THE PAST AS A CONSTITUENT OF THE PRESENT: SOCIAL WATERS AND POSTHUMANISM AT CARA BLANCA, BELIZE

BY

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DISSERTATION

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ABSTRACT

Cara Blanca is a system of natural pools in central Belize accessed by bodies (human and non-) for millennia, both for physical and spiritual sustenance. Most prominently, the pools are home to ancient Maya ceremonial architecture and ritual remains that emerged and were accessed by Maya during a period of prolonged and severe droughts in the Terminal Classic period (800-900 CE). Almost 27,000 years earlier, the pools were visited by extinct giant ground sloths also in search of reprieve from drought. I examine archaeological and paleoecological materials from Cara Blanca in the Terminal Classic period (800-900 CE) and paleontological material from 27,000 years ago to show that water was essential in the formation of human and non-human relations at the Cara Blanca pools.

This dissertation examines, through a framework of posthumanism, the ways in which the shifting climate has impacted the context of Cara Blanca throughout millennia. I focus on the role of water in maintaining an integrated landscape through these climate shifts and show that water was the integrating force in the construction of the Cara Blanca space during the Terminal Classic period of Maya occupation, as well as pre- and post- Maya occupation. The repositioning of water as a primary force in this analysis situates water as active and energetic, allowing for an expanded notion of who or what warrants justice. This reconceptualization of past landscapes as still unfolding in the present has the potential to influence the development of today's conservation policy.

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No justice... seems possible or thinkable without the principle of some responsibility*, beyond all living present, within that which disjoins the living present, before the ghosts of those who are not yet born or who are already dead...*—Derrida (1994:xix; emphasis original).

Since the concept of the Anthropocene was first introduced (Cruzten 2002), it has become a polarizing topic with some scholars calling for an eradication of the term (Malm and Hornbord 2014), many scholars debating its start date (see Lewis and Maslin 2015; Morton 2013; Ruddiman and Ellis 2009; Water et al. 2016), and still others discussing the complex politics of its use (Bauer and Bahn 2018). The roots of this debate lie in the notion that either the Anthropocene should be defined as the "human-dominated, geological epoch" (Cruzten 2002:23; see also Ruddiman et al. 2015; Steffan et al. 2007), or that the acknowledgement of this epoch occasions the necessity to break down the boundary between "natural" and "cultural" (Chakarabarty 2009; Morton 2013). The tension that divides the concept of the Anthropocene—between the ideas of "human above" and "humans amongst"—drives the present New Materialist analysis of the Cara Blanca pools in central Belize.

Here, I push against the ideation of nature as dominated by humans. While climate change and the Anthropocene should be considered global phenomena, their consequences are "profoundly local" (Cruikshank 2005:25) and are best understood in local contexts. This dissertation examines, through a framework of posthumanism, the ways in which the shifting climate has impacted the context of Cara Blanca, focusing specifically on the role of water in maintaining an integrated landscape through these shifts. I show that water was the kinetic force in the construction of the Cara Blanca space during the Terminal Classic period of Maya occupation (e.g., Krause and Strang 2016), as well as pre- and post- Maya occupation.

Following Pauketat's (2019a:21) outline of New Materialist studies, I show how the Cara Blanca landscape, mediated by entities (primarily water), emerged from "less-thingly substantial or material fields". The repositioning of water as a primary force in this analysis situates water "as an active participant in a mutually constitutive relational process, thus enabling an 'appreciation of the other' and highlighting the need to consider its interests" (Strang 2017:13). An expanded notion of who or what warrants justice allows for a more 'biocentric' (less anthropocentric), more materially and biological unbiased consideration of landscape formation. This approach has the potential to influence the development of conservation policy in the present. As Krause and Strang (2016:633) contend, "…if we study how social and hydrological relationship are interconnected and mutually constitutive,…significantly better management and policy can be designed."

Cara Blanca is a system of natural pools in central Belize accessed by bodies (human and non-) for millennia, both for physical and spiritual sustenance. Most prominently, the pools are home to ancient Maya ceremonial architecture and ritual remains that emerged and were accessed by Maya during a period of prolonged and severe droughts in the Terminal Classic period (800-900 CE). Water was essential in the formation of human and non-human relations at the Cara Blanca pools and the influence of water is most tangible in the Terminal Classic period. This study first examines archaeological and paleoecological materials from Cara Blanca in the Terminal Classic period (800-900 CE) in order to identify how relations among this watery landscape were constituted through the hydrosocial (e.g., Linton and Budds 2014; Krause and Strang 2016).

Through a posthuman and relational approach, I propose the importance of these waters transcends the nature/culture divide and informs the long-term role the pools play in the formation of relations—at Cara Blanca, water was mediator of all relations. Posthumanism is an ethical position that reimagines humans as one life force among many in the universe and works to debunk ideas of human exceptionalism (i.e, Barad 2007; Braidotti 2010). It relies on a relational ontological perspective, which espouses that distinct material articulations of the world emerge through relations, and it is those relations that engender both mattering and meaning (Barad 2007; Bennet 2010; Braidotti 2010). Through an analysis of archaeological and paleoecological materials from Cara Blanca in the first part of this dissertation, I show that water infiltrated and instigated movement through and within the Terminal Classic Cara Blanca landscape. To focus this, I will first show that water was the motivating entity in the formation of Terminal Classic Maya space—built and "empty" (see Chapter 2). In order to highlight the fluidity of matter at the pools, and the unbounded affect of the Cara Blanca waters, in the second part of this dissertation I consider the formation of the Late Pleistocene and present day Cara Blanca landscapes.

In the remainder of the chapter, I will first introduce the theory of New Materialism used in the rest of the dissertation. I will then provide brief examples of the ways posthumanism and relational ontology have been used in global and Maya archaeological studies (both within the realm of New Materialism and not), as well as the role that water has played in the everyday life of ancient Maya. Finally, I will introduce these theoretical approaches in the context of Cara Blanca, Belize and explain how they might help us better understand landscape formation in the context of conservation and, ultimately, environmental justice.

Relational Matter and Water as a Connective Kinesis

New Materialism is a philosophical, ethical, and political paradigm that gives life to the arguments of relational ontology and posthumanism by challenging constructivism and anthropocentrism (see Barad 2003; Braidotti 1994; DeLanda 2006 for early discussions). Built on the philosophical contributions of Deleuze and Guattari (1987), New Materialist studies have prominently been adapted into the literatures of feminist theory (Barad 2003, 2007; Braidotti 2006), political science (Bennett 2010), and of course anthropology (Fowler 2013; Harris 2017; Ingold 2007, 2012; Latour 2005). This philosophical approach has been folded into archaeology as a way to have posthumanist discussions in the natural and social sciences that produce perceptions of matter that are unified across disciplines. With the baseline ontological perspective of relationality, we should be able to reconceptualize matter as synchronically and diachronically unbounded, a position that serves to highlight the complexities of "matter" and "things," including material boundaries. Ontology is the "fundamental set of understandings about how the world is" (Harris and Robb 2012:668). The ontological turn puts forth the idea that people do not just have different beliefs about the way the world works (a cultural phenomenon), but actually inhabit specific, perhaps at times distinct, material worlds (Thomas 2015). A *relational* ontology promotes an understanding that all matter is dynamic—that each of those distinct material worlds emerges through relations (Barad 2007; Bennett 2010; Ingold 2007). This perspective helps to break down Cartesian perspectives of most of the world existing in dichotomies (Alberti and Marshall 2009; Barad 2007), which is common in western ontologies. It is born from the recognition that western, and in fact all, understandings of the world are social constructs of a very particular reality that inadequately speaks to the diversity of global perspectives and the fluidity/singularity of matter. The shift towards focusing on relational ontology allows archaeologists to have more nuanced discussions about diverse ways of existing in material articulations that inherently challenge Cartesian thought. Focusing on how entities materially and symbolically emerge through relations exemplifies the entanglement and indistinction of matter and meaning (Barad 2007), nature and culture (Harrison-Buck 2012; Lucero 2018), animate and inanimate (Barad 2012), and past and present (Alberti 2016; Dawdy 2010, Olsen 2010).

This project draws heavily on the disintegration of socially constructed dichotomies. Such divisions are not bounded in matter, but they are concepts that have material impacts. They are not deeply rooted ontological differences, but differences in external expression (e.g., Neves 2018). Barad's (2007, 2012) exploration of quantum physics and relational ontology shows us that the matter of which each part of our world is composed is dynamic and in a constant flow of relations. The meaning of the forms that matter takes emerges through those relations. Therefore, the import and concreteness of the boundaries formed—boundaries between and among human and non-human bodies, animate and inanimate beings—too, are enacted and specific to that entanglement. That is, boundaries will lose definition or change form, but they do not lose impact; all things cannot be considered the same. Differences are essential to a New Materialist understanding of the world—the notion of unbounded matter "positions difference as a verb or process of becoming at the heart of that matter" (Braidotti 2013:28). The processes and actions that create material configurations of difference are themselves pivotal to examining the world. Such an approach emphasizes that humans do not just impose upon their surroundings, but instead that there is ongoing entanglement of all participants in a space that informs *what is human*. This approach allows us to continuously stabilize and destabilize the "differential categories of human and non-human" (Barad 2007:66).

From a New Materialist perspective, "things" (including humans) emerge through continuing relations and "things" (including physical boundaries and meaning) are always fluid, malleable, and becoming through continuous relations (Barad 2007). This approach de-centers humans and instead considers the ways in which materials, organisms, and processes "together constitute the social spaces we inhabit" (Bauer and Kosiba 2016:116). Different terms have been used to discuss the "togetherness" of these materials, organisms, and processes, including: "rhizome" (Duleuze and Guattari 1987) "meshwork" (Ingold 2007), Actor-Network theory (ANT) (Latour 2005), and "assemblages" (Fowler 2013; Harris 2017). ANT signifies a meeting of distinct entities that is, perhaps, hierarchized (Pauketat and Alt 2018:75) and so does not align with a New Materialist analysis. "Rhizome" and "meshwork" emphasize the fluid, undefined nature of entanglements and cannot be reduced to a static entity, yet essential in any analysis of the material world is understanding distinct material articulations of that world. Thus, here I will emphasize concepts of territorialization and assemblage (Deleuze and Guattari 1987; Harris 2017; Pauketat and Alt 2018) so that we might better understand the contexts within which the Cara Blanca landscape is forming and reforming. Distinct configurations of material and immaterial elements (assemblages) of the world are formed through the process of territorialization, which bounds that configuration into an assemblage of "things, intersecting movements or entanglements in space, and recollections and embodiments of knowledge, history, or feelings" (Pauketat and Alt 2018:78). Territorializations are otherwise constantly unfolding, fluid relational worlds, and they allow us to study the material and immaterial consequences of the mediated assemblages that form. In the case of Cara Blanca, assemblage formation is territorialized through water and territorialization is fueled by kinetic forces.

Kinesis is the mobilizing, energetic force originating in material emergence. It is social, in that both "mobilization" and "emergence" imply an engagement—co-constitution. This sociality, its potentiality, and its catalyzing, territorializing energy is kinesis. My use of this concept does not require the engagement of humans. All matter experiences kinesis. It implies animacy and is akin to "tropism" or "taxis", but does not rely upon biology and does not require an "external force", as kinesis itself both penetrates and integrates matter. Rather, kinesis relies upon being material, being composed of cells. Kinesis itself is not material, but the movement of that matter is an engagement with kinetic forces. Kinesis results in aggregations, or territorializations—it is the connective energy, the orchestrator or director of a space and of the relations within that space. So, things do not, for instance, embody personhood, but things express and experience kinesis. In the case of the Cara Blanca pool, as I will discuss later, water's kinesis is territorializing.

There is no doubt that water is an essential component of human sociality and that it has been well integrated into anthropological and archeological studies (see Lucero 2006; Rodriguez 2006; Scarborough 2003). But, more pertinent, the environment and water are well integrated into New Materialist studies (Linton and Budds 2014; Harmanşah 2019; Krause and Strang 2016; Pauketat and Alt 2019; Strang 2013, 2014, 2017). Wittfogel's (1957) examination of hydraulic societies engendered a course of study focusing on the ways in which water is social—or at the very least those ways in which it engages with the social world. More recent explorations of the "hydrosocial" (Linton and Budds 2014) consider the dialectic of water and society, how "water and society *make and remake* each other" (Linton and Budds 2014:179, emphasis original). The "immanence" (Pauketat 2019:244) of water situates it as essential in discussions of and beyond biology, as well as (in its own way) blurring boundaries, as noted by Pauketat (2019a). Water's prominence in considerations of "being" comes from its necessity in all organic processes and all biological life (Strang 2006). It is fluid, encompassing, and transformative. It is both microscopic in individuation and insurmountable in concerted force—it is essential. Water is both mirror and wall: it can be translucent, transparent, or a dark, foreboding unknown. Water makes up bodies and fuels minds. These inherent qualities are affective, and it is this affect that mediates and ultimately territorializes an assemblage (Pauketat 2019a). Regardless of what state water is in, "it remains relational to a less fluid environment which contains it" (Strang 2006:2). Water is not only constantly engaged in dialectics but it is also, at once, integral to each thing in dialogue. Water exemplifies New Materialism both because of its immanence and the distinction and affect of its various material articulations (Krause and Strang 2016; Strang 2006, 2014).

The Anthropocene deals directly with challenging boundaries, particularly the limits of what is human and what is "other than…", whether one thinks it bolsters or breaks down those boundaries. The climate, as Bauer and Bahn (2018:3) point out, is a perfect example of New Materialist assemblages formed by ontologically heterogenous elements (Deleuze and Guattari 1987). Until recently, however, there has been little by way of New Materialist understandings of the changing climate (see Bauer and Bahn 2018; Krause and Strang 2016). Bauer and Bahn note that a renewed interrogation of climate change through the lens of New Materialism is essential to generate a politics of climate change that is pertinent and attuned to people's distinct engagements with other beings and environmental constituents. This interrogation is also essential toward recognizing the material and immaterial outcomes of such engagements (2018:6). I further this new interrogation of climate change through New Materialism by "thinking relationships through water" (Krause and Strang 2016:633). To make clear the intersection of time (temporalities), land (landscape), and water (an ontological constituent), we need to understand that what separates humans, plants, animals, landscapes, and water are not deeply rooted internal ontological discrepancies, but rather, as noted earlier, external expressions (e.g., Neves 2018). To do this, we explore how New Materialism emphasizes sameness but appreciates difference.

Potential Challenges with New Materialism

There are, of course, some dangers of adhering to this theoretical framework. As Bauer and Bahn (2018) and Tuana (2007) point out, the category of human is still essential for two key reasons. First, as a critique of the New Materialist and posthuman approach, Swenson (2015:679) fears that historical and political contexts (components of our epistemological understanding of the world) are discounted, and that social constructivism must be retained to some extent to avoid this negligence. These fears, however, are rooted in a fundamental misunderstanding of the New Materialist framework. To consider ontology (the way things are) is not to ignore epistemology (the way that we know things). To de-center humans (including cultural, historical, political context) is *not* to ignore the ways in which those contexts impact ontology. On the contrary, Barad (2007) highlights that to study ontology is inherently to study epistemology because one knows/learns through being. The researcher cannot be considered ontologically separate from that which it is attempting to know. Therefore, to de-center humans is not to ignore historical, political and cultural contingency or context, but to recognize they, too, are emergent and a part of the same unfolding of relations as that which is not human/social. "The aim is not to remove humans but to stop believing that we hold a fifty-percent stake in ontological shares on reality" (Whitmore 2014:218). New materialism allows us to become untethered from the human exceptionalism that can encourage a particularly teleological research paradigm and ask questions that better situate humans within material entanglements. Rather than asking questions solely about different material interactions, we can ask questions about their mutual constitution. Taken further, we can move from questions about the ways in which we as researchers influence the analysis/interpretation of a particular context, and instead recognize ourselves as part of the context we are studying (perfectly exemplified in Barad's 2007 discussion of 'apparatus' and phenomena).

Additionally, humans in their differentiated and complex contexts have greatly altered the trajectory of the planet, and accountability must be retained, even in "posthuman" conversations. There is a real potential for the challenge of boundaries between human/non-human to encourage a deflection of accountability. Claims that New Materialism depoliticizes archaeology are rooted in the belief that it will allow blame to be cast beyond humanity. Bennett (2010) and Tuana (2007) discuss this dilemma in relation to the Holocaust and Hurricane Katrina, respectively. There is a danger in treating socially critical contexts as "an assemblage of disparate entities" (Thomas 2015:1294) in case it reduces human accountability. The concept of "territorialization" helps us to address this. Within territorializations, boundaries are determinate and therefore accountability can still be attributed to humans. Posthumanism debunks human exceptionalism while allowing for humans to be "accountable for the role we play in the differential constitution and differential positioning of the human among other creatures" (Barad 2007:136). The different material articulations of assemblages within these territorializations gives credence to the distinction of human impacts.

Instead of being apolitical, New Materialism allows archaeologists to ask more nuanced questions about ethics (Alaimo 2010; Bennet 2010; Braidotti 2013; Grosz 2017) because it inherently concerns *possibilities* of political, social, collective, cultural, economic, and environmental life, and in that, *possibilities for change*. Because New Materialism works with things as they are in a state of becoming, ever emergent, it allows archaeologists to consider the possibilities for the future that emerge from the past and present (Barad 2007:182; Grosz 2017:2). With this understanding of matter, archaeologists, who are popularly "accused" of dealing with only the past, can ask questions that explore the possibilities for impactful change through relations in the future. These questions are inherently political because their primary action is to dehierachize—to break down structures of power. Discussions of the changing climate often do center on groups of humans disproportionately impacted by climate change (see Tuana 2007) and those groups are very often already marginalized and silenced. To perpetuate the unbalanced representations already prevalent in anthropological (and other) literature, is unacceptable. I approach this project, then, with the understanding of this danger and the hope that a New Materialist framework that works to break down structures of power will open space for those voices—human and other than— rather than continue to silence them.

Relational Ontology and New Materialism in Archaeology

Archaeological examinations of relational ontology are not uncommon throughout the world. In fact, entire volumes have been dedicated to examining relational ontologies and non-human personhood in archaeology (see Buchanan and Skousen 2015; Harrison-Buck and Hendon 2018; Watts 2013). The multitude of archaeological studies cover diverse geographic and temporal contexts, and each sheds light on the importance of not masking indigenous ontologies and non-western states of existence, highlighting the blurring of boundaries and disintegration of Cartesian dichotomies. Most of these studies, as I will discuss below, reconstruct indigenous worldviews.

In discussing these studies of relational ontology, I will briefly use "personhood". Personhood is defined as "the condition or state of being a person" (Fowler 2004:7) and in the studies outlined here, humans are, if not the source of personhood, intimately involved in its designation. The category of personhood, however, is not set, but constantly shifting with fluid conceptions of identity in diverse social contexts (e.g., Strang 2014; Verdery and Humphrey 2004). The use of personhood is common in the relational ontological studies I first introduce (as opposed to New Materialist studies) because in the reconstruction of indigenous worldvies, personhood is defined in that particular social and ideological context. Personhood is, indeed, contingent (e.g., Verdery and Humphrey 2004) upon the human's current conception and perception of matter and animacy. To be able to discuss the energy implied with designations of personhood, however, and to do so without the connotation of human personhood, is essential. In my discussion, what other scholars name "personhood" can extend to things, landscapes, animals, water, affects, atmospheres. It does not necessarily need to extend from a human body or human sociality to these other things, but from a relational, social engagement. What is most important for this dissertation is the sociality, which can exist amongst all materials. Kinesis, described above, embodies this affective, instigating force.

Reconstructing Relational Ontologies

Although there is great variety among studies of relational ontology, there are two distinct ways of approaching such studies. Most studies present archaeological analyses of communities with relational ontologies and reconstruct those ontologies (e.g., Brück 2004; Hill 2011, 2018). For instance, Joanna Brück (2004) explores relational identities as represented in Early Bronze Age burials in Ireland and Britain. She examines objects left in burials and contradicts the previous conception that they reflected the deceased's identity. She analyzes the objects as negotiating the relationship between living and dead. These objects, which include decorative items (such as beads, rings, and necklaces), as well as tools (scrapers and awls), show the relationality of identity. As such, they blur the boundaries between the living and the dead.

Perhaps more significantly, however, they blur the boundary of the human body—or what/whom was considered a person. "The boundaries of the self did not coincide neatly with the limits of the physical body, but incorporated elements 'outside' of it" (Brück 2004:325); one's concept of self was not contained by their human body, but rather extended to include the burial objects. Employing the relational perspective allows Brück to better interrogate concepts of selfhood and identity as they were experienced in the day-to-day, and informed on a new way that mourners both expressed and coped with death and its impact.

Such studies do not simply consider the human body or constructed objects, but include moderately posthuman examinations. Erica Hill (2011), for example, examines animals as ontological subjects who are actively engaging with the social practices of indigenous Chukotkan and Alaskan hunting rituals. This is an important step forward from considering objects as relational—burial objects can be placed in the Cartesian category of cultural, as they are constructed; animals, however, would be relegated to the natural. Her analysis extends personhood and conceptions of humans to animals, though she does recognize that not all animals were considered to have personhood. Her approach relies upon human social interaction to define animated entities or personhood. Animals that are engaged in social interactions with humans are persons, otherwise, they are "just animals". This analysis, while rich, continues to necessitate *human social* engagement. Hill notes that animals who are agents but not persons lack the capacity for both sociality and reciprocity, again seeming to necessitate sociality with humans in the designation of persons. The understanding that certain animals were persons dictated the relations of human and animal, and particular interactions between these persons were necessary to ensure the success and safety of a hunt; it appears that the "hierarchical system in which humans dominate all other beings" (Hill 2011:409) is absent.

New Materialist Studies

Some scholars, however, have moved beyond attempting to reconstruct a past worldview to present a New Materialist analysis of archaeological material from the framework of relationality (e.g., Lazzari and Korstanje 2013; Pauketat and Alt 2018; Pauketat and Alt 2019). This approach moves through and outside the confines of culturally defined ontologies to propose an all-encompassing state of matter. The reconstructed ontologies (discussed above) exist under the umbrella of these more encompassing studies (discussed below). Pauketat and Alt (2018) adhere to the dehierarchized and posthumanist examination of the relationality of the development of the Mississippian world of the U.S. Midwest. They understand the mediating and transformative powers of "inanimate" things, and acknowledge their role in social transformation—"*water*, *mollusks*, *corn*, and *mud*, transmogrified by *fire*, gathered, reconfigured, and territorialized humanity to produce the Mississippians" (Pauketat and Alt 2018:79; emphasis original). They consider the seasonal shifting of water sources and mollusk procurement sites in concert with maize intensification as an "embodied rhizomatic relationship" (87) that mediated the unfolding of what we now consider Mississippians and their engagement within their landscape. Pauketat and Alt argue that the dense web of relations, most intricately mediated by water, engendered Mississippian lifeways. Perhaps most significant in this analysis, and something that I will espouse in this dissertation, is that Pauketat and Alt do not seek to define a worldview or give voice to how Mississippians saw their world. They do not define intentional interactions with embodied inanimate entities—though those, too, may have existed. Instead, Pauketat and Alt present a way for us in the present, to conceptualize past lives with "a relational eye" (90). In doing so, they present a way for us to reconceptualize the present. It is in this way that such a theoretical evaluation of past lives can benefit current conversations on sustainability.

In other similar New Materialist studies, water is central to terrorialization. In a recent volume Pauketat (2019b) notes that water, and other things bundled with it, inform human spirituality because of its affects and infrastructures. While it is entangled with the emergence of a worldview and spirituality, water is also key in processes of urbanization (which are not necessarily secular) worldwide, whether those processes are exceedingly wet or dry. The affective environment—"omnipresent liquidity" (267) or "uneven" or "absent" wetness (266) is bound by water in a way that allowed for the possibility of a city—for that particular, social territorization. Pauketat recognizes that more than humans, water and other cosmic entities (e.g., the moon) drove this process and helped to maintain integration of the cities with extensive irrigation systems running beneath and throughout, which in turn engulfed the city in water through evapotranspiration. An important point of Pauketat's discussion is that the distinct social, political, and economic contexts of urban development can be considered and given appropriate due while still existing within the unified and fluid material world. He makes clear that a New Materialist analysis does not necessitate ignoring cultural construction.

Similarly, Harmanşah (2019) looks at the water infrastructures in Hittite cities during the Anatolian Bronze Age. He approaches his analysis from a concerted political ecological and New Materialist framework. His analysis is interesting because he discusses both the fluid, connecting necessity of water in the Hittite worldview, as well as affective water, which exists beyond the Hittite worldview. Much like at Cara Blanca, in the Hittite case, again, water is what territorializes the assemblage of sacred, secular, political, and ceremonial practices at the pools.

Relationality at Cara Blanca

Following Bennett's concept of "vibrant matter" (Bennett 2010), I consider the ways in which the complementary flow of knowledge between active participants at the Cara Blanca pools inform upon one's existence through the entanglement of relations. This flow is constant and ever-changing, highlighting at once the existing and constructed nature of boundaries and the ways in which perceptions of material fluidity allow us to explore sustainability beyond humanity. My consideration here is similar to Bird-David's "responsive relatedness" (2008:S68-S69), or the "mutually responsive changes in things in-the-world and at the same time in themselves". Responsive relatedness, however, implies that the perception must be an intentional act, limiting its applications beyond human or animal cognition. I extend the recognition of active relationality and highlight that it is the "kinesis" in the relations of assemblage parts that is generative rather than the cognitive intent of the assemblage members. In this case, it is the kinesis from the water through which these relations emerge that is generative. DeLanda (2006:6) argues that it is "the movement that in reality generates all these emergent wholes" that we should study in order to "get a sense of the irreducible social complexity characterizing the contemporary world." I argue that we can study those movements in the past to better inform our present. It is not required that those generating movements have cognitive ability or blood coursing through their veins—"it is absurd to think that complex self-organizing structures need a 'brain' to generate them. The coupled system atmosphere-hydrosphere is continuously generating structures (thunderstorms, hurricanes, coherent wind currents) not only without a brain but without any organs whatsoever" (DeLanda 2012:42). Structure, here, is the territorialization of entanglements. By seeing "past landscapes (as) the entanglements of a relatively untidy articulation of temporalities" (Roddick 2013:303), I can better comprehend long-term processes of sociality emerging through the landscape. In what follows, I consider first the Terminal Classic period at Cara Blanca, and later diverse time periods. In each, I explore the affective qualities of water that have encouraged, through kinesis, the formation of the Cara Blanca landscape.

Cara Blanca consists of 25 water bodies that line the base of steep, limestone cliff. Many of the deepest of the pools (over 60 m), *cenotes,* have ceremonial Maya architecture surrounding them, while residential architecture can only be found towards the outskirts of the watery landscape, near the relatively shallower lakes. Two of these deeper pools (Pool 1 and 20) also have megafaunal remains embedded in their walls. The pools, each boasting a unique history, have acted as the substance through which relations have emerged in the Cara Blanca space for millennia (Kinkella 2009; Lucero and Kinkella 2015; Lucero et al. 2016; see Alberti 2014; Linton and Budds 2014; Strang 2014). Considering the assemblages that have formed and transformed over the last 30 millennia at Cara Blanca—from extinct giant ground sloths, to ancient Maya visitors, and through the present—will allow me to reconsider the formation of the landscape itself. I will focus much of my discussion on the Terminal Classic Cara Blanca landscape but will ultimately turn my discussion to different time periods to highlight the unbounded capacity of water's affective kinesis; the same processes have been in motion for millennia, though different material articulations of the space have emerged.

The Role of the Maya Worldview and Beyond the Maya Worldview

Studies of relational ontology have often engaged with the formation processes of particular ritual objects or cultural spaces (e.g., Harrison-Buck 2012:115). In the case studied here, the formation processes of a landscape and the assemblages of which it is a part are considered without the necessity of humans at the center. The waters are the gravitational points (see Lazzari and Korstanje 2013) that instigated the formation of the Cara Blanca assemblages. It will be important, however, in my discussion of ancient Maya architecture and daily life, to introduce their worldview. They adhered to a more biocentric, less anthropocentric view that sees animacy in all things (Lucero 2018; Stuart 1996; Taube 2004). This worldview aligns well with my discussion and contributes to our understanding of the Cara Blanca space. The ancient Maya offer an ideal avenue to better understand relational ontologies because ethnographic and epigraphic examples indicate that their lived lives were notably relational (Lucero 2018). Boundaries—between dead and alive, human and non-human, natural and cultural—were blurred in the everyday lived experience of the Maya. The designation of ensouled, having *ch'ulel*, was not limited to the human participants, but everything was thought to have *ch'ulel*—each ceramic vessel created, each house built, and every mountain climbed (Stuart 1996:157). There was no simple life/death, animate/inanimate dichotomy but their worldview was cyclical— life begets death begets life…and so on (see Lucero 2018). Therefore, their everyday lives can help us understand such a relational and biocentric ontology.

With this said, it is essential to highlight that the Maya worldview is not necessary for my argument. In this dissertation, water is not an object. It is not "produced through social relationships and imbued with meaning through cultural schemes" (Krause and Strang 2016:633). Water is innately a material co-constituent in the formation of relationships with and meanings of water. Although water is powerful in the Maya world, water was not granted meaning by the Maya worldview. Rather, water's malleability, permeability, flow, drench, and biological necessity was an active, vocal influencer in the formation of this worldview. That is to say, the Maya worldview is important but the theoretical and material condition discussed in this dissertation preempts this worldview.

To help emphasize this point, my analysis extends beyond the Maya period, as discussed below, to understand the continuous formation and reformation of the watery Cara Blanca landscape (autonomously from humans). As Lazzari and Korstanje (2013:395) point out:

> "the power that ancient…places have in framing current perceptions, understandings, and obligations between people, things and places, needs to be acknowledged in its radical rawness. In this view artefacts and places as/of heritage are not passive receptacles for today's discourses, but instead are constituent parts of 'past-present systems', formations of lived social experience characterized by the mutual constitution of past and present realities."

The point is that the New Materialist position "allow[s] for animate and agentic forces other than people to cause history" (Pauketat 2019:14); of course, the Maya ontology, the Maya ways of being in and relating to the world, is still an essential part of that history.

Before and Beyond the Terminal Classic Cara Blanca

The second part of the dissertation will take a chronological turn. I will show how the relationship between water and animate/inanimate entities at the pools does not rely upon human use of the pools or the worldview of the humans engaging with the space. This relationship was integral in the pre-human Pleistocene use of the pools. Finally, I will show how a better understanding this relationship matters in the present day political context. This analysis of the centrality of water in forming and reforming the Cara Blanca assemblage will allow me to posit the possible agency of the landscape in informing present day political dialogues surrounding landscape conservation (e.g., Krause and Strang 2016).

The Anthropocene framework and debate offers a valuable lens through which to examine the acceleration of climate change and perhaps even to readjust our view of the changing climate and the direction forward to one of an integrated material world. Important in mitigating the impacts of the changing climate is ensuring the protection of resources of "natural" and "cultural" significance—but often national regulations are still dichotomized and protection is granted on the terms of culture or environment (e.g., the Belize Ancient Monuments and Antiquities Act and the Belize Environmental Impact Assessment). To readjust national regulations so they are able to draw on the relational, material wealth of a landscape allows communities to employ political agency in seeking protected status for lands without having to adhere to "essentialized notions of specific, local identities" (Lazzari and Korstanje 2013:395). Strang (2017:1) contends that such a perspective encourages justice for those who cannot speak for themselves. I contend that such a perspective provides us with the tools to listen to those animate and inanimate beings that have been speaking all along. This perspective recognizes that the past is always redefined in the present, but the past is also a real, lived landscape that has agency in the present. My analysis of the Cara Blanca landscape, by "integrating the past and present on equal terms" (Lazzari and Korstanje 2003:395), recognizes the past landscape as an active and lived constituent in the political and academic unfolding of the present landscape and that the future, too, has agency as our hope for the future motivates our present (e.g., Braidotti 2006).

The assemblages participating in the formation processes of the landscape are completely different at different time-scales, in different geographies, and at different spatial scales (e.g., Harris 2017; Lenton and Latour 2018). Pleistocene megafaunal, ancient Maya, and current visitors to the space have merged and thrived with the Cara Blanca water through material and meaningful transformation of the landscape (Larmon et al. 2019b; Lucero and Kinkella 2015). Today, a climate plagued with extremes and increasing intrusions of non-sustainable agriculture threaten the landscape's endurance (Benson 2015, 2017). In this dissertation, the relational assemblage that has unfolded through social engagements within the landscape since the Late Pleistocene (and before) do work to inform a modern reimagination of social life at Cara Blanca and the landscapes status as worthy of protection. I look at the "social collectives [that] emerge from within specific material orders which have various levels of temporality embedded in them" (Lazzari and Korstanje 2003:411); these collectives hold equal stake in the outcome of present-day political action regarding the sustainability of a landscape. When addressing accountability or causality and working to formulate effective policies in doing so, it is minimalizing to just consider human and non-human entities instead of the entanglement and relations between the two (e.g., Strang 2017). Accountability might be attributed to humans, but the unfolding of a material-discursive configuration of a landscape is best understood through a consideration of those relations and entanglements and, therefore, policy is best formed with the same consideration (e.g., Orlove and Caton 2010; Krause and Strang 2016). After all, "theory is manifested in practice. A theoretical frame in which human needs and interests are separated and prioritized inevitably gives insufficient weight to the needs of the non-human" (Strang 2017:3).

Water's Centrality at Cara Blanca

A posthuman archaeology explores how matter (including humans, things, and environments) emerges through relations to articulate particular material configurations of the world. This perspective understands that matter is dynamic and fluid. The emergence of the Cara Blanca ritual landscape (Larmon and Carbaugh 2018; Lucero 2018; Lucero and Kinkella 2015; Lucero et al. 2017) is through the agentive deep, dark waters of Cara Blanca; water allowed Maya visitors to communicate with ancestors and deities that exist as that water. Water permeated the Maya space in the form of tufa (calcium-carbonate precipitate that formed in the pools) included in architecture, ceramics used in ritual, and processions of Maya that were cleansed by its water and steam (via sweatbaths) (Larmon and Amin 2017; Larmon and

Carbaugh 2018; Lucero 2018; Lucero and Kinkella 2015). In this material-discursive articulation of the Cara Blanca space, deities and ancestors are not just residing in the water—they are, in fact, the water. The water is not just involved in the ritual, but is a part of the purification processes and the built and empty spaces involved in the ritual supplication. The meaning of the Cara Blanca space emerges in this unfolding. In this case, the materials used in building (including tufa), the type and quantity of ceramic vessels recovered from survey and excavations (primarily large water jars), and the placement of architecture and materials (on the edge of pools, in pools, or overlooking pools) all speak to the inherent primacy of the water (Lucero and Kinkella 2015). But the relational reality of the Cara Blanca assemblage is not contingent upon Maya understandings of the watery landscape. As the second part of this dissertation will discuss, water was the gravitational pull to which the social giant ground sloth succumbed and the material marker (in the form of isotopes) of its shifting subsistence existence. Pauketat and Alt (2018) show that "inanimate" things (water, mollusks, corn, mud, and fire) were the mediating life power of a peoples, I show that water is the mediating life power of a landscape.

Harrison-Buck and Hendon (2018:8) define relations as "generative actions that bind intangible relational beings, create personhood, and produce an animate ontological status in an object-body. It is the co-creative (re)productive process that is crucial for generating the movement and life force in a relational being." Required for maintaining the status of relational persons is "both ongoing movement (agency) and reciprocal engagements (mutual constitution) with other relational entities" (Harrison-Buck and Hendon 2018:10; see also Hill 2011:409; Ingold 2006:12). Movement and engagement are essential components of kinesis and these can occur apart from human bodies or cognition—autonomously (Looper 2018; Harrison-Buck 2012;

Harrison-Buck and Hendon 2018). At Cara Blanca, both movement and discourse are fueled by its waters; they thread together scales of experience. The substance of the waters is, again, not bounded but flows through emergent and surrounding bodies, allowing for the necessary fluidity of boundaries, movement of matter, and extension of bodies. Water connects things and water connects times (Strang 2014). If, as Strang contends, water is often a conduit for emerging relations, then the Cara Blanca pools, and the growing impact upon them, is a telling place to explore shifting relations, and their impact, through time.

My research in the Cara Blanca region will show how water was the kinetic force in the territorialization of the Terminal Classic Cara Blanca space. To do this I use archaeological analyses of constructed and empty space during the Terminal Classic period. I analyze material remains of the Maya relations with the landscape to show that they are fueled by the water. This analysis includes, but is not contingent upon, Maya understandings of water. This final point is emphasized by then turning my discussion to paleontological remains—an extinct giant ground sloth—and the inherency of water in the Late Pleistocene landscape. The ontological subjects here are varied and their engagements unique, but the kinesis of the water remains. Considering the Cara Blanca landscape through the water allows for conversations of sustainability to do precisely what ecologists have called for (see Day et al. 2009)—reimagine the landscape as an assemblage in which the sustainability of all things is intertwined. I elaborate upon these methods in Chapter 2.

Final Thoughts

Ethics is therefore not about right responses to a radically exteriorized other, but about responsibility and accountability for the lively relationalities of becoming, of which we are a part[…]Responsibility, then, is a matter of the ability to respond. Listening for the response of the other and an obligation to be responsive to the other, who is not entirely separate from what we call the self. This way of thinking ontology, epistemology, and ethics together makes for a world that is always already an ethical matter (Barad 2013:68).

The acceleration of climate degradation, the solidification of the human/nature divide, and the start of the Anthropocene has been widely attributed to the industrial revolution (e.g., Crutzen 2002; Day et al. 2009). As with any other social process, however, its emergence is complex and not globally uniform. Examining the material footprint of the shift in assemblage formation that instigated the transformation at a more local scale will allow us to identify patterns within the context of emergence and to respond to local needs in light of the shifting landscape. Such analyses will provide us with a greater sensitivity to the unique integrations of social and natural within diverse contemporary spaces, ultimately contributing to a discourse of relationality that operates on a global scale. Encouraging this perspective, which decenters and de-hierachizes humans, offers a difficult task within and beyond the field of archaeology. This project recognizes the ever present entanglement of science and the sometimes inscrutable ontological perspectives of relationality and posthumanism while ensuring that humans will still matter because humans are matter, too. Cara Blanca has emerged through millennia of kinesis. Through appreciating the impact of this vibrancy as it appears materially, we might also begin to grasp the importance of the spaces that we both help compose and that comprise us.

Heise (2008) writes of promoting the transformation of a sense of place into a sense of planet. In her estimation, adopting a "universal environmental consciousness" (Heise 2008:10) is the way through, and the path to grow from, current environmental degradation. She argues that early 21st century attentions to the local perhaps act to promote a self-concerned approach to sustainability, ultimately counteracting global sustainability efforts. The proposed project brings to the forefront the tensions between the local and the global, recognizing that in order to encourage "environmental world citizenship" (Heise 2008:10), we must start from the local level and move outward. Climate change is a global phenomenon, but it is experienced locally; and it is when inquisition grows from locality that its ontological reality might be recognized. The *longue durée* perspective shows that reintegrating humans into the unbounded, relational landscape promotes sustainability and could offer a paradigm shift in contemporary social and political discourses.

Dissertation Organization

Chapter 2 begins Part 1 of this dissertation. In Chapter 2, I will outline the background and methods necessary to better understand and contextualize the Terminal Classic Maya analysis in this research. In chapter 3, I will present previous environmental reconstructions of the Maya region, both those that we will discuss in this text later on and others, and I will outline previous research regarding Maya relationships with water. The focus on previous studies of human and environment interactions in the area is necessary to shift the conversation and highlight the ways in which a posthuman framework can be beneficial. Chapters 4 and 5 will look at the Pool 1 space and architecture, as well as the hypothesized ceremonial circuit at Cara Blanca, respectively. Each will focus on the ways in which water was the constructor, the territorializer.

Chapter 6 begins the Part 2 of this dissertation. This chapter is, in a sense, a stand-alone New Materialist analysis of a distinct time period at Cara Blanca, again highlighting water's kinetic, affective properties and their role in mediating the assemblage. Chapter 6 will address Late Pleistocene Cara Blanca. My final chapter, Chapter 7, will take the results from each chapter and present a cohesive discussion of how such an understanding of the central Belizean landscape might inform present day social and political discussions. This chapter will investigate previous worldwide efforts to grant rights to the environment, as well as how they have succeeded and failed. Finally, I will look at the national regulations presently protecting

Cara Blanca and other Belizean landscapes and how a posthuman, New Materialist approach could benefit those regulations. I will explore the past at Cara Blanca as a constituent of its present condition and how Cara Blanca's waters have produced an enduring and cohesive social landscape.

CHAPTER 2: ANCIENT MAYA NEW MATERIALISMS: HOW WE UNIFY MATTER

Water is no longer valued as a divinely appointed means of survival, for producing and reproducing human life, as it was in local subsistence communities. Nor is water an awe-inspiring ally in the quest for political empire, as it was in the agrarian states. It has now become a commodity that is bought and sold and used to make other commodities that can be bought and sold and carried to the marketplace. It is, in other words, purely and abstractly a commercial instrument. All mystery disappears from its depths, all gods depart, all contemplation of its flow ceases. It becomes so many 'acre-feet' banked in an account, so many 'kilo watt-hours' of generating capacity to be spent, and so many bales of cotton or cartloads of oranges to be traded around the globe. And in that new language of market calculation lies as assertion of ultimate power over nature—of a domination that is absolute, total, and free from all restraint.—Worster (1985:52, cited in Rodríguez n.d.:8)

As discussed in Chapter 1, my analysis is of the kinesis that exists between water and the other constituents of the Cara Blanca landscape. This analysis relies upon highlighting the permeability of boundaries and the mutual constitution of those constituents. In their analysis of the political ecologies of water, Linton and Budds (2014) show how water is socially constructed and produced—that it cannot be separated from its social context. Here, I show that water is, indeed, social but this sociality exists beyond the human experience. Water threads the Cara Blanca landscape together through kinesis and this mutual constitution is what drives the sustainability of that landscape (e.g., Cox 2014; Rodríguez in press). This approach does not just "sustain intrinsic linkages between human and natural systems that increase community and ecosystem resilience to climatic and socioeconomic stresses" (Fernald 2009:3), but integrates the systems so they are indistinguishable. Such a mutualism increases resilience to stressors (Turner et al. 2016:2) and encourages a flexibility in the system that promotes sustainability (e.g., Cox 2014). My approach is akin to Linton and Budds' (2014) configuration of the relational-dialectical approach to hydrosocial systems, but extends beyond the human realm, as the generative force originates in the water and integrates the material world.

The generative force of water has been integrative throughout the continuous engagement of the landscape and through the ever-changing tropical climate. In order to make clear how this framework works outside the Maya worldview, the second part of my analysis introduces the Late Pleistocene, before humans arrived, and the present. In each time period, I explore water's kinesis through different datasets, ultimately tying the distinct time periods together through the Cara Blanca waters. My argument is that there has always been continuous *social engagement* (kinesis) between humans/non-humans, non-humans/non-humans, and/or humans/humans, especially via water at Cara Blanca. The waters provide the cohesion of the Cara Blanca space and allow for the cohesiveness of that landscape.

Too often, "humans are…at the foci" of designations of animacy (Harrison-Buck and Hendon 2018:13). The problem with many studies of relationality and non-human personhood (e.g., Gell 1998) is that they treat "objects *as if* they were persons" rather than as if they "just *are* people" (Holabraad 2009:434, emphasis original). Taking seriously such a consideration as posthuman means perhaps engaging with the concept of kinesis rather than personhood. I suggest that this framework offers valuable insights into conversations of conservation. I open the dissertation with the Late Classic Maya period (600-800 CE), a time in which the relation ontological world is truly embodied. In contrast to the intention of many ontological studies, I am not attempting to only define the world in which the Maya lived. Rather, I am trying to redefine the way we, today, see that entire Cara Blanca landscape. Because each crevice of the Cara Blanca landscape (material and immaterial, constructed and unconstructed) has been essential to its functioning, Cara Blanca and its positioning within an increasingly endangered terrain is perfectly suited to shine a light on the eternal relationality of the landscape. In this chapter, I introduce the setting—the Tropics, the Maya, and Cara Blanca, Belize—and why it is excellently suited to inform a posthuman, relational analysis of landscape sustainability in the present-day political climate. While the kinetic qualities of the water are preemptive of the ontological position of the Maya the emergence of the Cara Blanca space is intimately tied to both their understanding of water.

Setting

The Tropics

The tropics, the region between 23½° north and south, are home to 40% of the world's population (Anadón et al. 2014), in part due to the high productivity and the incredible diversity of species. In general, the tropics have relatively minor climatic fluctuations (Hutterer 1985), but the humid tropics (between 10° and 23½° latitude north and south) experience dramatic fluctuations in rainfall. The rainfall and wind patterns of this region are largely controlled by the seasonal movement of the convergence of northeast and southeast trade winds in the Intertropical Convergence Zone (ITCZ), which is controlled by hemisphere temperature contrasts (Ridley et al. 2015) and changes in El Niño frequency (Kennett et al. 2012). The ITCZ shifts from north during the rainy season to south during the dry season, ultimately leading to shifting winds that cause a plethora or dearth of precipitation (Haug et al. 2003). These fluctuations in precipitation impact the availability of water and resources and the productivity of the land. It is estimated that by the year 2050, over half of the world's population will likely live in and rely upon the resources of the tropical forest (Roberts et al. 2017). Yet, the changing climate and increased pressure from the movement of human populations into these ecosystems make them some of the most endangered and, therefore, the most important to study.

Periods of climatic fluctuation and change have been occurring in the tropics, as elsewhere, for millennia. The environment of central Belize during the Pleistocene was much different than it is today. The southern Maya lowlands, which are home to the Cara Blanca pools, lie in the humid tropics of Belize. Leyden and colleagues (1993) document that the Central American lowlands were increasingly cool and arid from Interstadial Stage 3 (Marine Isotope State 3 ~36 to 24 ka) through the Glacial Stage 2 (MIS 2 ~24-13 ka), when lake levels were at their lowest. The environment was much drier, the icecaps much more expansive, sea levels lower, and the water table much lower. Dry conditions persisted until the Late Pleistocene or early Holocene (c. 9390-7550 BCE), when precipitation increased (Metcalfe et al. 2009). More recently, periods of drought have been recorded in the lowlands c. 200 CE and between 700-950 CE (Haug et al. 2003; Medina-Elizalde et al. 2010). Today, limestone hills and ridges with deciduous hardwood forest cover predominate in the lowlands (Ford and Nigh 2009). The low-lying areas are in particular danger of being impacted by rising sea levels.

