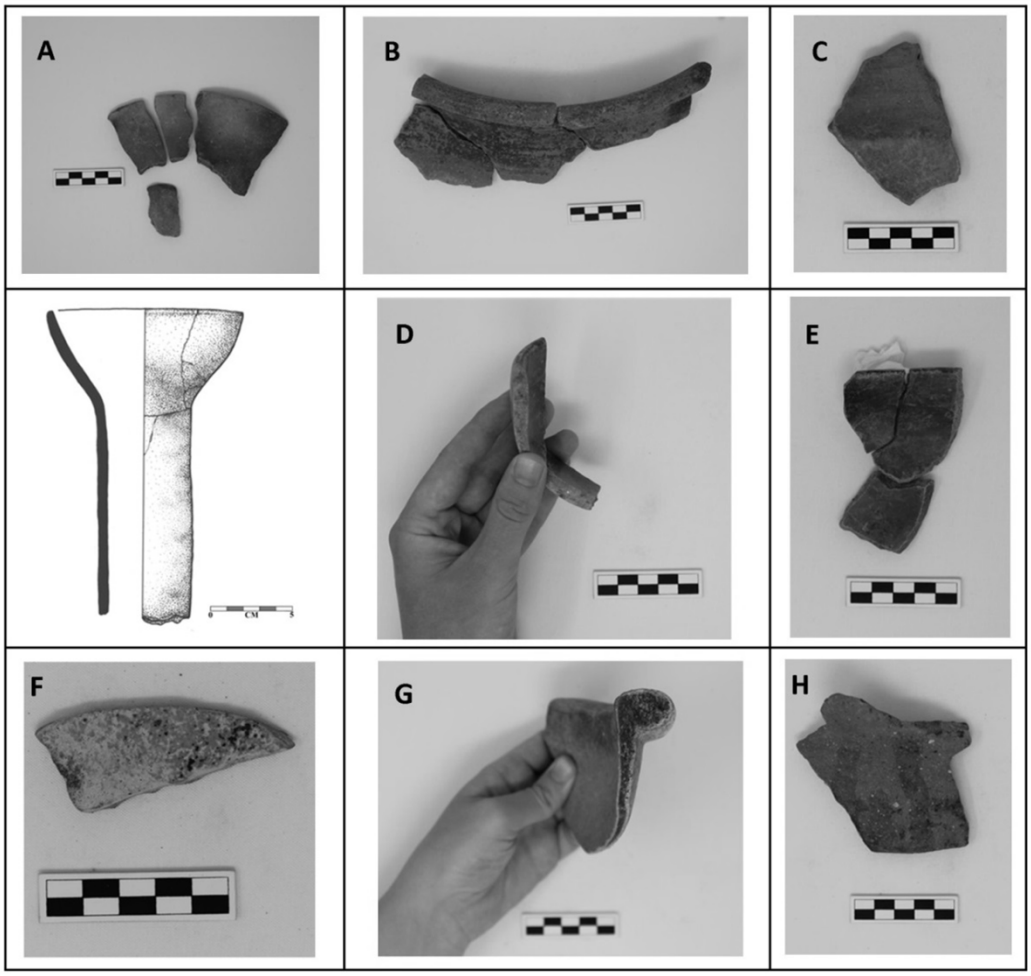

Figure 9. Ceramics from Chulub: a. fragments of a torch holder (with comparison from Pakal Na, Sibun Valley, shown below), b. Sibun Red-Neck jar rim, c. Zakpah Orange-Red, d. and e. red slateware bowl, f. worked tan slateware, g. Campbell's Red basin, h. trickle ware jar.

including Sibun Red Neck and Tu-tu Camp Striated types, and what appears to be Chambel Striated. Like other excavations at Chulub, the Zakpah Orange-Red type is common in the assemblage. In addition, we also see several examples of Kik Group types, such as Indian Creek polychrome and large red-slipped basin forms that are tentatively identified as Campbells Red (Figure 9g). This and Chambel Striated are types more often associated with the Terminal Classic Rancho Sphere (D. Chase 1982; Pring 1976). We also have quite a few slatewares, some of which have mend holes or appear worked (Figure 9f).