The Late Classic Maya

Humans have been occupying what is now Guatemala, Belize, southeastern Mexico and parts of El Salvador and Honduras for the last 12,500 years (Prufer et al. 2017). Cara Blanca is in the southern Maya lowlands, which is comprised of northern Guatemala, southeastern Mexico, and a large portion of Belize. Early inhabitants were mostly nomadic or semi-sedentary hunter-gatherers and fishers until c. 5000-2500 BCE, depending upon where within the Maya region they were residing (Pohl et al. 1996). Evidence for agricultural practices, including the presence of maize (*Zea mays*) pollen, is noted as early as c. 3500-2500 BCE (Fritz 1994; Pohl et al. 1996). The Preclassic Maya (c. 300 BCE-300 CE) lived sustainably in small communities with small-scale agriculture and a less hierarchical social structure until the end of the Preclassic period, when kings and urban centers emerged.

The Classic period (c. 300-800 CE) witnessed the growth of large urban centers intertwined with hinterland farmers, over which kings ruled (Lucero 2006). During this period, population densities in the lowlands reached $<100/km^2$, with some urban centers home to over 100,000 people (Turner and Sabloff 2012). Because the Maya were dependent on productive agricultural cycles for subsistence—particularly for their staple crops of maize, beans, and squash—they relied upon predictable and plentiful rainfall. At a latitude of 16-18˚ N, Belize has one wet and one dry season annually. Various subsistence techniques were used on a household and communal scale to maintain productivity throughout the seven-month rainy season—including terraces, dams, canals, and raised fields in house gardens, short-fallow infields, and long-fallow outfields (Lucero 2017). Yet, kings also played a significant role in Classic Maya subsistence, garnering their kingly power by communicating with the rain deity, Chahk, and providing supplication in return for dependable rainfall (Lucero 2006). Water in the southern lowlands was still scarce; the karstic landscape allowed water to seep through the bedrock and the Maya had to build water catchments as a means of retaining water for agricultural and daily needs (Scarborough and Gallopin 1991). Though the agriculture and water management strategies employed, primarily in the Late Classic period, were intrusive and *could* damage the landscape, they were often sustainable adaptations to the fluctuating climate (Lucero 2017). Recently, the more sustainable practice of forest management in contemporary and ancient Maya contexts has been discussed (Ford and Nigh 2009; Ford and Clarke 2016; Lindsay 2011), suggesting that cultivation practices—including accessing built, managed, and untouched areas for resources—often still allow(ed) for a more sustainable subsistence practices in the region and beyond (Lucero 2018).

This system of subsistence sustained both urban centers and hinterland areas until a series of prolonged droughts struck between c. 800 and 930 CE (Douglas et al. 2015; Kennett et al. 2012; Medina-Elizalde et al. 2010). As kings could no longer provide dependable rainfall and constructed water management systems began to fail, Maya commoners lost faith in their rulers and moved out of the city centers into the hinterlands (Lucero 2006) to new regions along the coast and major rivers where market towns and trade expanded (Graham 2011; Masson and Freidel 2012). Those that stayed in their home regions lived near water bodies where they would have access to freshwater. The Maya thrived in hinterland areas and new urban centers throughout the Postclassic period (c. 900-1520's CE). In the early 16th century, Spanish colonizers arrived in the Yucatán. Belize was invaded by the Spanish and the British throughout the 16th century and through the present (Graham et al. 1989). Today, however, over 7 million Maya survive in the region and elsewhere.

New Materialism and the Ancient Maya

The ancient Maya offer a fruitful avenue to better study and understand relational ontologies because ethnographic and epigraphic examples indicate that their relationship with their surroundings differ from a Cartesian, dichotomized ontology. Ancient Maya worlds were relational and western dualities—animate/inanimate, nature/culture, alive/dead—did not exist. This is particularly evident during the Classic Period (300-900 CE), from which we have the richest Cara Blanca dataset in the form of artifacts, architecture, epigraphic, and iconographic materials. Thus, the below discussion of Maya ontology is based upon the Classic Maya understandings of their world.

During the Classic period, when the lowland Maya populations reached their peak, the Maya built hundreds of urban centers. These urban centers were home to monumental architecture—including royal temples and tombs, ballcourts, palaces, inscribed monuments that recorded important dates and events, defensive walls, causeways, and in many cases, large water management systems to provide for the center inhabitants (Sharer and Traxler 2006:1). Each of these urban centers had its own king, the most powerful of which were in areas with fertile soils and little access to fresh water, such as the kings of Tikal, Calakmul, and Naranjo (Sharer and Traxler 2006: 1-2; Fedick 1996). These kings used the control of access to fresh water to mobilize the labor of others and centralize their power (Lucero 2017; Lucero et al. 2014). Kings were thought to have the power to communicate with deities and hinterland occupants relied upon rulers to mediate this communication. While hinterland occupants relied upon kings for water, other resources, and communication with the deities, the kings also relied upon the hinterland occupants. Commoners reported to the city centers, often to monumental buildings, to pay tribute and bring goods to sustain the centers elite and royal occupants. These temples, and related artifactual remains, as well as epigraphic information from this time, provide the insights into the ancient Maya world that inform their relational worldview. Let us consider Maya landscapes.

Maya landscapes—"space materializing cumulative interactions of people and their environs" (Ashmore 2009:183)—are actively engaged in the formation and becoming of Maya life. Landscape, here, includes the entanglement of built and empty spaces and things, within which meaning is constituted. The Maya believe that the landscape is animated. The *ch'ulel,* a type of soul or "co-essence" (Stuart 1996; Taube 2004), resides within both animate and inanimate things. Mountains, caves, and bodies of water are often featured in ethnographic texts, but also in depictions of pre-Hispanic Maya life (e.g., Bassie-Sweet 2008; Brady and Ashmore 1999; Christenson 2003; Lucero and Kinkella 2015; Taube 2003, 2004; Vogt 1969). The Maya believe that these animated "natural features" connect the three worlds (the upperworld, terrestrial world, and underworld). Mountains (or *witz*), caves, and water bodies are home to deities and ancestors (Stuart 1987; Stuart and Houston 1994:82). When within mountains, caves are the doorway to the upperworld and the mountains themselves the means of ascension. This is witnessed iconographically in Flower Mountain (Taube 2004), which is a place for souls to go when they have passed on from this world; it is full of fragrant flowers and music for ancestors to enjoy in their eternal paradise.

Water bodies, caves, and sinkholes (all openings in the earth) are also portals to the underworld (Bassie-Sweet 1996), in particular still bodies of water like *cenotes* (karstic sinkholes filled with water) (Scarborough 2006). It is within (or as) these portals that ancestors and deities reside and through (or with) these portals that Maya communicate with ancestors and deities (Brown and Emery 2008:300). These features have been so integrated in the Maya world that Maya built them in their centers. Maya architecture was an alternate example of those features—temples (*witz*) are mountains (*witz*) which are Flower Mountain and deities/ancestors resided within all of them (Stuart and Houston 1994; Taube 2004, 2012). Additionally, houses were constructed with pits (like caves) at their center, just as caves or *cenotes* marked the center of villages and acted as the *axis mundi* (Brady and Ashmore 1999). These pits are caves, which are the "pumping heart" (Garcia-Zambrano 1994:218) of settlements. It is essential to note that rather than a temple being a substitute for a mountain (or representative of one), the temple *is a mountain* (Lucero 2018). As Harrison-Buck (2012:66) explains about circular shrines, they are not just buildings, "They are living and breathing landscapes, continually (re)generated through their ongoing engagement with the world they inhabit". Built spaces are not symbolic of "natural features" (e.g., Earle 2008), but they are those features. The boundary between natural and cultural disintegrates. In light of Harrison-Buck's explanation of engaged and regenerating landscapes, then, we can understand why relational studies of the ancient Maya world are common.

Following an animistic, relational approach, Harrison-Buck (2012) explores how circular shrines in the Maya lowlands were animated through their ongoing relations with both human and other-than-human agents. The shrines themselves were considered living, breathing entities that were part of an animate landscape. With the inclusion of speleothems and marine shells in the creation of these circular shrines, Harrison-Buck argues that the Maya were signaling the transformative powers of the coming wind and rain. The animate qualities of these artifacts and the continuous engagement with humans and other-than-humans, imbued the shrine with life power, animating the landscape. Her analysis highlights the Maya existence in a "web of relatedness" (Bird-David 1999:S77) that does not adhere to modernist dualities of animate/inanimate or nature/culture. Rather, personhood is extended to objects, places, and assemblages. Similar to this case, in my exploration of the Cara Blanca pools, the constructed and empty spaces are animated and kinetic—the landscape is not static. At Cara Blanca, however, the social engagement through the waters that acted to territorialize that assemblage did not center upon human presence or action. The water itself is the social agent forming the web of relatedness, both with humans and autonomously; the water is the catalyst of the kinesis.

In an examination of relationality between animate beings at hunting shrines in the Guatemalan Highlands, Brown and Emery (2008) examine how humans and the forest engaged in dialectical activities to negotiate the interactions between their two domains. The authors discuss the "boundaries between agent realms" as the "thresholds where human and non-human actors interact" (2008:300) and, therefore, an important space of liminality to study. Brown and

Emery provide ample ethnographic and epigraphic detail surrounding the forest-community dynamic, which has long been noted by scholars (e.g., Brady 1989; Prufer and Brady 2005; Vogt 1969, 1976, 1981). In their study, hunting shrines are a place for the primordial forest and the Maya community to negotiate. Using ethnographic examples to reexamine faunal remains at archaeological sites around highland Guatemala, Brown and Emery establish that "the space between nature and society is social" (Viveiros de Castro 2004:481). At Cara Blanca, we too are considering the constructed and empty spaces in the landscape as signifying a threshold and a social space, but not between different types of animate agents, as Brown and Emery suggest. In the case studied in this dissertation, the pools mark the space where an assemblage is territorialized—not where separate entities interact. The agentive water territorializes the assemblage. The assemblage is not defined as human vs. forest, but rather by the water. So, though human and animal may be epistemologically separate (though not ontologically) in different contexts (or assemblages) in the context of the Cara Blanca pools, they are not. The Cara Blanca Pools, like the hunting shrine, are a threshold not where boundaries are reestablished, but rather where they are reimagined. A threshold of ontological entanglement, rather than ontological opposition.

This section shows that studies of relationality have often been undertaken in considerations of the Classic Maya. It also highlights, however, a discrepancy in the goals of those studies and the posthuman approach. Rather than investigating how people in the past imagined and invigorated their space/landscapes, it will be fruitful for us in the present to transform our own understanding of what a landscape is and how it obtains meaning. I will explore this further through the study of Cara Blanca, Belize.

Terminal Classic Cara Blanca, Belize

Cara Blanca lies within the southern Maya lowlands and is a system of 25 pools—lakes (2-18 m deep) and *cenotes* (or steep-sided, karstic sinkholes filled with groundwater—6-60+ m deep)—that runs east-to-west along the base of a limestone cliff in central Belize. The Cara Blanca *cenotes* were formed during the Cretaceaous-Tertiary (KT) event, the 65.95 million-year-old Chicxulub crater impact, and represent the outer-most ring of *cenote*s formed by the combination of compaction and fracturing between the impact breccias and the surrounding karstic landscape (Urrutia-Fucugauchi et al. 2011). Since, they have filled an essential role in the seasonally arid region; during periods of prolonged drought, the pools have acted as places of refuge for those in need of freshwater. Because there is a dearth of plentiful freshwater resources in the area due to the higher elevation and subsequent lower water table, several of the deeper Cara Blanca *cenotes* were some of the only places that beings could access freshwater during periods of desiccation; the pools' importance as a source of fresh water has persisted for thousands of years. In Pauketat and Alt's (2018) examination of the emergence of "Mississippians" (see Chapter 1), a web of relations was essential, but the formation of the landscape of Cahokia was still contingent upon human agency. Here, I do not discuss the end result of a city or human constructed space. Rather, I focus on the unfolding of a embodied space, an assemblage of relations mediated by waters, whose kinesis lies beyond human construction and therefore is not contingent upon human agency. However, I begin with human engagement at Cara Blanca to emphasize that cultural contingencies matter even in posthuman conversations—our goal is not human erasure but posthuman holism.

The Classic Maya at Cara Blanca

Archaeological investigations of Cara Blanca have been carried out by Lisa J. Lucero, Principle Investigator of the Valley of Peace Archaeology (VOPA) project, since 1997 (see project website: http://faculty.las.illinois.edu/ljlucero/index.html). Archaeological evidence indicates that Maya visitors to the pools relied upon the resource during periods of turbidity—in moments of both growth and decline. Ancient Maya archaeological remains of water-related rituals permeate the Cara Blanca landscape, providing insight into the territorialization of the Maya landscape. Both Maya residential settlements and ceremonial sites have been investigated and show that the deep pools were home to Maya ceremonies that were fueled by, reliant upon, and tied to the Cara Blanca waters. Late-to-Terminal Classic period (c. 700–900 CE) Maya architecture originally spurred a focus on the Pool 1 space. Here, an associated water temple, Structure 1 (Lucero and Kinkella 2015), ceremonial platform, Structure 3 (Larmon and Nissen 2015; Larmon 2017) and sweatbath, M186 (Larmon and Amin 2017), offer a view into the water driven assemblage—through water the structures emerged, with tufa found in the fill; water cleansed the actors at the sweatbath; water brought to life the ceramic vessels in ritualized offerings to the ancestors and deities; water opened the doorway between the earth and other worlds. In the first part of this dissertation (Chapters 3-5), I attempt to better understand how the waters drove the social life at Cara Blanca, as experienced by the Maya. Included in this analysis is the perception that the waters allowed for the Cara Blanca landscape of the Terminal Classic to emerge as we, today, understand it—apart from worldview, water was essential.

At Cara Blanca, I will show evidence of water's centrality in the Cara Blanca landscape through the Late Classic (600-800 CE) and Terminal Classic (800-900 CE) periods. I hypothesize that water, regardless of worldview, is essential in the formation of many landscapes in flux. If the territorialization of the Cara Blanca landscape is fueled by water, we have to show its pertinence, in absence and excess, throughout the Terminal Classic Cara Blanca landscape. To do this, I have to reconstruct the relative abundance, and shifts in the abundance, of water in the landscape throughout the Classic to Terminal Classic period. I also have to show that water permeated the constructed and empty spaces of Cara Blanca. I use previous VOPA data, including excavation results from a water temple at Pool 1, and new excavation results to show the Late and Terminal Classic engagement with the space by Maya and other-than-human inhabitants. During the Maya period, social engagement is shown in the way the water was incorporated into bodies, movements, and things of Maya ritual (daily life). The test implications are summarized in the points below, and subsequently elaborated upon.

If the prevalence (or dearth) of water was a motivating force in the integration of the Cara Blanca landscape, there will be evidence for fluctuations in the regional availability of fresh water during the Maya period. First, I attempt to show that the dearth/excess of water was key in the formation of the space through environmental reconstructions of Cara Blanca and the surrounding regions (see Chapter 3). During the Maya period, I use fossil pollen data from sediment cores (with higher concentration of drought and salt resistant species outcompeting those that require neutral and wet environments), as well as previously published data regarding the changing climate (Akers et al. 2016; Haug et al. 2001; Medina-Elizalde et al. 2010, 2016; Walsh et al. 2014) to explore Terminal Classic climate shifts at Cara Blanca.

Then, I show that the formation of Cara Blanca and movement through Cara Blanca is driven by water's kinesis (Chapter 4 and 5). *If water's kinesis fueled movements in, with, and through the landscape, there will be evidence for water related activities dominating the landscape that align with the pulses of water availability reconstructed for this environment.*

These activities will be clear in a dominance of water jars as compared to other ceramic styles or tools and in the position of these movements on the landscape compared to bodies of water. The lack of domestic architecture and household assemblages indicates that Cara Blanca was experienced as a non-residential space (e.g., Lucero and Kinkella 2015). The presence of ceremonial architecture and ritual assemblages throughout the landscape indicate that it was a ritual landscape, as is further explored below. I then show that the rituals were driven by Cara Blanca waters—the waters were the motivator or rituals, as well as deeply materially embedded in their performance. In consultation with other archaeological and ethnographic examples, I show that the dominance of wide orifice water jars and other material items (e.g., blue chert, faunal remains, shell, etc), the location and composition of the architecture (including tufa within architectural fill), the presence of a steam bath, the presence and location of human caches, and the timing of the intensity of use of ritual architecture indicate that water was an essential material and immaterial part of the social engagement of the space and the formation of the Cara Blanca landscape during the Terminal Classic period. As part of the ritualized nature of the Cara Blanca landscape, I show that movement through the landscape was essential.

In this case, the movement was organized as ceremonial circuits around and through the pools. *If ceremonial circuits were key to the integration of the Terminal Classic Cara Blanca landscape, I will find organizational elements similar to other circuits noted in archaeological and ethnographic Maya studies (Reese-Taylor 2002; Sullivan 2016; Vogt 1968).* These organizational elements will include both architectural and topographical features, specifically including choreographed routes through the watery and mountain landscape. The movement along these routes certainly would have shifted with the inundation of the landscape in the rainy season, offering a particular temporality to the landscapes kinesis.

Many studies have shown that the Maya region often needed to adapt to shifting patterns of precipitation (Haug et al. 2003; Larmon et al. 2019b). One of the most extreme shifts that has been recorded and experienced by human inhabitants came during the Late to Terminal Classic periods. I show that the Cara Blanca area, too, was undergoing an unusual period of desiccation. I use previously published environmental reconstructions (e.g., Akers et al. 2016; Haug et al. 2001; Medina-Elizalde et al. 2010, 2016; Walsh et al. 2014) and fossil pollen isolated from sediment cores that were extracted from the Cara Blanca Pool 6. By counting the relative fossil pollen concentrations, I can identify periods with greater concentrations of drought and salt resistant species, which outcompete those that require neutral and wet environments.

During the late Late and Terminal Classic period droughts, the Maya intensified their visits to the pilgrimage destination of Cara Blanca to communicate with deities and ancestors and bring an end to the droughts (Lucero et al. 2016). Maya likely traveled from all over the Maya region to access this watery landscape and seek reprieve from the drying climate and related social and political upheaval (Lucero and Kinkella 2015). Ceramic and architectural evidence indicates intensified engagement and water related ritual during periods of increased aridity. The ceramic assemblages include diverse regional styles, but are dominated by water jars, suggesting that though participants may have been coming from different areas, their reason for engaging with the landscape was the same—water (as detailed in Chapter 4). Jars are overwhelmingly associated with water and water rituals in ancient Maya contexts often involve leaving whole or partial jars in openings in the earth (Moyes 2007). Terminal Classic Maya participants centered their movement through the Cara Blanca landscape around those pools and the waters territorialized the assemblage, which bridged worlds. Water's importance in Maya ideology and political life is well documented (e.g., Ashmore 2009, in press; Lucero 2006; Lucero and

Kinkella 2015; Scarborough 2003). I posit that Cara Blanca was a ritual landscape mediated and motivated by the Cara Blanca waters, rather than just Maya beliefs about water.

First, it is important to recognize that water's affect did influence the Maya worldview and, therefore, Maya perceptions of water and its influence in Maya ideology and ritual should be considered. Ritual is intimately involved in all parts of Maya life, including that which might be called "domestic" or household. The distinction between a household and ritual landscape is important, particularly when attempting to better understand ceremonial spaces, though it is not steadfast and often is nonexistent. There are instances, however, when Maya would not intrude upon ceremonial spaces with daily activities and, instead, only access and use the space for sacred purposes (Lucero et al. 2017). These spaces would have held particular significance for Maya and being able to identify them in the archaeological record is essential.

Households are defined as an "activity group" (Ashmore and Wilk 1988:3) and one of the "most basic social units of human societies" (Robin 2013:48). They are identified in the archaeological record by the materials produced by household activities that have survived deposition. At Aquateca, Inomata and Stiver (1998:433) have outlined what they consider "utilitarian domestic objects" based upon the excavations of residences and the materials left behind. In this assemblage they include: large numbers of chert flakes, obsidian blades, mano and metates in pairs, other types of lithics, numerous reconstructable ceramic vessels for storage, food preparation, and serving. This description of a household assemblage has also been noted in ethnographic contexts (Henrickson and McDonald 1983) and in other archaeological contexts (Lucero 2001). Lucero (2001:14-15) further describes what ceramics used for serving, cooking, and storage (together comprising a household assemblage) would have looked like. Serving vessels typically are shallow and open, have thin walls, and fine or regular paste. Cooking vessels are generally short and squat with an open mouth and sometimes features to help handle them (appendages or textured surface). They generally have rounded bottoms and coarse and non-uniform paste. Finally, storage vessels have restricted necks to protect the contents and appendages for handling. These vessels have varying styles based upon long or short-term storage needs.

Though households are inherently ritualized spaces (Lucero 2010; McAnany 1995; Walker and Lucero 2000), ritual spaces are not inherently households. Considering the material configuration of households that I discussed above, identifying spaces that are *not* domestic but ritually significant should be relatively simple. There will still be evidence for ritual, often including dedicatory and terminating rituals. The artifact assemblage, however, will be markedly different. If a particular context is not utilitarian, then I do not expect to find the range of utilitarian artifacts discussed above (e.g., Lucero 2001:14-15). For instance, at the hypothesized water temple at Cara Blanca, there are almost no lithic materials recovered from excavations. The majority of recovered artifacts were smashed large water jars (Lucero and Kinkella 2015). In addition, the types of dedicatory rituals differ. Though McAnany (1995:19) highlights clear evidence for the burial of family members in household floors with grave goods, spaces that are not parts of households or residences will differ. For instance, at Cara Blanca Structure 3, the ceremonial platform, there are three burials with no grave goods. These individuals were not considered ancestors passing into the afterlife because they were not left with the grave goods needed in the afterlife. Instead, they are caches animating and dedicating the ceremonial space (Lucero et al. 2017) (discussed further in Chapter 4). Ceremonial spaces that are not a part of households will show some of the same signs of ritual but lack household assemblages and other things needed for everyday life. It is important to note, however, that some ritual spaces in pre-Hispanic Maya contexts will not be built but remain ritually potent—as discussed previously, caves, waterbodies, and mountains are all animated and active spaces (Brady and Ashmore 1999).

Once the Cara Blanca space has been established as a ritual landscape, I will show how integral water was in integrating the built and empty animate and inanimate, this world and other worldly entities of Cara Blanca. In their study of the Cara Blanca water temple (Structure 1), Lucero and Kinkella (2015) cite the domination of open orifice water jars (e.g., Moyes et al. 2009; Taube 2001), the preponderance of the color blue (e.g., Houston et al. 2009: 27–8, 40), the location on the edge of sacred still-bodied water bodies (e.g., Brady and Ashmore 1999: 130; Scarborough 1998, 2006), depictions of the waterlily jaguar (e.g., Miller and Taube 1993:184), and the inclusion of tufa (a calcium carbonate precipitate that forms underwater around any matter in the water) in architectural fill as evidence that water was vital to this material articulation of the Cara Blanca space. I apply similar analyses to the architecture that I excavated at Cara Blanca. Finally, I investigate the ways in which the inherent kinesis of water was integral to the ritual in this formation of the Maya worldview, but also the ways in which it fed the vitality of the space, co-constituting those moving throughout the landscape through kinesis—a condition of matter that preempts ideology and encompasses (as it is bigger than) worldview. My understanding of movement through the landscape comes primarily from a study of "empty" spaces.

Maya Landscapes and "Empty" Spaces

Much of my analysis focuses on the archaeological remains of Terminal Classic Cara Blanca. Just as important, however, is what is absent, the "empty" spaces of the landscape. In the 1980's, it became clear that archaeologists needed to pay more attention the landscape with which people in the past were interacting daily. Though these early approaches dichotomized "human" and "nature", recent approaches to landscape archaeology have paid better attention to how the "built" and "empty" portions of landscapes are integrated (Ashmore 2004, 2009; Brady and Ashmore 1999). The necessity of examining "empty" landscapes developed from the recognition that the "natural world", apart from human construction, plays an essential role in daily and ritual life. These studies see built/empty spaces on a "conceptual continuum, rather than as disjunctive categories" (Brady and Ashmore 1999:126). Yet, these approaches still erroneously divorce settlement from environment, uncritically perpetuating the nature/culture divide through the use of terms like "built" and "unbuilt" (Harrison-Buck 2012). They also focus upon how constructed and empty spaces were pertinent directly to the Maya worldview. Here, I use "empty" as opposed to "unbuilt", but I recognize that the term "empty" does not capture that nature of those spaces—they are actually quite vibrant spaces, bountiful and active. I use empty as Adeo (2019:106) does to portray the paradox, the "impossible representation of the 'empty-full'". The importance of these spaces, however, does not lie in the lack of constructed architecture and so I will avoid the use of "unbuilt". Rather, in this "emptiness", processes of evapotranspiration feed humidity that then condenses on leaves, precipitation drenches the soil and quenches vegetative thirst, sunlight desiccates sources of sustenance, atmosphere mediates and integrates assemblages. Emptiness is actually turgid with kinetic forces.

Studying Empty Spaces

The "empty" nature of landscape spaces makes them inevitably more difficult to study in archaeological examples than in ethnohistoric or ethnographic examples. Archaeological investigations of these spaces has been undertaken through spatial studies (Moyes 2005), epigraphic and iconographic analyses (Stuart 1996; Stuart and Houston 1994; Taube 2004), botanical studies (Ford and Nigh 2009; Lindsay 2011), and ethnohistoric and ethnographic comparisons (Coe 1965; Reese-Taylor 2002; Vogt 1969). In her study of ritual pathways within Actun Tunichil Muknal (ATM) in central Belize, Moyes (2005) uses a Geographical information system (GIS) to explore patterns of artifact deposition within the main chamber of the cave. Though a large quantity of artifacts are found in this chamber, it is remote (500m from the cave entrance) and lacks any architecture. Moyes found that artifacts were deposited in small cluster or linear arrangements, which correlated to each cardinal direction and lined ritually prescribed pathways. Moyes relates these pathways to iconographic and ethnographic examples of cardinal places and ethnographic examples of ritual paths. The "empty" space of the pathways within ATM is studied through the spatial analysis of archaeological materials as they relate to ethnographic contexts. Moyes' study, however, is inherently anthropocentric—it relies upon the assumption that "the archaeological record was produced by the human mind and was therefore patterned by mental processes (Moyes 2005:269). In these cases, the space is still constructed, in a sense.

What if there is no ceramic or other human construction to examine? Understanding the empty landscape that might be devoid of archaeological materials gives great insight into the emergence and vibrancy of "empty" spaces. In this dissertation, however, I do so by considering ceremonial circuits—or paths that the Maya walk in order to ritually define "geographic territories and their interrelationships" (Freidel and Sabloff 1984:74)—which are discussed in more detail in Chapter 5. Botanical analyses (Ford and Nigh 2009; Leyden et al. 1998, Leyden 2002; Lindsey 2014), geomorphological analyses (Rosenmeier et al. 2002), and isotope analyses (Rosenmeier et al. 2002) have all been used to better understand past environmental shifts, directly informing the ways in which the environment was actively engaged in the formation ritual landscapes, such as ceremonial circuits. Here, I compare landscape features and architectural features at Cara Blanca to those discussed in other archaeological and ethnographic examples of Maya ceremonial circuits (Reese-Taylor 2002; Vogt 1969), though the precise paths that the Maya may have walked at Cara Blanca cannot be defined. Key landscape organization features indicate that the ritual movement through this space was very likely choreographed by the waters.

Epigraphic and iconographic depictions of the importance of landscape features, as well as ethnographic and ethnohistoric examples of human movements and non-human movements through these landscapes, are helpful to understand empty spaces in the past. As discussed previously, iconography shows that water, mountains, and caves were animated and essential parts of Pre-Hispanic Maya life (Coltman 2015; Stuart 1996; Stuart and Houston 1996; Taube 2004). Ethnographic and ethnohistoric examples show these features as similarly animated and essential in recent and contemporary Maya communities in the lowlands (Coe 1965; Vogt 1969). Movements through and engagement with these features are particularly witnessed in ceremonial processions. Reese-Taylor (2002) identifies the material configurations (spaces and things) that emerge through these circuits and attempts to identify them in the past—this provides a better understanding of both built/empty spaces and helps to exemplify the breakdown in the distinction between the two. At Cara Blanca, while the Maya ontology is important to understanding the movement through the landscape, ultimately, it is unnecessary to the process itself. Instead, water, again, motivates movement and the affective qualities of water are inherent. That is to say, and to emphasize, the reconstruction of Maya ontology is not necessary for the analysis of "empty" spaces.

Severin Fowles (2010:25) offers a complex understanding of the human/non-human dialectic by emphasizing the importance of the spaces in-between and the richness lost in an analysis that ignores the immaterial and the absences. Exploring the Cara Blanca landscape—"empty" spaces, built spaces, and things—in relation to related epigraphic, iconographic, and ethnographic records of lowland Maya landscapes provides historical and cultural contingency for the importance of those "empty" spaces. As every crevasse, constructed or empty, was an animated part of the Cara Blanca assemblage, I also study the space between. Many of the pools have evidence for ceremonial circuits (Pool 1, Pool 15, Pool 20), which are materially-discursive practices that include the entire landscape and rely upon the water's engagement. Each space, in distinct ways, expands upon our understanding of how beings have engaged with the environment and changing climate through the pools as active participants in the formation of the watery Cara Blanca landscape.

During the late Late and Terminal Classic periods, the Cara Blanca landscape was a place of ceremonial movement through and with the landscape and engagement with the built and "empty" landscape. The architectural and survey data show an intensification of movement throughout the landscape during periods of shifts in climate and the Terminal Classic Maya participants centered their movement through the at times inundated landscape around the pools (see Chapter 5). "Empty" spaces that played a role in ceremonial circuits at Cara Blanca can be identified and better understood through first engaging with the "built" spaces—shrines, architecture, and archaeological materials (water shrines, water temples, water jars, shattered ceramics, human caches, termination rituals, building materials, etc). With paleoenvironmental data from local and regional proxies, we gain a richer understanding of how the animated empty spaces were in constant motion (see Chapter 3). Just has Harrison-Buck (2012) employed multiple lines of evidence, we examine each of these as a means of understanding how the Cara Blanca waters (similar to Harrison-Buck's speleothems) flowed throughout Cara Blanca, animating the landscape, connecting the worlds, and facilitating communication between Maya, ancestors, and deities. This will not be approached as a relationship between human and "other-than-human persons" (Harrison-Buck 2012:75), but rather as a posthuman exploration of how matter (including humans, things, and environments) emerges through the waters to articulate particular material configurations of a landscape.

Who Was Visiting the Pools?

An essential aspect of the posthuman understanding of Cara Blanca is, in fact, the humans that were visiting the space. Cara Blanca was in some ways a change of tradition, as many rituals that may have been practiced in city centers moved to hinterland areas such as Cara Blanca. Thus, while some rituals may have at times been limited to ritual specialists and royalty (Sullivan 2016) it is likely that all Maya people were able to visit the pools and participate in the rituals surrounding them. There is both archaeological and ethnographic precedent for this inclusion. In his ethnographic study of the Zinacantan Maya, Vogt (1965, 1968) found that ritual specialists were essential in some rituals—women and men of all ages (15+) could be ritual specialists—but not all. Many ceremonies required the participation of commoners and some required the participation of ritual specialists and commoners. For instance, different families in the community had to share access to particular waterholes—these families formed a waterhole group. Ritual specialists and those families had to participate in rituals at these portals to communicate with ancestors and deities, as well as establish the shared rights to the waterhole and their obligation to care for the waterhole. This ethnographic examples shows that it was common for *all* Maya people—men, women, and children—to be involved in ritual activities.

Archaeologically, we find evidence for women's participation in iconography. The ritual processions depicted in the murals at Bonampak show children and women overseeing or involved in portions of the procession (Reese-Taylor 2002). Warriors, rulers, musicians, and nobles are all depicted, indicating that involvement in these processions was not necessarily exclusive. Additionally, women were essential in archaeological and ethnographic Maya feasting (LeCount 2001), for which we have evidence at Pool 1. Feasting was also not relegated just the elite, but it was also an essential ritual supplication for commoners (LeCount 2001). Women, too, were closely tied in use and symbolism to sweatbaths (Perego 2007)—sweatbaths are linked to birth, menstruation, and sexuality. There is a sweatbath just 400 m to the west of Pool. It is likely that women (and men) were cleansed in the sweatbath before they went on to perform rituals at Pool 1.

While some rituals, particularly during the Classic period, had very restricted participation, this was not a constant restriction. There is evidence that those who could be involved in rituals and processions shifted through time. For instance, Sullivan (2016) notes that Formative period rituals and processions were open to the public and likely involved a diverse group of commoners but the shift to the Classic period saw much more exclusive participation in these same rituals. The material manifestation of this shift can be bee seen in "the construction of less accessible spaces" (Sullivan 2016:29) in the Classic Period as rulers' powers grew and cities became ruled by kings. Surely the disintegration of these cities in the Late and Terminal Classic period, as well as a loss in faith in those rulers, would have shift ritual practice and participation, as well. Because of the above evidence, I believe that Cara Blanca was a space for everyone—women, children, men, commoners, elites, ritual practitioners, and so on. The inclusivity of the space would have also extended beyond the human.

Postclassic Maya and Present Day Destruction at Cara Blanca

Much of the data collected at Cara Blanca for this dissertation has focused on the Late and Terminal Classic periods. All of our archaeological materials suggest that Maya did not visit the pools and leave material evidence after the Terminal Classic period. This does not mean, however, that they were not actively engaged in the surrounding landscape, nor that social engagement was no longer unfolding at the pools. Pool 7, which is the western-most pool, is a shallow lake with associated residential settlement. In the survey and excavation of Pool 7 Mound Field, Mound 2, we found two Postclassic projectile points (see Benson 2017:51). This is some of the only Postclassic material found at the pools; it is possible that a period of Postclassic occupation at these house mounds has been stripped away by agricultural plows. After Hurricane Richard in 2010, Yalbac Ranch sold 54,929 acres to Spanish Lookout Community Corporation (SPLC), a Mennonite community corporation that proceeded to clear-cut large swathes of previously forested landscape. The initial deforestation of this area revealed hundreds of Maya house mounds; the subsequent farming began to strip away those house mounds as tractors tore away the ground, layer by layer. We are currently fighting the clock with the destruction of these houses, attempting to gather as much information as we can before they are plowed away, there have not yet been large-scale excavations of this residential settlement. With a more extensive excavation, we might recover more material suggesting Postclassic occupation of the area. Additionally, at the nearby site of Saturday Creek, there was continuous occupation from at least 600 BCE through at 1500 CE (Conlon and Ehret 2002:10). Finally, Yalbac, the medium-sized center that is c. 13 km to the southwest of Pool 1, provides evidence that Maya abandoned the center in the Terminal Classic and returned in the Postclassic to leave offerings (Conlon and Ehret 2002:9). This same pattern has been identified at other pilgrimage sites (e.g., Hammond 1991). It is possible that Maya returned to the pools during the Postclassic to provide offering to the waters/deities/ancestors. We do not, however, have material evidence of their return. The loss of landscape, including Maya histories, from the hinterland fields of Cara Blanca, emphasize the need for renewed conversations of conservation in the area (see Chapter 7).

Beyond Maya engagement, the Cara Blanca waters were very much still in process in the Postclassic period and long after. The pools cohered the landscape as the precipitation increased and the forests sprung back to life, architecture began to crumble into the pools, and jaguars hunted and drank from the pool's edge. In time, my discussion can expand to incorporate this period, as well as the others upon which I only briefly touch. For now, however, I relegate my discussion to the Late Pleistocene, Classic Maya, and present day.

Final Thoughts

There has always been continuous social kinesis between humans/non-humans, non-humans/non-humans, and/or humans/humans, especially via water. The Cara Blanca waters provide the cohesion of the Cara Blanca space and dictate the extent and cohesiveness of that landscape. If the Cara Blanca landscape has been continuously occupied and engaged, we should find continuous evidence of social engagement with the watery landscape. I explore this through the presence of archaeological, ecological, and paleontological remains at Cara Blanca and in other regions of central Belize (e.g., Prufer et al. 2017). If the climate was naturally shifting exerting distinct pressures on this landscape, we should find evidence of fluctuating isotope ratios and changes in relative pollen concentration values. I show that both engagement and climate change have been constants in the landscape's history, but I also show the constancy of social engagement through water with the result of mutually constituted bodies (human, non-human, inanimate, etc.). During the Maya period, social engagement is shown in the way the water was a part of the bodies, movements, and things of Maya ritual.

Above, I outline three main hypotheses that I need to address regarding the Terminal Classic Cara Blanca space: shifting precipitation patterns in the area of Cara Blanca, a ritual preoccupation with water at the pools, and movement through the landscape that is choreographed by water. Chapters 3, 4, and 5 address each of these, respectively. In the next chapter, I introduce previous paleoclimate reconstructions of central Belize that help to inform my discussion and how they have previously been included in archaeological analyses, as well as a reconstruction of Cara Blanca's Terminal Classic environment.

CHAPTER 3: WATER MATTERS: THE SETTING

Thus was found the food that would become the flesh of the newly framed and shaped people. Water was their blood—Christenson (2003:181, from the 16th century Maya origin story, *Popol Vuh*

In this chapter, I outline the background necessary to better understand and contextualize this dissertation. I present previous environmental reconstructions of the Maya region, and outline my attempts to reconstruct Cara Blanca climate shifts. My focus on previous studies of human and environment integration in the area is necessary to shifting the conversation from hierarchical, in which humans are the reigning actors, to relational, in which water is an active and affective participant, highlighting the ways that a posthuman framework can be beneficial. Our understanding of the Cara Blanca landscape is, in this dissertation, tied to water. Therefore, in order to better understand the Cara Blanca landscape, its formation and its perseverance (as I will do in the following chapters), I must first outline the state of water in central Belize during the time period we are here considering, the Terminal Classic period (800-900 CE). Examining the climate that is so tied to the tides of water availability and predictability is essential.

Here, I explore the context in which water's material significance propagated and preempted its cultural significance; to do this I show the integration of cultural and geological components of Cara Blanca. I first discuss the ways that water has integrated the Cara Blanca pools with the surrounding landscape. This includes presenting the geology of the pools, as well as how that geology instigated and maintained the Maya relationship with water. While the kinetic qualities of the water preempts the ontological position of the Maya and their relationship with water, the propagation of the Cara Blanca space is intimately tied to Maya understandings of water. I then present previous environmental reconstructions of the Cara Blanca region, as well as a brief reconstruction from the pools themselves. These reconstructions show that water's presence and absence was felt by all participants in the Cara Blanca space throughout time.

Water in Maya Life and at Cara Blanca

Numerous studies have been dedicated to understanding the role of water in the Maya decline. The "role of water"—as if water is an impenetrable object that can assert force upon other impenetrable objects. But this is as contradictory as the material reality of water, itself. The nature of water and why it is so valuable in New Material analyses of landscapes, is that it is at once distinct, bounded, and indefinite, nebulous. The Cara Blanca pools, for instance, each have their own distinct cultural and ecological histories. Culturally, the Maya settled residence near some (Pool 7) and used its waters for their daily lives (cooking, cleaning, etc.) (Kinkella 2008). Other pools were relegated to ritual and ceremonial uses (Pool 1) and were only accessed in periods of need (Lucero and Kinkella 2015). Ecologically, some have small in- and outflows on the surface that connect them to other pools (Pools 22-25) (Larmon and Carbaugh 2018). Depending upon the time of year, the current between these pools is too strong to walk up, overwhelming any attempt for contrary movement. Some pools have clearly defined edges, while others spend half the year in complete inundation, their edges blurring into the surrounding landscape (Larmon and Carbaugh 2018).

On the surface, each pool is its own, more or less distinct. Subsurface, however, is a complex tangling of open and closed systems (Beddows 2011; Carlson 2012). The pools are semi-perched, sealed off from the water table and bedrock, yet the porous limestone and fissures in the fault lines have allowed for the subsurface inundation of the entire, local landscape by Cara Blanc waters—water that is distinct from the water table, yet totally indefinite in that underground, city-like system of karstic tunnels and tectonic fractures. The pools are perfectly defined and yet completely indistinguishable. This contradiction is the essence of the kinesis fueled by water. This contradiction is also what drove the Maya relationship with water. To the Maya, the water was both portal through which one could speak to ancestors and deities, and the entire underworld from which the earth emerged (Christenson 2003:12). The "earth is submerged in water" (lines 118-136, from Christenson 2003:39)—and large, standing bodies of still water are the underworld into which Maya proffer and within which deities, such the Sovereign and Quetzal Serpent, reside. Yet, all things, too, *emerge* from water (Christenson 2003:53). Water is the first; water was before anything. When water was removed, emptied from the landscape, earth emerged. The visible and invisible inundation of the Cara Blanca landscape, however, ensured that there was never a distinct boundary drawn between the earth and the underworld. The tension of the waters was, too, felt by the entirety of the assemblage, as the soil, trees, jaguars, and sloths state was both dehydrated and quenched by water's manifestation.

The ubiquity of water in Maya ideology and its prevalence in the Maya origin story, the *Popol Vuh*, are not born from Maya predisposition for water or constructed from the "building blocks" of Maya culture. As the Maya noted, water was first. And so, in my above discussion of Terminal Classic reconstructions of central Belize, the excess and dearth of rain-water and its role in forming Terminal Classic spaces should not be seen to originate from Maya perception of water and its ideological function, but rather from the innate necessity of water in feeding material vibrancy of the space. This necessity includes human need for water—not just for human sustenance, but human material existence, as "water was their blood" (Christenson 2003:181). This necessity includes Maya ideological positioning not due to Maya beliefs about water, but due to water's ability to pull together material and immaterial spaces and animate and inanimate entities. This necessity encompasses the Maya worldview and exists beyond it. Below I consider the state of water during the Terminal Classic period throughout the Maya world, the megadroughts, as well as climate reconstructions of Cara Blanca and the surrounding region, in order to better understand water's role in the Cara Blanca landscape.

Climate Reconstructions

Because the occurrence of prolonged and severe megadroughts have often been linked to social and demographic shifts in the Maya area, myriad of studies have focused upon reconstructing the Central American climate (Table 3.1). Since the mid-1990's, climate reconstructions have provided evidence that regional periods of extreme dryness occurred (Table 3.2). Here, I will outline previous reconstructions and understandings of the central Belizean landscape during the Classic and Terminal Classic period and introduce our attempt to reconstruct the local Cara Blanca landscape.

Overtime, records from Mesoamerica, in general, have become increasingly more localized with finer resolution. Periods of drought have been linked to Maya social changes through evidence for population movement, warfare and competition recorded on stela, iconographic attention to the rain deity, and intensifying and adapting of rain related rituals. Below, I briefly outline previous evidence for megadroughts in the lowland Maya area and the ways in which archaeologists have linked those paleoclimate records to social changes. I use these previous reconstructions to show how water infiltrated and impacted the reorganization of society in the Maya lowlands.

Table 3.1. Outline of culture sequence

Date	What Occurred
Late Preclassic to Early Classic Transition (c. 250 CE)	Preclassic abandonment, some centers were abandoned and others were not
Classic Period Florescence (c. 300-800 CE)	Increasing population densities, agricultural production, etc.
Terminal Classic Period (c. 800-900 CE)	Urban diaspora (Lucero et al. 2015); most large centers in the region were abandoned

Table 3.2. Studies discussed in text.

Study	Location	Source	Proxies
Akers et al. 2016	Macal Chasm, Vaca Plateau, Belize	Stalagmite	Uranium-thorium dating, $\delta_{18}O$, $\delta_{13}C$
Haug et al. 2001	Cariaco Basin, Venezuela	Sediment core	Titanium and iron concentrations
Medina-Elizalde et al. 2010, 2016	Tecoh Cave, Northwest Yucatán Peninsula	Stalagmite	Uranium-thorium dating, $\delta_{18}O$
Hodell et al. 1995, 2005	Lake Chichancanab, Yucatán Peninsula	Sediment core	Calcite, gastropod, and ostracod $\delta_{18}O$ and sediment density
Curtis et al. 1996	Punta Laguna, Yucatán Peninsula	Sediment core	Calcite $\delta_{18}O$ and sediment density
Walsh et al. 2014	Aqua Caliente, southern Belize	Sediment core	Charcoal, pollen, sedimentological data
Kennett et al. 2012	Yok Balum Cave, southern Belize	Stalagmite	Uranium-thorium dating, $\delta_{18}O$
Anselmetti et al. 2007	Lake Salpeten, Guatemala	Sediment core	Seismic Imaging, sediment description and density
Leyden 1987	Lake Salpeten, Guatemala	Sediment core	Pollen
Mayewski et al. 2004	Global sources	Various sources	Various proxies

The Maya Megadrought

Multiple studies have been conducted that establish various periods of drought in the Maya region. Mayewski and colleagues (2004) conducted research showing that during times of rapid cooling in the northern hemisphere, it was common to see periods of drought in the tropics. The authors present data from multiple environmental reconstructions obtained with the use of high-resolution climate proxy records (including chemical, isotope, and pollen analysis) from a variety of locations around the world. The results revealed that Holocene climate variations were, in fact, much larger and more frequent than previously recognized. Using primarily changes in the extent of glacial coverage, the authors determine that shifts in climate, specifically precipitation rates, were dynamic at scales that had the ability to affect humans and the ecosystems in which they lived. The most significant dry periods occurred from 4050 to 3050 BCE, 2250 to 1850 BCE, 1550 to 550 BCE, and 750 to 950 CE, but additional rapid climate changes can be identified in the glacial fluctuation record at 7050-6050 BCE and 1350 CE – present, the latter being a cool period in the poles, with wetter conditions in the tropics. These fluctuations have worldwide significance; changes in the hydrologic cycle, sea level, sea ice extent, and forest cover contribute to shifting environments for human and non-human entities.

In the early 2000's, the Cariaco Basin of Venezuela was studied by interdisciplinary scholars to produce a sub-decadal resolution of hydrological cycle variations over the past 14,000 years (Haug et al. 2001). Since, it has been cited in arguments that severe and prolonged droughts played a role in the decline of Classic Maya population densities (Haug et al. 2003) and other social and demographic changes (Gill 2000). Haug and colleagues studied the levels of bulk titanium in annually laminated basin sediments to reveal short-term climate variation. These analyses showed variations in riverine inputs and the hydrological cycle. The fine resolution analysis, bimonthly resolution for 700-950 CE, reflects changes in both wind and rainfall patterns in response to seasonal shifts of the Intertropical Convergence Zone (ITCZ). The ITCZ is the zone around the equator where the moisture filled northeast and southeast trade winds meet (Linsley et al. 1994). The north and south movements of the ITCZ help to regulate seasonal variability in the tropics and small variations in its position can greatly influence rainfall (Linsley et al. 1994). The authors hypothesize that the inhabitants of Mesoamerica relied upon dependable rainfall patterns to support their agricultural practices because they lived in a seasonal desert.

As the top of the ITCZ moved southwards, less rain reached northern Mesoamerica, causing drought conditions in much of the area. Maya population densities reached their peak around 550 – 750 CE, during favorably wet conditions. Maya living in densely populated cites and less populated hinterland areas were all embedded within an agricultural and social system that was born from the necessity of water (Lucero 2006). With such high population densities, the environment soon reached its carrying capacity and people were left extremely vulnerable to environmental changes, particularly drought. As much of Mesoamerica, particularly the lowlands, received less rainfall, the social system that was built upon kingly access to water and the agricultural system that relied upon predictable rainfall began to crumble.

Regionally Relevant Paleoclimate Reconstructions and Impact

While the above helps to establish the occurrence of megadroughts, in order to better understand the ways in which the changing environment and those engaging with it were entangled, we have to compile a much finer resolution climate reconstruction, focusing on site-specific data (Webster 2014). This is a two part problem. First, we cannot rely on data recovered from hundreds of kilometers away to aid in local understandings of the human/environment dialectic. Second, we cannot rely on data that discusses climate change on the scale of centuries, or even decades, when the experiences that we hope to discuss are most significant on a daily scale (Figure 3.1). Recently the adoption of more refined climate proxies have contributed to more localized reconstructions from the lowland Maya area (e.g., Akers et al. 2016; Hodell et al. 1995, 2005; Medina-Elizalde et al. 2010; Ridley et al. 2015) and the Cariaco

Basin has been deemed an inappropriate analog for much of the Yucatán Peninsula (Medina-Elizalde et al. 2010).

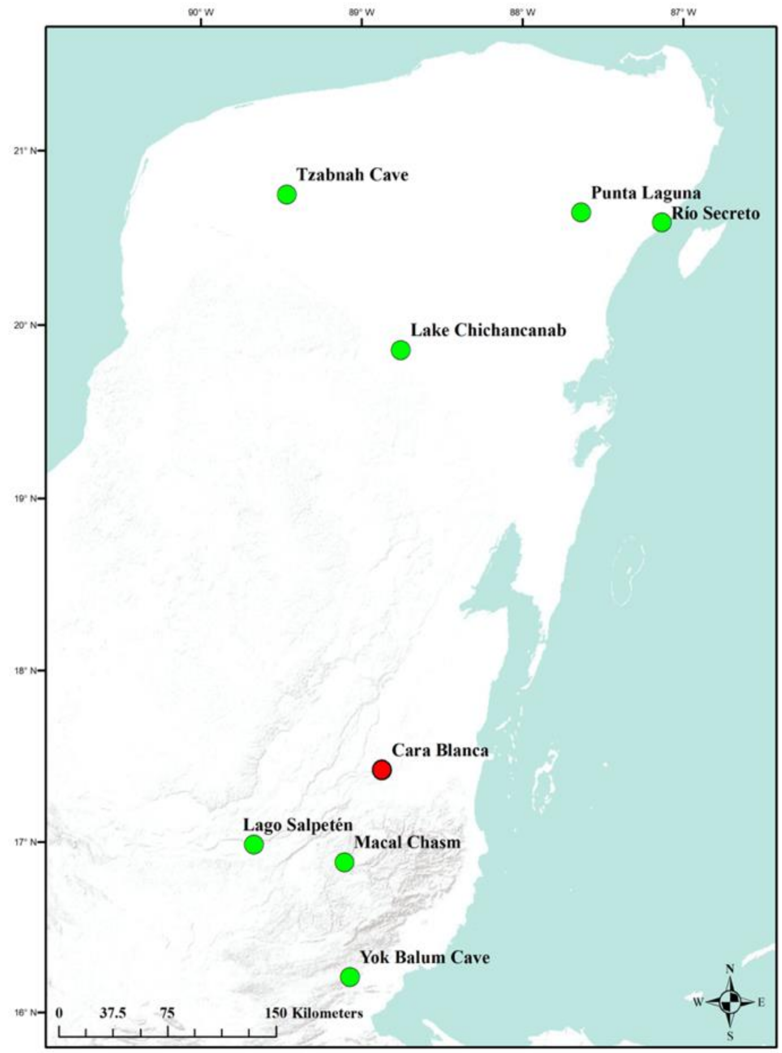

Figure 3.1 Location of Cara Blanca in relation to other climate reconstructions discussed in the text.

Akers and colleagues (2016) obtained uranium-thorium (U-Th) dates from a stalagmite found in Macal Chasm cave on the Vaca Plateau of Belize to produce a record extending to 5250 cal yr BP. This study builds on an earlier study of the same stalagmite (Webster et al. 2007). Using $\delta_{18}O$ and in $\delta_{13}C$, the authors note periods of extreme dryness that punctuate the mean precipitation levels, which were also much drier from c. 3100 cal yr BP onward. Their record ultimately agrees with the Cariaco Basin record and shows regional major dry events during periods of significant upheaval in the Maya world.

In another example of rather localized reconstructions, Medina-Elizalde et al. (2010, 2016) use U-Th dating and $\delta^{18}O$ records from a stalagmite from a cave in the Río Secreto nature reserve on the northwest Yucatán Peninsula to show the impact of drought during the Terminal Classic period and the Preclassic-to-Classic transition. The authors argue that there may have been precipitation declines as significant as 36-52% during the Terminal Classic (c. 804-938 CE). This fine resolution study (1 year resolution) suggests that there were eight severe droughts between 800-950 CE. On the peninsula and just to the southwest, at Lake Chichancanab (Hodell et al. 1995, 2005) and Punta Laguna (Curtis et al. 1996), calcite $\delta^{18}O$ and sediment density records corroborate Medina-Elizalde and colleagues' reports of Terminal Classic drying. These lakes also provide incredibly high resolution reconstructions, with Lake Chichancanab providing a 5-year resolution and Punta Laguna providing an 8-year resolution.

In their 2010 study, Medina-Elizalde and colleagues use the annual resolution reconstruction of droughts to problematize the universality of a causal relationship between drought and decline. They show that evidence for warfare and abandonment in the Petexbatún region of Guatemala came before the first drought in their record from the Yucatán. Again, this highlights a need for localized understandings of climate and social dynamics. They do note, however, that the last settlement that remained populated was the center best equipped to endure drought. Ultimately, the authors cite the evidence for declines in population densities and site abandonment during drought, as well as periods of cultural florescence during more humid periods, as evidence for the impact of climate change on social shifts (Medina-Elizalde et al. 2010, 2016).

Similarly, Walsh and colleagues (2014) used macroscopic charcoal, pollen, and sedimentological data from Agua Caliente in concert with a 2000-year long speleothem record from Yok Balum Cave (from Kennett et al. 2012) in southern Belize to reconstruct human-caused landscape alteration. The Yok Balum Cave record suggests that multi-decadal droughts between 820-870 CE that were part of a regional drying trend impacted agricultural productivity, ultimately increasing warfare and political competition, which were recorded on Maya stela (Kennett et al. 2012). Walsh et al. (2014) use the marcocharcoal record to show that changes in precipitation can be linked to agricultural productivity and practices.

Two major dry events are particularly important, at 250-330 CE and at 750-900 CE, and are present in many of the above reconstructions (Akers et al. 2016; Kennett et al. 2012; Medina-Elizalde et al. 2016). The earlier dry event, at the Preclassic to Classic transition, aligns with what many have term the “Preclassic Abondonment”. Many centers, such as Ixchel, experienced a sort of disruption in population growth during this period (Hansen et al. 2002), evidenced by a temple burning event at the time of drought (Iannone et al. 2011). The response to this earlier drought, however, was varied. Similarly, this early drought event has been linked to the decline of some massive centers in the lowlands, such as El Mirador (Kennett et al. 2012). Yet, many centers, such as Caracol, appear to not have been impacted at all (Chase and Chase 2006) and some grew in size and power, such as Tikal (Laporte and Fialko 1995) and Uxbenká (Culleton et al. 2012). The difference in response has largely been attributed to individual site’s resiliency; For instance, while Caracol focused much agricultural energy on terracing making it more resilient, Ixchel had very little terracing (Akers et al. 2016). The Terminal Classic droughts, however, had a much different impact. The small center of Ixchel was abandoned very early in the increasingly dry conditions and Akers and colleagues suggest that its lack of resiliency to the changing conditions made it more vulnerable to the larger centers, such as Caracol (Akers et al. 2016). There appears to have been a military defeat of Ixchel by 675-750 CE and total abandonment by 1200 CE. Many of these larger centers persisted through this early period, but even resilient centers in the southern and central Lowlands, such as Caracol and Xunantunich, were largely abandoned during the Terminal Classic period droughts (Akers et al. 2006; Kennett et al. 2012).

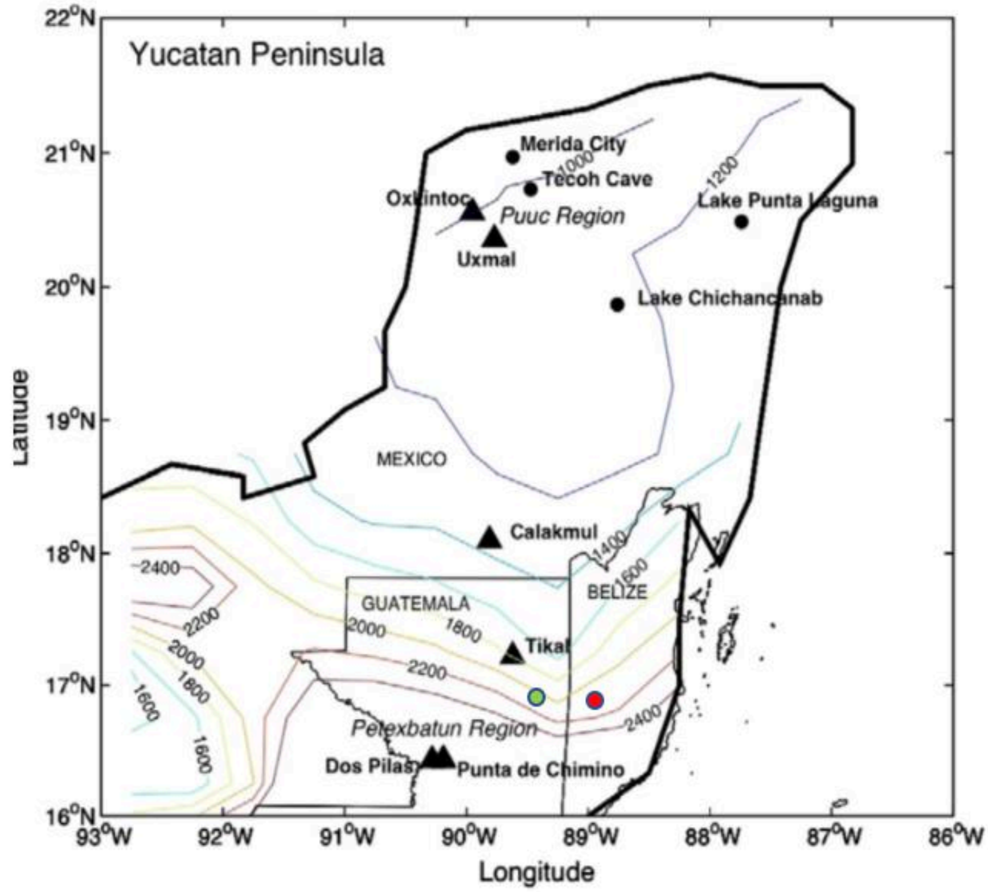

Figure 3.2 Colored contour lines represent total annual precipitation isolines (mm/year) (adapted from Medina-Elizalde et al. 2010: Figure 1). Important archaeological sites and features are represented by black triangles and circles. Macal Chasm (red circle) and Lago Salpetén (green circle) were added by the author.

The differential response to drought is important to note—there were drought conditions that propagated earlier social change throughout Mesoamerica (c. 200-300 CE) but did not result in the massive social shifts witnessed during the Terminal Classic period. Even on the Pacific coast of Guatemala, for instance, fossil pollen and microcharcoal evidence shows that there were drought conditions at the Preclassic to Classic transition and during the Terminal Classic period (Larmon 2014). Human activity in the area, however, is consistent through the earlier period and appears to halt in the later period. During this earlier period, kings did not yet rule and tout their access to and control of water over commoners. Smaller population densities and more flexible practices likely allowed for communities to uphold resiliency. Thus, the interaction of shifting tides of water with human relationships with—and understandings of—water influence a communities resilience to the drought.

The abandonment of cities and the drop off in the production of dated monuments at urban centers certainly indicates that there were massive shifts occurring in the Maya world during the Terminal Classic period (Kennett et al. 2012). Additionally, much of the evidence for socio-political shifts associated with drought, particularly that pertains to Cara Blanca, comes in an intensification of rain related rituals (e.g., Moyes et al. 2009). In fact, Moyes (2007) has presented the idea that a "drought cult" developed in response to environmental shifts in Late and Terminal Classic period Belize. While Moyes' analysis focuses on Chechem Ha Cave, she cites evidence that the cult likely functioned at a regional scale, with data from various caves throughout the region showing ritual use. Moyes notes that because the Maya believed that various deities, such as chahk the rain god, are thought to reside in openings in the earth (caves and *cenotes*), it is logical that many Classic Maya cave rites were related to rain and that cave use was influenced by climate shifts. Moyes finds that there were significant shifts in ritual practices in caves as the drought of the Late and Terminal Classic period worsened—the intensity of ritual and the nature of the ritual changed. During the Late Classic period, large jars made up much of cave ceramic assemblages; their placement in hard to reach crevices of caves emphasize the that the rituals "became more costly and esoteric" (Moyes 2007:225) as the droughts continued. Thus, Moyes suggests that the droughts were at least perceived as stressful enough to impact the daily lives of the Terminal Classic Maya. Throughout the worsening droughts, cave rituals shifted to focus upon the rains and as the area was abandoned, those cave rituals were also abandoned (Moyes et al. 2009).

Each of the above studies highlights a need for localized climate reconstructions, though their focus on the impact of these precipitation shifts centers around the resulting human dynamics. Of course, this is an essential understanding of the shifting climate, particularly as we face dire climate upheaval in present day. It is not, however, only the understanding of the impact on human social dynamics that can emerge from these reconstructions but also an understanding of the impact to landscape integration, within which humans are included. The disintegration of landscapes as a result of the changing climate impacts the histories that are still emerging through that landscape, including human (i.e., Maya), non-human (i.e., giant sloth), tree, soils…all participating entities. My discussion of the environmental reconstructions at Cara Blanca, will focus on this integration rather than solely impacts to human social dynamics.

Climate Change at Cara Blanca, Belize

The above studies used high resolution stable isotope data from U-Th dated stalagmites, isotope, pollen, macrocharcoal, and sedimentation data from sediment cores to reconstruct (primarily) shifts in precipitation levels throughout the past 3000 years. The studies all indicate that there were significant periods of drying that impacted Maya cultural development—during the Preclassic-to-Classic Period transition some lowland centers were abandoned and during the Terminal Classic Period, most lowland centers were abandoned. The authors cite the abandonment of centers, evidence for increased warfare and political competition recorded on stela, increased and intensifying rain related ritual, and changes in agricultural production as evidence that these dry periods are linked to Maya social changes. The link is important—yes, climate change has real, large-scale consequences. There are, however, local variations in these studies that can be accounted for largely by latitude of the study site (Figure 3.2)—for instance, droughts were less severe in the northern Yucatan than in Belize (Akers et al. 2016)—as well as the resolution of study. Inevitably, local variations in climate patterns will differentially impact the resulting shifts in culture (Webster 2014) and landscape integration, but the resolution of the study also greatly impacts the results and subsequent interpretation.

Cara Blanca Belize is at c. 17.42º N and today receives roughly equivalent annual rainfall to Macal Chasm (Akers et al. 2016) and Lago Salpetén (Anselmetti et al. 2007; Leyden 1987), which are at 16.84 º N and 16.98 º N, respectively (see Figure 3.2). It is likely that local reconstructions for Cara Blanca would most closely mirror those at Macal Chasm, which suggest dry periods at the Preclassic to Classic transition and during the Terminal Classic period—though Cara Blanca is just further north and likely received at least somewhat less precipitation, indicating that droughts may have been more impactful in this area. In addition, multiple decade-long droughts are recorded in the Terminal Classic period. Annual or, at least decadal, resolution of precipitation shifts would be ideal to highlight the stochastic nature of the shifting climate, particularly during the Terminal Classic period. Below, I discuss our attempts to retrieve proxy data from Cara Blanca and synthesize our results with those at Macal Chasm to produce a relatively localized picture of precipitation at Cara Blanca.

Pollen Analysis in the Maya Area

Vegetation is highly sensitive to changes in temperature, sunlight, and precipitation; therefore, fossil pollen can provide a reconstruction of environmental conditions at the time of deposition (Bryant 1989; Bryant and Holloway 1983). With an understanding of preservation conditions and the appropriate processing techniques, fossil pollen is highly identifiable, providing insight into the conditions within which the Maya were embedded. In addition, particular pollen taxa are indicators of human settlement and subsistence practices (Bryant and Holloway 1983). Because there are a plethora of lakes and other water bodies from which to extract sediment cores, studies of fossil pollen in the Maya area are not uncommon.

At the site of Colha in northern Belize scholars have studied fossil pollen from both sediments cores and excavation unit sediments and revealed human disturbances in the area, including forest modification and plant cultivation as early as 2500 BCE (Jones 1991, 1994). Early inhabitants of the site were growing both manioc and maize with the help of irrigation canals and raised fields (Jones 1994). Mary Pohl and colleagues (1996) studied excavation units and sediment cores from freshwater wetlands in northern Belize to better understand the transition to agriculture in the Maya lowlands and showed that there was a massive episode of deforestation after 2500 BCE, but pushed the earliest domestication of manioc and maize back to 3400. Additionally, their findings relate the introduction of wetland agriculture and the implementation of canals to around 1500-1000 BCE to fluctuations in groundwater levels. Fossil pollen has also often been used to reconstruct environmental changes in the Maya region. A sediment core from a swamp, El Palmar, in the Rio Hondo basin region of the southern Yucatan Peninsula provides a 5000-year record of the transition of a tropical forest to a mangrove forest (Torrescano-Valle and Islebe 2006). Fossil pollen from the core sediments reflect sea level rise through the mid-Holocene to the present, as the vegetative cover shifted from tropical forest, to mangrove forest dominated by red mangrove (*Rhizophora mangle*), to button mangrove (*Conocarpus erecta).* Each of these cases emphasize the instigating power of the waters throughout the Central American landscape.

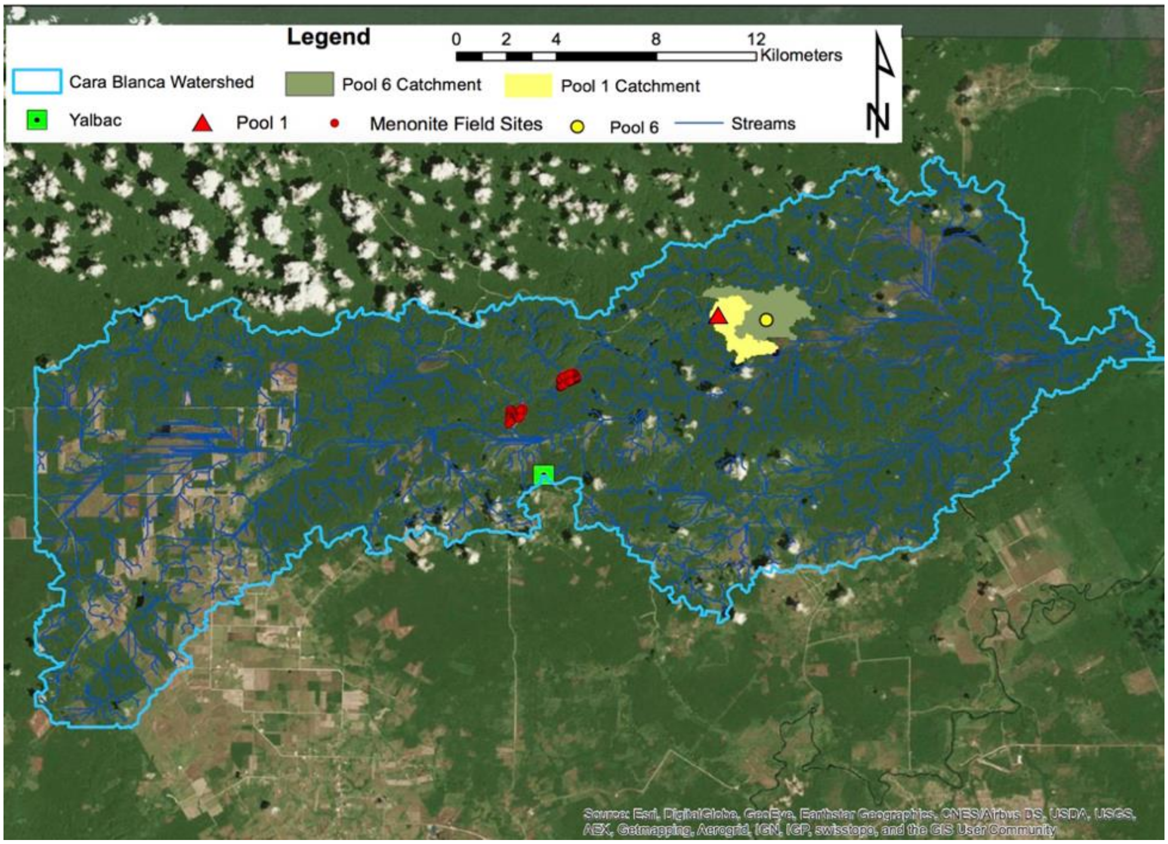

Figure 3.3 Watershed and catchment areas for Pools 1 and

Pollen Analysis of the Pool 6 Sediment Core

Though regional and global trends were influencing the Cara Blanca landscape, local variations in these broader trends were certainly impactful and a localized reconstruction is necessary. In extracting sediment cores from the Cara Blanca pools, our goal was to produce a reconstruction that highlighted those more local signatures. The watershed of the Cara Blanca area is relatively confined (Figure 3.3), with the larger watershed representing potential shared contribution to pollen assemblages and the smaller, distinct sub-basins showing the localized catchments that might introduce variations into the assemblages between, in this case, Pool 1 and 6. Additionally, flow between the pools likely followed fractures in the fault line, as well as through porous rock (Beddows 2011:33). The varying fault lines in the Cara Blanca system formed conjugates of pools that, therefore, would have been more likely to have water (and pollen) flowing between them through these fractures (Figure 3.4). Hydrogeochemical analysis by Beddows (2011) indicates that pools are primarily fed by groundwater, rather than rainwater input. The elevated ionic concentrations in the pools (with electrical conductivity of 2700 uS/cm) would have been much lower if fed by rainwater (with values less than 1000 uS/cm). With this information, we can conclude that these pools are semi-closed basins (see the catchment areas in Figure 3.3) fed by primarily subsurface stream systems rather than surface water (Carlson 2012).

Though climate reconstructions are common in the larger region, Central Belize has relatively few paleoclimate reconstructions because there are not many bodies of water from which to extract sediment cores; the lack of water bodies elsewhere in the region makes Cara Blanca a particularly fruitful place to study environmental shifts in sediment core proxies. The Cara Blanca pools are at least semi-perched (above the water table with minimal discharge) and their flux is most likely due to groundwater flowing between the pools through the porous limestone or fissures/fractures in the rock (Beddows 2011:33), which suggests that we might be able to reconstruct rather local conditions through these analyses. Most of our attempts to extract cores, however, have been limited by difficulties getting cores of adequate length. In the 2015 and 2016 field seasons, we attempted to extract cores from Pools 1 and 7, but were unable to get adequate time depth (Table 3.3) (Lucero 2015; Larmon 2017). Three short cores were extracted from Pool 1: Core 1 was 0.79 meters (m), Core 2 was 0.57 m, Core 3 was 1.55 m. Unfortunately the bottom portion of Core 3 was damaged during transport; Core 3, however, was still our longest core and we therefore sampled organic materials from Core 3 for radiocarbon dating. The bathymetry of Pool 1 led to complications in analyzing core sediments. The top 70 cm of the core was modern and the bottom of the core was dated to only 1,665 CE. The time depth of this core was inadequate to obtain useful information. Likely, the pool's bottom sediments were too disturbed to maintain chronological integrity and, therefore, analysis of those sediments is useless.

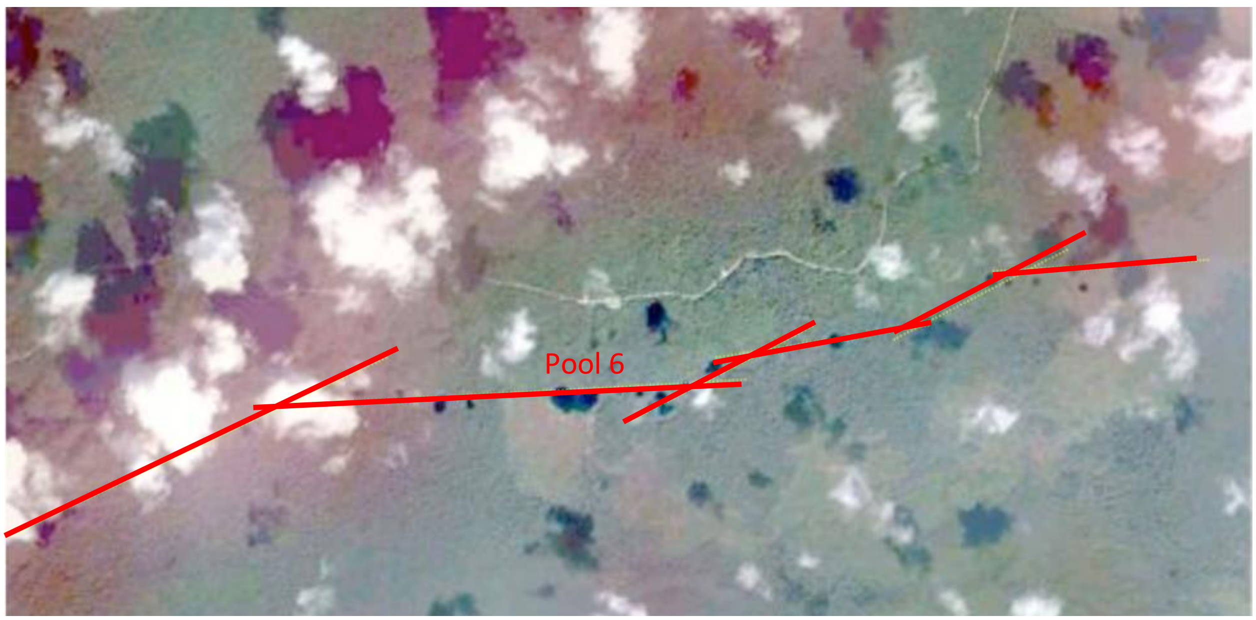

Figure 3.4 The fault lines in the Cara Blanca system, with the red lines representing the fracture alignments that formed the pools in to conjugate sets. Pool 6 is labeled to orient the reader to the rest of the Cara Blanca pools (adapted from Beddows 2011:Figure 3.5).

Table 3.3 2015 and 2016 coring locations and time ranges

Core	Length	Date Range	Depth core taken from
Pool 1 Core 1	0.79 m	n/a	60.00 m
Pool 1 Core 2	0.57 m	n/a	51.82 m
Pool 1 Core 3	1.55 m	Modern-1665 CE +/-15	50.29 m
Pool 7 Core 1	1.62 m	1755-1640 CE +/- 15	1.20 m
Pool 7 Core 2	1.10 m	n/a	1.30 m

Parallel sediments cores from Pool 7, which would allow me to identify disruptions in the stratigraphy of the core and provide alternative sediments for sub-sampling. Because Pool 7 is shallow and relatively easy to access, we were hoping that these cores would offer valuable insights. While extracting these cores, however, we ran into additional complications. At approximately 1.40 m, we hit a layer of thick, clay sediment and limestone that we were unable to core through. We were hopeful that our longest core, Core 1 (1.62 m), would provide some time depth so we extracted organic materials from this core for radiocarbon dating. Unfortunately, the deepest layer from which we were able to extract organic materials for dating returned a date of just 1640 CE +/- 15.

Table 3.4 Carbon-14 dates for material from Pool 6, with uncalibrated and calibrated values (adapted from Carlson 2012:Table 1).

		Uncalibrated		Calibrated	
Sample Type	**Depth (cm)**	**Age (BP)**	**1σ (BP)**	**Age (BP)**	**1σ (BP)**
Sediment/water interface	0	-60		-60	
Wood – chunk	14	220	20	160	12
Wood – twig	33	345	15	357	40
Root – aquatic	55	6970	20		
Sediment	77	2228	31	2216	63
Wood – twig	100	1260	20	1213	62
Wood - large chunk	126	170	40	225	59
Wood	135	1083	28	975	41
Root – aquatic	146	7215	20		
Leaf	172	1395	15	1310	22
Leaf and twig	196	1320	15	1274	19
Wood – massive	221	1650	40	1522	106
Sediment	296	2124	27	2080	76

In an early attempt to study fossil pollen from the Cara Blanca pools, technical divers led by Dr. Patricia Beddows extracted a sediment core from Pool 6 (Beddows 2011). The core allowed for the analysis of materials that dated back to 2124 BP, or 175 BCE (Table 3.4, Figure 3.5) (Carlson 2012). The 3.2-meter compacted core was extracted from the deepest part of the

Pool 6 eastern basin, at 11.2 m deep. The Pool 6 core provided adequate time depth to look at the Late and Terminal Classic periods, yet the radiocarbon dates obtained from the core are problematic, with some inverted dates (Figure 3.6). This is likely due to mixing from both a slump in the wall of the *cenote* (Carlson 2012), as well as thermal vents that are in the base of Pool 6. Colleen Lindsay undertook the initial analysis (Lucero and Lindsay 2013; Lindsay 2014). Her analysis was preliminary and identified some pollen preservation within core sediments. However, she did not note the quantity of grains identified nor the concentration values of the samples, making it difficult to use the information for environmental reconstruction. Lindsay's analysis shows that there was some presence of arboreal and grass pollen types throughout the core (Table 3.5) but we are unable to make any interpretations from this data. The initial pollen analysis undertaken by Lindsay (Lindsay 2014; Lucero and Lindsay 2013) indicate that pollen preservation of durable grains is moderate (at best). In 2016, I undertook the reanalysis of these sediments to identify the potential for a thorough palynological analyses of the Pool 6 core.

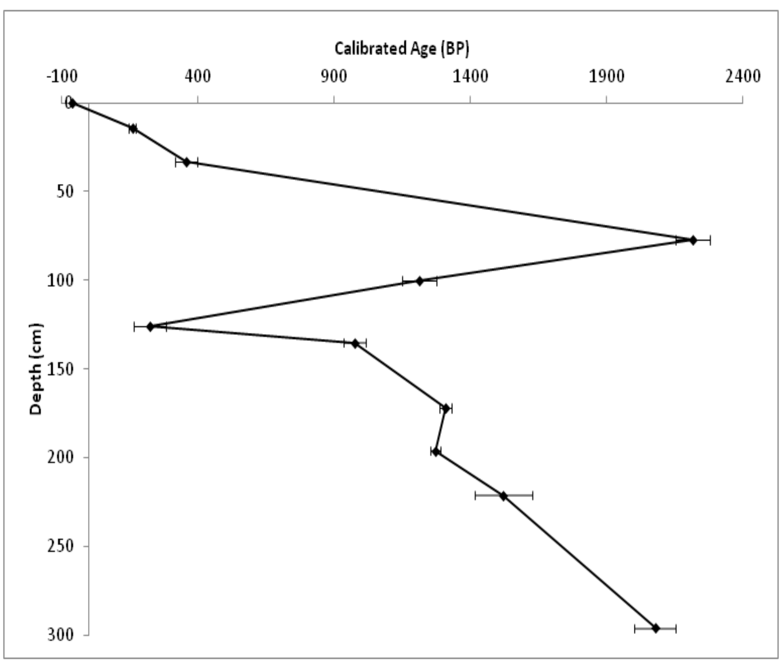

Figure 3.5 Calibrated Age Profile for Pool 6. Dates Calibrated using CALIB 6.0 system (from Carlson 2012:Figure 8).

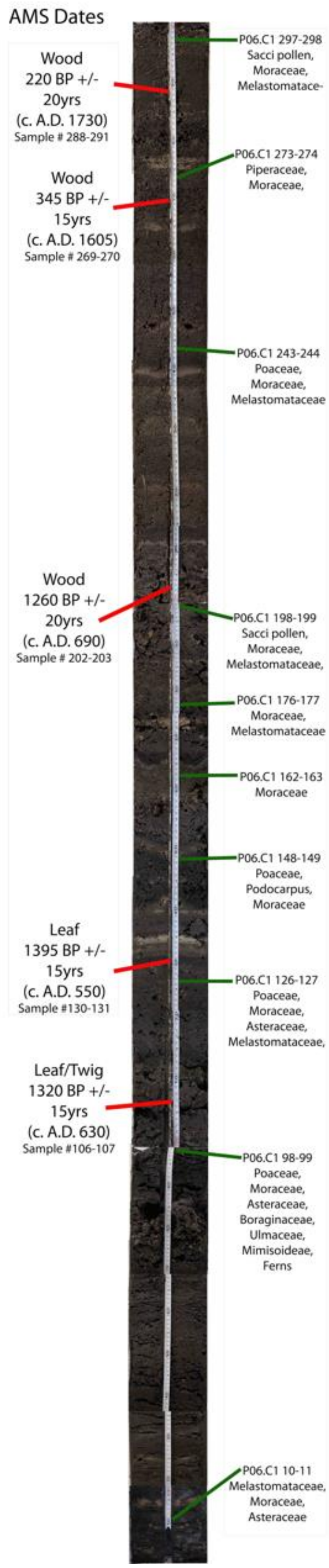

Figure 3.6 Pool 6 core with known radiocarbon dates and preliminary pollen analysis information (from Lucero and Lindsay 2013:Figure 5).

Table 3.5 Pollen identified by Lindsay in the Pool 6 core (from Lucero and Lindsay 2013: Table 2).

Sample (cm from the bottom)	Pollen Types	Calibrated years B.P and CE
10-11	Melastomataceae, Moraceae, Asteraceae, Poaceae	
98-99	Moraceae, Asteraceae, Poaceae	c. 1320 BP (sample 106-107); 630 CE
126-127	Melastomataceae , Moraceae, Asteraceae, Poaceae, *Pinus sp*.	c. 1395 BP (sample 130-131); 555 CE
148-149	Moraceae, Poaceae	
162-163	Moraceae, Poaceae, *Pinus sp*.	
176-177	Melastomataceae, Moraceae, Poaceae, *Pinus sp*.	
198-199	Melastomataceae, Moraceae, Asteraceae, Poaceae	c. 1260 BP (sample 202-203); 690 CE
226-227	Melastomataceae, Moraceae, Poaceae	
243-244	Melastomataceae, Moraceae, Poaceae	c. 345 B.P (sample 269-270); 1605 CE
273-274	Melastomataceae, Moraceae, Piperaceae, *Pinus sp*.	c. 230 BP (sample 288-291); 1730 CE
297-298	Melastomataceae, Moraceae, Poaceae, *Pinus sp*.	

2016 Pool 6 Sediment Core Methods and Analysis

In 2016 I revisited the Pool 6 sediments with the hope that a slightly refined methodology would provide more adequate preservation of all grains, rather than just very durable grains (Appendix B).

Results and Interpretation

Unfortunately, preservation within the core was relatively poor. The concentration values were consistently too low for a reliable analysis in the six samples analyzed, as indicated by the high number of beads counted to the low number of pollen grains counted (Figure 3.7, Appendix B). Hall (1981) and Bryant and Hall (1993) state that low concentration values may not be reliable, as they are not reflective of past conditions and usually represent a differentially preserved assemblage. In many cases, the grains that were present were degraded to a point of indistinction. Many of the pollen types recovered were also noted by Lindsay (2013), but their infrequency, in general, suggests that she too was finding only few and partial grains. The samples counted are shown in Table 3.6. The low pollen concentrations suggest that it would not be time or cost effective to process the remaining samples. The pollen that is present in the Pool 6 core is indicative of more or less closed forest habitats—*Pinus sp.* (pine) and Moraceae (the mulberry or fig family) are the tree genus and family most common in the core. The primary shift that we can see is an overwhelming majority of Melastomataceae in samples five and six, dating to 690-750 CE. Melastomataceae is a flowering tree that was a dominant species of multi-crop maize field agriculture. This tree favored open habitats because of its need for sun and is often present in the initial phase of the milpa cycle (Ford and Clarke 2016). This clear shift in the composition, even without adequate concentrations values and preservation of grains, might suggest a shift in the context surrounding the pool beginning in the Late and through the Terminal Classic periods. With the condition of the pollen, however, it is impossible to make conclusive statements about climate.

The poor pollen preservation in the Pool 6 core is perhaps due to two factors. First, the active thermal vents in the base of the pool might produce oxidizing conditions that are contrary to pollen preservation. Though the exine, or outer shell, of a pollen grain can withstand millions of years of weathering in the correct conditions, oxidizing habitats can quickly break it down (Lebreton et al. 2010). This can both completely deteriorate a pollen grain or just make it unidentifiable. Second, though Beddows (2011) and Carlson (2012) both note that the pools are at least semi-perched, meaning they are sealed off from the bedrock and sit above the water table, the bedrock is limestone, which has basic properties when in solution. If the pools are not completely sealed off from the limestone bedrock, the sediments could be sitting in a basic solution that works to break down the exine and impacts preservation. Pollen grains preserve best in neutral or slightly acidic conditions (Dimbleby 1961). Interestingly, however, Carlson

(2012) found that the pH profile of the east basin waters was slightly acidic, which would encourage pollen preservation.

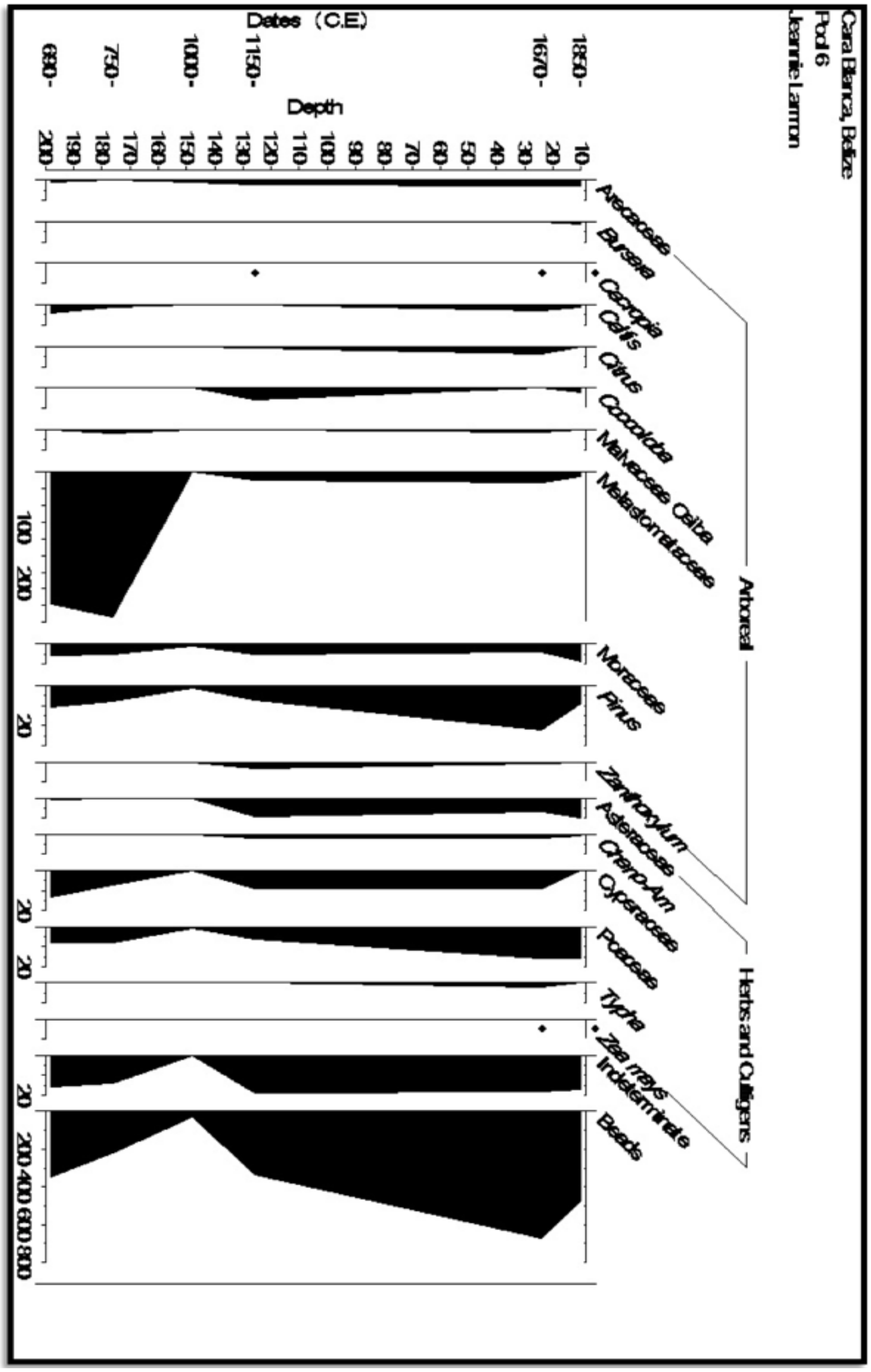

Figure 3.7. Pollen diagram from Pool 6. Note insufficient concentrations in large number of beads to low number of grains.

Table 3.6 Pool 6 core samples analyzed and associated dates.

Slide Depth	Date
10-11 cm	1850 CE
24-25 cm	1670 CE
126-127 cm	1150 CE
148-149 cm	1000 CE
176-177 cm	750 CE
198-199 cm	690 CE

The poor pollen preservation in the Pool 6 core is perhaps due to two factors. First, the active thermal vents in the base of the pool might produce oxidizing conditions that are contrary to pollen preservation. Though the exine, or outer shell, of a pollen grain can withstand millions of years of weathering in the correct conditions, oxidizing habitats can quickly break it down (Lebreton et al. 2010). This can both completely deteriorate a pollen grain or just make it unidentifiable. Second, though Beddows (2011) and Carlson (2012) both note that the pools are at least semi-perched, meaning they are sealed off from the bedrock and sit above the water table, the bedrock is limestone, which has basic properties when in solution. If the pools are not completely sealed off from the limestone bedrock, the sediments could be sitting in a basic solution that works to break down the exine and impacts preservation. Pollen grains preservation best in neutral or slightly acidic conditions (Dimbleby 1961). Interestingly, however, Carlson (2012) found that the pH profile of the east basin waters was slightly acidic, which would encourage pollen preservation.

Though palynological analysis of this core was insufficient, Carlson (2012) conducted the hydrogeochemical analysis of bulk sediments from the Pool 6 core in order to identify shifting climate patterns. In his Pool 6 analysis, he noted a section of the core with particularly high density of sediments in the portion of the core correlating to the Terminal Classic period (800-900 CE). The high density of sediments could be caused by droughts, which lead to the evaporation of pool waters and the subsequent deposition of gypsum. Though he makes this initial observation, he does also note that no gypsum lenses were present in this section of core.

His analysis is preliminary. This conclusion, however, in concert with the paleoecological analyses conducted by other scholars at nearby sites that would have had experienced similar climate shifts (e.g., Akers et al. 2016; Anselmetti et al. 2007; Leyden 1987), as noted above, suggests that Cara Blanca was not immune to the precipitation woes of the Terminal Classic period.

Possibility for Future Analyses

Though there are clear problems with pollen analysis, future attempts to extract sediment cores could be undertaken at Pool 6. Care should be taken to place the cores far away from vents. Prior to any core extraction, a seismic analysis of pools sediments should be conducted (see Anselmetti et al. 2007). This approach will provide an idea of sediment stratification and thickness to a depth of c. 50 m below the basin floor and help indicate the most effective place for sediment core extraction. Even with a sediment core of adequate length, a fine-resolution chronology is necessary to support arguments at a decadal scale. This, however, is only possible in anoxic, finely laminated lacustrine conditions, such as the Cariaco Basin (Haug et al. 2001).

If adequate preservation can be established, pollen might still provide information. The relatively small catchment area and low fluvial input at Cara Blanca will decrease the regional signature, though pollen rain remains a significant portion of pollen input. Pollen concentrations might provide information on human induced changes to the vegetation, as well as changes in climate. Because these tend to be get blurred in the fossil pollen record (Anselmetti et al. 2007; Hodell et al. 1995), additional proxies from cores sediments are necessary. Macro- and micro-charcoal remains in the Neotropics can provide information regarding anthropogenic burning and can be studied in concert with pollen data to better identify anthropogenic vegetative shifts (e.g., Walsh et al. 2014). Additionally, when pollen data is compared to oxygen isotope ratios from diatoms and gastropods extracted from core sediments, one can identify which vegetative shifts are more likely to be climate driven. Additionally, changes in the calcite and gypsum concentrations within sediments might provide some insight into the Evaporation/Precipitation ratio (E/P) (e.g., Hodell et al. 1995). Beddows (2011) noted a significant contribution of gypsum to Pool 6 cores sediments. According to Hodell's model, time of high E/P (dry periods) are reflected by increased $\delta_{18}O$ from ostracods and gastropods with increased proportions of gypsum and calcite. Therefore, a decline in human related pollen taxa (i.e., disturbance taxa, such as chenopodium and grasses, or maize) and a decline in microcharcoal input into the pools during a dry period (as represented in $\delta_{18}O$ and gypsum/calcite), suggests that there is a decrease in intensive human activity (agriculture) in the area during the period of prolonged aridity.