Turning to the faunal remains from Op. 49 at Chulub, they too have not been fully analyzed but a cursory examination of the assemblage by Lori Phillips suggests the presence of hicatee, white-tailed deer, peccary, and fish remains, similar to other household middens at Chulub and Ek'tok. An abundance of turtle was recovered throughout the midden and in the far western end of the excavation unit at the deepest point of the depression a nearly complete hicatee was recovered. One theory is that the ancient Maya modified the series of natural depressions to serve as a seasonal retention pond to house live turtles during the rainy season. The Creole living around the wetlands today recall a similar practice carried out before refrigeration. They describe how retention ponds proximate to their residences were used to store hicatee and mud turtle during the wet seasons when procuring these species in the lagoons became more

Figure 10. Before and during excavation of Operation 49 at Chulub (Note the dense midden heap in bottom left photo and eroded bedrock in bottom right photo after midden was removed).

difficult with the rising waters. In Operation 49, Maya cultural material was found deeply embedded into the pits of the undulating bedrock and showed signs of trampling indicative of regular use around the edges of the depression, perhaps indicating locales where processing turtle and other production activities took place.

Wetland Geomorphology

Dr. Samantha Krause not only excavated the pond feature at Chulub, but also directed a pilot project in the Western Lagoon wetlands, where we have detected extensive modification in the form of a vast system of canals with associated pond features. We believe these large canals that cross-cut the lagoon may have been used as fish weirs, channeling water to small ponds to trap fish during the dry season when the waters recede (Harrison-Buck 2014). Locals indicate that these ponds still function this way now. We have previously described our initial attempt to excavate one of the pond features (Op. 34) in the Western Lagoon Wetlands during summer 2017 (Harrison-Buck, Willis, Murata, and Craig 2018 [see Figure 2]). In summer 2019, geoarchaeologists Dr. Sam Krause, as well as Drs. Tim Beach and Sheryl Luzzader-Beach of UT Austin joined us for a brief pilot season to collect soil samples from a selection of the linear canal features within the Western Lagoon area (Krause et al. 2020). Their geoarchaeological excavations tested three of these canals (Operations 46-48) that zig-zag throughout the length of the Western Lagoon wetland system, which extends roughly 20 km in length (Figures 2 and 11).

During June the Western Lagoon is dry and accessible by car but, as noted above, the lagoon becomes inundated in the rainy season and water covers the extensive wetland channel system (Figure 2). The excavation data will highlight the unique hydrological and geologic context of the Western Lagoon wetlands. Soil samples extracted from the wetland excavations can provide insight into how water and soil resources were manipulated, which further supplements our broader study of local human-wetland interactions within Belize. Intensive geochemical analysis of the soils within these wetland systems is critical to the continued understanding of ancient human interaction with these areas as a source of not only aquaculture and food resources, but also potential raw materials and seasonal arable farming land. To get at this information, a suite of soil samples were collected and are currently being analyzed for pollen and phytolith remains (Jones 1994); carbon isotopic analysis will help us to understand changes in vegetation over time, as well as any potential aquaculture or agricultural patterns (Beach et al. 2009; Webb et al. 2007). Geochemical analysis will also help us to understand enrichment/depletion patterns of phosphorus and other key elements as an indicator of past human activity, including the dumping of organic remains over time (Hutson 2009). Micro and macro charcoal analysis are also being performed to better understand fire regime and possible drought patterns through time (Anderson and Wahl 2016).