Final Thoughts

Each of the above analyses is centered on the necessity of water, in excess and dearth. Cara Blanca offers a unique look into this issue because this landscape has been fed by the water in these pools for millennia. The studies introduced above highlight that there have been periods of severe desiccation, including during the Terminal Classic period. Maya use of the Cara Blanca space is largely related to rain-related rituals and processions (Lucero and Kinkella 2015; Lucero et al. 2016; Lucero et al. 2017) during that period. Intensification of these practices during locally verified dry periods provides insight into ritual practice during climatic upheaval. This has been corroborated by excavations that place the construction, use, and termination of Cara Blanca structures (parts of these circuits) during these extended dry periods noted in the studies discussed above (Lucero and Kinkella 2015; Lucero et al. 2017). How water was integral in constructing these spaces will be discussed in the following two chapters. Here, however, it is important to introduce the kinetic qualities of the Cara Blanca waters as they infiltrated and engendered the pools themselves. As I showed above, the state of water during the Terminal Classic period at Cara Blanca was dire—regionally, it was unpredictable, making the permanence of its infiltration of the Cara Blanca landscape (both through and between the pools) even more remarkable. In Chapter 4, I explore this infiltration and its remarkability through the archaeological materials excavated from Pool 1 Structures 1 and 3.

CHAPTER 4: WORLD(S) OF WATER: POOL 1'S GRAVITAS

Rivers are the arteries of the earth and lifelines for humanity and millions of other animals and plants. It's no wonder they have been venerated, considered as ancestors or mothers, and held up as sacred symbols.—Kothari et al. (2017:1)

In a world plagued by water extremes, Maya inhabitants learned to exist. They did so not by giving water a particular importance in their physical and ideological worlds, but by allowing themselves to be engulfed in the way the world is and thus appreciating the material reality of their existence. Enveloped in the water, the Maya world emerged from the sea. The water's exertion stands apart from the Maya, as even they saw that the water had a power to "divide itself" (Christensen 2007:298). The world that emerged was, too, forced into being by the water, territorialized by the water, and allowed to shape shift and change through the water. In Chapter 3, I showed that the shifting tides of precipitation were poignant in the daily world of the Cara Blanca landscape. Through reconstructions at nearby sites and what information we could gather from the Cara Blanca pools themselves, we see that the Cara Blanca landscape was undergoing a desiccating transformation during the Terminal Classic Period (800-900 CE). Here, I will show that this transformation was key in the formation of the Terminal Classic Maya landscape, not only because of water related climate shifts, but because of the way those shifts manifested, mediated by waters, in the daily lives and materials of the Cara Blanca space.

First, I will introduce Cara Blanca Pool 1 and the work undertaken there by the Valley of Peace Archaeology (VOPA) project over the last decade, particularly Structure 1 and Structure 3 excavations. I will review the excavation and analysis of Structure 1 materials and introduce the 2014-2018 excavations of Structure 3. Lucero and Kinkella (2015) have previously shown that Structure 1 acted as a water temple for the Maya during the prolonged droughts of the Terminal Classic period. The emergence of the entire landscape, Structure 1 and Structure 3, was a process of mutual constitution in which inter-material sociality, fueled by water's kinesis, territorialized the landscape during this period of climatic upheaval. Below, I show how water fueled the built landscape at Pool 1. Ceremonial architecture lines the deepest of the Cara Blanca pools, Pool 1, and the built and empty landscape resonates with kinetic forces.

The Cara Blanca Pools in Context

The central Belizean Maya lowlands were resplendent for Maya during the Classic (300-800 CE) and Terminal Classic (800-900 CE) periods. People who settled in the Belize River Valley had access to resources of the fertile river basin. Small and medium sized agricultural communities and centers line the floodplains of the Belize River to the south and Rio Bravo to the north in central Belize (Figure 4.1) –these communities grew and thrived through the waters and the material sustenance they provide. One such center, Saturday Creek was occupied from 900 BCE to 1500 CE (Conlon and Ehret 2002). Living in farmsteads comprised of both solitary mounds and *plazuelas*, or mound groups, Maya inhabitants were fed and sustained by the rivers through the drought of the Preclassic to Classic transition (c. CE 300) and the Terminal Classic droughts (c. 800-900 CE). As the floodplains thrived with population densities reaching 100-151 structures/km_2 (Lucero 2006:117), the medium sized center of Yalbac emerged from the nestled comfort of two smaller tributaries that offered less reliable water 15 km to the northwest. From the constant movement of merging ground and rain waters stretching from the highlands to the coast, Yalbac and the nearby ceremonial center of Cara Blanca emerged; they were sustained by the entities of the Cara Blanca pools. That is not to say that the waters in these pools are materially distinct from their surroundings (as water flows through the porous limestone landscape), but by being bound in the earth—dirt and limestone and prying roots—upon which and from which the Maya landscape emerged, the context of these pools changed. Though the rains and groundwater instigate as they flow through the landscape, these pools stand apart in the ways they motivate and engender our present understandings of that landscape. In many cases, as at Cara Blanca, the ancient Maya understood their space as uninhibited by perceived material boundaries (see Chapter 2)—water was central to this integration. In order to understand how and why the material landscape (as we know it today) emerged, we must first go back to the matter.

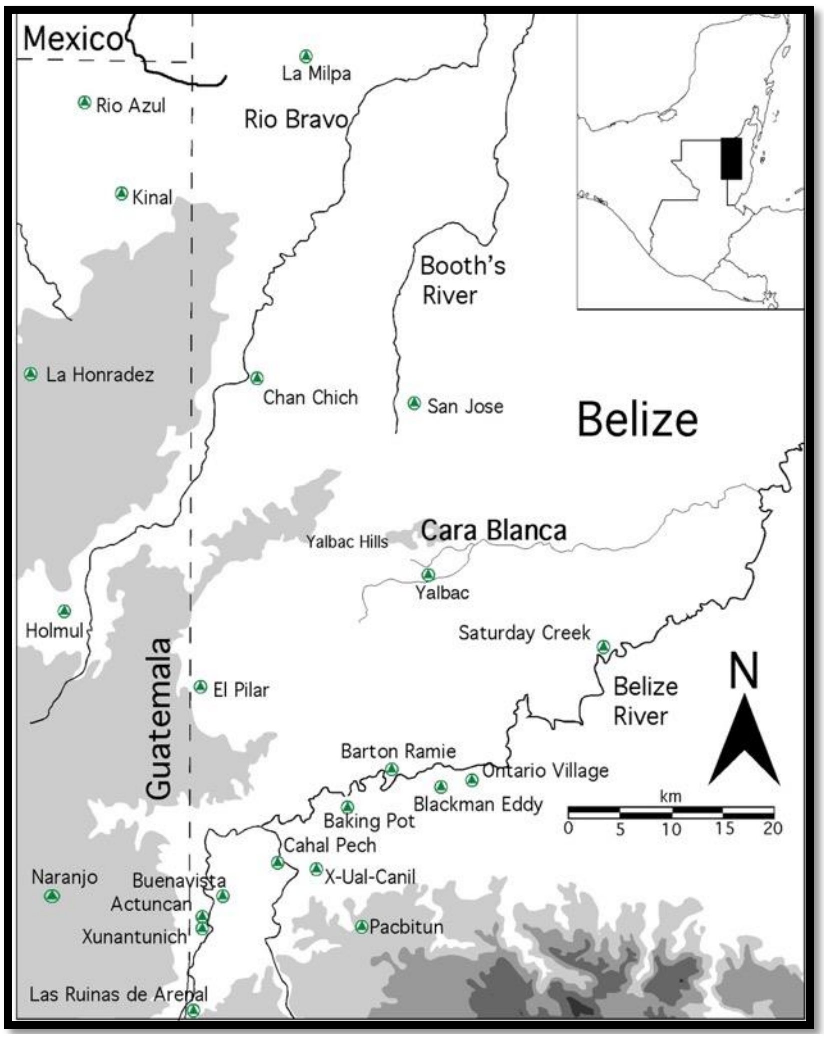

Figure 4.1 Location of Yalbac, Saturday Creek, and other Belize Valley sites mentioned in text.

How do we consider the Terminal Classic Cara Blanca space as an integrated landscape, with truly embedded humans contributing to the sociality of assemblage parts? To do this, we turn to water—whose kinesis facilitates the integration and relations of the landscape. Kinesis, as discussed in Chapter 1, is the territorializing energy of matter. Matter experiences and expresses kinesis in a way that promotes relationality and the formation of assemblages. In the case of the Cara Blanca Pool 1 Terminal Classic assemblage, water's kinesis territorializes. As Pauketat (2019:250) shows, water's materiality is "perceived by people" to form the things that we now understand as rivers, lakes, deserts, mists, storms, rainbows, and so forth; just as water's materiality is perceived by the Maya to inform their creation story and the narrative of the *Popol Vuh*. But apart from human perception, water's materiality is "the basis of causal relationship beyond things" (Pauketat 2019:250)—water's kinetic possibility is the basis for the formation of landscapes and their assemblages.

Understanding the relation of water in Maya ontology is important. My discussion below of the Cara Blanca excavations, and in Chapter 5 of movements through the landscape, highlights the important contribution that Maya ways of being in and relating to the world contribute to the understanding of the Cara Blanca space, but the Maya did not alone and unterritorialized "*cause* history" (Pauketat 2019:14, emphasis added). Rather the space emerged from human and non-human engagement in this material articulation of Cara Blanca. The fluid landscape—materially and abstractly—tied together temple, city, forest, human, animal. I like to imagine kinesis has tentacles with undefined reach, moving out from its dihydrogen oxide center to envelop the Pool 1 space, pulling together the landscape as we understand it today. The formation of this space unfolds in a context of loss—remember that the Maya region is undergoing loss of reliable and plentiful rains that feed ecological, social, ideological, political, economic, and agricultural worlds (see Chapter 3). The opposition of little in the regional landscape to plenty in the local landscape (in the Cara Blanca pools) opens a narrative in which water is the director of a multifaceted, dynamic symphony.

Pool 1 is the widest and deepest of the Cara Blanca pools. Cichlids and crocodiles swarm the massive trees thrown underwater by centuries of hurricane winds and erosion. Beneath the surface of Pool 1, another portal sits, Actun Ek Nen (Lucero and Kinkella 2015). This massive cave is on the north wall of the cenote 30 m beneath the surface—its depths continue more than 70 m into the karstic landscape beyond, though it has not yet been fully explored by divers. The waters' integration of the space, through this cave and the surrounding porous landscape, is expansive. Below, I outline the excavations at Pool 1 to show that within this context of plenty, water's kinesis causes the embedded history of Pool 1.

Cara Blanca Pool 1

Archaeological investigations of the Cara Blanca Pool 1 began in 1997 when VOPA identified a temple (Structure 1) teetering on the edge of the pool (Lucero 1997). In contrast to the pools to the east (Pools 7, 8, 9), which are shallow lakes that hosted farmsteads, Pool 1 is a large (75 x 100 m), 60+ m deep *cenote* that looms as a black hole amongst green growth (Figure 4.2). This seemingly unending pool was teaming with fish and crocodiles, its limestone base smothered in sediments and detritus from millennia of hurricanes, which have left 18 m tall trees deposited in its floors. Though its history is tied to the other 24 pools in geological and hydrological origin, its history is unique because of the placement of structures at the pools' edge. Structure 1, a water temple, and Structure 3, a ceremonial platform are material manifestations of the water's kinesis (see Chapter 1), the water that "caused" Pool 1's history (e.g., Pauketat 2019).

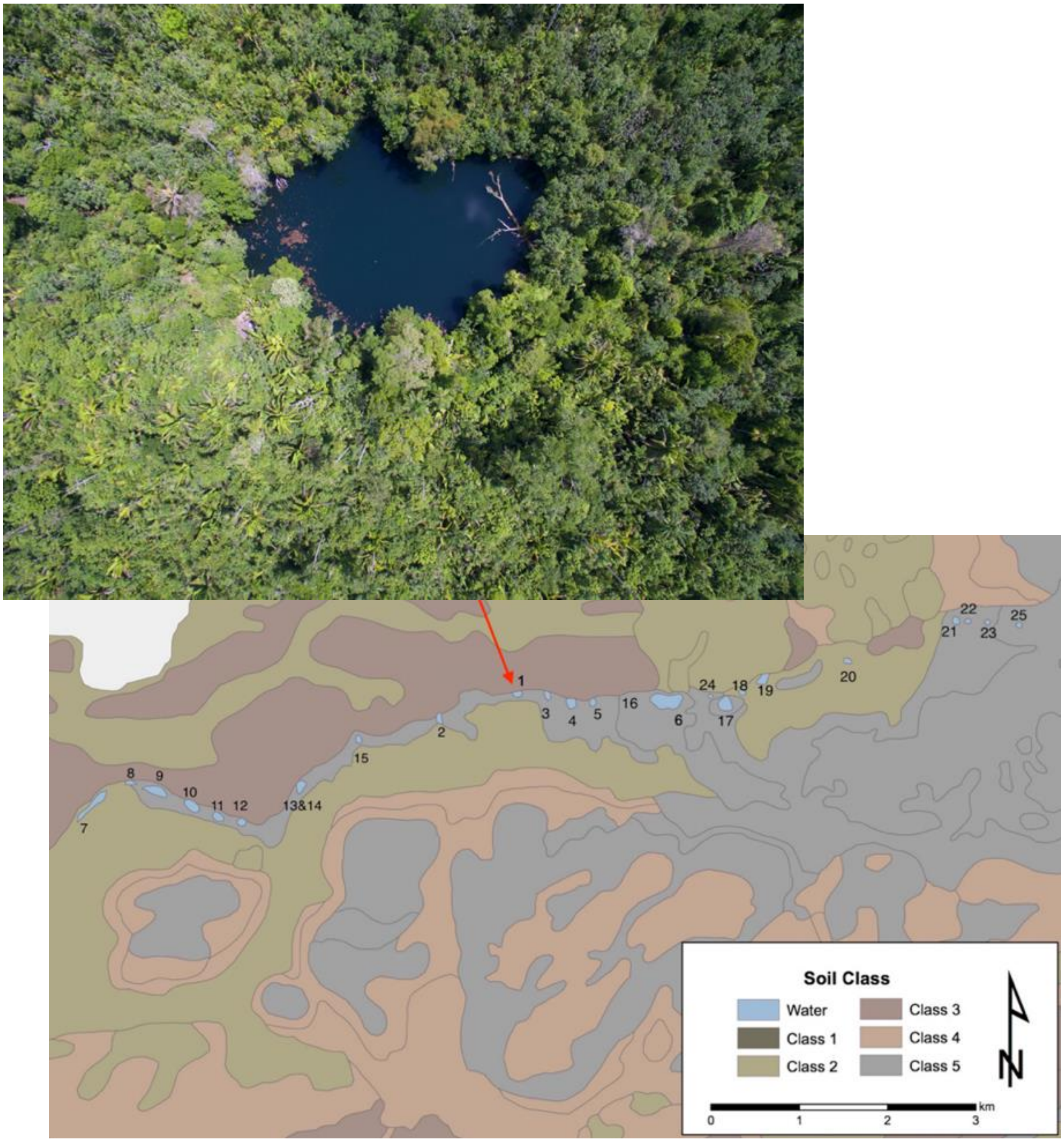

Figure 4.2 Pool 1 is shown in upper left. Map shows numbered Cara Blanca pools and related soil classes (1-5, where 1 is most productive and 5 is least productive, see Ford and Fedick 1992 for more detail).

The Pool 1 space, including Structure 1 and Structure 3, was most intensely visited by Maya during the Terminal Classic period, when widespread droughts struck the lowlands, urban diaspora led to the abandonment of city centers, and the loss of rulers' power led to social transformation. From its fluorescence, the ceremonial space was the locus for rain related rituals performed by Maya from all over the lowlands, as is evidenced by ceramic styles, who were in search for reprieve from the droughts. Kings' diminishing power meant that they could no longer act as the middlemen between the Maya people and deities, so the people went right to the source. As I show below, Pool 1 was the threshold to the otherworld through which ancestors and deities were to be contacted. When their pleas for relief did not work, however, they joined the migration out of the lowlands.

Poo1 1 Structure 1

Led by Principle Investigator Lisa J Lucero, VOPA crews excavated Structure 1 was between 2013-2014 (Lucero 2014, 2015). Structure 1 is a temple constructed between the late Late and Terminal Classic periods. Though its northeast portion has crumbled into the pool, the remnants of the temple were enough for Lucero and Kinkella (2015) to highlight its connection to water, deeming it a "water temple".

Water Temple Construction

Initial excavations of the water temple (20.0 x 7.5 m, and 3.5 m tall) were originally complicated by the structures precarious placement on the edge of Pool 1 (Figure 4.3), as well as two looters trenches that tore through the northeast and southwest sides of the structure (Figure 4.4). Excavations revealed a complex, asymmetrical temple comprised of 11 distinct strata in four rooms. The structure originally had six to eight rooms, but the northeastern portion of the structure has eroded into Pool 1. The structure itself has a complex orientation, with its southern half orientated at 10° and its northern half oriented at 18°; Lucero (2013) has proposed that this might have been to mirror the edge of the *cenote*. The structure was built with high quality materials; thick (85-95 cm) double faced walls filled with diverse fills (tufa, boulders, cobbles, and mortar), thick (c. 7-9 cm) fine-grained plaster floors, and large slab or vault stones (some nearly 1m long) have left the remnants of a corbel-vaulted building that required high labor investment. The effort employed in the construction of this space was not typical elsewhere in the lowlands, where Late Classic construction typically average floor thickness of 5 cm (Hansen 1998:55). A single entrance to the temple leads visitors first through a narrow hallway, limiting access to rest of rooms. The practices unfolding within its walls would have been hidden to those outside, known only to the practitioners and the water temple walls (Harrison 2015).

Figure 4.3 Showing Structure 1 on the edge of Pool 1. Photo by Tony Rath.

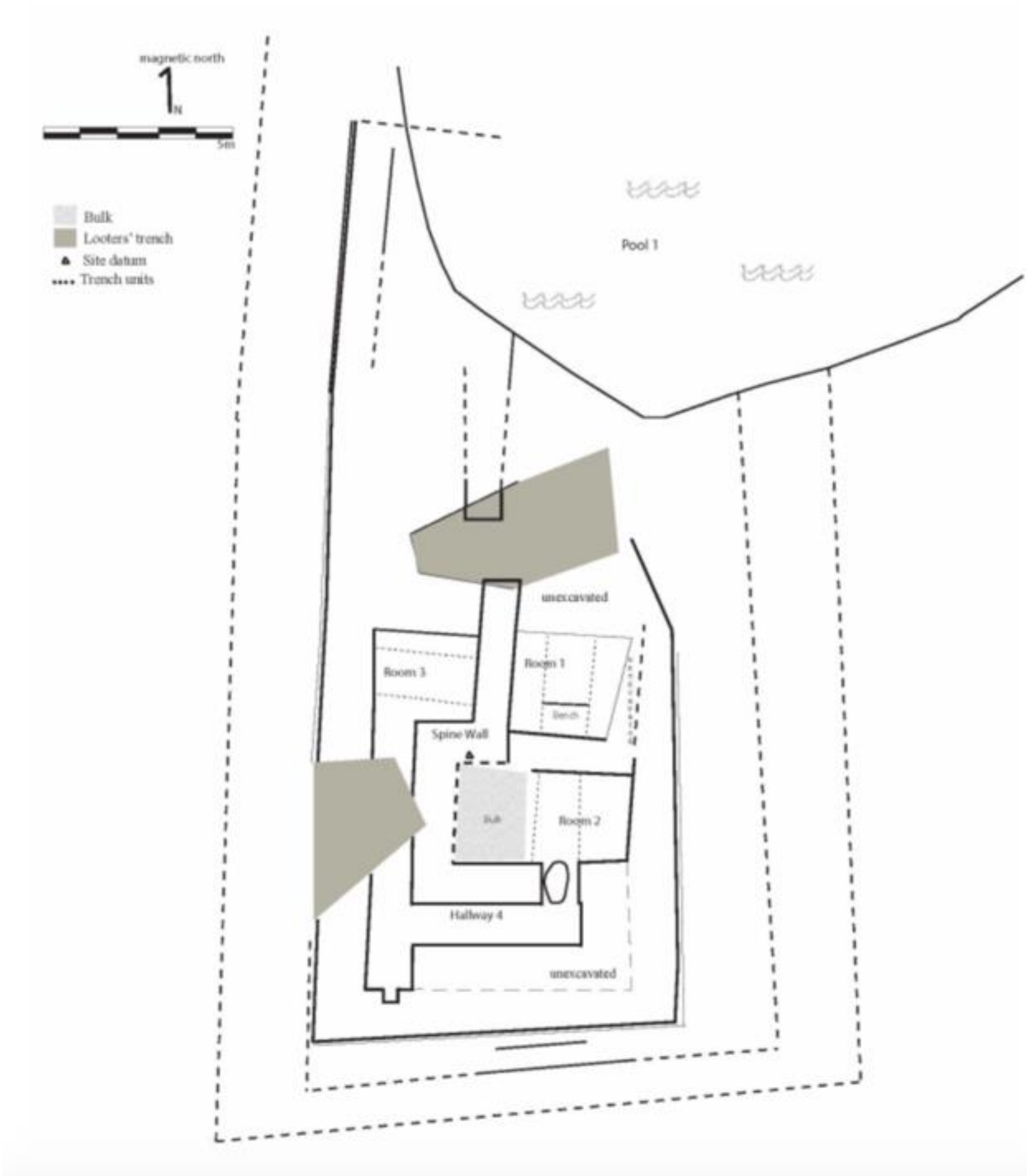

Figure 4.4 Planview of Pool 1 Structure 1 showing the two looter’s trenches (in grey) (from Harrison 2015:Figure 2.2).

Maya people—likely men, women, children, commoners, elite (see Chapter 2)—constructed the water temple in at least two distinct events during the Terminal Classic period. While the earliest phase of construction had very little material, the earliest strata of the later construction (also dating to the Terminal Classic period) offered insights into the structure's importance. This fill was comprised of a diverse materials, including red and blue chert or chalcedony, limestone, and geodes (Harrison 2015). In 2014, we walked the ravine down to Pool 1 in order to identify the local limestone and chert outcrops and did not note any fine-grained red and blue chert inclusions. The outcrops we examined were exposed by Yalbac Ranch employees cutting a road down to Pool 1 and would not have been as exposed for the ancient Maya. Hester and Shafer (1984) presented an overview of the limestone outcrops in Belize and, though there are chert bearing soils near the pools, those with red and blue/gray hues are common c. 75km to the northeast, near the archaeological sites of Kichpanha and Colha. Though we cannot confirm the source, it is possible that construction materials were important from northern Belize. The color of the chert inclusions are intentional—while blue is reminiscent of water and was often used in reference the watery underworld, red is generally associated with the direction of the rising sun (east) and renewal (Houston et al. 2009: 27-28, 30-31, 40). Additionally, the few ceramics pulled from this earliest fill had a red slip (Harrison 2015). These color choices are prevalent throughout the entire structure assemblage—blue and red chert dominated the small lithic assemblage that we did recover, red slipped pottery was common, and there are remnants of a red paint on the structure interior.

Figure 4.5 Room 2 Cluster 1 sherds, showing representative sample of the of large water jars that make of 72.1% of the Structure 1 assemblage.

Water Temple Artifact Assemblage

Lithics were lacking from the artifact assemblage; the vast majority of materials recovered were ceramics, 72.1% of which were jars (Harrison 2015) (Figure 4.5). The most common style of jar was Cayo/Cambio Unslipped, a type indicative of the late Late Classic and Terminal Classic period (Gifford et al. 1976:278; Harrison-Buck 2007:232-235). We posit that these jars served as water jars—their large size suggests that they were not for individual use (Table 4.1). The non-jar ceramic assemblage, too, appears to have been primarily for serving large groups of people, perhaps for ceremonial feasting (Harrison 2015; Lucero and Kinkella 2015). There were bowls, dishes, and plates recovered, most of which had large rim diameters (average=31.3 cm) (see Table 4.1). The vessel forms included serving and storage vessels, which were large enough to be used for feasting—orifices ranged from 20-50 cm (bowls), 29-45 cm (plates), and 40-50 cm (dishes) (Harrison 2015). Additionally, more than 200 faunal remains were recovered. Though many of the faunal remains have not been identified, there were deer, bird, and *Pomaceae* (a freshwater shellfish) in the assemblage and some of the remains were charred (Lucero 2014, 2018). Room 2 (Figure 4.4) may have been for feasting activities, based upon five ceramic clusters recovered from the plaster surface of the room.

Table 4.1 Orifice Diameters of Structure 1 Ceramics from the 2013 and 2014 field seasons (adapted from Harrison 2015:Table 2.5)

Vessel Type	Average Orifice Diameter (cm)	Orifice Diameter Range (cm)
Jars	19.05 (n= 131)	10-45
Necks	25.00 (n=119)	15-40
Dishes	40.30 (n=13)	25-50
Plates	35.70 (n=15)	29-55
Bowls	29.80 (n=17)	10-50

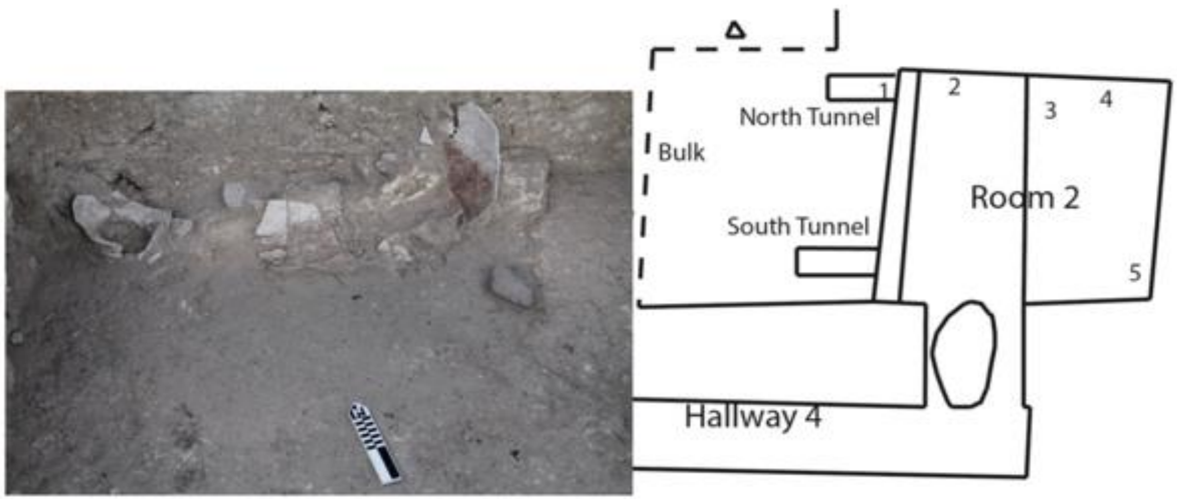

Figure 4.6 Left: Room 2 Clusters 1-3, in situ. Right: Placement of the five clusters in Structure 1 Room 2 (Harrison 2015:Figure 2.7).

These five ceramic clusters lined the margins of the northern and south western portions of Room 2 (Figure 4.6) and included Dolphin Head Red dishes, Vaca Falls Red bowls, and Cayo/Cambio Unslipped jars, one of which was inverted. There were also three clusters tucked into the southwestern corner of the water temple in Hallway 4, abutting the single entrance. These clusters include Belize Red bowls, Fat Polychrome, and Cayo/Cambio Unslipped jars, some of which were, again, inverted. Inverted vessels were often intentionally placed over the heads of the deceased, on top of other vessels (lip-to-lip), or over living surfaces (Lucero 2003, 2010). Pollard (2008:57) suggests that this practice was meant to contain something, perhaps a particular essence or *ch'ulel*, in the person, space, or ceramic upon the end of its use-life; "Inverted vessels thus represented death" (Lucero 2010:159).

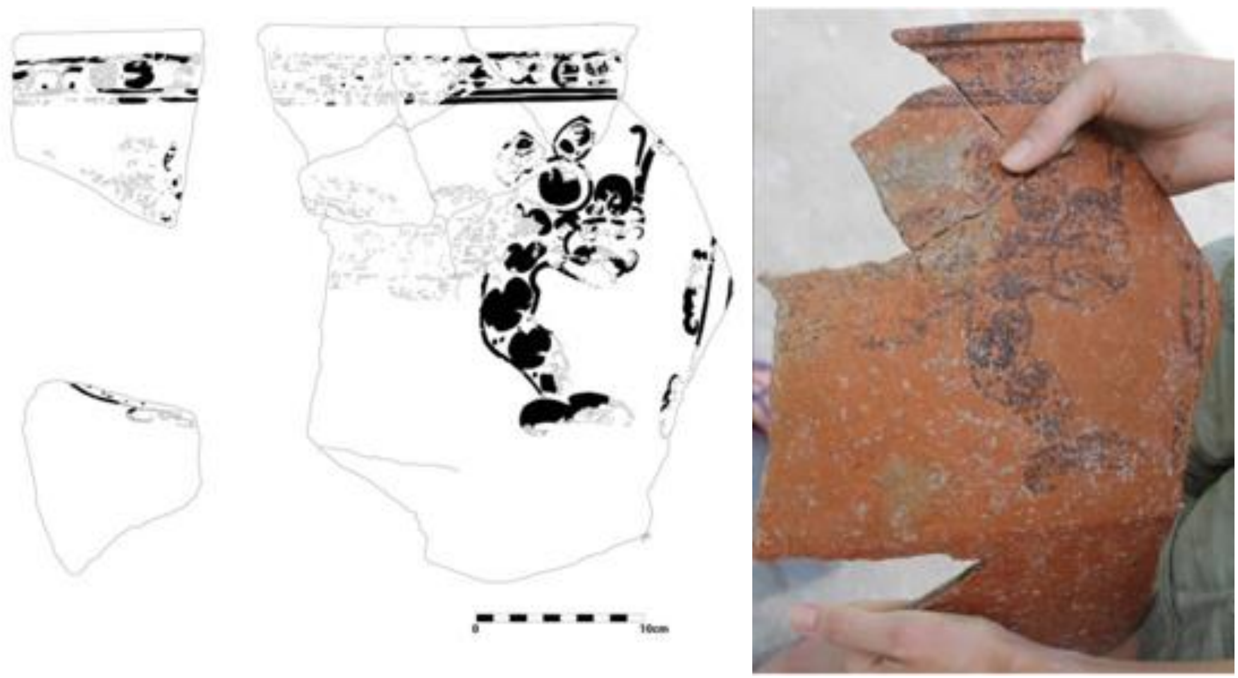

Figure 4.7 Structure 1 jaguar vessel (Lucero 2014:Figures 1.24, 1.25). Drawing by Joanne P. Baron.

A noticeably distinct addition to the ceramic clusters is the "Jaguar Vessel" (Figure 4.7), the style of which originates in the northern Maya lowlands (Harrison 2014). The vessel itself was studied by VOPA epigrapher, Joanne Baron, who noted celestial iconography surrounding its rim, as well as water iconography and a jaguar on its body—jaguars association with portals (Miller and Taube 1993:102) and the water iconography on the vessel are proposed to have intended to mirror the "Cara Blanca environs" (Lucero 2014:18). While much of this vessel was located in Room 2 Cluster 3 (see Figure 4.4), which also had 178 freshwater *Pomacea* shells deposited over it, a rim and body sherd from the Jaguar Vessel were recovered from the clusters in the southwestern corner of the temple. It is probable that the Maya purposefully broke the vessel, releasing its *ch'ulel*, and deposited in discrete locations of the temple as part of the termination of the space, which I will discuss in more detail below.

Figure 4.8 Dos Arroyos polychrome vessel from Structure 1 Room 1.

Another important aspect of the ceramic assemblage is the inclusion of synchronically and diachronically distinct styles. Harrison (2015) made a particular point of noting an Early Classic (300-600 CE) Dos Arroyos plate cache (Figure 4.8). The ceramic chronology from all construction phases indicates that the entire structure was constructed in a relatively short period during the late Late and Terminal Classic periods (700-900 CE) (Harrison 2015), but Early Classic materials were incorporated into the space. The inclusion of earlier ceramics is also found in other Cara Blanca architecture and acted to disintegrate diachronic boundaries by tying Early Classic materials to Terminal Classic spaces (see Chapter 5). Additionally, the Dos

Arroyos style originates in the Petén. Though we cannot definitely say that the vessel was made in the Petén and transported to Cara Blanca, at the very least the foreign style was imitated. This is also seen with the inclusion of Palmar Orange polychrome, a trade-ware originating in northern Belize (Harrison-Buck 2007:254; Harrison 2015).

Water Temple Termination and Integration

Finally, the large vault stones originally used in the corbel vaulted roof appear to have been purposefully deconstructed and placed in the terminating fill of the structure—an act of deanimation. Termination rituals were performed by ancient Maya as a way of deanimating or desanctifying a space or an object (Stross 1998:37; Kunen et al. 2002:198). In doing so, Maya would destroy, partially or completely, the space or object that they wanted to deanimate through burning, breaking, puncturing, or otherwise destroying it (Pagliaro et al. 2001:76-80). Also included in this fill was tufa, a calcium carbonate precipitate that forms in the water around foreign objects, which then decompose (Pedley 1990) (Figure 4.9). For instance, if a stick falls into the water, tufa will form around the stick, which then decomposes to leave a rock-like tube. There was also some tufa included in the earliest construction fill in Room 3 (Harrison 2015). Maya went into the deep *cenote* to collect tufa to help integrate the Cara Blanca waters to the water temples construction and termination. Similarly, fragments of marine shell were recovered from both the construction fill and termination fill of the water temple (Harrison 2015). Marine shell would have had to be transported from the coast and, therefore, was an exotic and revered material for the Maya. Their presence at Cara Blanca was "evocative of the sea and of water, fertility, and life" (Harrison 2015: 20), as well as the watery underworld; their inclusion in the structure would have, again, tied its construction and termination to the watery underworld (Lucero and Kinkella 2015).

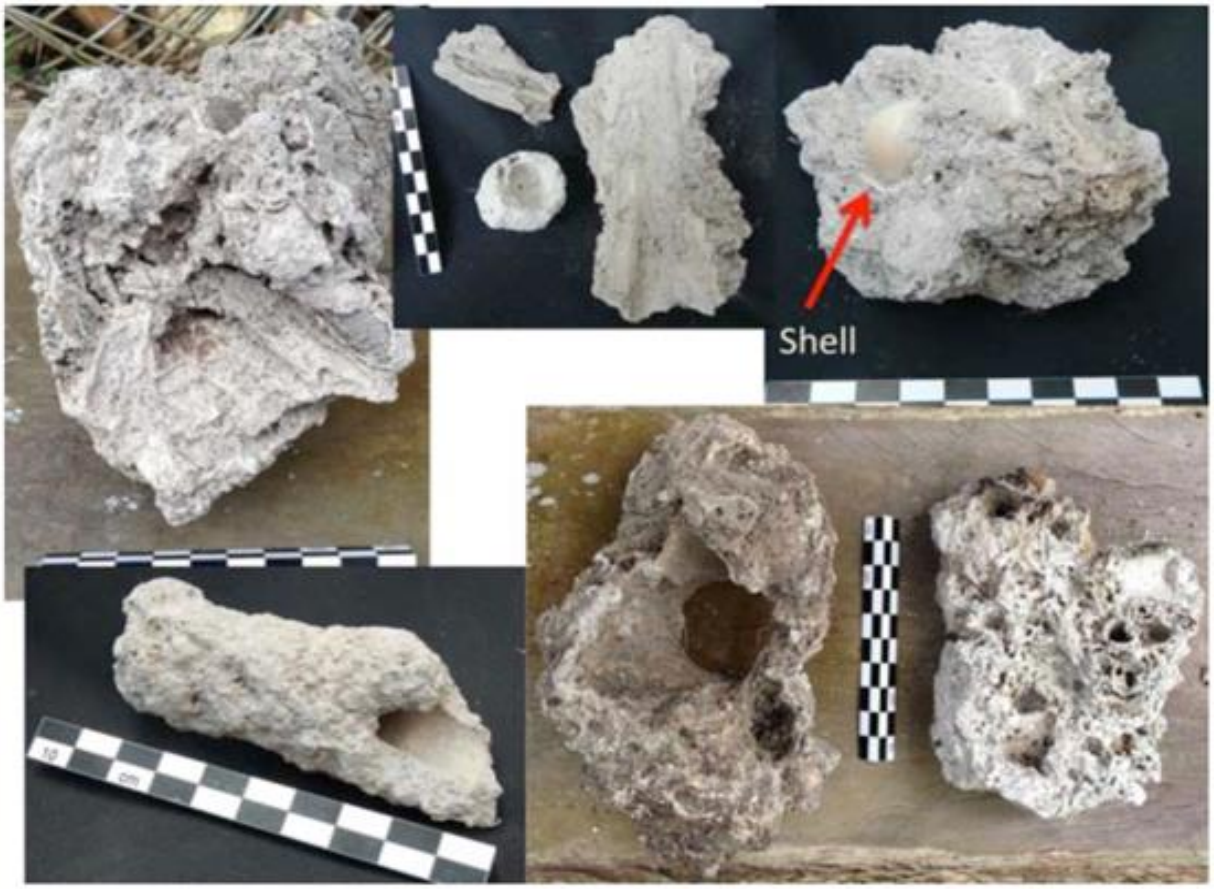

Figure 4.9 Tufa and shell from Structure 1 (Lucero 2014: Figure 1.16)

The material integration of the built and empty landscape was a common practice among the Maya, as witnessed in the inclusion of speleothems and marine shells in a shrine dedicated to the wind god in the Sibun Valley (Harrison-Buck 2012; Peterson et al. 2005), the use of speleothems as fill and marine fossils and tufa as the base for a pyramid at Caracol (Ishihara-Brito et al. 2011), the inclusion of speleothems in rain-related caches at Actun Tunichil Muknal (Moyes 2001), and the use of tufa as raw materials on walls, columns, reliefs and murals at Toniná (Riquelme 2012). For the Maya, the inclusion of these materials in the construction and termination fills served to animate the landscape, perpetuating the life-death-regeneration cycle.

At Cara Blanca, tufa and marine shell was the material articulation of water's kinesis in the water temple's construction.

Structure 1 sits on top of a plastered platform, which is then atop a plaza floor that stretches to the east, likely connecting Structure 1 to the rest of the Pool 1 space, including Structure 3 (Figure 4.10). The evidence outlined above indicates that, in this Pool 1 space, Structure 1 (the water temple) was a loci of ritual activity, but it was not alone in this endeavor of continuously becoming in the Cara Blanca constructed landscape

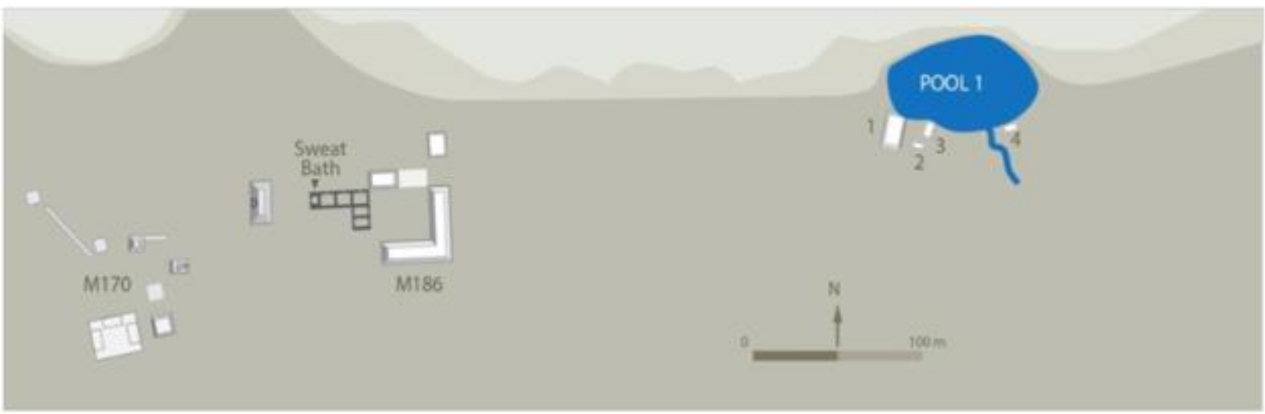

Figure 4.10 The Pool 1 architecture, showing the position of Structure 3 on the south side of Pool 1. Schematic by Julie McMahon.

Pool 1 Structure 3

Structure 3 Termination Rituals and Integration

Structure 3 (7.46 x 3.65 m, 0.80 m tall) is located 22 m to the southwest of Structure 1 and sits on the south side of Pool 1 (Figure 4.11). The ceremonial platform is oriented at 15°; this does not match the orientation of the water temple, suggesting that both buildings may have been oriented in relation to the pool rather than to each other. Structure 3 was originally located by Andrew Kinkella (Kinkella 1999:53) in his survey of the Cara Blanca landscape. In 2014, I led the first subsurface investigation of the platform, which I continued during the 2016 and 2018 field seasons (Larmon 2015, 2017; Larmon et al.2019a). Upon excavation, it became immediately clear that the Maya understood this space on the landscape as particularly important—permanent, intensive acts of termination set the platform apart from Structure 1. Though both spaces are integrated within the Pool 1 landscape, both enmeshed in the water fueled assemblage, the effort put into the termination of Structure 3 is unmatched at Pool 1.

Figure 4.11 Structure 3, south/southwest side of Pool 1.

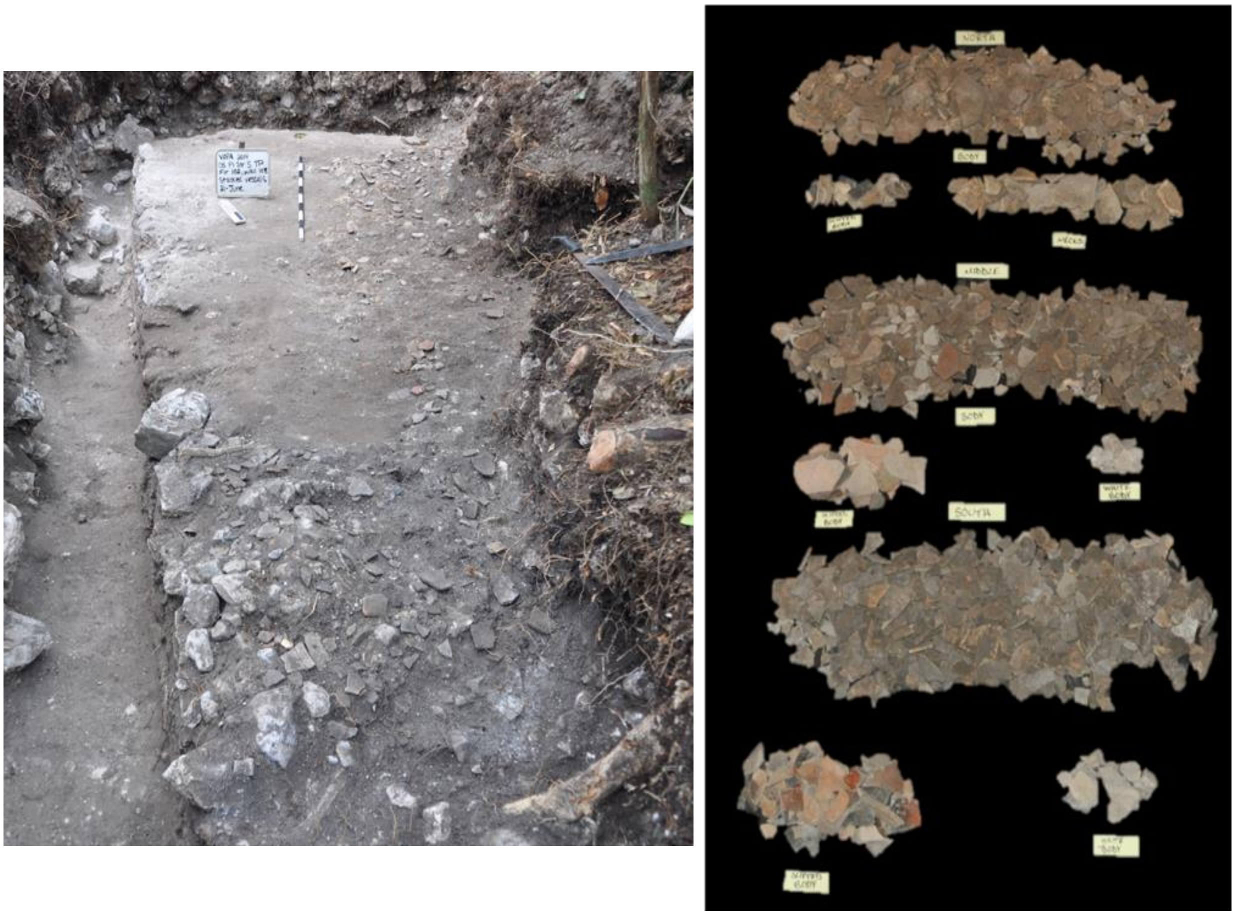

Figure 4.12. Left: Ceramic sherds atop Structure 3. Right: Piles of ceramic sherds after they were removed from atop the platform.

The Maya first burned the platform plaster surface (Floor 102). Subsequently, ceramics were smashed or broken sherds were deposited upon its surface —we recovered 3519 smashed ceramic sherds from directly on top of the floor (Figure 4.12) and an additional 1615 from the fill above. But burning the platform and smashing vessels was not adequate for terminating such a resonant space. The Maya then placed a layer of large boulders atop the burned platform and ceramic sherds, covering the entire structure (Figure 4.13). The Maya took great care to perform termination rituals that effectively ended the use life of this structure as a platform for the Maya, who would no longer be involved in its life history going forward. The extensive burning atop the platform, as well as the sheet of broken sherds and layer of large boulders certainly would adequately desanctify this space—a termination that was done with such permanence that it is clear the space was not to be revisited by the Maya.

Figure 4.13. Left: Boulders located atop Structure 3. Right: Charred portion of the platform. Both are important aspects of the termination of Structure 3.

No complete vessels were noted in this sheet of ceramics and only 5.97% of the assemblage was rims. If entire vessels were taken to the platform and smashed, we would expect to find a higher percentage of both rim sherds and refitting vessels. The composition of this assemblage instead suggests that Maya brought pieces of sherds from other locations, whether around Cara Blanca or from a greater distance, to contribute to these termination ceremonies; it is also possible that they took pieces of the ceremony away from Cara Blanca with them, as a means of staying connected to the space. While these acts certainly served as the termination in the regeneration/dedication/termination cycle typical of many ancient Maya structures (Walker and Lucero 2000), the space was also regenerated as the platform was re-immersed into the Cara Blanca soils and enveloped in vegetative growth.

Figure 4.14 Step 108 on the northside of Structure 3.

On the northern edge of the platform, there was a step (Step 108) from which Maya visitors likely threw offerings into Pool 1 (Figure 4.14). Interestingly, only this northern edge and the western edge of the platform are clearly delineated with formal walls. Considering that these edges face two central components of this powerful space—Structure 1 and Pool 1, it follows that they are distinct while the south and east side merely blend into the surrounding landscape, which may have been artificially risen to meet the sloping edges of the platform. Such blending of the landscape features, a practice known as geomancy (Dowd 2015; Yoon 1980), integrates the built and unbuilt and blurs material boundaries (see Chapter 5).

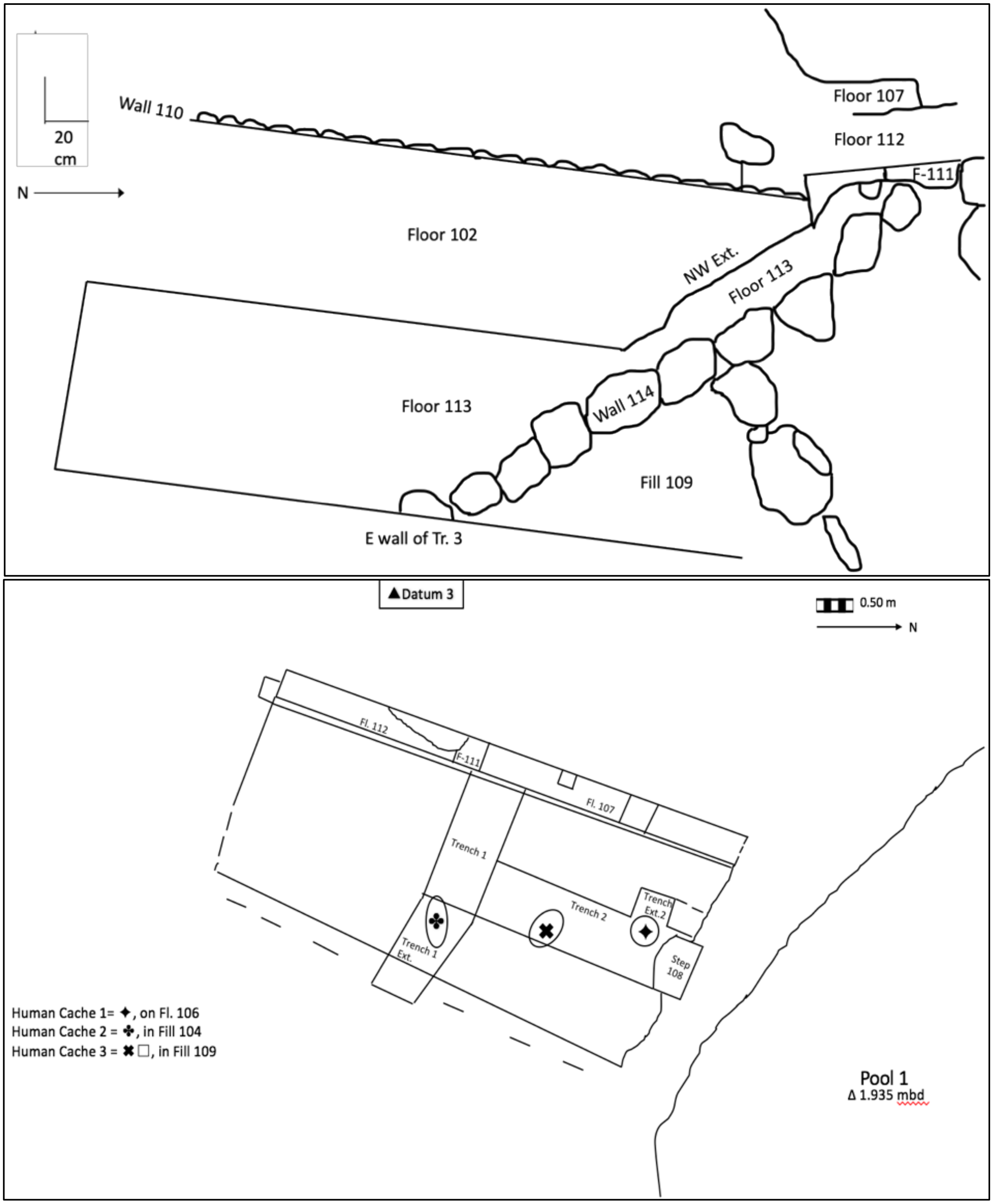

Figure 4.15 Top: Structure 3 planview post- 2016 excavations. Bottom: The 2018 additions.

Figure 4.16 Left: The eastern limits of our excavation of Floor 113, delineated by Wall 114. Right: Wall 114 and the depth or archaeological deposits.

Sub-platform Structure 3 Excavations

When we had removed the remnants of these termination rituals and exposed the entirety of the platform, we excavated two trenches in 2016, one running north-to-south from the northern edge of platform to the center (1.00 x 2.56 m, 15°), and one running east-to-west in the center of the platform (1.00 x 1.89 m, 105°) (Larmon 2017), as well as one trench in 2018 extending south from the northern trench (1.00 x 2.84 m, 15°) (Larmon et al. 2018) (Figure

4.15). These trenches exposed complex stratigraphy that indicated that there were two primary construction phases.

Though I originally thought that the entire structure had been constructed during the late Late and Terminal Classic periods, during the 2018 field season we uncovered a low platform in the southern half of Structure 3 that might have been constructed as early as the Early Classic period (Kowsakowski 2017, 2019). This southern platform is a plastered surface (Floor 113) delineated on its north side by a line of small boulders (Wall 114) (Figure 4.16, also see Figure 4.15) and oriented at 116°; its orientation diverges from the platform later constructed above, instead diagonally dissecting the later platform (see Figure 4.15 and 4.16). Due to time constraints, we were unable to determine Floor 113's eastern and southern extent. It was clear from this excavation, however, that it did not extend further to the north and did at least extend some to the west, towards Structure 1. The platform was bolstered by two layers of construction fill atop the natural subsoil. Though we did not recover much cultural material from within this anomalous platform, the few ceramic sherds that we did find suggest that it could be an Early to Early Late Classic construction. Noticeably absent from the assemblage were the large Cayo/Cambio Unslipped jars that dominate in most other Pool 1 collections; these jars are replaced by an Early Classic Dos Arroyos Polychrome basal flange vessel and other non-diagnostic Classic sherds (Kosakowsky 2019; Larmon et al. 2019a). Again, there was not enough for definitive chronology and the majority of the assemblage was unknown Classic, but it does seem to suggest that this platform might have been part of an earlier construction event (Larmon et al. 2019a), which is in line with the possibility that Maya likely had been visiting Pool 1 and other pools for centuries, leaving a just minimal footprint until the Terminal Classic. The need to supplicate the rain god, Chahk, did not evolve with the Terminal Classic droughts;

rather, it was a constant in Classic Maya daily lives. Prior to the droughts, it is likely that many rain rituals occurred elsewhere but surely the Maya knew of these pools and visited them at times. As the droughts worsened and the other locations for rain rituals could no longer be relied upon, rituals at these pool intensified, leaving a more permanent and elaborate mark upon the landscape. The earlier platform may have been a less formal component of the landscape that aided Maya participants communication with the other world and access to the portal.

Figure 4.17 Chronology of the upper Structure 3 platform.

Structure 3 Human Caches

The more elaborated structure built above this earlier platform appears to have had multiple construction events, but within a relatively short period of time. Each construction event dates to the late Late and Terminal Classic periods (Figure 4.17) (Kosakowsky 2017, 2019). There are two defining features of this later platform: the human caches and the ceramic assemblage. Three individuals were buried in Structure 3 as dedicatory human caches (Figure 4.18) (Carbaugh 2017; Larmon 2017; Lucero et al. 2017). That these individuals were interred with a lack of non-perishable grave goods in a ceremonial platform suggests that they were not necessarily considered burials, but rather offerings (see Carbaugh 2017). We call them caches because cache burials and artifacts are meant to be dedicatory offerings to the structure, and the deities and entities with whom it is associated (Kunen et al. 2002; Welsh 1988).

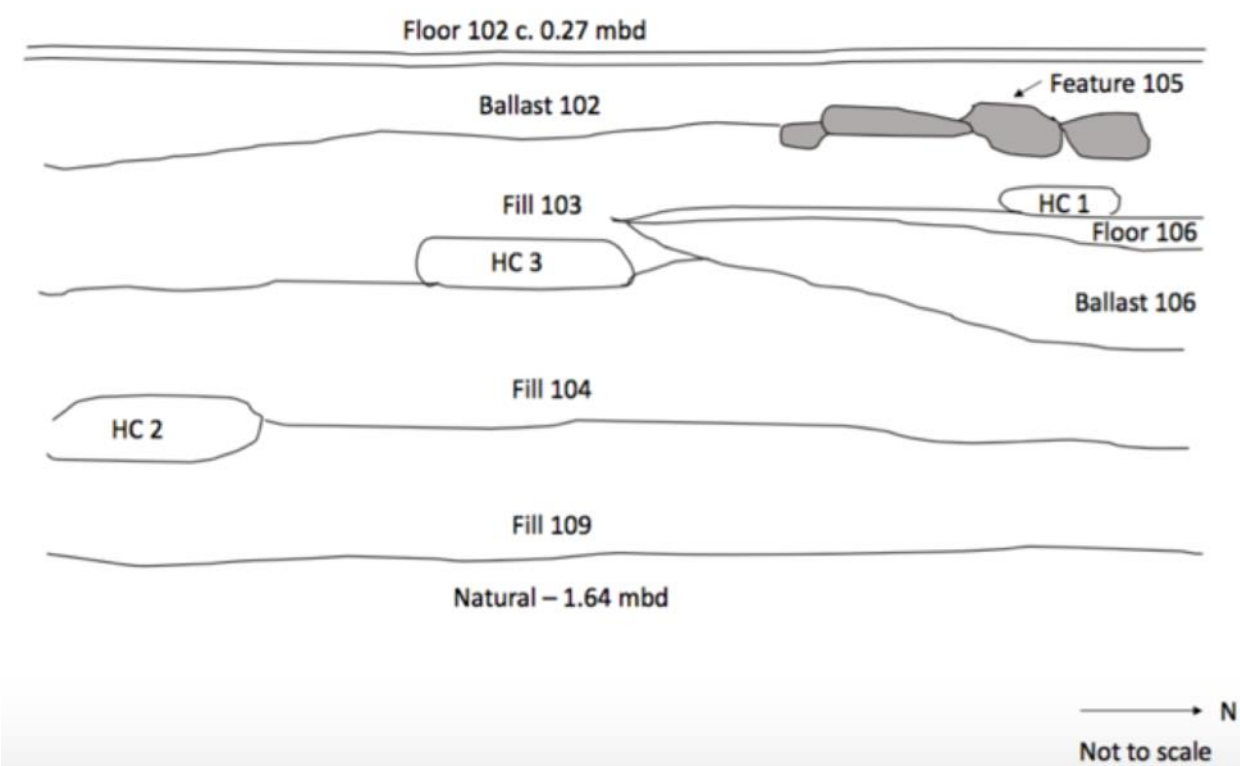

Figure 4.18 Placement of the human caches in the north half of Structure 3.

Table 4.2 Age and sex determinations for human caches (from Carbaugh 2017:Table 7.2)

Human Cache	**Age**				**Sex**			
	Age Estimate		**Dental Attrition**	**Cranial Suture Closure**	**Sex Estimate**	**Skull**		**Pelvis**
						Supra-orbital Ridge	Remus Angle	Greater Sciatic Notch
1	Adolescent	16-20 Years	16-20 Years	Open (sagittal & lambdoid)	?	-	-	-
2	Adolescent-Young Adult	18-22 Years	18-22 Years	-	Male?	4/4	-	-
3	Young Adult	20-24 Years	2024 Years	-	Female?	-	2/-	2/-

These caches were left as dedicatory offerings with each different phase of construction (see Figure 4.18, Table 4.2). All of the skeletal analysis was done by bioarchaeologist Aimée Carbaugh (Carbaugh 2017). Human Cache (HC) 2 (Figure 4.19) is associated with the earliest of these phases—the Maya dug into Fill 109 to leave the remains and then covered it with Fill 104. HC 2 is the primary, likely bundled interment of a possible young adult (18-22 years) male with limestone stones placed in a tight line around the individual's cranium and small boulders covering the individual. Pressed up against the right side of the individuals face was a broken metate fragment, likely intentionally placed and thus the only possible associated grave good. His head was left in the center of the structure with his body extending east.

Figure 4.19 Structure 3. HC 2

Figure 4.20 Structure 3, HC 3

Figure 4.21. Ballast support for Floor 102. Stones were directly atop HC 1.

The next interment was HC 3, found on top of Fill 104 with Fill 103 and Ballast 106 covering the individual (see Figure 4.18). HC 3 is a young adult (20-24 years) possible female. HC 3 was a primary, tightly flexed interment left lying on their right side, facing the east (Figure 4.20). No grave goods were found with HC 3. The final interment was HC 1, left on top of Floor 106 and beneath Feature 105, which consisted of stones left in a rough cross shape that likely acted as ballast support for Floor 102 (Figure 4.21) in the northern portion of the structure, where most visitors to the space would be standing to proffer into the *cenote*. HC 1 was the interment of a possible adolescent (16-20 years) individual (indeterminate sex) who was left with their head just southwest of Step 108 and on top of or surrounded by a pile of limestone, raising the head above the post-cranial remains (Figure 4.22). These stones appear to have been placed purposefully to keep the face oriented upwards, looking from underworld towards the threshold and terrestrial world. While Carbaugh (2017) hypothesizes that the remains were a primary interment in a tightly flexed position, they were far too deteriorated to definitively define its position.

Figure 4.22 Structure 3, HC 1

Structure 3 Ceramic Assemblage

Another important component of the Structure 3 excavation is the artifact assemblage (Figure 4.23). Like the artifacts recovered from atop the platform and from nearby Structure 1, the majority of the artifacts recovered suggested ceremonial use of the platform (Kosakowsky 2017, 2018; Larmon 2017; Larmon et al. 2018). Inomata and Stiver (1998:433) have outlined what they consider "utilitarian domestic objects" based upon the excavations of residences and the materials left behind. Domestic assemblages generally include large numbers of chert flakes, obsidian blades, mano and metates in pairs, other types of lithics, numerous reconstructable ceramic vessels for storage, food preparation, and serving. This description of a domestic assemblage has also been noted in ethnographic contexts (Henrickson and McDonald 1983) and in other archaeological contexts (Lucero 2001). Lucero (2001:14-15) further describes what ceramics used for serving, cooking, and storage (together comprising a domestic assemblage) would have looked like. Serving vessels typically are shallow and open, have thin walls, and fine or regular paste. Cooking vessels are generally short and squat with an open mouth and sometimes features to help handle them (appendages or textured surface). They generally have rounded bottoms and coarse and non-uniform paste. Finally, storage vessels have restricted necks to protect the contents and appendages for handling. These vessels have varying styles based upon long or short-term storage needs. What we have at all of Cara Blanca, including Structure 3, is not a domestic assemblage.

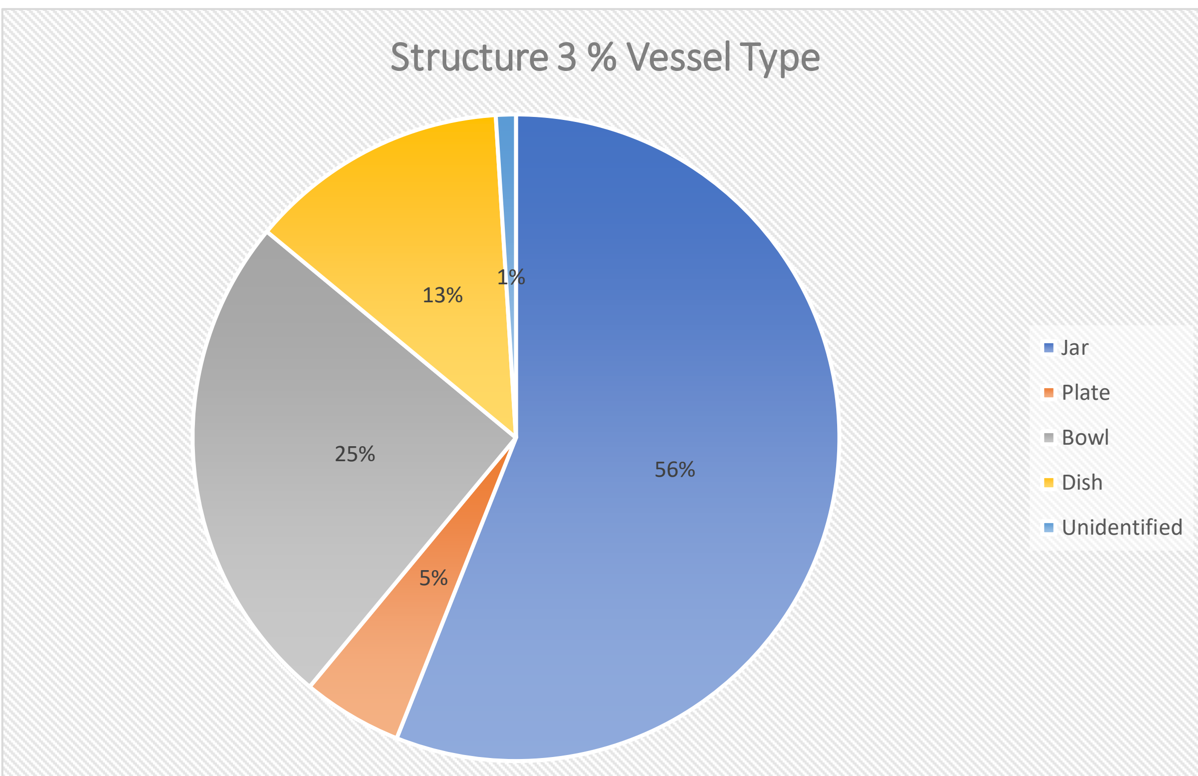

Figure 4.23 Composition of the entire Structure 3 ceramic assemblage.

To begin, the vast majority of the artifact assemblage is comprised of ceramics, rather than lithics, confirming that it is indeed a ritual space (Larmon and Nissen 2015; Larmon 2017;

Larmon et al. 2018). Additionally, we did not recover any complete ceramic vessels and only one that appeared to comprise the majority of a vessel, though this too was broken into pieces. Next, of those ceramics, the vast majority were jars (56.0%), meaning that we do not have a diverse enough assemblage to encompass the entirety of utilitarian and domestic needs (see Figure 4.23). Again, these jars were primarily narrow orifice and large-bodied, suggesting that they were used to hold large amounts of liquid. Jars' ties to water and water ritual solidify the importance of water in the space. Finally, only 9.5% of our entire assemblage was comprised of rims—4.9% directly atop the terminated structure and 14.4% from within structure fills—a percent small enough to safely rule out entire vessels being smashed but, rather, pieces of ceramics being brought the platform, likely from elsewhere. Interestingly, the 2018 excavation ceramic assemblage from the southern half of the structure was comprised of 18.0% rims. The strata from which we got most of the rims was Fill 103, had a ceramic assemblage consisting of 25.8-30.0% rims. This might indicate that the rims were selectively deposited in the southern portion of Fill 103; the 2016 excavations of the northern portion of Fill 103 had just 16% rims.

The composition of the Structure 3 ceramics is relatively similar to Structure 1 (Table 4.3). From the entire structure, we recovered 56.03% jars. When we look at more specific contexts, from directly atop Floor 102, we recovered 56.43% jar rims and 69.12% from the fill above. From within structure fills, we recovered 48.10% jar rims. Interestingly, the highest concentration of jars was found atop the platform in the sheet of ceramic (on Floor 102) and the fill above (Topsoil 101)—both of these are considered terminating deposits. Like at Structure 1, water was intimately tied to the termination of this platform. Still, jars were the most common identifiable ceramic type throughout the entire Structure 3 assemblage, highlighting the importance of water to the platform's function.

Again, much like at Structure 1, the majority of the artifacts recovered were broken ceramic sherds and represent styles from throughout the Maya regions, including primarily the eastern Petén, northern Belize, and the Belize Valley (Kosakowsky 2016, 2019). Without petrographic analysis to confirm to source of the materials composing these sherds, we are unable to definitively say more than that there are styles from throughout the Maya world represented, indicating that there are minimally long distance contacts between these areas and those visiting the pool. We can, however, hypothesize that these sherds were brought to the platform from distinct homelands. This has been reported at other Maya sites that were portals for the otherworld. For instance, Moyes (2001:75) found that 39% of the sherds recovered from Actun Tunichil Muknal, a large cave in western Belize, could not be refitted, and thus were likely "brought in as offerings in and of themselves".

Table 4.3 Ceramic Counts for Structure 3 by year and by context

	All sherds	**All rims**	**% total rims Non-ID or other**	**% ID rims**	**% ID Jar rims**	**% ID Plate rims**	**% ID Dish rims**	**% ID rims Bowls rims**
ALL 2014	3778	5.68% (n=215)	4.65% (n=10)	5.43% (n=205)	**62.93% (n=129)**	4.39% (n=9)	18.05% (n=37)	14.63% (n=30)
ALL 2016	2963	11.04% (n=327)	8.26% (n=27)	10.12% (n=300)	**50.33% (n=151)**	6.67% (n=20)	8.33% (n=25)	34.67% (n=104)
ALL 2018	1730	14.97% (n=259)	18.53% (n=48)	12.49% (n=216)	**57.40% (n=124)**	4.63% (n=10)	14.81% (n=32)	20.83% (n=45)
Total	8471	9.46% (n=801)	10.61% (n=85)	8.51% (n=721)	**56.03% (n=404)**	5.41% (n=39)	13.04% (n=94)	24.83% (n=179)
				By Context				
TR. 1/2	1083	10.43% (n=113)	7.08% (n=8)	9.70% (n=105)	**42.86% (n=45)**	7.62% (n=8)	13.33% (n=14)	36.19% (n=38)
TR. 3	1236	17.96% (n=222)	20.72% (n=46)	14.60% (n=180)	**53.33% (n=96)**	5.56% (n=10)	17.22% (n=31)	21.67% (n=39)
Top Flr. 102	3519	5.97% (n=210)	3.81% (n=8)	5.74% (n=202)	**56.43% (n=114)**	4.95% (n=10)	17.33% (n=35)	21.29% (n=43)
Topsoil 101	1615	9.16% (n=148)	8.11% (n=12)	8.42% (n=136)	**69.12% (n=94)**	.74% (n=1)	5.88% (n=8)	24.26% (n=33)

Cara Blanca Pool 1 in the Maya Ontology

Structure 1

The context of Cara Blanca Pool 1, when seen from within the Maya ontology, is clear. As Lucero and Kinkella (2015) explain, Structure 1 was a water temple that was accessed by Maya, perhaps from different areas of the Maya region throughout the late Late Classic and Terminal Classic droughts. The prevalence of jars containing water or (in some cases) *balche* (Harrison 2014), an alcoholic drink made by fermenting the bark of the *balché* tree that was consumed by Maya in ceremonies, reaffirms the necessity of water in contributing to the maintenance of human and other-than-human relationships. Jars are most often used in ceremonies in caves because of their association with water and Chahk (Moyes et al. 2009). The percentage of jars at Structures 1 and 3 (72.11% and 56.03%, respectively) mirrors other ceremonial contexts associated with rain ritual, such as the central Belizean cave Actun Tunichil Muknal, where 54-64% of the ceramic assemblage was composed of jars (Moyes 2001:68-69) (see Chapter 2 for a discussion of the importance of caves and *cenotes* as portals to the underworld in Maya cosmology).

The positioning of the structures surrounding Pool 1 is not by chance. The water temple sits on the west side of Pool 1, the direction of the setting sun and nighttime; most of the caches and ritual activity appears to have occurred facing the east, where the sun rises and, therefore, the direction associated with creation/renewal (Houston et al. 2009:27-40). The structure's placement in the west, with ritual and supplicatory intentions directed towards the east might signify a recognition of the contemporary chaos driven by drought and the need for renewal. The opposition of features of night (the sunset) and day (the sunrise) have been noted elsewhere as an indication of cosmic warfare and chaos (see Brumfiel 2004 for a discussion of the sun/night conflict in the Basin of Mexico). One of the caches, the jaguar vessel (see Lucero et al. 2016) was placed in the northeastern corner of Room 2. Jaguars are known for traversing the worlds (upper-middle-under) by lounging on tree branches over the water—the tree of course is the axis mundi that connects the three realms (Miller and Taube 1993:102 cited in Lucero 2014:19). They are associated with portals to the underworld. Also on the jaguar vessel, project epigrapher Joanne Baron identified motifs associated with darkness (an *ak'bal*) and with yellow (*k'an*) (Lucero 2014). While Baron notes that this marks the rim of the vessel as celestial, I want to highlight its association with opposition. Again, the opposition of the sun/daylight with darkness shows an attention to turmoil or regeneration. In concert with these motifs of chaos are water signs—in this case, parallel lines with small dots or circles down the middle and spirals coming off. While this opposition does not necessarily indicate confrontation or conflict (Christenson 2001:155), its association with water motifs during periods of drought and social upheaval suggests an acute awareness of the environmentally traumatic period.

The dominant colors at Structure 1, reds and blues, can also be associated with the confrontation of the underworld and renewal (Houston et al. 2009:66-67). These associations place this water temple at the center of creation, a reproduction of—and tribute to—the deities that called the earth from the primordial sea; the middle world that we all inhabit emerged from the waters of the underworld (Christensen 2007: 58-63). It is in this space of creation that the feasting occurred at Structure 1 as a socially integrative event that offered sustenance to the humans, ancestors, and deities present.

The placement of termination deposits around the edge of Room 2 and Hallway 4 emphasizes the water temple's position at the boundary, the threshold. Harrison (2015) notes that those using the water temple appear to have purposefully avoided leaving terminating deposits in the center of the room, choosing to instead leave them at the rooms' margins, perhaps as a means releasing those *ch'ulel* positioned in liminality, further deteriorating the boundaries between the realms. The fact that some of these deposits included inverted jars further indicates their role in termination and the perpetuity of the life, death, renewal cycles.

Finally, the use of materials that are formed in and by the water, such as tufa and shell, in both the construction and termination fills of the water temple worked to integrate terrestrial and aquatic, constructed and empty spaces. Through the tufa and shell, water helped to build and to terminate the structure—an active participant in site formation. The inclusion of these materials at Cara Blanca integrated built and empty space. It is at this watery threshold that all things are renewed, or reintegrated into the Cara Blanca Pool 1 assemblage in a new form.

Table 4.4 Average rim diameters from Structures 1 and 3

Average rim diameter (cm)	***Pool 1 Str. 1***	***Pool 1 Str. 3***
Jars	19.3 (n=131)	22.1 (n=342)
Plates	35.7 (n=15)	34.6 (n=35)
Dishes	40.3 (n=13)	31.2 (n=86)
Bowls	29.8 (n=17)	32.4 (n=93)
Plate/dish	-	34.9 (n=7)

Structure 3

While feasting occurred at Structure 1, we do not have evidence for feasting at Structure 3. Though the ceramic assemblage at Structure 3 is similar to that of Structure 1, with jars representing the largest proportion (56.03%) of identifiable vessels with similar rim diameters (see Table 4.4), we do not have extensive faunal remains suggestive of feasting from Structure 3. We do have many more fragmented vessels and, of course, three human caches. The broken sherds atop Structure 3 and from within its fills may have acted in three ways: first, as an offering to the underworld; second, as an act of termination; third, to blur spatial boundaries.

First, the intentional inclusion of pieces of ceramics, rather than complete ceramic vessels, in ritual contexts has been noted elsewhere (Moyes 2001:71-72; Moyes et al. 2009; Tedlock 1982:65). Moyes (2001:73-74) connects the high percentage of singular (those that cannot be refit with other sherds), broken sherds to the Maya 16th century origin story, *Popol Vuh*—the hero twins victory over the Lords of the Underworld and their promise to provide only offerings of sap nodules and *broken or brittle* goods to the lords (Christensen 2007:175). These broken sherds served as offerings to the Lords of the Underworld. The position of Structure 3 south of the pool, the portal to the underworld, likely signifies its position as "the underworld" at Pool 1 and the ceramics as offerings to the ancestors and deities within.

These sherds, while acting as offerings to the underworld, also de-animated the space to start afresh, and connected that new beginning to distinct homelands. Termination rituals, discussed above, often included the destruction of artifacts, spaces, and so forth. The inclusion of thousands of ceramics sherds atop of Structure 3 certainly appears to be an intentional de-animating of that space. Interesting, however, the ceramics (or, at the very least, the ceramic styles) have origins from throughout the Maya region. The styles of the Structure 3 ceramics overlap with those of northern Belize, the Belize Valley, and Petén sites (Kosakowsky 2017). This pattern does not necessarily indicate that these ceramics were produced there, nor that they were brought from that region, merely that there is some connection between Cara Blanca, northern Belize, eastern Petén, and the Belize Valley. The presence of foreign styles becomes more interesting when we hypothesize that these sherds were brought to Structure 3 from various, distinct homelands, as has been recorded at other sites. As mentioned above, 39% of the sherds recovered from Actun Tunichil Muknal were likely brought in from other locations as offerings to that space (Moyes 2001:75). These individual sherds are an essential part of the rituals being performed in the cave. Similarly, Pool 1 visitors likely brought connections to, and representations of, their home and community in the form of vessels or sherds to tie them to this threshold to the otherworld. These ceramics became "sticky" (Harris 2014:91) with the memories of their home space—transporting the ceramics from different regions to Cara Blanca helped transform the space into one that incorporates or remembers different communities or households and, therefore, connects the "distinct" locales.

Concepts of chronological and spatial distance can be interrogated as heirloom and foreign pieces are witnessed in the Cara Blanca space, tying it to distant places and times. Similarly, the delineation of what is natural and what is cultural can be questioned, as we truly have difficulty delineating the east and south sides of platform, which melt into landscape. The distinction between what is natural and what is cultural is blurred with the construction of platform, which in its southern position, blurs the distinction between the middle world and the underworld.

The position of the three human caches further supports the connection of the platform to the underworld. As shown above (see Figure 4.18), the three human caches were placed in an ascending line towards the southern edge of Pool 1 and the portal to the underworld. These individuals, then would have acted as dedicatory caches for the structure itself *and* as a map to the underworld, guiding the way for those providing offerings into the *cenote*. As visitors to the space traversed the platform from south-to-north, a path indicated by Feature 105 (the cross-shaped ballast support), they approached the portal to meet these deities and their ancestors at the pool's edge, pulling together and integrating "distinct" dimensions and worlds. Here, the HC as non-burials "can be viewed as similar to other caches or non-human deposits demonstrating their equal roles in establishing place and a new array of relations" (Lucero 2018:345).

In sum, the Pool 1 space was a cosmogram of sorts, with constructed and unconstructed features facilitating relations between the worlds. The complementary opposition of day and night highlights an understanding of the turmoil or need for renewal in the Terminal Classic period. The ceremonial use of jars in rain-related dedicatory rituals ties that turmoil the prolonged droughts occurring throughout the Maya region (see Chapter 3). Maya ritual practices were often seasonal, many oriented around the agricultural productivity and the rainy season (Scarborough 1998, Vogt 1968:136). As Maya relationships with water shifts throughout the year, so too would their draw to and experiences with Pool 1 waters. Kinesis, as any entity and assemblage, is not a stable force, but rather one that ebbs and flows within its context. To go back to the analogy of a symphony, musical pieces and those performing them are most affective when they are dynamic—sinking into calls for *pianissimo* and emerging from softness with swells of *fortissimo*. By definition, water's kinesis is not static.

Cara Blanca Pool 1 Beyond Maya Ontology

I have established the role of Cara Blanca within Maya ontology; it is a place of regeneration and supplication. But what of the water beyond Maya ontology? Structure 1 was built by the hands of Maya, but its origins can be attributed to the 62+ m deep pool upon whose edge it sits with the hidden chasm Actun Ek Nen lurking beneath the surface. The Maya understand the pool as a place of liminality and creation, a point preempted by New Materialist understandings of water. The Cara Blanca waters are indeed points of creation and life—the likely instigation for this Maya belief. In periods of desiccation and water-fed turmoil, these waters fuel the landscape, sustain its inhabitants, and foster growth. This point is perfectly exemplified by the role nearby Pool 25 played in fending of flames, sustaining some life (Figure 4.24). Notice that the pool fed the thirsty landscape and some patches of green were able to thrive amongst the charred remains. Pool 1 provided for humans; Pool 1 provided for vegetation; Pool 1 provided for the ancestors and deities; Pool 1 provided for animals. What we need to understand here then, is not just the ways that human groups used a space, but the ways that the watery landscape orchestrated its own use.

Figure 4.24 Pool 25 post-2016 fire.

The position of the Pool 1 architecture is driven by water, and so too is its composition. The tufa used in the construction fill of both Structure 1 and Structure 3 was formed in the water, by the water. Pool 1 facilitated the precipitation of calcium carbonate around decomposing materials, a solid materialization of water's kinesis. The engagement of Maya and water can be seen in the use of tufa in construction fill—in the movement of tufa from water to structure, we see social relations unfolding between two constituents of the assemblage (water and human). Water instigates and mediates this relationality through facilitation of tufa formation. This mutual engagement ultimately works to place water as an active participant in and organizer of the construction. Again, then, we are forced to ask where is the boundary between "cultural"/constructed and "natural"?

If we go one step further to look at the artifact assemblages associated with the Pool 1 space, water is further implicated as the mediator of the space. The association of water jars with Structure 1 and 3 is overwhelming, in both cases making up the majority of the ceramic assemblage. This highlights the importance of water at the site, but also indicates the continually unfolding dialogue between water, humans, and other constituents of the assemblage. The negotiation occurs in two important ways: the creation of the vessels used in Cara Blanca rituals and their use at the pool. Maya ceramics were made with water, clay, and some form of temper (sand, limestone, ash, etc.). It is the integration of these distinct materials that, when treated with fire, transforms into the vessel that we see shattered atop Structure 3 or left in supplication on the eastern wall of Structure 1. While different materials and methods are put into action to produce the vessels, here water is highlighted. As discussed above, the distinct styles of ceramics suggest that these ceramics may have been brought from different regions of the Maya world. In such a case, water too would have moved throughout the landscape, connecting one's local source of water to the rituals being performed at Cara Blanca—a kinetic tentacle extending through diverse geographies. This extended relation complicates a western understanding of geography—through these waters, distinct worlds/homes/cities/spaces/materialities are connected (see also Pauketat 2019; Strang 2014).

Beyond the construction of these vessels, their use in water related ritual, their intent of rain related dedication, and their placement on the edge of Pool 1 show that water could not be discrete from the movements of the pool. Though it is impossible to say that these jars held the Cara Blanca waters, they are a material manifestation of the mutual engagement of the water and the people. The practices emerging from the Pool 1 space would have necessitated the continued relations of Pool 1 waters with human and other-than-human things and acted as a bridge between the aquatic and terrestrial realms of the landscape. Water fueled these relations, which became trans-scalar (connecting local and regional) and trans-dimensional (connecting the aquatic, the terrestrial, and the cosmic) (e.g., Pauketat 2019:268). Today, water continues to orchestrate the space. As the water temple crumbles into the west side of the pool and consumes the pools edges, the Cara Blanca assemblage continues to shift.

Final Thoughts

How does such an understanding of water change our understanding of the space? We now are forced to reconsider the space as inherently blurring the lines of natural and cultural—if water is the mediator, we cannot consider even the structures themselves as "cultural" constructions. The history of the Terminal Classic material articulation of Pool 1 was not *caused* by the Maya or Maya understandings of water, rather by the material implications of the water itself. Water was the orchestrator, the mediator, the facilitator of a space that held particular sacred implication to the Maya, and of the material rendering of their universe through architecture, artifacts, open space, and movement. As the Maya visited this space from various regions of the Maya world, they became embedded in the landscape that was territorialized by Pool 1 waters. The hydrological and social, human and not, relations were truly mutually constituted and the significance of the space is born from that kinetic energy. In Chapter 5, I will expand this understanding of the Cara Blanca landscape to include human and non-human movement within and between the pools.

CHAPTER 5: CEREMONIAL CIRCUITS AND CARA BLANCA

Water is the driving force of all nature. – Leonardo Da Vinci

In Chapter 4, I showed how the Cara Blanca Pool 1 space was pulled together by the pool's water throughout the Terminal Classic period. Just as water acted to integrate in the built Maya landscape, it did so in the empty. Water's movement through the entire space, with and without humans, served to thread together these seemingly disparate pools. Well beyond the Pool 1 architecture and ambiance, the landscape remained vibrant with kinetic forces. Thus, we now include empty spaces and movement in our story of the Cara Blanca landscape. In Chapter 2, I introduced the concept of "empty spaces", as well as how and why archaeologists have studied them in the past. In many cases, scholars still erroneously divorce settlement from environment. I use "empty" as opposed to "unbuilt" while still recognizing that the term "empty" does not capture the vibrant existence of those spaces; they are "empty-full" (Aedo 2019). Here, I primarily focus on empty spaces associated with ceremonial processions or circuits. Empty spaces are of great importance to ceremonial and ritual lives of the pre-Hispanic, historic, and contemporary Maya (e.g., Lucero 2018). In what follows I discuss what Maya ceremonial pilgrimages and circuits are and the role that built *and* "empty" spaces play in these processions, how we have identified the remnants of an ancient Maya ceremonial circuit at Cara Blanca, and how water was instigator, perpetuator, and omnipotent in the landscape.

Exploring the Cara Blanca landscape—"empty" spaces, built spaces, and things—in relation to related epigraphic, iconographic, and ethnographic records of lowland Maya landscapes, provides historical and cultural contingency for the importance of those "empty" spaces in the Maya ontology. I examine how the Cara Blanca waters, similar to Harrison-Buck's (2010) speleothems, flowed throughout Cara Blanca, animating the landscape, connecting the worlds, and facilitating communication between Maya, ancestors, and deities. Further, exploring how water was an integral and active purveyor of kinetic forces shows that the landscape's vivacity endures the fluctuations of cultural contingency and thrives in posthuman understandings of the space. I do not emphasize the relationship between human and "other-than-human persons" (Harrison-Buck 2012:75), but rather the posthuman exploration of how matter (including humans, things, and environments) emerges through the waters to articulate this particular material configuration of the Cara Blanca landscape.

Ceremonial Processions

I first define ceremonial processions and pilgrimages so I can then tie those movements to Cara Blanca. Pilgrimages are "the visiting of a venerated place in expectation of spiritual and perhaps material benefit" (Hammond and Bobo 1994:19)—often involving rituals and deities (Brady 1989:413-414). They include the short- or long-distance travel *to* designated places and *through* landscapes; movement is necessary to their affect. The travel undertaken by pilgrims is intentional movement, sometimes taxing, in a way that "animate(s) the importance of the rituals performed" and "bond(s) pilgrims and place more strongly" (Ashmore n.d.:6-7). As Turner (1973:191) describes, pilgrimages are "'liminal' phenomena" in that they remove people from what might be considered a stable, familiar, or normal state. At the same time, pilgrimages, their human and non-human dimensions, briefly transform landscape dynamics and relations, meaning that the landscapes themselves become liminal. Elements of sacred landscapes include "mountains, cliffs, boulders, caves, ruins, bodies of water, and islands" (Palka 2014:9), integrating concepts of "built" and "empty" and highlighting the essential role of spaces not intruded upon by architecture in daily (and ritual) life. When overlapping with ceremonial circuits the movement through these spaces becomes more prescribed and, perhaps, even more essential.

In the Maya world, ceremonial circuits are paths walked in order to ritually define "geographic territories and their interrelationships" (Freidel and Sabloff 1984:74). Ceremonial processions often involve ritual practitioners and other members of society walking between designated ritual "stations" to reaffirm their relationship with and to that landscape (e.g., Freidel and Sabloff 1984 74-76; Freidel et al. 1993: 419; Lucero 2018; Reese-Taylor 2002; Vogt 1969:390-391). Ceremonial processions have been documented in contemporary, ethnohistoric, and pre-Hispanic Maya communities. Movement is essential in each description of a circuit—the counterclockwise movement of circuits (Vogt 1969:390) or the passing in/out/around or a geographic location (Vogt 1969:388)—but often only the actions performed at each "station" are discussed and the route of the circuit itself is depreciated (Reese-Taylor 2002). The "empty" spaces of ceremonial circuits, however, play an essential role in the meaning that emerges from the landscape.

Because of their animated, cosmological status, landscape features such as mountains, caves, and water bodies play particularly important roles in these circuits. In Momostenango, Guatemala, Freidel et al. (1993:419) describe the four-part ritual circuit of contemporary K'iche' Maya, involving the "great directional mountains that bound the Momostenkan world". During this circuit, processors move to a sacred mountain in each cardinal direction every 13 days—east, west, south, and finally north. The movement through this landscape is both the "sowing and the planting" (Freidel et al. 1993:419) that stabilizes the town of Momostenkan within the mountains. In the case of the K'iche' Maya living in Momostenkan, the mountains are, perhaps, primary, but as Fash (2005:114) points out "throughout Mesoamerica, mountains and their caves are seen as the sources for the life-giving and powerfully sacred water the gods send to earth". Water and mountains are intimately tied.

Vogt (1969:390-391) documents ethnographic examples of ceremonial circuits among the Zinacanteco (Tzotzil) Maya in Chiapas, Mexico. He notes that ceremonial circuits move counterclockwise and almost always involve mountains; the function of these circuits is to make clear and uphold boundaries—with their movement through the landscape, processors are saying "this is our sacred center through which the holy river flows and around which live our ancestral gods watching over and guarding all of us" (Vogt 1969:390). In these cases "ritual respects are paid to them whenever a ceremonial pilgrimage passes in or out of a (place)" (Vogt 1969:388). Again passing through and over, the movement in a space regardless of "built" or "empty" is animating—note that this movement is not relegated to just humans, as the flow of the holy river is essential. Though the "built" portions of the circuit, including cross-shrines that are doorways to the otherworld (Vogt 1969:387), help to tie the landscape to the three worlds, it is the movement through spaces that integrates the charged landscape.

Pre-Hispanic examples of ceremonial circuits (Freidel and Sabloff 1984; Lucero 2018; Lucero and Kinkella 2015; Lucero et al. 2016; Moyes 2005; Prufer 2002), too, emphasize Maya and other animated entities integrating the landscape. Though they are inevitably more difficult to recognize archaeologically, depictions of charged landscapes in iconography and material correlations with ethnographic examples of ceremonial circuits suggest that they have been in practice since at least the Late Preclassic period (300 BCE –250 CE) (Reese-Taylor 2002). Reese-Taylor (2002) explores ethnohistoric and ethnographic examples of ceremonial processions in order to identify physical features of the circuits and then connects those features to ancient Maya settlements. She notes three distinct types of ceremonial processions—ritual circumambulation, banner processions, and base-to-summit processions. In her account, these processions integrate the "built" and "empty" spaces of civic centers. The civic center, however, is not a necessary aspect of the circuits and each of these types of processions can unfold outside of built, or urban, spaces (Larmon and Carbaugh 2018; Lucero and Kinkella 2015; Lucero et al. 2016; Lucero et al. 2017). As mentioned in Chapter 2, ancient Maya temples are mountains, and vice versa. Therefore, though Reese-Taylor depicts each of these ceremonial processions as occurring in the urban centers where political power resides within the monumental architecture, the mountains and pools of Cara Blanca provide the same centralized power (of ancestral spirits and deities) as civic centers. If this is the case, the trials of traversing the arduous, empty Cara Blanca landscape contributes to the significance of the experience (Ashmore 2009). Below, I explore these three choreographed movements (banner, base-to-summit, and circumambulation) in the Cara Blanca landscape. In explaining movement through the landscape, I must also describe some of the specific built and empty spaces that comprise the landscape. Thus, I start with M186 (the sweatbath and range structure), move to the Pool 15 water shrine and Motmot Sinkhole, and end at the inundated eastern extent of Cara Blanca.

The Ceremonial Circuit of Cara Blanca

Data collected over 20 years of research at Cara Blanca suggest that the 25 pools are part of a ceremonial circuit, which was formalized and intensified in part as a response to rulers' failure to secure rain during the Terminal Classic droughts. Ceremonial circuits are paths that Maya walked connecting built architecture in a way that makes explicit their relationship to that space—including both the architecture and sacred, empty spaces (Vogt 1969:89, 446). Because *cenotes* are considered portals to the underworld and a space in which Chahk, the rain god, resides, by reaffirming their relationship to this landscape, the Maya were also strengthening their connection to, and their ability to communicate with, Chahk. The 25 pools of Cara Blanca are each active participants in this landscape. Each pool contributes to the vivacity of the landscape. Each pool is a lifegiving force, quenching the thirst of those engaged in its web. Though I do incorporate parts of the built Cara Blanca space into this conversation, *interpretive* emphasis remains on movement.