In addition to the wetland investigations, our geoarchaeology team including Drs. Tim

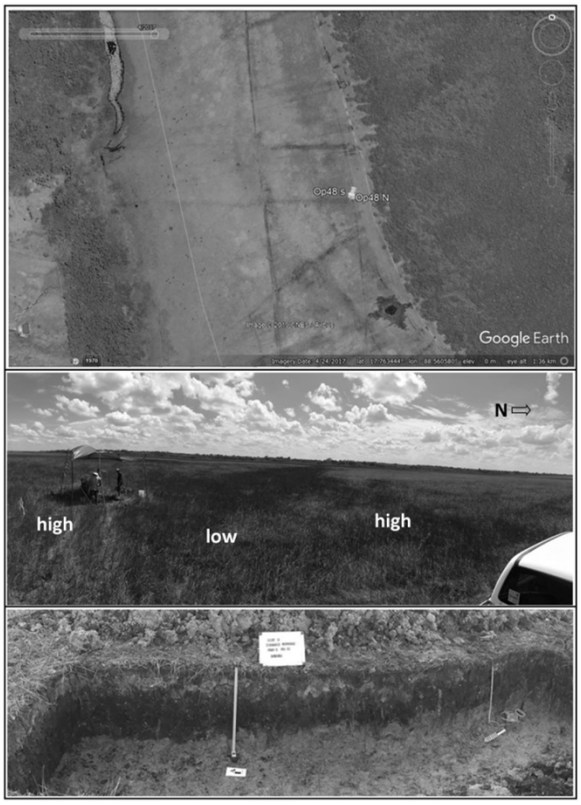

Figure 11. Western Lagoon soil testing of canals, Operation 48.

Beach and Sheryl Luzzader-Beach, collected sediment cores from nearby pond features associated with the perennial wetlands to aid in our ongoing understanding of paleoenvironmental and paleoclimatic changes within the surrounding pine ridge area. We looked at a few places to core and ultimately selected Waddy Pond. This body of water, fed by a natural spring, is located in an area west of the Western Lagoon known as Blackburn. The team extracted three cores, the longest being 47 inches, all of which were exported to UT Austin where they are being analyzed as an additional proxy for understanding environmental and human-induced changes in these landscapes over time.

From Excavations to Educational Outreach: Programming at the Crooked Tree Museum

At the beginning of June, Drs. Tim Beach and Sheryl Luzzader-Beach offered a public presentation on their Belize wetland research at the Crooked Tree Museum and Cultural Heritage Center. Following their public talk, Dr. Sam Krause and other members of the BREA team offered a practicum targeted for young people in the community to learn more about how we use science to study materials, ranging from dirt to lithics to animal bones. This kick-started a series of public programming events offered each week for the month of June to mark the year anniversary of the museum opening that occurred in June of 2018.

BREA also teamed up with educators, including Dr. Sara Clarke-Vivier from Washington College, and NICH representatives Ms. Cindey Rivero and Ms. Yahaira Vega at the Banquitas House of Culture. Together, we developed a teachers' workshop. The Workshop introduced local teachers to the artifacts on display in the Banquitas House of Culture and Crooked Tree Museum and how to develop lesson plans that connect their national social studies curriculum to the museum content and artifact collections. We began the day at Banquitas where the group toured the museum and learned about the educational programming they offer. Then, the group of 12 teachers and staff headed to the Crooked Tree Museum where Dr. Harrison-Buck offered a tour of the exhibition and Dr. Clarke-Vivier and two of her students from Washington College led a discussion and group exercise on the learning opportunities at the museum (Figure 12). The guiding question of the workshop was "What can we learn from things?" The teacher workshop was accredited with Belize's Ministry of Education and all of the teachers got workshop credit hours for participating. The goal of the workshop was to promote the importance of public archaeology and the value of experiential learning in museum settings and was aimed at encouraging teachers to use the museums for school field trip learning opportunities. A measure of success was the following week one of our teacher participants brought her class on a tour of the museum!

Another public programming event involved a "community curation day" and open discussion between BREA and members of the Belize History Association (BHA), which is part of NICH's Institute of Social and Cultural Research (ISCR). Members of BHA presented on their work along with Raven Bishop of Washington College who specializes in digital

Figure 12. Teacher's workshop held at the Crooked Tree Museum and Cultural Heritage Center in June 2019.