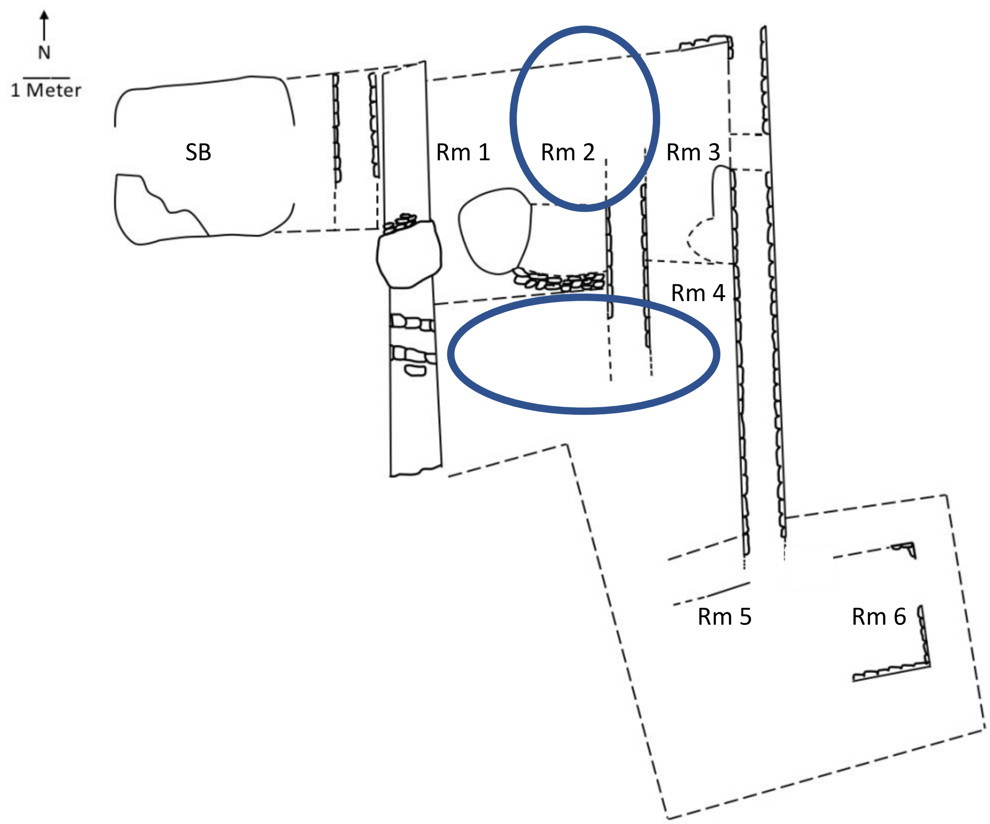

Figure 5.1 Planview of M186 showing the sweatbath (SB) and six room range structure. The blue ovals show areas of disturbance.

Cara Blanca M186

In his early investigations of the Cara Blanca space, Andrew Kinkella noted "a large, enclosed plaza group of range structures 2-3 m in height" that he labeled M186 (Kinkella 2008:53) (see Figure 4.10, Figure 5.1). He hypothesized that there was a sweatbath included in the structures, a place of ritual cleansing for visitor's journey through the landscape. The group is 400 m to the west of Pool 1, where we have excavated a water temple and ceremonial platform used by the Maya during the Terminal Classic (800-900 CE) droughts (see Chapter 4).

Sweatbaths are, perhaps, most commonly found at Maya centers dating to the Classic Period (250-900 CE) (Child 2007). While they are frequently associated with larger centers, there are also examples of sweatbaths that are in rural settings, not associated with elites or centers (see McKee 2002). Ethnographically, Maya use sweatbaths in purification rituals of both their own bodies and of the structure. Stuart (1998) has proposed that in some contexts, architectural rituals involving fire serve to "feed" the structure—the vibrancy of the fire necessary to the function of a sweatbath is transferred to the structure itself. Here, the act of throwing water on the hearth and steam filling the space and the body would have been an animating and cleansing act. As the structure is ensouled, it is simultaneously cleansed. The heat from the hearth and steam both brings life to the structure and sanctifies it for its ritual life. Maya, too, have used sweatbaths in the process of body purification and childbirth. Child (2007) notes that there are numerous ethnographic accounts of purifying oneself in a sweatbath before participating in rituals of any kind (see Bucko 1998:82)—but particularly before being transported to the supernatural world or during transformation rituals (Bellas 1997:123-125). Thus, the sweatbath and movement through and within the sweatbath would have been essential aspects of this landscape during the Terminal Classic period. Below, I outline support for identifying this structure as a sweatbath.

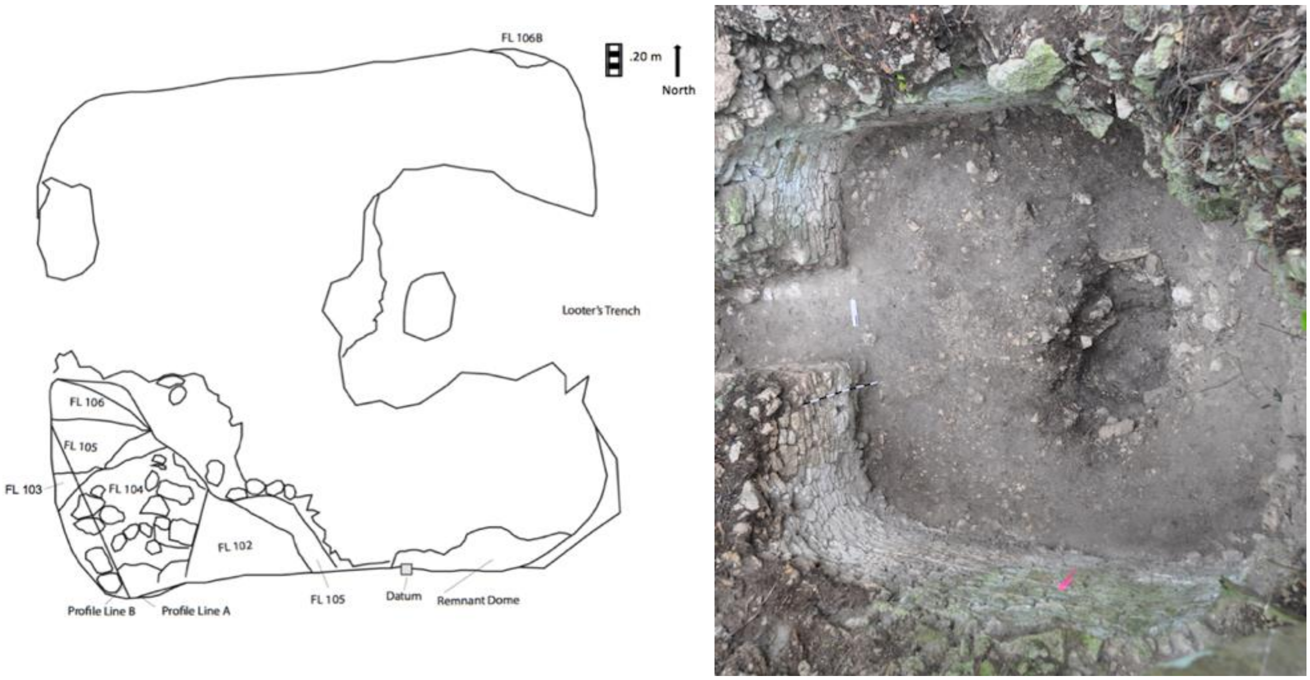

Figure 5.2 Planview of the M186 sweatbath.

The M186 Sweatbath

The M186 sweatbath (Figure 5.2) is a 3.66 m x 3.66 m "squircle"-shaped room oriented at 10° W of north with the remnants of a low dome (or true arch) ceiling that is c. 1.8 m high (Figure 5.3). It sits at the west end of a range structure with six additional rooms (several with looters trenches) (see Figure 5.1). It was the unique squircle shape of the interior and domed roof that initially led Kinkella to hypothesize that this was sweatbath (Kinkella 2008, 2009:153-157). While they are frequently mentioned epigraphically, relatively few sweatbaths have been "securely identified" archaeologically (McKee 2002). Child (2007) notes three primary features of sweathouses and some additional traits; these traits are roughly equivalent to those discussed by Satterthwaite and colleagues (2005) and are related to either heat production or heat retention.

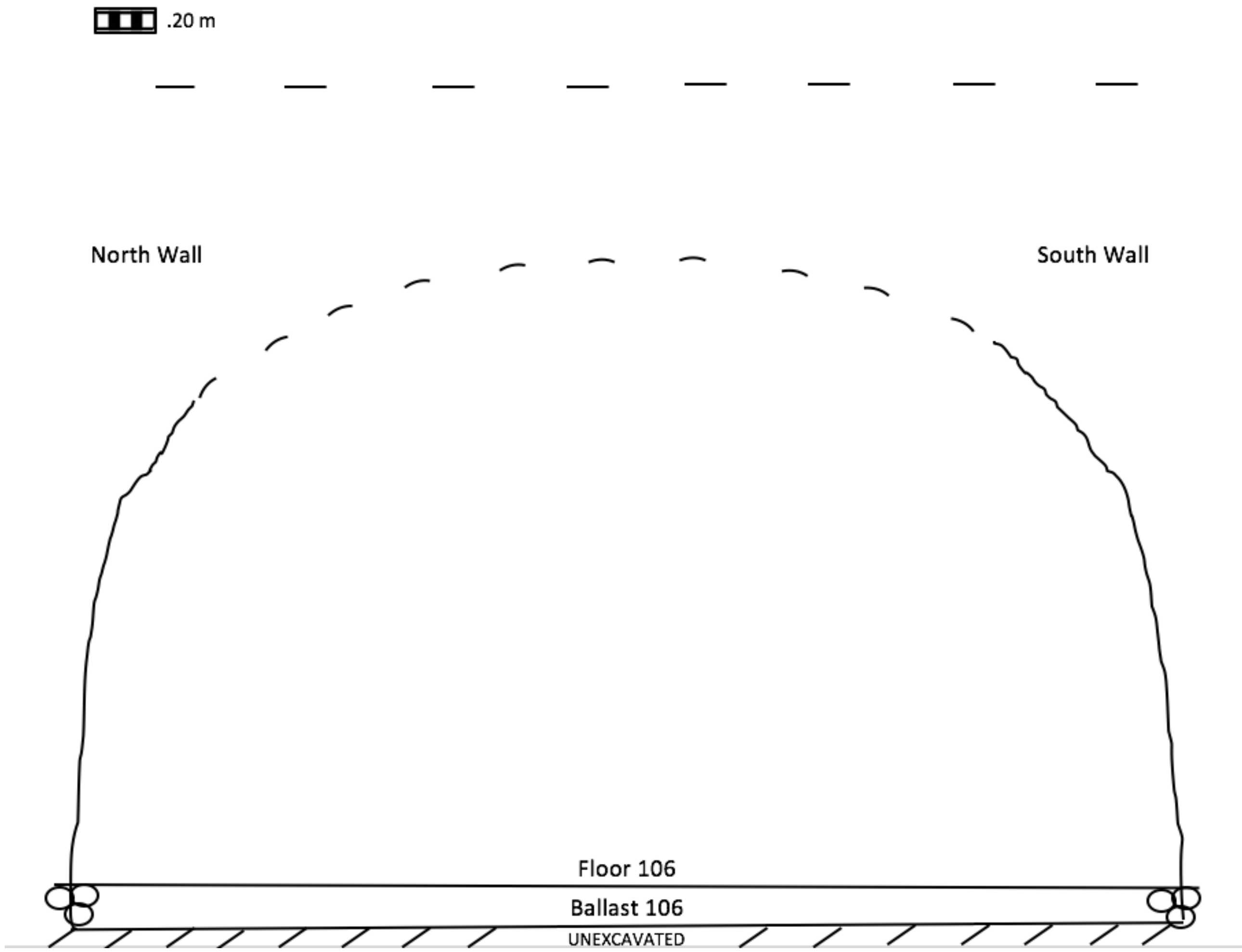

Figure 5.3 Profile view of the sweatbath showing the domed roof.

Table 5.1 Comparative lists of ethnographic and archaeological sweatbath dimensions (Larmon and Amin 2017:Table 5.2), adapted from Satterthwaite (2005:253), McKee (2002:89-91) and Jones (1996:75). All dimensions in m unless otherwise noted (adapted from Larmon and Amin 2017:80-81). Missing data is denoted by dashes.

Identification	**Interior length**	**Interior width**	**Maximum Height**	**Area (sq. m.)**	**Doorway Width**	**Doorway Height**
ETHNOGRAPHIC						
San Martin Teotihuacan	-	-	-	-	0.50	0.70
Tepoztlán	1.60	1.80	1.10	2.90	0.50	0.60
Chichicastenango 1	1.80	1.80	1.50	3.10	0.60	0.60
Milpa Alta 1	2.00	2.00	1.10	3.60	0.50	0.60
Aguacatán	2.40	2.10	1.20	4.90	1.00	0.90
ARCHAEOLOGICAL						
Str. P-7-1ST-B, Piedras Negras	3.30	2.20	2.70	7.30	0.80	1.10
Str. J-17, Piedras Negras	4.00	3.00	-	11.80	0.80	-
Str N-1-1st-B, Piedras Negras	4.80	3.30	-	15.60	0.70	1.00
Str. 9 at Cerén	3.65	3.83	1.00 – 1.80	8.00	0.40-0.50	0.80
Str. 5E-22, Tikal	5.14	2.75	2.40	14.14	0.76	1.55
M186, Cara Blanca	3.65	3.65	1.80	13.32	0.60	-

As outlined by Child, all sweatbaths should have the following: a low domed roof (heat retention), a narrow doorway (heat retention), and a hearth area with hot rocks (heat production) (see also Helmke 2006). An additional trait noted by Child (2007:252) is a sloped floor or other features related to drainage. The M186 sweatbath had many of the traits outlined by other scholars and fit well within the range of normal in regards to the size of sweatbath elements (Table 5.1). This information is adapted from Larmon and Amin (2017:80-81):

1.) **Domed Roof** – The domed roof is a trait of sweatbaths meant to help with both heat and steam retention. This feature has been noted at various Maya sweatbaths, including a 1.5 m high domed roof at Structure 9 at Cerén (McKee 2002). At the Cara Blanca sweatbath, much of the roof was destroyed by looters and the 2010 Hurricane Richard (Figure 5.4). In initial surveys in 2007 and in 2016, the remnants of a low domed roof were noted. We were able to reconstruct the height of the ceiling to c. 1.8 m from the interior plaster surface at its highest point (see Figure 5.3). Both the domed architecture and low ceiling are indicative of sweatbath structures.

Figure 5.4 Photograph of the sweatbath pre-2010 Hurricane Richard

2.) **Narrow Door** – Again, a single, narrow doorway would have acted to retain heat and steam within the structure, and perhaps to restrict access to the sacred space (see Figure 5.2). Doorways at recorded sweatbaths range from 0.80 m at Chichén Itzá (Ruppert 1952), 0.70-0.89 m wide at Piedras Negras (Cresson 1938:89), and 0.50 m wide at

Cerén (McKee 2002). At M186, there was a single 0.60 m wide doorway on the west side of the room. Though there was not enough of the structure left intact to gauge the height of the doorway, the narrow entrance suggests that it, too, would have been low in order to further retain heat and steam.

3.) **Hearth Area** – The hearth area serves as the heat and steam producing space within the sweatbath. The hearth can take on a number of forms including fire chambers, fireboxes, or fireplaces (Satterthwaite 2005:251). Clearly, the presence of some space for fire or for the placement of already heated stones within the sweatbath is essential. We uncovered a box-like feature (F-104) in the southwest corner of the room (Figure 5.5)—the only portion of the interior architecture that was left intact by looters. The box-like feature was comprised of 20-25 medium-to-large cobbles and, at its widest point, measures 1 x 0.95 m. There was not extensive evidence of burning within the sweatbath, and it is most likely that cobbles were heated outside of the room and brought in to produce steam (see Helmke 2006; Satterthwaite 2005:251).

Figure 5.5 Southwest corner of the sweatbath with the potential hearth feature outline

4.) **Additional Feature: Drainage** – Satterthwaite (2005:250) notes that sloping floors are common features of various buildings at Piedras Negras and elsewhere in the Maya region. Alone they cannot be considered an indicator of sweatbath function; however, the other indicators mentioned above, one can tentatively support our sweatbath identification. Some of the floors in sweatbaths gradually slope towards the doorway. Satterthwaite discusses peripherally down-sloping floors in which there are "noticeable slopes downward to the bases of all the walls, or to some of them. The connotation is that water would collect or run out along the walls, rather than spread out…" (2005:250). In the M186 sweatbath, a floor that slopes down 19-20° into the southern wall (Figure 5.6). This was likely a feature meant to drain excess water, though there was not enough of the floor's surfaces left intact to confirm that this is a drainage feature.

Figure 5.6 The potential drainage feature in the sweatbath. Red line highlights the sloping floor.

5.) **Additional Feature: Interior Benches –** Satterthwaite (2005:255) also notes ethnographic examples of benches within sweatbaths and suggests that they functioned to raise users towards the ceiling where the heat and steam would have been most effective. The profile of the interior of M186, as well as what little of the plaster surfaces there was left intact, suggest that there may have been bench like surfaces in at least the corners of the room based on their height off the floor and distance from the ceiling—it would have been only c. 0.25 m off the floor and c. 1.25 m from the ceiling. Their secure designation, however, is impossible with the state of disrepair within the structure.

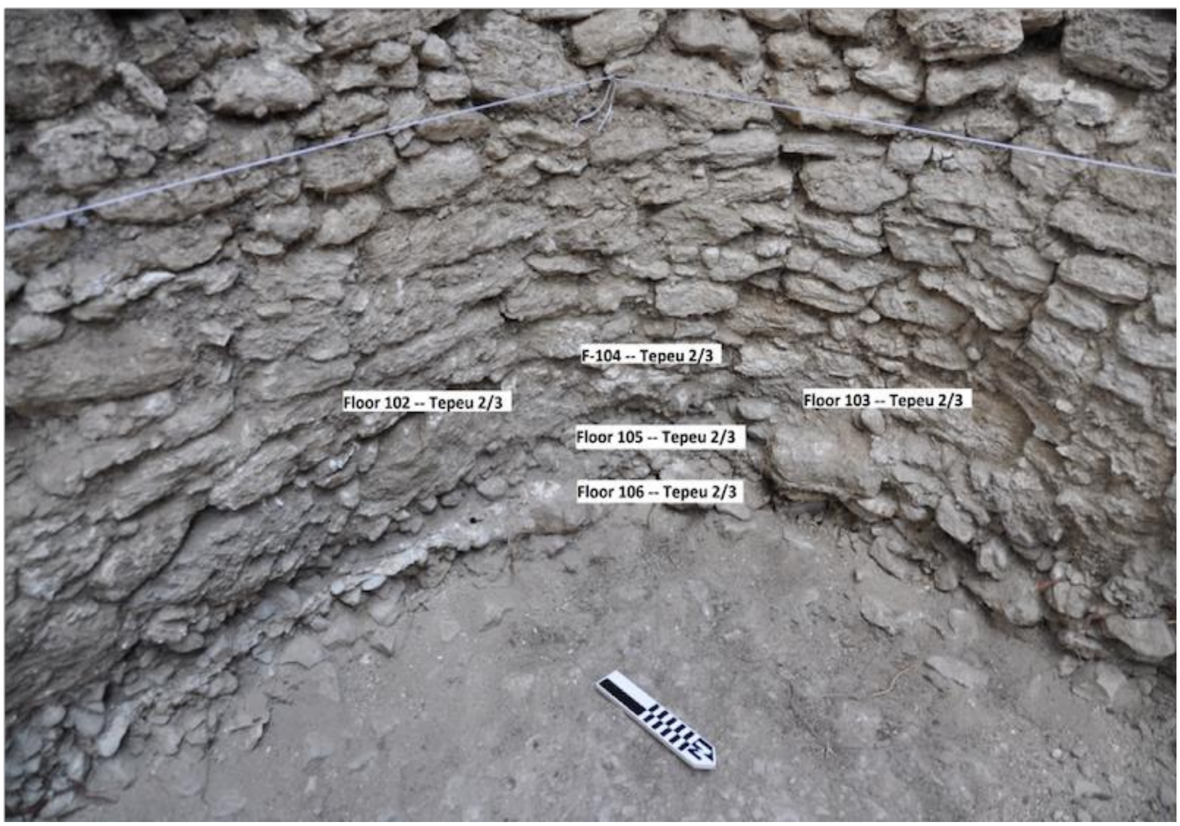

Figure 5.7 The southwest corner of the sweatbath showing the structure chronology. Compare to Figure 5.2 (left) showing the planview of this same corner. Each layer dates to Tepeu 2/3, the late Late and Terminal Classic periods.

The ceramic assemblage recovered from the sweatbath consists of materials dating from the Early Classic through the late Late and Terminal Classic periods (300-900 CE), suggesting that heirlooms were once again included in the use of space (Kosakowsky 2017; Larmon and Amin 2017). The entire structure construction and use, however, can be dated to the late Late and Terminal Classic period, when the droughts were at their most damaging and the water temple and ceremonial platform were constructed at Pool 1 (Figure 5.7). It is most likely, then, that those performing rain rituals at the Pool 1 temple and platform were also purifying themselves at the M186 sweatbath.

M186 Range Structure

The sweatbath is not standalone. A six-roomed range structure extends in a L-shape east from the sweatbath (see Figure 5.1) (see Larmon et al. 2019a for a complete discussion of the 2018 excavations). After clearing the structure of much of the vegetation we realized that it was both much more disturbed and more complex than we originally thought. The M186 range structure is 13.5 m (east-to-west) by 16 m (north-to-south). It has nearly 1 m wide walls that likely once supported vaulted architecture running the length of the building. At first we thought that the building was thoroughly looted, much like the sweatbath. Entire walls and floors had been dug out, and it appeared that large parts of the structure had actually been disassembled.

We attempted to clean up around the apparent looters' trenches to get a better idea of stratigraphic sequence; we also excavated small columns to get chronology from closed contexts and a trench running north-to-south in Room 1. In each of the six rooms, we recovered ceramics that date to the period of drought (Kosakowsky 2019; Larmon et al. 2019a); though many late Late and Terminal Classic jars were included in the assemblage, including large Cayo/Cambio unlsipped jars, this is not what stood about the assemblage. Instead what so impressive is the mix of trade and local wares, the unique architectural features, and a human interment. Our excavations reveal that there was a purposeful re-intrusion into, and disassembly of, the M186 range architecture, including walls, roof, and floors. In juxtaposition, though the sweatbath floors were largely removed, its walls and roof was left intact (see Figure 5.4).

Figure 5.8 Left: Profile of the Room 1 Trench showing the wall between the sweatbath and the range structure. Right: HR 1, placement within the stratigraphy indicated with red line.

Construction/Deconstruction and Architectural Features

The Room 1 trench (1 x 3.36 m) was excavated north-to-south along the length of the building. Room 1 is directly adjacent to the sweatbath and so we hoped that the trench might expose artifacts or architecture that shed light on the Maya use of the structure. However, as we excavated, we recognized that there were no walls and no permanent, formal plaster floors. Rather, this entire room was fill consisting of cobbles, boulders and loose sandy loam sediments (Figure 5.8). In the upper-most stratum of the Room 1 trench, we exposed the remains of an individual (HR1) (see Figure 5.8). This stratum was loose, rocky termination fill that we first thought to be looter's debris. We soon realized, however, that rather than just result of looter's debris, this individual appeared to be purposefully placed in a bundled formation just to the east of the eastern sweatbath wall. The remains were analyzed by bioarchaeology student Amy Copper (University of Illinois at Urbana-Champaign (UIUC) under the direction of certified skeletal analyst Aimée Carbaugh (UIUC) and with assistance from Dr. Anna Novotny (Texas Tech). Copper identified a probable left and right femur, a probable right tibia, and fragments from probable humerus and fibula. Only the long bones and teeth remained of the individual, perhaps because cortical bones and teeth are most durable in adverse preservation conditions, such as rocky fill (Copper 2019). It is also possible that these portions of the remains were preferentially redeposited in this secondary burial. Much like the remains exposed in Structure 3 (see Chapter 4), this individual was interred with no associated grave goods. The long bones' intentional inclusion in the uppermost fill, towards the very top of the structure, suggests that they may have been left as terminating deposit (e.g., Harrison-Buck et al. 2017).

Beneath HR1, there was then about 1 meter of fill; in the northern portion of the trench this fill was much looser than the south, suggesting that it might have been a secondary fill deposited at another time. Beneath this fill, there was a thick, very soft plaster floor (10-12 cm thick). The floor was unusable—unfired and unstable—again maybe suggesting this was a later intrusion upon the space, not expected to be exposed to the elements for long (Larmon et al. 2019a). In the fill beneath this floor, we recovered 12 human teeth—they were all different teeth, suggesting they are from one individual. Though we cannot determine if the long bones and teeth are from the same individual, it is possible that the entire stratigraphic sequence—loose fill with teeth, thick floor, loose fill, HR1—was all placed at one time as a termination cache. A similarly thick and unusable floor (c. 18 cm thick) was also exposed in Room 2 (Figure 5.9). Much like the floor in Room 1, it was unfired and unstable. We did not expose any walls between what we called Room 1 and Room 2—if these two floors are, in fact, connected, the two contexts are likely part of the same room and the entire, massive floor could have been placed as an unusable sealant, of sorts, on the entire context. Unfortunately, much of the context has been destroyed.

Though we initially thought that the destruction was caused by looters, these excavations reveal that the Maya intentionally took apart the range building in the Terminal Classic, perhaps because ceremonies did not appease gods and ancestors due to persisting droughts. The 1 m wide walls found throughout the structure suggest that large vault stones had once comprised the roof of the range structure, not including the sweatbath. Those vault stones, however, were not found in any backfill piles surrounding the structure, as they were at the Pool 1 water temple (Str. 1) (see Chapter 4). Additionally, there was not enough backfill around the structure to account for all of the looting—if traditional looters did, in fact, destroy much of this architecture, where was the evidence for it? Where were the traditional looter's tunnel and backfill piles?

Figure 5.9 Left: Room 2 and 3. Red dot shows the location of the Room 3 Cluster. Orange lines outline a 1 m thick wall that once supported vault stones. Top: Thick and unstable floor in Room 2. Position indicated with red arrow.

The current state of the structure is more suggestive of an intentional dismantling and removal of cut stone and other building materials. The dearth of vault stones and backfill piles indicates that the structure was purposefully disassembled in acts of termination (see Chapter 4 for a discussion of termination rituals) and pieces of the building were brought elsewhere to connect M186 to other locales. Where, we do not know. Interestingly, while possible heirloom pieces (ceramics dating earlier than the period of construction, the late Late and Terminal Classic periods) were present in many contexts, they were most prevalent in the upper most termination fill (Kosakowsky 2019). If this is the case, the heirloom pieces, which work to tie Cara Blanca to other times and places, may have been essential features of the termination of the M186 range structure.

The possible dismantling of the range structure is quite different from the sweatbath itself, which appears to have been deconstructed by looters and weather-related forces. Though looters did remove most of the sweatbath floors, they seemed to have left its true arch architecture and four walls intact (Kinkella 2009:155-156; Larmon and Amin 2017). It may have been left intact for future use; if Maya were to visit the area later to perform any water-related rituals, they could have purified themselves in the sweatbath. Or, perhaps this structure was left untouched because of its potency. As a space of healing and cleansing (Larmon and Amin 2017), it would have had particular significance to visitors, regardless of the functioning of the rest of the structure.

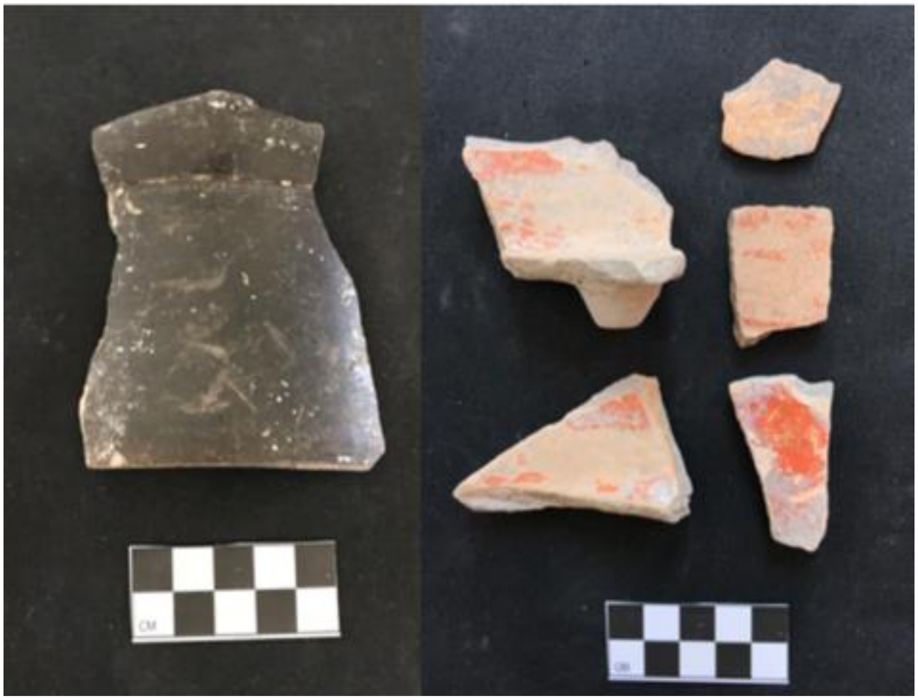

Figure 5.10 Left: Achoté black jar neck. Right: Benqué Viejo polychrome with basal flange.

Figure 5.11 Room 3 Ceramic Cluster

Local and Non-local Wares

In addition to the individual interred in the structure and the evidence for purposeful dismantling of the structure, we recovered a diverse ceramic assemblage from M186. Like at Structure 3 at Pool 1, the M186 ceramic assemblage is composed of styles from throughout the Maya region (Kosakowsky 2019); we were able to identify styles linked to the Petén, the Belize Valley, and from other peripheral areas such as the Sibun area in eastern Belize and the urban center San Jose to the north. These vessels include fine wares that might represent trade wares, such as Achoté Black and Benqué Viejo Polychromes (Figure 5.10). The most distinct vessel recovered was part of a ceramic cluster left on the floor in Room 3 (Figure 5.11, see also Figure 5.9). The cluster was a mix of Petén style polychromes and Achoté Black group vessels, large unslipped Cayo/Cambio jars, Tinaja Red jars, Belize Red vessels, and an eroded polychrome, ash temper jar with specular hematite (Figure 5.12). This eroded polychrome jar is most unusual because the specular hematite is a mineral that originates in El Salvador and the Guatemalan highlands. The vessel may have been made in either of these places and transported/traded to the M186 area, or nodules of specular hematite were transported to the Cara Blanca area and the vessels were made locally. At least in some cases, it was not just a foreign style being emulated but foreign materials were actually included in the assemblage.

Most likely, we have a mix of traded or imported ceramics with locally made ceramics; in fact, we have a large portion of Belize Red vessels with both ash and carbonate/calcite temper (Kosakowsky 2019). Belize Red vessels generally have an ash temper and are thought to originate in the Belize Valley, possibly at the site of Baking Pot (Hoggarth 2013; Chase and Chase 2012). While we do have some of the standard Belize Red wares, the mixed temper Belize red might represent a local ware (Kosakowsky 2019). The prevalence of imported and local wares shows that ceramics both important to local households and those that are part of more distant centers are brought together (through trade or long distance travel) at these Cara Blanca spaces—tying together diverse Maya people in this potent space. The ceramic assemblage further supports the hypothesis put forth in Chapter 4 that people were bringing vessels to Cara Blanca as a pilgrimage destination (see also Lucero and Kinkella 2015; Lucero et al. 2016).

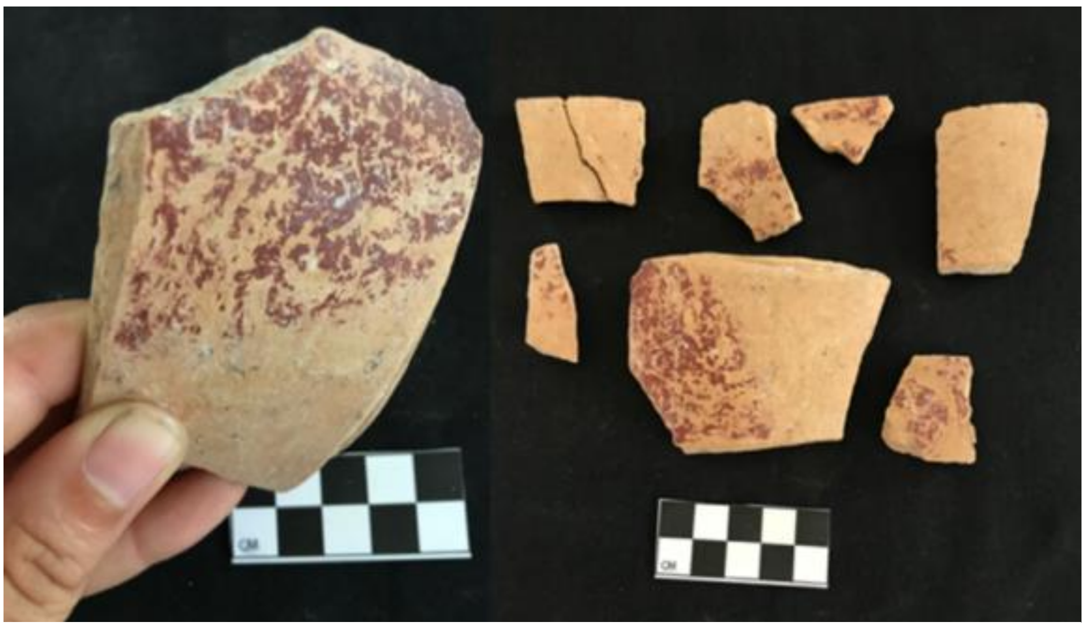

Figure 5.12 Specular hematite jar from the Room 3 cluster.

During the rainy season when the area is inundated with rainwater, the only suitable path between the M186 sweatbath and Pool 1 follows along the edge of an escarpment (Kinkella 2008). Those taking this path would walk directly to the Pool 1 water temple—the temple acts as a barrier to the pool. This observation connects the cleansing occurring in the sweatbath to the ritual surrounding Pool 1, suggesting that those performing rain rituals at Pool 1 (see Chapter 4) first cleansed at the sweatbath, perhaps preparing ceremonial materials at the range structure, or even resting after the possibly long and arduous journey. Ten mounds surround M186, three to the east and seven to the west, that may have also acted as staging areas or temporary housing (Larmon et al. 2019a). Kinkella (2008) excavated a 1x1 m test pit in mound M170, and revealed a burial ~30 cm below the surface. Unlike the rest of the individuals interred at Cara Blanca, this individual was buried with an inverted Belize Red plate and Achoté Black bowl over their cranium (Figure 5.13). These ceramics date the burial the late Late or Terminal Classic period and suggest that M170 was more residential, again, likely a temporary housing based upon the mound size (Lucero et al. 2016).

Figure 5.13 Right: M170 1x1 test unit and burial. Left: skull fragments and remnants of an inverted Belize Red vessel. Close-up: Close of the other associated inverted vessel, an Achoté Black bowl (Lucero et al. 2016: Figure 8).

Banner Procession at Pool 1 and M186

As mentioned, the path between M186 and Pool 1 might have been the chosen path of those participating in the ceremonial circuits on the Cara Blanca landscape. Kathryn Reese-Taylor proposes that "there are distinct types of ritual circuits and that the incorporation of one or more of these ritual circuits is requisite to the design of a proper Maya civic center" (2002:144). As I argue above, though Reese-Taylor depicts each of these ceremonial processions as occurring in urban centers engaging with the monumental architecture, the mountains and pools of Cara Blanca provide the same centralized power. The ceremonial circuit at Pool 1 would have been a banner procession (Larmon and Carbaugh 2018), which moves from a periphery to a center (Reese Taylor 2002). Banner processions are "a mechanism to strengthen integration and social solidarity within towns or villages comprised of dispersed settlements" (Reese Taylor 2002:152). At Cara Blanca, Pool 1 was the deepest of the *cenotes*, the portal that would bring visitors closest to the underworld, and therefore the central power on the landscape. After all, at Pool 1 there is both the surface portal, as well as a hidden watery portal (Actun Ek Nen) one, lying beneath the water's surface c. 30 m deep (Lucero 2011). Visitors to Cara Blanca likely cleansed themselves at the sweatbath before engaging with the rest of the landscape (Larmon and Amin 2017; Lucero et al. 2017). Here, the sweatbath is the periphery, Pool 1 is the center, and the processions between M186 and Pool 1 would have integrated the landscape—highlighting the idea that the entire landscape, not just the ceremonial stops, is essential. Similarly, the procession up Structure 3, crossing over the three interred individuals (see Chapter 4), would have been the final integrating movement through the landscape. Ethnographically, these processions have been a way to indicate rotating political authority and social integration. The ceramic assemblage suggests that people were coming from throughout the Maya region to participate in the space. This procession would have acted to disseminate "authority" over the space and integrate a diverse community under the common goal of supplicating ancestors and deities for reprieve from the Terminal Classic droughts. Pool 1 was a potent place—but it is only one of 25 pools, many of which likely comprised a ceremonial circuit. In what follows, I discuss additional pools to further show the potency of Cara Blanca.

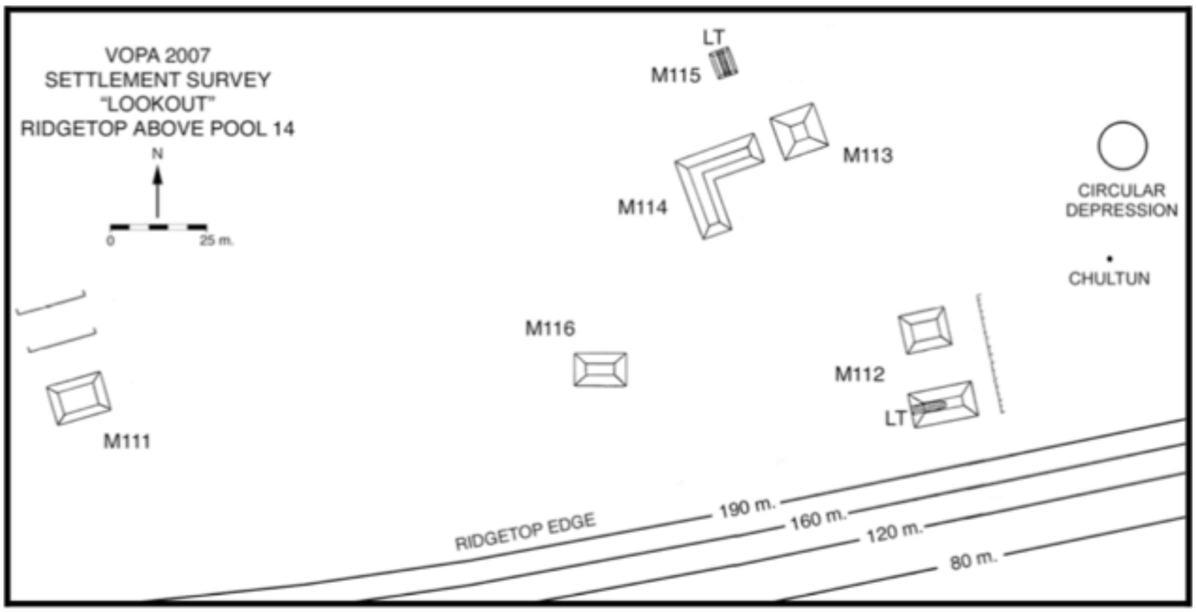

Figure 5.14 The "Lookout Group" in the ridge above Pool 15 (Kinkella 2009: Figure 5.18)

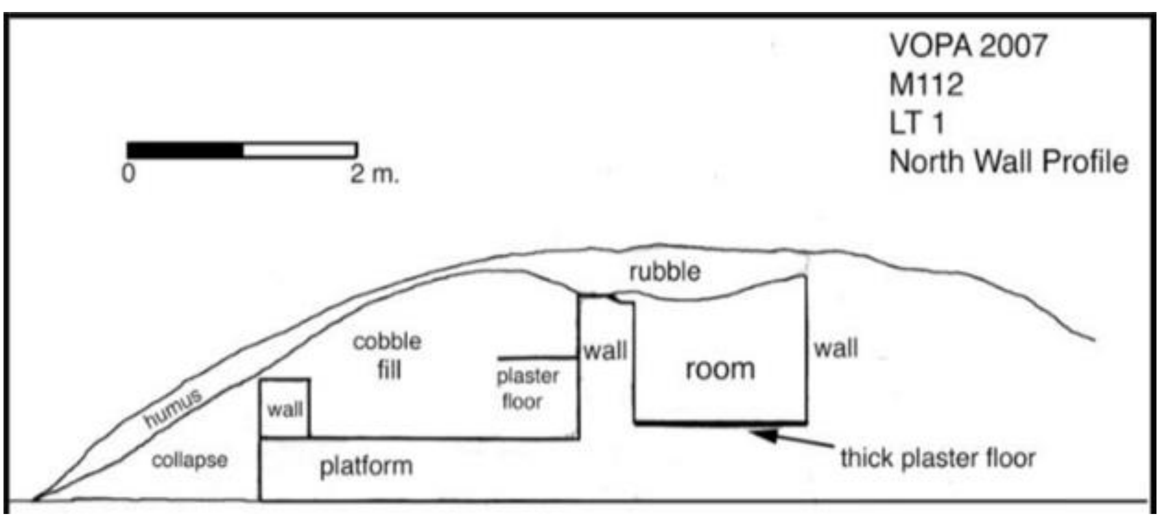

Figure 5.15 Profile of M112, the water shrine (Kinkella 2009:5.19)

Pool 15 and the Water Shrine

Just 1.86 km to the west of Pool 1 are Pools 14 and 15, both of which sit on fertile soils that are well suited for agriculture (Ford and Fedick 1992; Lucero 1997; Lucero et al. 2017). Much like Pool 1, however, there is no evidence that the land was permanently settled or farmed. Rather, the only architecture nearby is a group of seven mounds, M111-M116 (the Lookout Group), which overlook the pools from the atop the cliff (Figure 5.14) (Kinkella 2009:138-142, 309-312). The Lookout Group has an unhindered view of the forest and pools below, and is difficult to access from any direction other than the west due to the prevalence of steep, sloping terrain. A large looter's trench through one of the mounds, M112, shows that the structure was constructed with fine cut limestone blocks (Figure 5.15). Maya put great effort into the construction of M112, a fact further emphasized by its difficulty to reach.

Kinkella also recovered sherds from within the looter's trench, including a Garbutt Creek bowl from the late Late or Terminal Classic period (700-900 CE). The structure, then, was used contemporaneously to the rest of the Cara Blanca landscape and, based upon its proximity to the ledge overlooking the pools, its use was likely related to Pool 1 and M186. In addition to M112, there is some terracing associated with M111, a *chultun* just 25 m from M112, and a possible stone-lined depression (1 m deep and 10 m in diameter) (Kinkella 2009:140). Kinkella suggests that these mounds compose a water shrine. Barbara Fash (2005) has noted a similar mound group at Cerro de las Mesas mountaintop in the Copán Valley, which the Maya today still use at present for water and rain rituals. She describes a mound group (originally recorded in 1978) that is quite similar to the Lookout Group—there are depressions lined in stone for water catchment, artificial terraces, and a central structure (in this case a tower). Fash interprets this mound group as a "ancient water shrine" (Fash 2005:111). Though M112 is not a tower, it does appear to be the loci of ritual activity at the site and entire group, too, likely acted as a water shrine.

Figure 5.16 Pool 15 and the Motmot sinkhole (indicated by red arrow).

Yet, the shrine's placement on the hilltop between two pools is perplexing. While it is evidently related to the pools below and its placement surely is significant, VOPA PI Lucero always wondered why the Maya built this series of structures on top of the ridge overlooking Pools 14 and 15 rather than at the pools. Like at Pool 1, it would make sense to perform rituals at portals. Then, during a 2016 reconnaissance flight over Cara Blanca, Tony Rath noted a large sinkhole below the Lookout Group and perched just above Pool 15 (Figure 5.16). Perhaps the Maya built a water shrine above the sinkhole rather than a single pool, a sort of stairwell to the Pool 15 underworld. During the 2018 field season, we located and explored the sinkhole, which we named the Motmot sinkhole. Unfortunately, much of the growth within was new, suggesting that it was a recent collapse of the landscape—likely a cave in the porous karstic limestone collapsed to form the much larger sinkhole within the past many decades, burying any potential Maya offerings (Lucero et al. 2018). The roughly 40 m deep sinkhole is massive, approximately 50 x 50 m (though it was difficult to get an exact measurement), and filled with the thorns and thistles that accompany a young forest. As we navigated its base, we did not note any signs that it had been exposed for longer than a decade or two. We did however, find a cave in the southwest corner of the sinkhole that was seeping water from Pool 15, a 16 m deep *cenote* that, similarly to Pool 1, would have offered opportunity to communicate with ancestors and deities.

Base-to-Summit Procession at Pool 15 and the Water Shrine

Though the connection is tenuous, it does appear that the water shrine, the now enveloped cave, and Pool 15 are connected. The base-to-summit processions described by Reese-Taylor (2002:159) and perhaps practiced at Pool 15 serve to connect the three realms of the cosmos for the Maya (Larmon and Carbaugh 2018). In these cases, the procession moves from the south (often a depression or body of water) to the north (the hilltop). At Cara Blanca, this type of procession might have been a part of the Pool 15 space. As mentioned, Pool 15 sits south and just below the sinkhole on the hillside that opens up to the hilltop upon which the water shrine sits. If Maya emerged from the *cenote*, perhaps through the cave, and processed to the shrine on top of the hill, they would have been connecting the watery underworld, the human realm, and the heavens. This movement imbues the Cara Blanca landscape with the sacred essence of the otherworlds and integrates the landscape so as to facilitate supplication and communication.

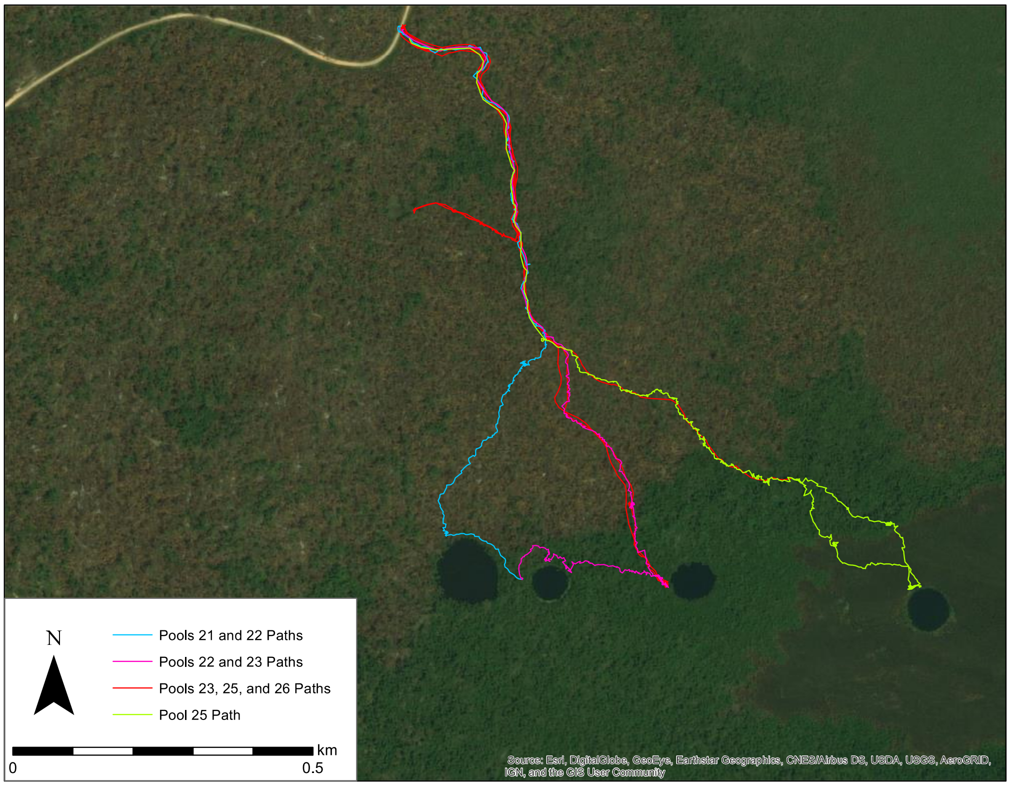

Figure 5.17 2017 paths to the eastern pools of Cara Blanca

Table 5.2 Dimensions and depths of pools 21-23 and 25

Pool	Diameter	Depth
21	c. 60 x 60m	c. 13m
22	c. 30 x 30m	c. 6m
23	c. 30 x 30m	c. 11.3m
25	c. 25 x 25m	c. 9-10m

Pools 21-23 and 25 and the Circumambulation of Cara Blanca

As part of the ceremonial circuit(s) at Cara Blanca, each *cenote* along its path was an integral part of the movement through the landscape. For his doctoral research, Andrew Kinkella (2008, 2009, 2015) conducted an extensive and thorough survey of the Cara Blanca area, identifying the 25 pools. Though he was able to reach 22 of the pools, because of the difficulty of the terrain he could not reach the three eastern-most pools; during the 2017 field season, I led the VOPA team in the exploration of these pools, Pools 22, 23 and 25 (Larmon and Carbaugh 2018) (Figure 5.17; Table 5.2).

Figure 5.18 Pools 21-23 and 25 (front to back). Photo by Tony Rath.

Contributing to the harshness of the terrain is that the landscape directly surrounding the pools is inundated, requiring that we wade through at times waist deep waters in our attempt to find the *cenotes* (Figure 5.18). The pools are surrounded by swamps and thick stands of red mangrove (Figure 5.19)—the terrain imposed itself upon us, making any who try to navigate the landscape at once aware of the toil of the journey. The inundation of the landscape made it impossible to determine if there was ever any Maya architecture surrounding the pools. Their susceptibility to flooding and the flat (as opposed to mountainous terrain surrounding), however, suggest that there was not. But the dearth of architecture does not mask the pools' resource richness, vibrancy and their magnetic qualities; the perfectly round pools that were tucked away in dense and harsh vegetation, a reprieve from the taxing terrain.

Figure 5.19 The swampy conditions surrounding the final eastern pools of Cara Blanca. Photo by Tony Rath

Figure 5.20 Cara Blanca Pool 20

The final category of ceremonial procession discussed by Reese-Taylor (2002) is ritual circumambulation. This consists of all participants moving in a counter-clockwise procession from one point on the landscape to designated other points (Reese Taylor 2002:145). Most often, these circuits follow the path of the sun—moving from east-to-west (Astor-Aguilera 2010:131-143). It is in this procession that the three pools explored during the 2017 field season play a role—as the eastern-most pools they would have been the point of departure for this procession (Astor-Aguilera 2010:131-143; Ashmore 2009; Lucero 2018). The landscape within which Pools 22, 23, and 25 are nestled is completely inundated. Participants in the procession would have been emerging from the water, the lower world, and moving west-wards to the rest of the ceremonial circuit. It is this circuit that would have encompassed the entire landscape. Ritual circumambulation has been used to define and maintain boundaries, and this procession might have been a means of further setting apart the charged landscape from surrounding utilitarian activities, as well as a means of connecting more deeply to the landscape (Reese-Taylor 2002).

Each of the processions outlined above likely would have been encompassed into the circumambulation—each progression a supplication. Pool 1 and Pool 15, in their own way, blended the Maya worlds and disintegrated the bounds between built and unbuilt. In addition to these spaces already outlined, Pool 20 was a probable destination within the larger circuit. Pool 20 is one of the deepest *cenotes* (40 m), a mirror image of the sky above (Figure 5.20). Two mounds mark the landscape 40-45 m north of the pool (Nissen 2015). Unlike the rest of the architecture at Cara Blanca, Pool 20 appears to have had more of a residential assemblage; though the ceramic assemblage is again primarily jars (68%), there were more *metates* and *manos* (used to grind maize) recovered (Nissen 2015). It remains, however, a heavily charged landscape. The larger of the mounds (M208) was carved directly into the a limestone knoll protruding from the bedrock—specifically, the Maya carved steps into the knoll so practitioners could ascend the mound (Figure 5.21). This practice is called geomancy, in which humans chose to build in particular area with the understanding that "certain locales are more auspicious as sites for dwellings or graves than others" (Yoon 1980:341). Dowd (2015:212) describes a geomantic landscape as "architecturally enhanced, one with significant man-made features incorporated into the whole". At Pool 20, geomancy was accomplished by merging built and unbuilt—making mound and mountain out of bedrock; taking away limestone rather than adding more. The Maya only added what they needed (cut stone and fill) to complete a small pyramid shaped *witz*. Geomantic architecture is inherently tied to existing topographic features and, very often, they stood as cosmograms (maps of the universe) that embodied that three Maya realms and served to connect rituals performed there, often those in ceremonial processions, to the rest of their world (Dowd 2015). Surely, then, Pool 20 would have been a visceral part of this integrated, animated landscape.

Figure 5.21 Pool 20 M208 showing the geomantic structure—stairs carved into the limestone bedrock (Nissen 2015:Figure 4.18).

The Cara Blanca Ceremonial Circuit Beyond the Maya Ontology

"Built and unbuilt-constructed and conceptualized – Maya landscapes are far from passive arenas or stage sets; then as now, they have played tangibly active roles in constant creation and shaping of Maya life" (Brady and Ashmore 1999:126). For the Maya, Cara Blanca was vibrant, animated, and impactful. Each of these portals offered sustenance at all levels to those visiting the pools—the space itself was seen as a threshold and Maya movement through and alteration of that space just worked to emphasize its connection to the other realms. Again, the strain of the journey through swamps and steep terrain only made more substantial the weight of their plight. But what beyond the Maya understanding of the space? Is the Cara Blanca landscape defined by Maya practitioners, devoid of substance when removed from that perspective? Beyond the Maya ontology, the Terminal Classic landscape was affective.

Within posthuman, New Materialist analyses, cultural contingency is important to understand, as it is a result of the kinesis that is under analysis here. As Fash (2005:104) notes, "water served as a link between the sacred realm of Maya cosmology and the functional domain of technology and politics". What is ritual cannot be separated from what is adaptive, what is cultural cannot be separated from what is natural; water and its movement through the landscape is all of these things—it is simultaneously esoteric and pragmatic (Matheny 1978:210). Movement through the Cara Blanca landscape is surely one of the features stimulating kinesis—kinesis is, after all, a movement of sorts. From within the Maya ontology, as discussed above, movement through the landscape is what animates and integrates the realms—at Pool 1 it is the movement from M186 to the water temple and ceremonial platform (as well as traversing the platform), at Pool 15 it is from portal to hilltop shrine, through the entire landscape it is from the inundated eastern pools westward. When we look beyond cultural perceptions of the space, however, we can recognize that humans are an essential contributing entity but it is from the potentiality stimulated by water's kinesis that this material articulation of the Maya world emerges.

So, let us remove cultural contingency and think only of the movement of matter and the possibility afforded by water. In Chapter 4, I showed how the eastern-most portion of the Cara Blanca landscape was fed and sustained by the water (see Figure 4.22). During the Terminal Classic droughts, the pools' water fed each the landscape and each entity within. Too, these waters were the very substance that pulled that landscape together. In times of plenty, as the land surrounding the pools flooded, radiating from Pool 25 westward and materially integrating and territorializing the landscape. But even in periods of desiccation, flooding was minimal and small tributaries connect flow between some pools; others are connected via underground flows where water travels through the porous limestone. Water's constant movement through this landscape keeping it alive. And it is not without import that these water sustain their depth in the driest of times, offering itself to surrounding beings. Moving west, as the water filters through the limestone in perpetual motion, it propels the Maya ceremonial processions—the paths walked are dictated by the trials of traversing deep waters (Pool 25) or the precarity of navigating rare exposed earth in an inundated landscape (Pool 1 and M186). Steam, emerging from the water of Pool 1, cleansed bodies—human and architectural—and rose to the sky, traversing the plains as it shifted between water's many forms—rain, vapor, sweat, condensation, *cenote*... Pool 15 and Pool 20 architecture is contingent upon water's position. Understanding Cara Blanca in this way—a landscape caused by water's kinesis—does not discount the ancient Maya ontological position; that they were engaged in ceremonial processions and traversed the land sheds light on an essential understanding of the landscape and its cultural contingency. But it extends beyond a singular understanding and experience of the space. To see water as the mechanism of territorialization, whose kinesis allows for the possibility of this ancient Maya materialization of the landscape to actualize, allows us to consider water's rights to and in the landscape. Within that consideration, certainly human (particularly Maya) rights are included.

Final Thoughts

We have to ask, then, what of this landscape before and after Maya engagement? Is its material and immaterial import "caused" by the Maya movements? Maya architecture? Even if water was the kinetic force that allowed for the possibility of this precise material articulation of Cara Blanca, is that only recognized due to human use of the space? Is the only experience with space that produces meaning that of humans? Certainly the answer is no. While exploring the landscape in the time of human use, however, it is difficult to show that this use is merely additive—one part of many producing a meaningful space. While Chapters 4 and 5 focused on a period of ritual intensification at Cara Blanca, Chapter 6 focuses upon a time when humans were not privy to the pull of the pools. Next, I explore the Late Pleistocene period at Cara Blanca and the fate of a giant ground sloth. In order to show that posthuman considerations of landscapes and environmental rights can include humans but does not need to include humans, I extend this conversation to the pre-human Cara Blanca landscape.

CHAPTER 6: WHEN A TREE FALLS, WHO HEARS IT? LATE PLEISTOCENE WATERS AT CARA BLANCA

The finest workers in stone are not copper or steel tools, but the gentle touches of air and water working at their leisure with a liberal allowance of time.—Henry David Thoreau (in Guthrie 2001:72.)

Water is power. Just as Maya kings garnered power through their control over water, hundreds of years later Stephens (1841:404, cited in Fash 2005:107) recognized that water was among the most valuable resources in the Yucatán and that to control access to water was to achieve power over others. But that power does not live in the people harvesting it, rather in the water itself and its relationship with surrounding entities. Water was power to the Classic Maya because it was the force that could flood or desiccate a crop, it was the necessity with the capacity to both feed and starve the vibrancy of a population. This ability to be all things exists before human exploitation of the space. So, let us consider the largest of the extinct giant ground sloths of the Late Pleistocene period in central Belize, *Eremotherium laurillardi* (Figure 6.1). The sloths, like humans (and trees, jaguars, soil, stones, etc.) were fed, maintained, and territorialized by the Cara Blanca waters. In the late Pleistocene, before the Maya had witnessed and participated in the growth of the built Cara Blanca landscape and before any human drank from the pools, kinetic forces still emerged from the waters, allowing for a completely different landscape to emerge. The 4-meter tall *E. laurillardi* sloths roamed a much different landscape than we do today or the Maya did thousands of years ago. Rather than the dense jungle in which we find it so easy to become disoriented, the megafauna of the Late Pleistocene were navigating a more open, scrub-juniper habitat—at least about 30,000 years ago (Larmon et al. 2019b; Leyden et al. 1993). The landscape was different, the assemblage was different, but the kinetic force of water remained. Here, I show how post-human considerations can be effective in contexts devoid of human participation. When we refocus our framework from a landscape orchestrated by the ancient Maya to one in which the Maya were deeply embedded but, ultimately, that was territorialized by water's kinesis, we can use the same framework to understand that very landscape throughout time.

In previous chapters, I reconstructed water's prevalence or dearth during the Terminal Classic period at Cara Blanca to better contextualize the territorialization of the landscape. I must also do so for the Late Pleistocene period (c. 126,000-11,700 BP). I will then show how water's kinetic qualities stand apart from the Maya ontology and were at work millennia ago in the same landscape, integrating and instigating. I open this chapter with an introduction to *Eremotherium laurillardi,* I then outline our methods for using the remains of a single *E. laurillardi* specimen to reconstruct water's role in the Late Pleistocene. Finally, I show how water's affect was much the same 27,000 years ago as it was during the Terminal Classic period, even though it was a different world where it was drier with more open terrain.

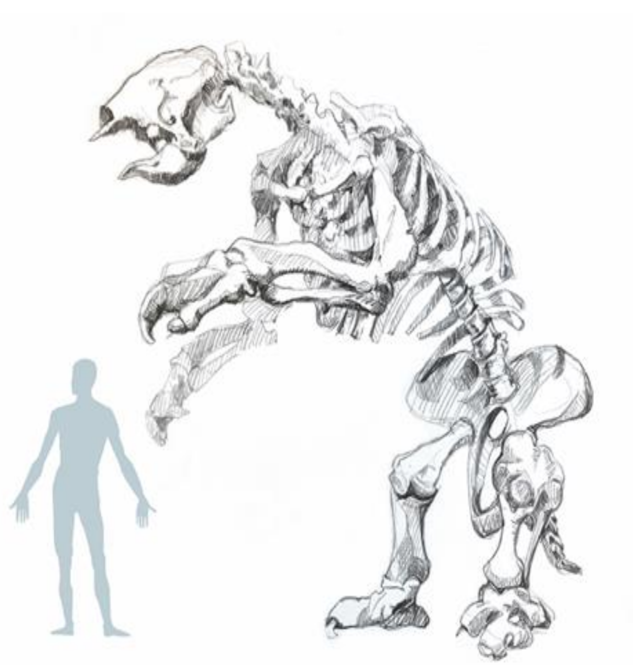

Figure 6.1 An interpretation of *Eremotherium laurillardi* with a human for scale. Generated by Julie McMahon.

Figure 6.2 A giant sloth's upper humerus recovered by divers in Pool 1. Photo by Lisa J. Lucero.

The Recovery of *E. laurillardi* and an Introduction

During the 2010 field season at Pool 1, a team of divers worked with the VOPA crew to explore the depths of the Cara Blanca pools (McDonald 2011). As I discussed in previous chapters, *cenotes* such as these were often integral in ancient Maya rituals and remnants of those rituals could be found at their bottom. Because of this, the divers were expecting to uncover fragments of ceramic vessels or tools, particularly elite or revered materials, or perhaps even human remains. Instead, however, the divers recovered the proximal end of a humerus (Figure 6.2), vertebral fragments, and rib fragments belonging to what was later identified by paleontologist Dr. Greg McDonald as an extinct giant ground sloth, *E. laurillardi* (McDonald 2011; Lucero 2012). When McDonald himself came to Cara Blanca in 2014 to explore for and excavate megafaunal remains in both Pool 1 and the nearby Pool 20 (see Chapter 5), he hoped to find a tooth because of the wealth of data contained in its bioapatite (tissue). During his first dive in Pool 1, McDonald almost immediately found a left femur and a molariform (molar-like) tooth from the 5-meter thick fossil stratum (17.3-22.4 m deep) in the *cenote* sidewall (Figure 6.3)—it is this tooth on which we will focus much of our later analysis. Soon, he realized that much of the clay layer was embedded with various fossils and on subsequent dives he observed vertebrae, limb bones, and a likely complete pelvis, as well as a plethora of bones that have yet to be identified (McDonald 2015). While it was originally suggested that all of the bone in Pool 1 may have been a single individual (McDonald 2011), the density of bone eventually observed and the occurrence of seemingly isolated concentrations, suggest that many individuals (perhaps different species) have been entombed in this pool's sidewalls (McDonald 2015).

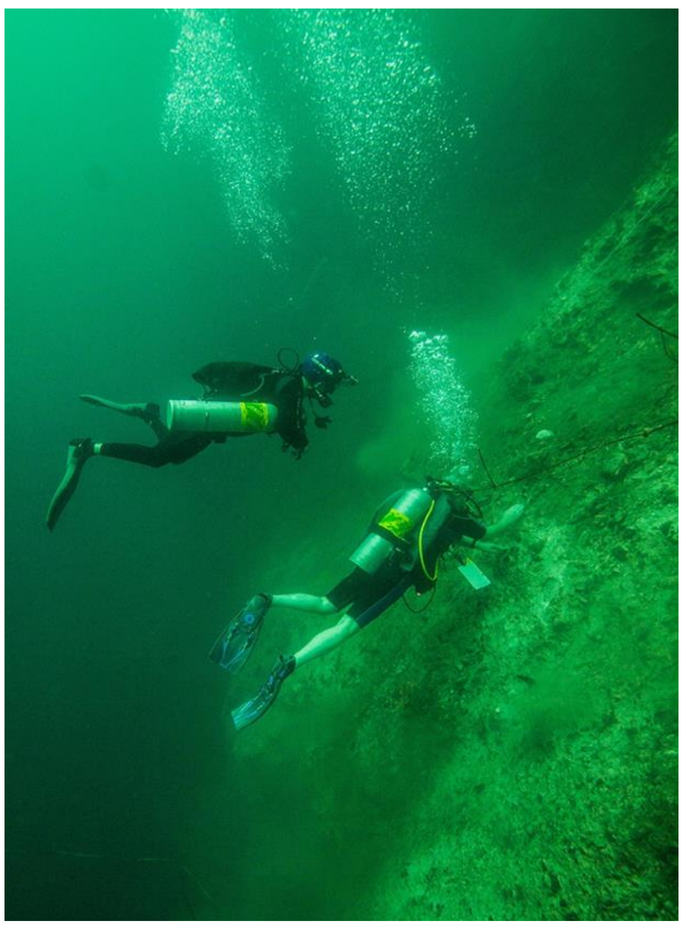

Figure 6.3 VOPA team member Marty O'Farrell filming fossils embedded in the *cenote* wall. Photo by Tony Rath.

Though our analysis here focuses on Pool 1, it is important to note that McDonald, with assistance from cave exploration divers Chip Petersen and Tony Rath, also recovered remains from Pool 20 (McDonald 2015). A fossil stratum 10.8-16.9 m deep was discovered; though fewer bones were observed, McDonald recovered a centrum of a sloth thoracic vertebra and a diaphysis of a left femur. Additionally, while excavating the femur, the tooth of a crocodile was found embedded in the carbonate matrix adhered to the bone. We are unable to determine at this point if the crocodile tooth is recent or, perhaps, contemporary with the sloth. It is possible, and maybe even likely, that other species of diverse megafauna are present in the pools, particularly in Pool 1. However, thus far only *E. laurillardi* has been observed.

E. laurillardi is the largest of the extinct giant ground sloths, reaching up to 4 m in height (6 m head-to-tail) and weighing up to 6550 kg (Dantas et al. 2017). During the Pleistocene and up until the Early Holocene, these massive members of the Xenarthra family lived from southern Brazil to the Gulf and Atlantic coast regions of North America (Cartelle and De Iuilis 1995; McDonald 2015). Their wide latitudinal range shows that they adapted to and lived in diverse habitats and likely had varied diets (de Fátima Rossetti et al. 2004; Webb 1999), allowing them to thrive in diverse climates.

The Central American lowlands were increasingly cool and arid during the Late Pleistocene, from MIS-3 (~36 to 24 ka) through MIS-2 (~24 to 13 ka). The expansion of the ice caps associated with the Last Glacial Maximum (LGM, equivalent to MIS-2) resulted in lower sea levels and a notable drop in water levels (Leyden et al. 1993; Metcalfe et al. 2000), including in the Cara Blanca *cenote* waters. MIS-2 had the lowest lake levels during this period because the environment was much cooler and drier than it is presently (Leyden et al. 1993; McDonald 2015); the lower water table would have left much of the Cara Blanca area desiccated, impacting both vegetation and wildlife. Rather than dense jungle, savanna and juniper scrub habitat dominated the landscape (Leyden et al. 1993; McDonald 2015). *E. laurillardi* would have likely preferred this more open setting to dense forest vegetation, both because of its subsistence habits (de Fátima Rossetti et al. 2004; McDonald 2015; Webb 1999) and its social behavior (Webb 1999). Additionally, the size of *E. laurillardi* suggests that it likely obtained most of its water from drinking, making all of the *cenotes* an important resource during the Late Pleistocene dry period (Levin et al. 2006; Yann et al. 2013). Pool 1 and Pool 20 are the deepest of the Cara Blanca pools (60+ and 40 m, respectively), and thus are the most likely to have retained water during this period of desiccation; megafaunal remains have been observed in both of these pools. While the records from other studies in the central lowlands of Central America show that there were periods of dramatic precipitation fluctuation regionally (e.g., Leyden et al. 1993), here I define more locally the context (how and when) within which the individual *E. laurillardi* studied here was accessing Pool 1.

Isotope Studies

Variations in isotope ratios from teeth have often been utilized in studies of past environments and diets (e.g., Balasse et al. 2002, 2006; Czerwonogora et al. 2011; Ruez 2005), including studies of other *E. laurillardi* remains (França et al. 2014; de Fátima Rossetti et al. 2004). Variations in $\delta^{13}C$ values along the length of the tooth indicate if the sloth was eating primarily C_3, C_4, or Crassulacean Acid Metabolism (CAM) plants, such as epiphytic bromeliads, or whether its diet varied during the year. If an animal is eating primarily C_3 plants, then $\delta^{13}C$ values are more negative than those of animals that consume primarily C_4/CAM plants. In medium-to-large herbivorous mammals, $\delta^{13}C$ values of tooth enamel reflect plants consumed plus an isotopic enrichment of ~14 per mil (‰) (Cerling and Harris 1999). However, one must also account for the decline in $\delta_{13}C$ values (~1.5‰) of atmospheric CO_2 due to the burning of fossil fuels over the past two centuries (Cerling et al. 1997). Extinct medium-to-large herbivores that consumed primarily C_3 plants have lower $\delta_{13}C$ values (≤-9‰), while those that consumed primarily C_4/CAM plants have higher $\delta_{13}C$ values (≥-2‰), with intermediate values indicating a mixed diet (Cerling et al. 1997). The isotopic enrichment between dietary food sources and sloth dentin remains unresolved, both because of the lack of modern analogues (of comparable body size) and because the teeth lack enamel. It may be close to the 14‰ of medium-to-large mammals or may be even higher due to the inferred high production of methane based on the complex chambered stomachs of extant tree sloths (Prideaux et al. 2009).

Similarly, changes in $\delta_{18}O$ along the growth axis of teeth can be indicative of seasonal changes in precipitation because they reflect the changes in the $\delta_{18}O$ of the water ingested with food, as well as from drinking water (Higgins et al. 2004). These values can vary substantially with humidity and water stress, providing insight into the duration and intensity of the wet and dry seasons. In general, higher $\delta_{18}O$ values both in local water and, subsequently, in tooth enamel indicate high evaporation and/ or low precipitation, often caused by warm and/or dry conditions (Dansgaard 1964; DeSantis et al. 2009). However, at lower latitudes, when temperatures are above 20°C and there is abundant summer rainfall, the "amount effect" becomes a dominant control of $\delta_{18}O$ and subsequently leads to lower $\delta_{18}O$ water/enamel values during the wet season (Dansgaard 1964; Higgins et al. 2004).

The Cara Blanca pools lie at approximately 17° N, meaning that today there is only one dry season and one wet season each year. Examining the severity of seasonality shows, in plethora or dearth, water's inherent impact on the landscape. In this aqueous context, just as the Cara Blanca landscape merged and evolved with humans (instead of because of humans), the

Pleistocene landscape merged and evolved with this massive ground sloth. In both cases, this integration was at the whim of the waters.

Figure 6.4 The structure of the tooth showing the diagenetic calcite (5), vasodentin (4), inner orthodentin (3), outer orthodentin (2), and cementum (1). Photograph by Stan Ambrose.

Methods

The molariform pulled from Pool 1 during the 2014 field season offers valuable insights into the environs at the time of this sloth's visit to the pool. By analyzing the isotopic signatures recorded in the sloth's bioapatite, we are able to identify shifts in precipitation. It is also possible to obtain an accelerated mass spectrometry (AMS) date from bioapatite if contaminating carbonate can be removed. Stable isotope and radiocarbon dating studies of teeth use enamel, the hardest of the bioapatites, for these analyses because it is most resistant to diagenesis (post-depositional chemical alteration of the original material) (Kalthoff 2011). However, members of the Xenarthra family, to which *E. laurillardi* belongs, lack enamel, making it particularly difficult to study their teeth (Kalthoff 2011). Rather than enamel, Xenarthra teeth have four distinct layers of bioapatite, including: vasodentin, inner orthodentin, outer orthodentin, and cementum (Kalthoff 2011). Each of these layers are more prone to alteration than enamel, primarily because they are more porous, but they are differentially impacted by diagenesis.

Previous studies (e.g., Dantas et al. 2017; de Fátima Rossetti et al. 2004; Ruez 2005) have used these dentin layers for isotopic analysis but have not specified a specific layer of the tissue. Our study (Larmon et al. 2019b) looked at 58 samples taken from three different apatite layers along the growth axis of the tooth—the cementum, the outer layer of the orthodentin, and the inner layer of the orthodentin, as indicated by the darker and lighter layers within the orthodentin (Figure 6.4). The orthodentin is the hardest layer of apatite in the tooth and therefore was expected to be the least subject to diagenesis (Kalthoff 2011). The difference in coloration of the orthodentin is caused by dentinal tubules in the bioapatite changing direction, differentially impacting the permeability of the orthodentin (Kalthoff 2011). After the sloth's death the tubules can act as "conduits for diagenetic fluids during fossilization" (Kalthoff 2011:654), thus their positioning would impact the tooth's resistance to diagenesis. We used cathodoluminescence analysis (CL) to determined which layers showed signs of diagenesis. CL uses electron beam bombardment to stimulate visible light emission from the minerals comprising the fossilized tooth based on their major and minor element compositions (Ségalen et al. 2008). This analysis allows us to identify differences in diagenetic mineral recrystallization and replacement of the three distinct tissues, or to determine which tissue is most intact and most altered. We then confirmed our CL results with comparative isotopic analysis and used the layer of bioapatite with the least diagenesis for both an AMS date and isotopic analysis. Our methods (see Appendix C) ensured that we obtained the most accurate chronology and climate data from our analysis. Our methods for isotopic analysis followed those used elsewhere closely (e.g., Balasse et al. 2002; Brookman and Ambrose 2012) and our methods for dating the tooth were adapted from experimental studies using dentin for radiocarbon dating (Krueger et al. 1991; Larmon et al. 2019b).

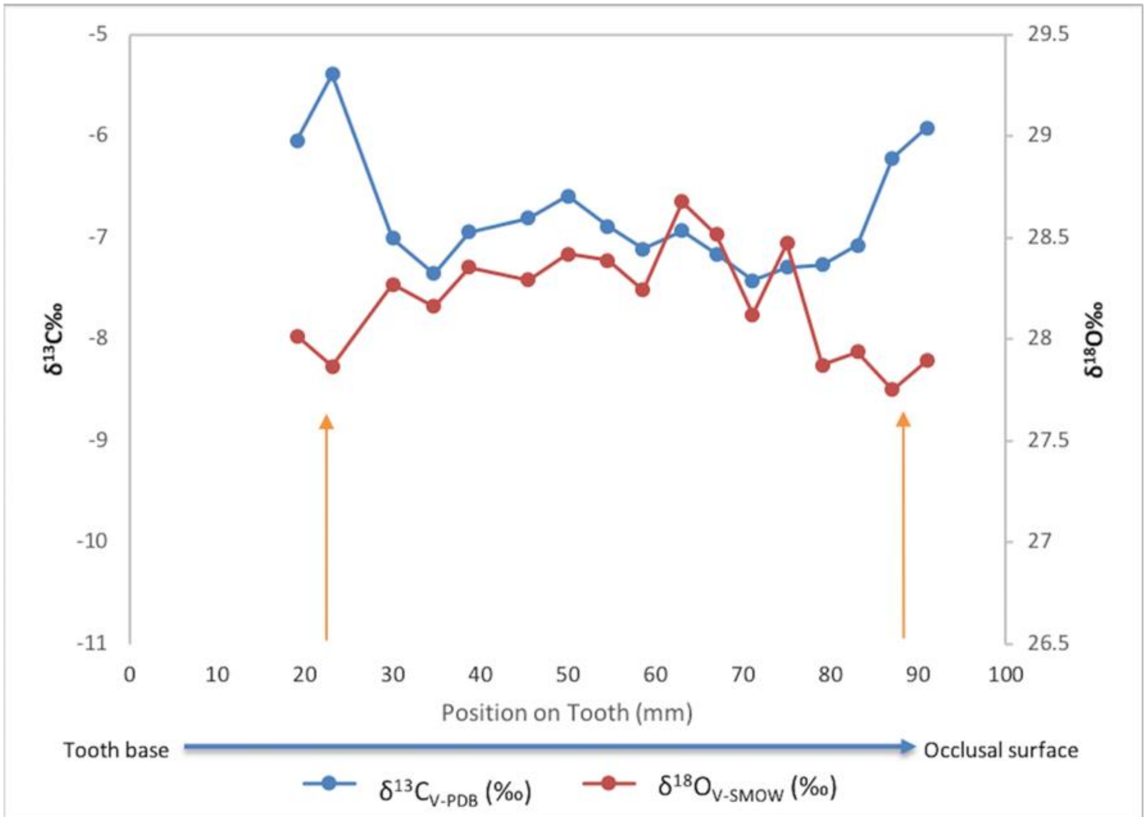

Figure 6.5 Results of the isotope analysis with orange arrows indicating the two wet season peaks.

Results

To obtain accurate isotope results from the most diagenetically resistant apatite layer, we took the samples from three distinct tissue types—the cementum, the outer layer of the orthodentin, and the inner layer of the orthodentine (see Figure 6.4). In addition, to further assess the reliability of isotopic data recovered from the tooth, we conducted CL analysis.

The results of the isotopic analyses are shown in Figure 6.5. Table 6.1 shows the range and mean of $\delta_{18}O$ and $\delta_{13}C$ recorded in each layer of bioapatite tested. There is a marked difference in the $\delta_{13}C$ results from different layers of apatite, with the outer orthodentin exhibiting δ_{13}C values significantly lower than the inner orthodentin ($p<0.0001$). In congruence with the results of the CL analysis (Figure 6.6), the inner orthodentin exhibits the least diagenesis. The average δ_{18}O values from each tissue type vary much less and are indistinguishable from one another ($p=0.716$). The diagenetic carbonate concretions, taken from the base of the tooth (see Figure 6.4) and from a crack filled with calcite, have δ_{13}C values of - -18.3‰ and -19.9‰, respectively, suggesting that the apatite with the most negative values (the outer orthodentin) is likely most affected by diagenesis. This conclusion is supported by the results of our CL analysis (see Figure 6.6), which show that the inner orthodentin exhibits the least luminescence and therefore has undergone minimal chemical alteration since deposition and fossilization. Its δ_{13}C values are highest, and farthest from those of the adhering matrix carbonate, demonstrating the inner orthodentine is minimally affected by diagenetic contamination. Carbon isotope values of the inner orthodentin range from -5.4 to -7.4‰ with a mean of -6.8‰ (SD, *n*-1 of 0.6‰) and total range of 2.0‰, while δ_{18}O range from 27.8‰ to 28.7‰ with a mean of 28.2‰ (SD, *n*-1 of 0.3‰) and total range of 0.9‰. Finally, using a pretreatment of vacuum milling with the material in a weak acid, we were able to obtain a date of 26,975 CAL BP +/- 120, [Illinois State Geological Survey (ISGS) no. A3712] from the inner orthodentin.

Table 6.1. Mean and range of isotopic values from each layer of bioapatite

Apatite Layer	Mean δ_{13}C‰	Range δ_{13}C‰	Mean δ_{18}O‰	Range δ_{18}O‰
Orthodentin (Inner)	-6.8	-5.4 to -7.4	28.2	27.8 to 28.7
Orthodentin (Outer)	-10.3	-9.1 to -10.9	28.3	27.5 to 29.1
Cementum	-9.2	-8.3 to -10.0	28.3	27.5 to 29.0

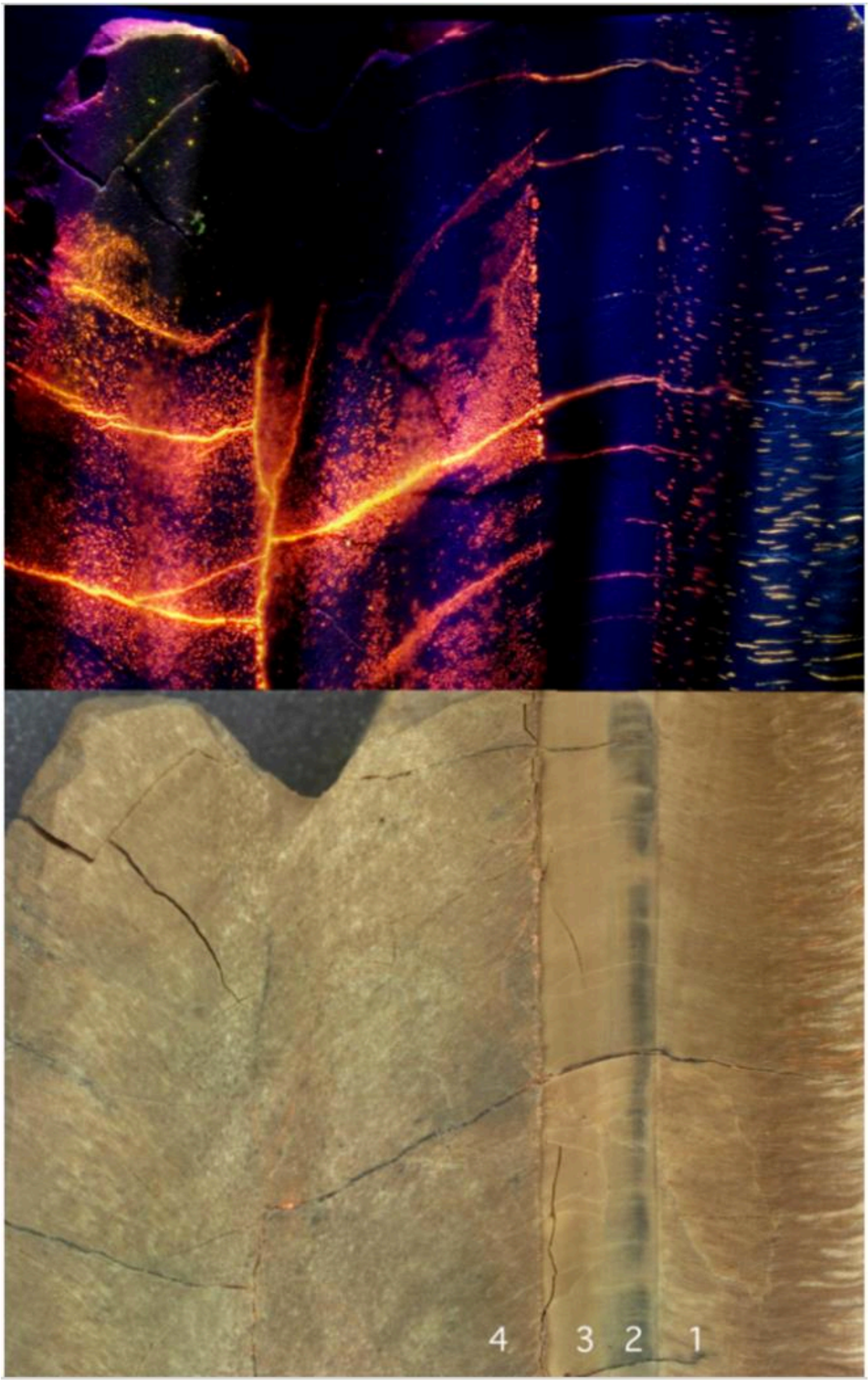

Figure 6.6. Results of the CL analysis (top) and the associated plain light image of the tooth (bottom) showing the vasodentin (4), inner orthodentin (3), outer orthodentin (2), and cementum (1).

Discussion

The sloth tooth dates to 26,975 CAL BP ±120, contemporary with the earliest stages of the LGM. As mentioned, during glaciation periods water levels drop. Because Pool 1 is more than 62 m deep, it remained a resource for fresh water during dry periods that would have desiccated many other surface water sources. Like during the Terminal Classic period, during the Late Pleistocene, the waters of the Cara Blanca landscape were a reprieve. It is likely that the giant sloth climbed down into the *cenote* for a drink and became trapped by the steep-sided sinkhole, ultimately becoming buried in the clay deposits accumulating on the ledge extending from the wall of the *cenote* (McDonald 2015). On the basis of the fossil-laden stratum that rings the entire 100 x 70 m *cenote*, it is likely that a large number of megafauna met the same fate. The sloth was subsumed by the Cara Blanca waters for thousands of years, which turned it from bone to stone, yet another example of its potency.

Because sloth teeth continue to grow throughout their life, changes in the isotope patterns along the length of the tooth reflect the last few years of the animal's life, with the isotope value at the base of the tooth reflecting diet and climate shortly before the time of the animal's death. The relationship between this *E. laurillardi* individual and its environment is visible in the pattern represented in the isotope data (see Figure 6.5). As shown elsewhere (Balasse et al. 2002; Brookman and Ambrose 2012; DeSantis et al. 2009), patterns in carbon and oxygen isotopes provide insight into the diet of animals during different seasons. The pattern in this *Eremotherium* tooth shows two short wet seasons at 2 cm and 9 cm separated by a prolonged dry season—c. 9 months, which dramatically differs from the current five-month dry season. The wet season can be identified in the $\delta_{18}O$ values—large precipitation events produce lower $\delta_{18}O$ values due to the amount effect (Dansgaard 1964; Higgins and MacFadden 2004).

As with most large mammals, giant ground sloths likely obtained most of their daily water in-take from drinking rather than from plant water (Gehler and Tütken 2012). *E. laurillardi* is the largest of the extinct sloths with an estimated body mass of up to 6550 kg (Dantas et al. 2017); it is likely that $\delta^{18}O$ values from this tooth reflect the $\delta^{18}O$ values of meteoric water, perhaps as represented in Pool 1, rather than plant water from food sources. Though these $\delta^{18}O$ values are less likely to reflect changes in relative aridity than those from plant resources, the analysis of the *E. laurillardi* tooth suggests that the wet season is substantially shorter than the dry season, indicating that the sloth endured a period of prolonged aridity annually. The two wet season peaks in this tooth are separated by roughly 70 mm, suggesting that the growth rate of this tooth was ~70 mm per year and that 50 mm of this tooth formed during the dry season. If tooth growth rate was constant then the dry season represented in this tooth spanned 8-9 months, which is nearly twice the current ~5-month dry season in Central America. Though the intensity of the drought cannot be measured by these isotopic analyses, the duration of the dry season both shows the how essential the Cara Blanca waters were to this sloth, as well as the many others still embedded in the *cenote* walls, and highlights the climatic context within which those beings were merging and adapting with the space.

With an increased canopy density, $\delta^{13}C$ values of plants decrease as this ^{13}C depletion is passed to the consumer (van der Merwe and Medina 1989). While it is challenging to place a fixed $\delta^{13}C$ value for closed canopy forest, some suggest that the depletion value is ~13‰ in Quaternary sites in South America (van der Merwe and Medina 1989). As all $\delta^{13}C$ are ≥ -7.4‰, there is no evidence that these giant ground sloths were consuming vegetation in dense forests similar to that found at Cara Blanca today. Instead, *E. laurillardi* from Cara Blanca consumed food in a more open environment, corroborating McDonald's (2015) discussion of a scrub and juniper forest during the Late Pleistocene.

On the basis of skeletal morphology, it has been suggested that this species was a browser, rather than a mixed feeder (Webb 1999); yet, the higher average $\delta_{13}C$ value of -6.8‰ (intermediate between -9 and -2‰) indicates more of a mixed diet and is consistent with studies of some other Xenarthra species (Rossetti et al. 2004). It is likely that C_4 vegetation (potentially grasses, C_4 shrubs such as *Atriplex*, and/or CAM plants) comprised a large portion of the sloth's diet during the wet season, which may explain higher $\delta_{13}C$ values when $\delta_{18}O$ values are the lowest (the inferred wet seasons). During the dry season, when C_4 grasses and shrubs are less palatable, they contributed less to the overall diet. Consequently, it is possible that, during the dry season, these sloths instead relied more heavily upon C_3 plants, as supported by the lower $\delta_{13}C$ signatures during the prolonged dry season (as inferred from elevated $\delta_{18}O$ values). This indicates that this individual's diet varied with the seasons; they were likely opportunistic feeders. The ability to shift between vegetation types depending on availability would have increased their dietary adaptability to changing precipitation. In the previous chapters we saw how Maya merged with shifting precipitation trends in the Cara Blanca space; instigated by the resonance of the Cara Blanca waters, they were enmeshed in the landscape to which and with which they had adapted (ideologically and practically). This is the precise path of this individual sloth 27,000 years ago, though the emergent landscape offered two very different material articulations.

Water, the Sloth, and the Cara Blanca Landscape

The above analyses have provided particular insights into the watery world that enveloped the sloth and its kin. Drawn to the pool's kinesis—its liquid gift to the landscape that is its whole—the social sloth wandered the more open scrub, juniper environs of Cara Blanca. Just as we conceptualize the different contributors to the Terminal Classic in a mutually molding, constantly shifting and becoming relationship, so too were the different contributors to the Late Pleistocene space. With a "relational eye" (Pauketat and Alt 2018:90) we look at the formation of the late Pleistocene Cara Blanca landscape. In previous chapters, I was not just reconstructing how the Maya saw their world and the co-constitutional formation of the landscape, but rather we are readjusting our understanding of the landscape as fueled by water—we are readjusting our present understanding the landscape rather than how it was understood in the past.

Again, the biological necessity of water is an inevitable propagator of the Cara Blanca space. Pool 1 waters were needed so the megafauna, and surely a vast diversity of smaller animals, flocked to its edges. But if we widen our lens to understand water at an even greater scale, there was less water in its liquid form and more in its solid—the ice caps expanding globally lowered water levels locally, decreasing available water and making Pool 1 an even greater imperative. Merely the shift of water between states had global consequences. Less rain forced this individual sloth to shift its diet with the seasons—they likely relied upon the rains to soften shrubs and grasses, making them more palatable during the rainy season and less consumed in the dry season. A sloth 6550 kg in size traveling with kin would have consumed large amounts of food, altering the landscape and floral assemblage, finding ways to exist in and with the space. It is amazing to think that as these sloths ate, the isotopic signature of meteoric water became embedded in their teeth, preserving its context for millennia. Through water's kinesis (locally and globally), the possibility of this articulation of Cara Blanca came to be and through water's imperative (as shown in the bioapatite of that tooth), we are able to better understand that articulation today.

As Roberts and colleagues (2017:1) point out, recent studies of tropical landscapes often present the ecosystems in the past as "pristine" or "untouched". But, untouched by whom? If our frame of reference is human disturbance, we have a multitude of archaeological studies that show millennia of mutual adaptations of human groups and their surroundings (see Roberts et al. 2017). If we take a posthuman framework, the landscape has been shifting and adapting since the day it came into fruition—with multiple entities contributing to and existing within the space, there has never been a forest that was pristine. Roberts and colleagues, too, promote this idea with archaeological and paleontological evidence, questioning the validity of any pristine space. When we do not privilege the human experience, we can start to see how truly alive, adaptive, and messy each space is. Studies of the impact of megafaunal movement and eventual extinction on Pleistocene and Early Holocene landscapes (Doughty et al. 2013; Doughty et al. 2016) have found that in the Amazon Basin, and elsewhere, megafauna (including *E. laurillardi*) were key contributors to and facilitators of forest biodiversity, vegetation distributions, nutrient cycling and carbon storage. Giant sloths and other massive creatures have consumed fruits and disseminated their seeds as they roamed. In the Amazon Basin, Doughty and colleagues (2016) hypothesize that megafaunal seed dispersion helped to propagate forests consisting of more densely wooded trees, ultimately increasing carbon sequestration. The Amazon landscape in the Pleistocene had adapted a mutually beneficial relationship with the large creatures and upon the extinction of many of those species in the Late Pleistocene/Early Holocene, the basin had to remain emergent.

Today, there is still evidence that extant megafauna greatly impact the evolutionary trajectory of their landscapes by helping to maintain tree diversity and ecosystem function (Blake et al. 2009; Bueno et al. 2013; Campos-Arceiz and Blake 2011). Doughty and colleagues (2016) use the example that trees with particularly large-seeded fruit rely upon elephants for dissemination—when the large-seeded fruit passes through the gut of an elephant or other megafauna, it both improves germination and reduces predation of that seed (Dinerstein and Wemmer 1988; Cochrane 2003). In fact, they even argue that the effects of megafaunal extinction roughly 11,000 years ago might still be witnessed in today's neotropical forests, just as the forests are remnants of ancient Maya managed forests (Lindsay 2011). The past landscape is truly still emergent in the present.