Figure 13. Virtual tour of the Crooked Tree Museum and Cultural Heritage Center online here: https://www.thinglink.com/channel/1197905329736646658/slideshow (produced by R. Bishop).

humanities work in museum settings. She also spent time in June working with Dr. Sara Clarke-Vivier and students from Washington College on a digitizing project, which has culminated in a virtual tour of the different exhibits in the Crooked Tree Museum and Cultural Heritage Center (Figure 13). The long-term goal is to digitize all the artifacts and panels on display in the museum and be able to view each of the exhibits online in detail.

Our final event in June was a community conversation and book talk by Dr. Melissa Johnson of Southwestern University. Her talk was based on her new book, *Becoming Creole: Nature and Race in Belize* (2018), which is based on more than two decades of ethnographic and archival research. She describes the lived experience of Afro-Caribbean people in both

Crooked Tree Village and Lemonal who call the watery lowlands of Belize home. She explores the relationships that rural Afro-Caribbean people have with this wetland environment—that is, the plants, animals, water, and soils. She examines how people become who they are in relationship to nature and how processes of racialization are always present in the entanglements between people and what she describes as a "more-than-human" world in which they live. While many archaeologists working in Belize search for lessons learned from the ancient Maya about sustainable human-environment interactions, Johnson points out that we have much to learn from traditional Creole culture who both today and in the past have had a sophisticated engagement with their environment. They are well aware of the Anthropocene and the impact climate change is having on the seasonal changes and the available natural resources in the wetlands of Belize. From our own interactions with the Creole community in Crooked Tree, we would certainly agree with this assessment. Whether it is about water, aquaculture, or agricultural practices in wetland environments—their observations have been critical for helping us to understand the deep history of human-wetland interactions in Belize. It would be accurate to say that in reconstructing the history of human-wetland interaction around Western Lagoon, they have provided the educational outreach to us and we are grateful for this sharing of their knowledge.

Acknowledgements We thank the entire BREA team who contributed to the fieldwork carried out in the January and summer seasons of 2019, including David Buck, Jessica Craig, Adam Kaeding, Satoru Murata, Lori Phillips, Ryan Rybka, Katie Shelhamer, Astrid Runggaldier, Samantha Krause, Emely Hernandez, Tim Beach, and Sheryl Luzzadder-Beach. I am particularly grateful to my co-authors—Sara Clarke-Vivier, Lori Phillips, and Astrid Runggaldier—for all their hard work on the public outreach and museum events, including a teacher's workshop carried out during June 2019. Together with my co-authors, we wish to thank all of those who participated in these public programming events, including Melissa Johnson of Southwestern University, Samantha Krause, Tim Beach, and Sheryl Luzzadder-Beach of UT Austin, Giovani Pinelo, Karla Pinelo, and Linette Sabado of the ISCR and BHA, as well as Raven Bishop and students Kayla Mehrtens, Holly Shaffer, and Colin Levi of Washington College. We also would like to thank Mr. John Gillett, the Chairman of Crooked Tree village, and the entire village council who have welcomed us into their community and continue to offer their support for the Crooked Tree Museum and Cultural Heritage Center. We also wish to acknowledge the generous financial support of our funders, including the University of New Hampshire and Washington College. We are especially grateful to the Alphawood Foundation for their generous support of the BREA field research and museum project. We are deeply grateful for the support of Kristin Hettich, the program officer of Alphawood. Finally, we would like to thank the branches of NICH, including the Institute of Social and Cultural Research (ISCR), the Belize History Association (BHA), the Museum of Belize (MOB), and the Institute of Archaeology (IA) for offering their support of our work. We want to especially thank the members of the Banquitas House of Culture, Cindey Rivero and Yahaira Vega, for teaming up with us this past summer to host a hugely successful teacher's workshop. We thank the director of the MOB, Mr. Alexis Salazar, and his staff, namely Ms. Carla Rosado for their ongoing support for the initiatives associated with the museum in Crooked Tree. Finally, we wish to thank the Institute of Archaeology, namely the Director Dr. John Morris who granted the first author permission to conduct the investigations reported herein.

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