Final Thoughts

The relationship between megafauna and today's forests is not well understood (Roberts et al. 2017) but these studies offer insight into the vibrancy of a forested space. The question "If a tree falls in a forest and no one is around to hear it, does it make a sound?" highlights the philosophical imperative of our understanding of the Late Pleistocene landscape. Who is considered anyone? Is not another tree, a sloth, the water, a rock enough to bear witness of this event? Humans are not unique in their ability to understand the impact of a tree falling and the noise that follows. A sloth can hear its impact. The waters still ripple.

Long before the Maya were drawn to the Cara Blanca pools, local and global waters allowed for the possibility of the Cara Blanca landscape to emerge as it did and as it still is—each of those territorializations is still unfolding in the present. The Terminal Classic landscape was embedded with Maya understandings of the space, but their landscape is not the only material outcome of water's kinetic forces. Nearly 27,000 years ago, massive sloths, juniper trees, grasses and shrubs, the drying dirt and sun-faded stones all created and existed under the same territorializing kinetic forces. Perhaps our position as archaeologists has been marginalizing to these aspects of the landscape and our goal should be to re-energize these spaces devoid of humans, allowing for this vibrancy to thrive and these histories to persevere.

CHAPTER 7: WATER'S JUSTICE: CARA BLANCA AND WORLDWIDE

Existence is not an individual affair—Karen Barad 2007:ix

In the previous chapters, I introduced the landscape of Cara Blanca throughout the millennia and showed how water is and was an integral force in integrating that landscape. As discussed in Chapter 1 and throughout, I have adhered to a posthuman framework for understanding the landscape. Posthumanism, an ethical position that reimagines humans as one life force among many in the universe, works to debunk ideas of human exceptionalism, and thus approaches landscape analyses with an eye more attuned to the material reality of the space. When Barad writes about the inherent shared nature of existence (e.g., Barad 2007:xi), she means that no one human and no one type of entity (all of humans, for instance) exist in isolation, unhinged from the intrusions of other material (and immaterial) things. In fact, each part of our world, from the local scale to the global, is co-constituted. A posthuman framework, and related co-constitution of all things, does not imply that the humanness of any landscape should be ignored. In many of my chapters, I discuss the ancient Maya and their ontological position within the Cara Blanca landscape—I do this both in a way that reconstructs their interactions with the landscape, as well as the ways in which the landscape (water) actually fueled those interactions. As I have insisted throughout, ancient Maya relationships with water and the landscape are important to understand because they are an important part of the landscape that was ultimately fueled by water's kinesis. What this approach does allow us to do, however, is consider the rights of today's Cara Blanca waters through understanding the integral role they have played in integrating the landscape throughout time. This role is not just as a life-giving substance for biological needs, but also a force that creates history.

Imagining the rights of water might be a tenuous task, but by focusing on the ways in which it has participated in co-constitution, we can understand that water's rights are inevitably tied to human rights. The points is, *cultural* conservation involves defining one's lineage to a place or object—relegating matter (whether ceramic, structure, water, and tree) to human domain, human ownership. But this means of understanding space and conservation proves limiting and ultimately can lead to a need for indigenous communities to prove their ancestral ties to an idealized and essentialized "native identity" (e.g., Lazzari and Korstanje 2013:395). So, perhaps we are thinking about conservation in the wrong way. Does not water, which has done immense labor in sustaining not only biology but spaces (particularly a space such as Cara Blanca,) warrant justice? Considering the landscape as I have in the previous chapters highlights the fact that water has been speaking through its kinesis, through integration, for millennia. Water has been speaking but we have not understood how to listen. By taking a non-traditional approach to "listening"—listening through understanding the essential effect of water, its material consequences, and its lasting impact—one can be a translator for water, present and past, in conversations of conservation. As I have stated, the past is a real, lived landscape that has agency in the present. My analysis of Cara Blanca's waters recognizes the past landscape as an active and lived constituent in the political and academic unfolding of the present landscape, and that the future, too, has agency as our hope for the future motivates our present (e.g., Braidotti 2006).

I was recently asked—"do you think the ancient Maya would have been who they were if not for their position in that landscape?"—I am cautious with my response. With the risk of falling into outdated environmentally deterministic language, I have to reiterate how essential water was (and is) to Maya understandings. In fact, the Maya world literally emerged from the waters (Christensen 2003:12). If not in the aqueous to desiccated context of the semi-tropics, would the ancient Maya world have emerged quite the same? That is not to say that water created a path and the Maya followed it, but rather that the state of water's kinesis in the semi-tropics made a space in which it was possible for the ancient Maya to exist, thrive, produce, consume and create as they have, as it made possible the extinct giant ground sloths eternal imprisonment in the pool walls. At Cara Blanca, the pools' kinesis made possible the ancient Maya and the Late Pleistocene material articulation of the many relations emerging at those times.

In this chapter, I will first introduce legislations in Belize, focusing on the language used in order to show the regulations and recommendations that are guiding the protection of much of Belize's landscape, as well as how much of the language used is anthropocentric or, at the very least, dichotomizing. In doing so, I will be inevitably critical of pieces of these legislations, though I do recognize that they are ultimately doing work to maintain and protect Belize natural resources. I will then turn to present day Cara Blanca, its ownership and the primary legislations regulating its use. I will show how dichotomizing language leaves spaces and places in danger in this era of increasing development. I then will look at worldwide legislations that have sought to grant water rights primarily under the framework of environmental personhood to show how worldwide movements towards ecological justice have at times both faltered and succeeded. Finally, I tie in the major themes of the dissertation by showing how the work that water has done integrating Cara Blanca warrants a posthuman ecological justice.

The Larger Legal Context: Understandings of Environment

There is great danger in the language used in conservation policies, reports, and recommendations. Without a standardized system of understanding landscapes as integrated, ambiguity allows for misinterpretations and abuses of space. Though environmental legislation worldwide is exceedingly common, “industrialised societies have adopted wholly unsustainable growth-based economic practices and levels of population expansion” (Strang 2019:6). Below, I explore environmental legislations and recommendations in Belize and worldwide, as well as how dichotomized and culturally specific understandings of space fail those works. “Nature, as it appears…has lost her personality; she is no longer playful, vengeful, inviting, or indifferent. Nature is now a type of resource, a landscape with aesthetic *and* economic value” (Athens 2018:199, emphasis original).

Much of Belize’s land is under protection by some legal statute. As of October 2008, there were 96 protected areas that comprised 22.6% of its marine and territorial regions (Dept of Environment 2014b). The different legislations that help to regulate the protection of these lands are outlined in the Spanish Lookout Community Corporation (SPLC) Environmental Impact Assessment (Dept. of Environment 2014b). These legislations are many and I will list them below to emphasize the inevitable difficulty of having such a vast array of legislation that work in congruence towards efficiently protecting an integrated (de-dichotomizing culture and environment) landscape. These legislations include (but are not limited to):

- The Environmental Protection Act, Chapter 328, Revised Edition 2000
- Environmental Impact Assessment (Amendment Regulations 2007
- Environmental Protection Act Chapter 328 Revised Edition 2003 of the Substantive Laws of Belize, “Chapter 238 Pollution Regulations”
- The Environmental Protection (Effluent Limitations) Regulations, 1995: Statutory Instrument No. 94 of 1995
- The Environmental Protection (Effluent Limitations) (Amendment) Regulations 2009 (S.I. 102 of 2009)
- The Forest Act, Chapter 123, Revised Edition 2000
- The National Lands Act, Chapter 191, Revised Edition 2000
- Land Utilization Act, Chapter 188, Revised Edition 2000
- Land Tax Act, Chapter 58, 2000
- Mines and Minerals Act, Chapter 226, Revised Edition 2000

- ❖ Wildlife Protection Act, Chapter 220, Revised Edition 2000
- ❖ The Coastal Zone Management Act, Chapter 329, Revised Edition 2000
- ❖ National Institute of Culture and History Act, Chapter 331, Revised Edition 2000
- ❖ Public Health Act (Chapter 40) Revised Edition 2000
- ❖ Solid Waste Management Authority Act (Chapter 224) Revised Edition 2000
- ❖ Disaster Preparedness and Response Act, Chapter 145 (Revised Edition 2000).

Not all of these legislations will be discussed in more detail here; rather, I will briefly discuss those that are most pertinent to the issues at hand.

I start with The Environmental Impact Assessment, as it is the legislation under which much of the Cara Blanca lands were assessed, as I discuss later. From its outset, this legislation defines "environment" as "the surroundings that all living things interact with, and for the purpose herein it focuses on the natural vegetation, fish, wildlife, and also water, coasts, seas, air and land, and the interrelationship which exists among and between water, air, and land, and human beings, other living creatures, plants, micro-organisms and property" (Dept. of Environment 2007:1-2). This explanation of environment seemingly highlights the interconnected and co-constituting nature of a landscape and the statutes' call for inclusion of local populations in the assessment of environmental impact leaves room for indigenous knowledge to take part in understandings of "environment". But even in this definition, the implication that the space is being protected for humans (as in human rights to the "environment"), rather than for the inherent rights of "nature" (see Athens 2018:190). Even still, there is some language that reverts to dichotomizing—"managing the environmental, and key social and economic impacts of developmental projects" (Dept. of Environment 2007:14, 15). The interrelationship appears to come most into the conversation by way of the processes of and words "production", "alteration", "construction"—"The production of industrial carbon", "alteration of river banks" or "construction of large dams" (Dept. of Environment 2007:14, 15), words that reposition humans as apart and in power of the elements. Additionally, the Environmental Protection Act, Chapter 328, Revised Edition 2000 (Dept. of Environment 2000a:8), under which the Environmental Impact Assessments are required, cites the same definition of environment, but specifically indicates that "environmental health" refers to "control of all environmental factors that have an adverse direct or indirect effect on the physical, mental or social well-being of man." Again, setting apart and above the position of humans. The language used encourages legal protection of entities on basis of human rights *to* those entities, rather than the rights *of* those entities. Thus, even environmental laws tend to privilege humans with their vernacular.

In 2005 the Taskforce on Belize's Protected Areas Policy and Systems Plan wrote The Belize National Protected Areas System (Meerman and Wilson 2005). The report was intended to recommend how to proceed with conserving the natural resources and biodiversity of Belize, while allowing national development and poverty alleviation. This report adheres to the ecosystems approach, which "provides for integrated management of terrestrial, coastal, and marine resources at the scale of functioning ecosystems, which include human population and its cultural diversity" (Meerman and Wilson 2005:2). Though the report then continues to discriminate between cultural and natural, a perhaps inevitable aspect of legal dialogue, at its outset it presents an integrated approach. What is important to notice in this report is their criticism of the inefficacy of three distinct departments managing all of the, at the time, 115 management units that comprise the 96 protected areas. The goals of each of these departments is different and yet there is overlap in some of their territories. The contradicting goals of these departments make the protection of the area inefficient, ultimately hindering their effectiveness. Without a systematic means of offering guidance to different organizations and departments working on the regulation and protection of spaces, there is an inevitable lack of congruence in the overall management of Belize.

The 2005 report ultimately recognizes that "the real weakness… is a lack of guidance at a system level, leaving each management body to do the best it can with the resources it can marshal. Essentially, site managers need consistent guidelines and support services applied throughout the system in order to do their work effectively" (Meerman and Wilson 2005:43). Of course, Meerman and Wilson are indicating that there is ample room for interpretation of different acts, and with that room for interpretation comes the danger of straying from the goals of the legislation. This 2005 management plan is "based on the concept that any level of human activity will change the system from its pristine condition. This is a normal state of affairs and the management decision lies in estimating what degree of change is acceptable so that levels of natural resource use (including visitor use) are set below that threshold" (Meerman and Wilson 2005:45). Again, starting with the idea that any landscape is "pristine" is a fallacy (see Chapter 6) and immediately privileges humans. Therefore, deciding how much change is acceptable becomes a problem. Acceptable for whom? Humans? Natural resources? Even considering the landscape as a collection of resources insinuates that they are resources for human use. Alas, there is great danger in much of the language used in these conservation policies and reports. Where is the legislation that allows for the protection of an integrated landscape, fueled by water—that allows for the rights of that water to be as palpable as human need for natural resources? It appears that these laws do not intend to "protect "nature" as an integrated and living system; rather [they] intend to protect the "environment" as a space in which humans live, work, and play…" (Athens 2018:187) Below, I outline the present ownership of the Cara Blanca lands and the how the above legislations have been used in an attempt to regulate the use and development of the area.

Cara Blanca Today

The land within which the Cara Blanca pools are embedded was part of Belize Estate Company, a logging company, until 1947 when it was redistributed by the government as part of the Land Acquisition Ordinance. In 1984, it was sold to Belize Timbers Limited and, in 1994 to Yalbac Ranch and Cattle Corporation, a sustainable logging company largely owned by Forestland Group (http://www.forestlandgroup.com/). Since 2008, Yalbac has partnered with The Forestland Group to act as stewards to the forest—their primary goals are *sustainably* harvesting the forest while protecting archaeological resources and bodies of water in the area. Part of this mission is to prevent illegal harvesting and poaching on their property (http://www.tfgoperations.com/property/yalbac/). They employ natural regeneration (rather than planting) to encourage a more extensive and less intensive means of forest conservation. Their commitment to sustainably maintaining the property has been steadfast, but they were forced to sell over 30,000 acres of their property to the Spanish Lookout Community Corporation (SPLC) after the 2010 Hurricane Richard decimated many of the hardwoods on the property. As the transition of land ownership took hold, it became increasingly important to document the diversity of the Cara Blanca landscape and consider ways in which those spaces that needed additional protection would remain unharmed by agricultural activities. An Environmental Impact Assessment (EIA) was prepared for each parcel of land sold by Yalbac to the SPLC (Department of Environment 2014a, 2014b).

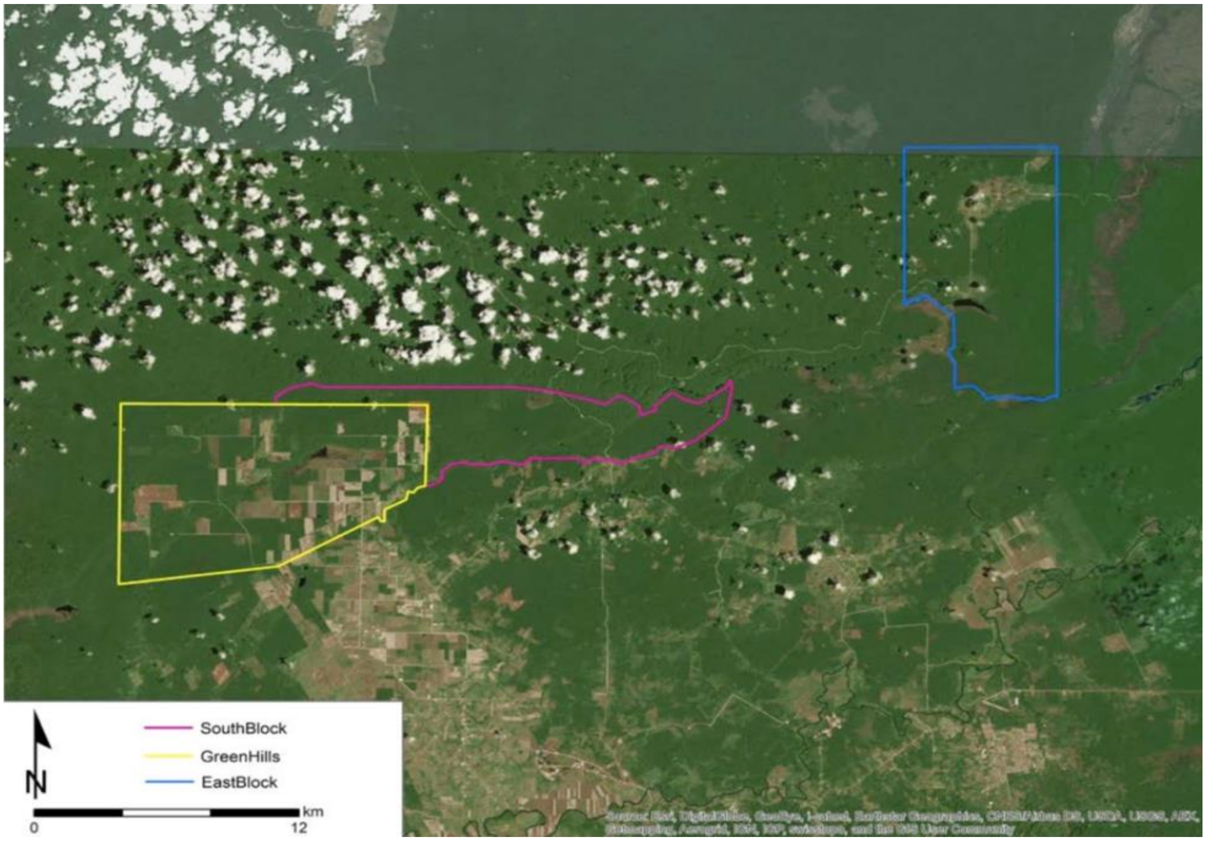

Figure 7.1. The three parcels of land sold to SPLC in relation to the Cara Blanca pools (Benson 2015: Fig 8.1).

The Spanish Lookout Mennonite Community that purchased the land are in the process of converting most of its over 30,000 acres to a diversified agricultural lands (Figure 7.1). Though the areas to be developed do not include the Cara Blanca pools (Figure 7.2), there is significant danger of runoff and deforestation impacting water health and sedimentation (e.g., chemical pesticides). SPLC plans to convert 90% of the land in the South Block, which is closest to the pools (see Figure 7.2), to agricultural lands. At present, the Environmental Impact Assessment recommends that the Cara Blanca pools should be protected by a buffer—no agricultural activities can come within 200 ft of the pools (Department of Environment 2014a:5-23). Jesann Gonzalez-Cruz (2019) conducted a study to estimate the rate of deforestation in the South Block and found that since SPLC purchased the land in 2014, there has been an approximate deforestation rate of an additional 382 to 668 acres per year (as compared to years prior to the sale). Gonzalez-Cruz estimates that, at this rate, the South Block will be completely deforested within 8.5 to 10 years. Her study focuses on the impact that this will have on Maya sites in the hinterlands, but its impact to the pools (regardless of a 200 ft buffer) is undeniable. While deforestation will lead to increased runoff into the pools, particularly stormwater in the rainy season, there is also a great concern for impact of contaminants from spray planes infiltrating the water system. As noted previously (see Chapter 3, Figure 3.3), the Cara Blanca watershed encompasses the area well beyond 200 ft of the pool and contaminants from agricultural activity will inevitably impact the health of the pools.

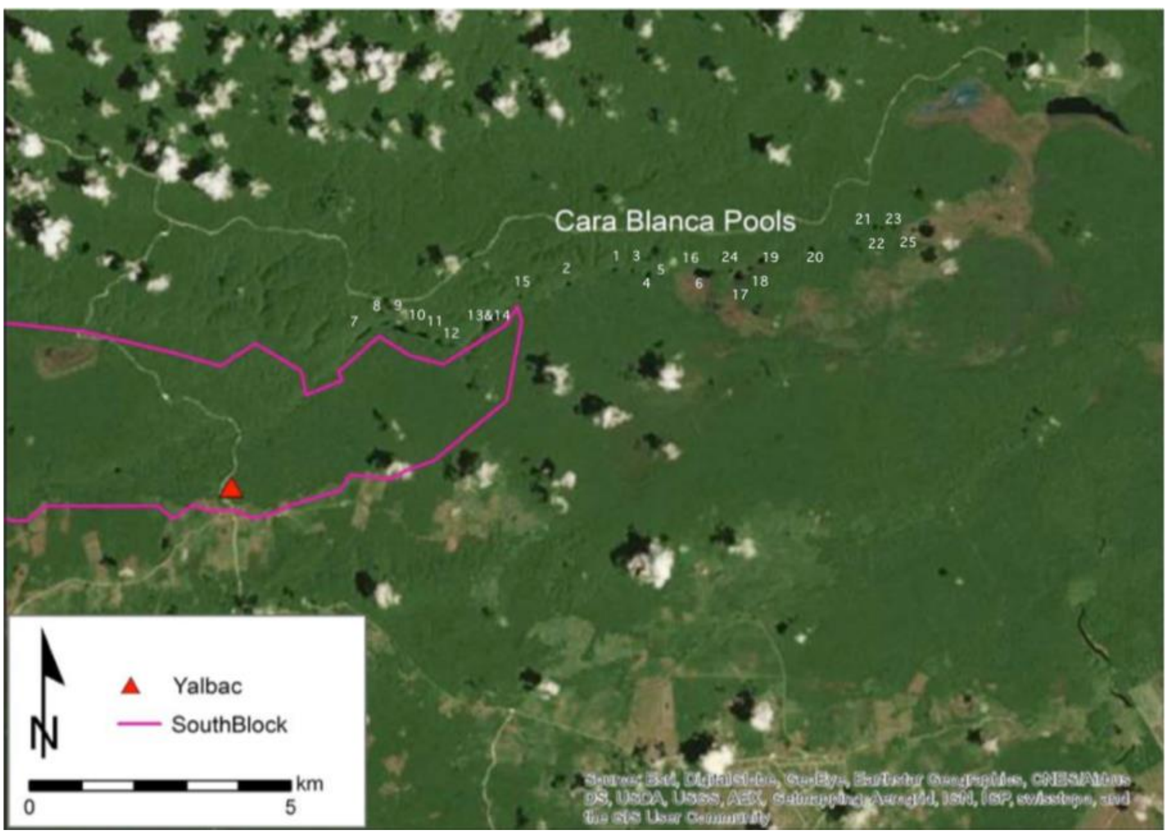

Figure 7.2. Showing the location of the South Block in relation to the Cara Blanca pools (Benson 2015:Figure 8.2).

Though SPLC development will result in massive deforestation of the area, the Belizean government has generally shown support for the Mennonite business community because of the vast revenue produced by their agricultural activities and the resulting decrease in the national dependence on food imports (Gonzalez-Cruz 2019; Peedle 1999:47; Sutherland 1998:161). The project rationale references the Mennonite community's ability to "feed Belize" (Department of Environment 2014a:XXII) as justification to the government for continuing with the development of the South Block. In the Environmental Impact Assessment, the "Best Management Practices" outlined by the SPLC are those that ensure "optimum growth and maximum yield" (Department of Environment 2014a:XXII). The concern with environmental prudence that they cite is with "better industrial practices, greater yields, and financial success" (Department of Environment 2014a:XXII) in mind, not environmental health. Because the regulations outlined in this Environment Impact Assessment are merely recommendations, rather than legislation enforced by the Belizean government, and because both the government and SPLC have agricultural yields in mind, adherence to these regulations should be questioned.

Similar concerns have been raised regarding the recommendations outlined in the EIA for protecting cultural resources. Measures of protection have been developed in partnership with the National Institute of Culture and Culture and Heritage (NICH) to protect Maya mounds and structures that are in the nearby agricultural fields being developed—large solitary mounds should not be leveled by plow; any decision making regarding the avoidance of an area should include the Institute of Archaeology (IOA); if any excavations are occurring, those working must be aware of the potential for unearthing archaeological materials; if these materials do appear, excavation must stop and the IOA should be notified (Dept. of Environment 2014a: 5-24). VOPA surveys of the hinterland areas surrounding the Cara Blanca pools, however, have shown that many major mounds have, in fact, been destroyed (plowed through or burned) (Benson 2015, 2017; Gonzalez-Cruz 2019). There is a clear disregard for the Maya mounds and, though the issue has been brought to the attention of NICH, they do not have the resources to enforce these regulations. The disregard of the measures intended to protect these mounds brings into further question the adherence to environmental regulations.

Even though adherence to these recommendations cannot yet be confirmed nor enforced, they are an important step in conservation. Yet, still, aspects of "natural" and "cultural" conservation are clearly separated—in fact there is no mention of the Maya structures surrounding the pools (only those house mounds in the agricultural fields). Because the standard of dichotomizing "natural" and "cultural" has been set by the EIA, the language used in outlining how the pools should be protected (from runoff and deforestation) leaves much of the integrated landscape at risk. For if we consider the landscape as truly integrated, protecting the waters includes those species living within and around, those structures teetering on the edge, and those *histories* fueled by those waters. Some of the potential impacts of the work being done on this property outlined by the EIA include: soil erosion, air pollution, loss of canopy cover, fragmentation of ecosystems, and loss of wetlands (Dept. of the Environment 2014a:6-4, 5). These are all real and palpable impacts that cannot fully communicate the ultimate transition underway in the landscape—perhaps the word fragmentation comes close. Each of the physical impacts discussed actually cues a further fragmentation—a disintegration, a dissociation—of past, present, and future integrated landscapes. Though the landscape has surely undergone shifts in the past, as I outlined for the Terminal Classic and Late Pleistocene periods, water has remained an integrating force, allowing for histories to unfold. The language of conservation used in the EIA does the work of disintegrating the landscape in a way that halts those histories.

Worldwide Movements of Environmental Justice

These legislations and recommendations are still essential and the work that they do an important step. However, while they employ language attempting co-constitution in the definitions portion of the legislation, the language used throughout leaves room for interpretations of that legislation that are still dichotomizing. This conversation comes on the heels of sporadic efforts to grant various natural resources human rights. In 2017, a number of litigations and legislations sought to grant legal *person*hood to integrated landscapes. "At the heart of the concept of legal personhood is that an entity exists for its own interests and not for the value it contains for others" (Athen 2018:206). New Zealand's government and the Māori people worked together to pass the *Te Awa Tupua* (Whanganui River Claims Settlement) Act 2017 (N.Z.), legislation granting the Whanganui River human rights under the framework of "environmental personhood". With the understanding of the river as an ancestor of the Māori people, a living entity, the waters are protected (Clark et al. 2019). The High Court of Uttarakhand, India did the same for the Ganges and Yamuna Rivers, their tributaries, their glaciers, lakes, air meadows, dales jungles, forests wetlands, grasslands, springs and waterfalls, but are having issues enforcing the legislation (Clark et al. 2019). A U.S. NGO, Deep Green Resistance, pursued litigations to have the Colorado River Ecosystem granted personhood, though the litigation eventually failed (Clark et al. 2019). Following these movements, the Australian state of Victoria put into effect the Yarra River Protection (Wilip-gin Birrarung murron) Act 2017 (Vic.) to grant personhood to the Yarra River (Clark et al. 2019). Most recently, in July of 2019, Bangladesh granted all rivers within its borders the legal status of human—the waters are their mother (Westerman 2019). For years, indigenous communities have been at the forefront of this battle worldwide.

In 1972, Justice Douglas's decision in the case of Sierra Club v. Morton put forth the idea that "Those people who have a meaningful relation to that body of water—whether it be a fisherman, a canoeist, a zoologist, or a logger—must be able to speak for the values which the river represents and which are threatened with destruction" (Douglas 1972:743). Since then, this concept has fueled various battles towards granting "natural" entities rights, with the most recent centering upon ontological positioning, personhood, and boundaries. Because of the inevitably arbitrary bounds of "nature", delineating personhood is difficult—how can a single entity be defined in the expanse of a landscape (Clark et al. 2019; Soper 1995; Stone 1974). Much legislation of environmental personhood, then, has focused on rivers, which have a seemingly well defined, anthropocentric boundaries. In their review of many of these case studies, Clark and colleagues (2019) compare how such law or litigation has been implemented (or not) in the past few years. Below I will briefly outline three of their case studies to show how even the most progressive legislation of environmental personhood is anthropocentric, can be essentializing, and might miss the point of a biocentric perspective of the conservation of integrated landscapes. To instead consider these landscapes as integrated, as I have shown at Cara Blanca, it might be possible to avoid some of the pitfalls of these legislations, particularly at Cara Blanca.

Te Awa Tupua *(Whanganui River Claims Settlement) Act 2017 (N.Z.)*

The *Te Awa Tupua* Act is groundbreaking legislation declaring that the Whanganui River has the legal rights, powers, duties, and liabilities of a person (*Te Awa Tupua Act* s 14.1). The river is ancestral to the Māori people and the act calls for the community to proceed with the rights, history, and relationships of the river in mind. The river is defined as a "spiritual and physical entity" (*Te Awa Tupua Act s* 13a), an "indivisible and living whole, comprising the Whanganui River from the mountains to the sea, [and] incorporating all its physical and metaphysical elements" (*Te Awa Tupua Act* s 12). "Above all, the Act is grounded in cultural and physical context, the unique relationship of particular peoples with their particular river" (Clark et al. 2019:805)—the act *is* groundbreaking and essential, but it still enacts the rights of the waters within the ontology of the Māori peoples. It calls upon that ancestral relationship to persuade the government and the masses that it is worthy of justice. The ontological positioning of the legislation can be further identified in statements made by the New Zealand's Members of Parliament that recall stories of their relationship with and uses of the river throughout their childhood and adult lives (Fox 2016). Māori speakers contributed stories of their own relationships with the water—that they bleed the river's waters, that the river "brings together the genealogies and legacies of a people who have swum, washed, played, prayed, dived, paddled and travelled *Te Awa Tupua* as the central artery of their tribal heart" (Fox 2016).

The water's right to justice is warranted in large part within the Māori ontology without the recognition that it is the water's material existence, its kinetic force, that fuels that ontology. But the rights of the water are confirmed in the final settlement agreement between the New Zealand Crown and the Māori people—the Māori were not granted ownership of the river but the river itself, rather, was granted legal personhood (Athens 2018; Hutchison 2014). Yet, portions of the river are still privately owned, the Crown owns all aquatic life and water from the river, and public access for recreation remains, so as Athens points out, the river has "dual personality of person and property" (Athens 2018:212; see also Hutchison 2014); thus, the urge to perpetuate human ownership over nature was not resisted. Though they write of the river as an integrated whole, they fragment that whole in legal language. Still, the office of Te Pou Tupua, or the "human face" of the river, must act in accordance with the rights of those, including the state, that own portions of the river and those that use it for recreation and sustenance. The act allotted funds in the form of Te Korotete to support the "health and well-being" of the river (*Te Awa Tupua Act* s 57), but ultimately merely reiterated what the Māori have always understood—that the river is not just a river. It does set an important precedent as an apology from the crown to the Māori people (*Te Awa Tupua Act* s 3). While this approach acts as an interesting and useful model in the cultural and political context of the Whanganui, it does not in other nations in which indigenous voices have not been considered in the legal dialogue (see Clark et al. 2019), and it ultimately does not overcome the prioritizing of economic goals over indigenous rights in post-colonial governments.

Ganges and Yamuna Rivers, India

In 2017, the High Court of Uttarakhand in the state of Uttarakhand, India, similarly granted legal personhood to both the Ganges and Yamuna Rivers, their tributaries, their glaciers, and surrounding environmental features (Clark et al. 2019). Personhood was granted with the knowledge that both rivers are economically and culturally significant; emphasis was placed on the religious significance of the rivers within Hinduism and the rivers were deemed living entities. Yet, even though legal personhood was granted to the rivers and related entities, there have been extensive difficulties enforcing their protection. While particular "human faces" were deemed responsible for upholding the law and protecting the rivers, state government officials were left with the majority of the day-to-day burden of preservation—but the rivers preservation was not originally sought by the state government of Uttarakhand and they were not allotted any additional funds to put the law into action (Clark et al. 2019). Thus, the law is not being upheld and it has been brought to the Supreme Court of India.

There are two primary contributions to the present failure of this legislation and they have been outlined by Clark and colleagues (2019). First, the majority religious population in India is

Hindu and therefore the river's religious significance within Hinduism is cited as a primary factor in the need for preservation. In Hinduism, the river's sacred status is bolstered by the Ganges position as *Ganga Mata* (the divine mother) and the Yamuna's position as *Yami* (Lady of life) and *Yama* (Lord of Death) (Conway 1994). Beyond their metaphysical embodiment of these entities, they are seen as cleansing (Black 2016) (paradoxically, as Clark points out, leading to the continued pollution of the rivers). Clark and colleagues (2019) make clear that this legislation is not anthropocentric (regardless of the designation of their "human rights") in the sense that they are not being preserved in the interest of humans—the judgement "speaks of an 'intrinsic right not to be polluted' and 'to exist, persist, maintain, sustain and regenerate their own vital ecology system'" (Clark et al. 2019:815, quoting *Glaciers case at 61*). However, the river's protection is still under the gumption of the Hindu ontological position, therefore not on the basis of the water itself.

This case also highlights how such a legislation can be essentializing. Though Hinduism is the majority religion, there are many minority religions that also have deep connections to the waters. Those groups are already positioned in the fringes, perhaps making it less likely that they would participate in the water's management and preservation, though the legislation does call for "ongoing community participation" (Clark et al. 2019:817). Additionally, Kothari and Bajpai (2017:108) argue that a "singular focus on Hinduism can be misused by right-wing nationalist organizations, to hijack the order for their own cynical agenda". Deep human rights violations have, in fact, been committed under the guise of environmentalism in the past. In the U.S., the Wilderness Act of 1964 (Wilderness Act 2012) sought to protect nature based upon the rights of nature itself, with a definition of wilderness that totally excluded humans except as visitors to the space (Athens 2018). But it was under this act that the Ahwahnechee people of the

Sierra Mountains were expelled from Yosemite National Park—a colonial act contributing to the fallacy of a pristine wilderness rather than recognizing the rights of the indigenous peoples that had lived in co-constitution with that landscape for millennia (Solnit 1999). Thus, the eradication of "pristine" and use of "integrated" is a moral imperative.

Second, a major criticism of the legislation was the designation of the rights allotted to the rivers and associated features as "human rights" (Clark et al. 2019). While those criticizing this designation are generally approaching the issue from the perspective that humans should have special rights and it lessens their value to assign those rights to other entities (Dvorsky 2017, cited in Clark et al. 2019), I take the alternative approach. As I hope I have made clear throughout this dissertation, we should not anthropomorphize, granting different entities personhood or the designation being human-like. Rather, we should de-center humans in the conversation and recognize the rights (not human rights) that these entities have even outside of the context of humans. Thus, if the focus is not on the *human personhood* granted to these waters within with Hindu ontology, and rather on the *kinetic forces* of the water that allowed for Hinduism (and other) ontologies to emerge, the statue would be much more free from essentializing identities while still leaving room for those identities, particularly in nations with fraught and continuing colonial histories.

Yarra River Protection (Wilip-gin Birrarung murron) Act 2017

New Zealand, as discussed earlier, is a nation with deep colonial history, but it has allowed for its indigenous peoples, the Māori, to have ample voice in legal matters. The conversations between settlers and Māori are ongoing and, today Māori histories play a prominent role in legal and social dialogue (Strang 2019). But the complexities of colonialisms are many and its consequences dire and rampant. In Australia, settlers have been much slower to recognize the rights of First Peoples (Clark et al. 2019). In cases where the margins are full of minority peoples, tensions between majority and minority cultures complicate such laws. The Yarra River Protection (Wilip-gin Birrarung murron) Act 2017 is unique in that it does not fully grant legal personhood to the river. It does, however, take an ecocentric approach to river and landscape protection. As I have done in this dissertation with Maya relationships to water, the Yarra Act opens with words from the Woi-wurrung, the First people of Australia, in their language about the life-giving, earth feeding role that the Yarra river has played in their history. It is recognized that they are born from the waters and they have a responsibility "to keep the Birrarung [the Yarra] alive and healthy—for all generations to come" (Yarra Act 2017:2). The act "invokes elements of the other successful river cases, demonstrating a localized expression of Ecological Jurisprudence that allows people-place relationships to guide the development of protective statute" (Clark et al. 2019:823) but does not rely upon this in its protection, rather is recognizes the river intrinsic value. Clark and colleagues see the failure to recognize the legal personhood of the river just that, a failure.

> The Yarra Act sings a song of relationality and inter-subjectivity. It values people's stories and places them at the heart of the Act. While it may not (yet) sing a song that recognizes the legal personhood of the Yarra River/Birrarung, it intones the river as more than either a biophysical or cultural entity. Stories become powerful legal actors that make visible relationships and dimensions of Birrarung that hold the potential for deeper ontological shifts (Clark et al. 2019:828).

But personhood is not what we should seek. Rather, the Yarra Act recognizes the river as "one living and integrated natural entity" (Yarra Act 2017:3). The acknowledgement of the landscape as integrated allows for the ontological questioning of river boundaries and the recognition that waters fuel histories. Though human rights are not granted, the landscape being protected is an integrated one —the act recognizes the importance of "the ecological health, and the cultural, social, environmental and amenity values of the Yarra River and the landscape in which the Yarra River is situated" (Yarra Act 2017:10). This act might not fully capture the necessity to grant waters legal justice (as it should do), but it does understand that waters' relation to humans is not necessary to do so.

Discussion

Above, I have shown that there are examples of the ways in which laws have sought to "color outside the lines", granting personhood to the rivers and associated entities that have fed worldwide landscapes for millennia. Most of those legislations and recommendations have drawn upon the ontologies of indigenous populations. Because of this, and the conflation of religion and ontology, one of the criticisms of these legislations has been that "modern secular states shouldn't make decisions on the basis of religious beliefs" (Strang 2019:4). While I have to ignore that conflation in this sentiment, I do tend to agree that to make legal decisions based upon such understandings of the world does not really get at the heart of the issue—some of the primary voices in support of these legislations praise "the recognition that a complex ecosystem is a living entity" (Strang 2019:4). But is that really what these legislations have done? And aren't the two sentiments completely contradictory in their fundamental understandings of the legislations? These are just voices that foremost ecological justice scholar Veronica Strang (2019) have pulled from newspaper websites (Roy 2017), so perhaps we shouldn't expect a deep understanding of the concepts of ecological justice from those commenters. They do, however, get at the heart of issue tackled throughout this dissertation. Can we really only grant non-human entities protection and rights within human ontological understandings of that space? And if we do that, are we really fully grasping the complexity (and integration of that landscape)? And, finally, if we do not fully grasp a landscape's complexity and integration, do we run the risk of essentializing human identities, ignoring landscape needs, and allowing a landscape to become a ghost of its former self (see Falk 2017)?

Strang (2019) cites Perlo's (2009) concept of "moral schizophrenia" when it comes to environmental justice—the idea that while many societies believe in the rights of non-humans and espouse environmental health for the sake of the environment, when it comes to changing behaviors and accepting the inevitable impact to human life, there is a disconnect. "This suggests that while the campaign to assert legal rights for non-human beings and 'living entities' is a useful pull towards more reciprocal human-non-human relations, as long as 'push comes to shove' for humankind, as it does most of the time, achieving significant ecological justice is likely to remain challenging" (Strang 2019:7). Perhaps, then, we have to embrace the idea of a moral schizophrenia and show that posthumanism is truly a reimagining, too, of human rights. Perhaps we just need to reconceptualize spaces and landscapes, concepts of self and other (see Strang 2019), and boundaries between human and non-human. The U.S. based NGO Earth Law Center has recently undertaken such a task:

> Earth Law is the idea that ecosystems have the right to exist, thrive, and evolve—and that Nature should be able to defend its rights in court, just like people can. Despite decades of environmental legislation, Earth's health continues to decline. Because our current laws protect Nature only for the benefit of people and corporations, profit usually takes priority over Nature. Even when environmental issues are brought to court, people must prove that the environmental damage violates their own rights since the environment has no rights of its own (Earth Law Center 2018).

Cara Blanca offers valuable insights into how the concept of a truly integrated landscape might benefit legal designations of spaces. In the opening of the chapter I outlined the regulations and recommendations that currently offer guidance to the management of the Cara Blanca space. Their shortcomings are clear. A point discussed by Gonzalez-Cruz in her study of cultural resource management in the Cara Blanca landscape is the tendency for "nationalism to supersede any local or tribal affiliations when concerning decision-making" (Gonzalez-Cruz 2019:12). At Cara Blanca, this tendency is reflected in the government's support of Mennonite agricultural activities, a continued oppression of the Maya people. Of course, this is intimately tied to the oppression of the Cara Blanca landscape as a whole—we have seen how environmental regulations and recommendations have been used to continue to oppress indigenous communities (see my discussion of Yosemite above).

Thus, let us consider the sloth who became embedded in the *cenote* walls due to the dearth of surface water in the vicinity, in search of reprieve from the increasing aridity as the worldwide aqueous context shifted. The sloth who still informs us through water (in the form of isotopes) that waters kinetic qualities drew social sloths to these life-giving pools that later became home to the ancient Maya. Let us consider those people who's world grew from the dark waters of the underworld—from the necessity of, in this case, the Cara Blanca waters—into the expansive and creative lowland Maya of the Classic period. At Cara Blanca, the Maya material world, water temples and ceramic pots, ceremonial circuits, constructed spaces and space in between, were born in the context of water being all consuming and yet all too scarce. The landscape's cycles of inundation and desiccation fed the continued kinesis of the late Pleistocene, Terminal Classic, and present day Cara Blanca. As these landscapes, fueled by water, are still emerging today, then they must be considered in the pursuance of ecological justice and conservation of today's landscape. As shown in the discussion of environmental personhood case studies, considering the landscape as truly materially integrated is essential, however, doing so only within particular cultural ontologies ultimately does a disservice to human and non-human participants in that landscape. To reposition human needs in the consideration of environmental regulations as not primary, but a contributing element, communities can cite multicultural understandings of space, as well as the distinctly non-human flourishing of that landscape.

Final Thoughts

…a willingness to consider rivers as persons is more than an intellectual exercise. Enshrining non-human rights in law is fundamentally a statement of values, and –as relationships between beliefs and values and actions are recursive—a pragmatic view might be that to establish legal rights for rivers in the first place will initiate a relational shift (Strang 2019:14).

This dissertation offers motivation and a step towards the relational shift discussed by Strang in the quote above. The language I use in this dissertation is sometimes artistic, expressive, and some might say unscientific. Yet, the use of such language has precedent in legal dialogue—Clark and colleagues (2019) speak of the songs different rivers sing, their tone and their melody; Carol Rose (1990) writes that poetics helps to paint landscapes and narratives allowing for the plausibility of laws that might otherwise seem implausible. Each of the legislations enacted since 2017 and discussed above show the difficulties of associating personhood (humanity) with non-human entities in the eyes of the law—some worked better than others but each, still, left something to be desired from the ontological position presented in this dissertation. Each, too, uses such poetic language to address some of those difficulties and to break down human perceptions of what is other. Throughout this dissertation, I have shown how water's kinesis was the fuel that integrated the Cara Blanca landscape throughout time—I focused upon the Late Pleistocene water's through the tooth of an extinct giant ground sloth and the Terminal Classic period through archaeological and paleoecological materials. The material articulations of the landscape that emerged in these periods varied, allowing for the florescence of ancient Maya and megafauna and allowing for the ever-changing and sustaining landscape to persist into our present day.

The histories of these landscapes, the Maya, the sloth and the many other entities thriving from the waters are still unfolding, still being defined, still changing. To forget this integration and allow these histories to halt unravels our understanding of past and present. The halting of histories has happened before. In the U.S., Will Falk with the NGO Deep Green Resistance sought to grant personhood to the Colorado River, which has deep roots in human and non-human worlds. Their efforts, however, failed. Extensive pollution has infested the river for generations, so perhaps their efforts were too late anyway. "Falk had been listening to the Colorado's lament: a song he realized with a sudden perspicacity was no longer the song of a living river, but tragically, that of a "ghost." (Clark et al. 2019: 819; Falk 2017).

Braidotti (2017:93) calls for humans to become minor, as in no longer striving for the need to be major. And, as Freitas (2019:100) asserts, this would diverge from the "tendency for abstract pan-human stupidity to emerge and dominate". Rather, she puts forth, there would emerge a sympathy (Brouwer 2015; de Freitas 2019; Hanley 2015; Schliesser 2015) that would focus upon "preindividual intensities of the affective plane" (Braidotti 2017:100); sympathies that no longer focus upon material boundaries associated with "individual" and instead are drawn to transindividual conceptions of the world, it "is a kind of *agreement* between bodies when they are mutually affected by each other in a coordinated and collective achievement" (de Freitas 2019:90, emphasis original). This is how we can imagine the Cara Blanca landscape—a sympathetic, transindividual space whose boundaries are blurred, broken, and integrated with the waters. If we consider ourselves as another part of this system that has a job to do, rather than separating ourselves from, putting ourselves above, and then further separating into essentialized identities, we can concentrate on the emergence of a landscape, focus on the rights of water as the ultimate integrator, work towards protecting, conserving, and facilitating history. Ultimately, such a mutualism will increase the integrated landscape's resilience and encourage a flexibility, a sympathy, in the system that promotes sustainability. My discussion of the Cara Blanca landscape throughout this dissertation has placed the onus of landscape integration upon the waters, but the onus of landscape conservation remains on "us".

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APPENDIX A: ARTIFACTS

Structure 1 Ceramic Data				
Description	**Artifact Type**	**Count**	**Additional Information**	**Orifice diameters (cm)**
East platform, N side, collapse	Rims	10	2 unslipped jar rims (both purposefully broken), 2 red slip VA bowl-same vessel, 1 red slip VA plate, 2 unslipped jar rims, 1 unslipped plate	2 15 cm from same unslipped jar, 2 20 cm from same VA bowl, VA plate 30 cm, unslipped jar 45 cm, unslipped plate 40 cm
	Necks	15	Two purposefully broken	
	Bases	4	2 from same vessel, 2 ring	
	Body	114	Wall thickness: .9 cm, 1.5 cm, 1.1 cm, 1.17 cm, 1 cm. Length: 9.7 cm, 11.56 cm	
	Bone	20	6 long bone fragments, 1 burnt bone	
	Marine shell	1	Originally identified as bone, but looks to be part of spiral; in photo with bones	
	Lithics	7	2 bifaces- 1 adze, 3 flakes, 2 cores	
East wall	Rims	18	2 VA red slip plate triangular sherd, 2 pieces of same red slip VA plate, 5 unslipped jar rim (Cayo Unslipped)—1 with slight fire clouding and purposefully broken 1 VA red slip bowl, 1 VA red slip plate, 6 unslipped jars, Cayo Unslipped, some with fire clouding	VA plate with 2 pieces 30 cm, VA plate 35 cm, jar 15 cm, jar 30 cm, jar rim 25 cm, jar rim 25 cm, jar rim 15 cm VA red slip bowl 50 cm, two tan paste jar rims 15 cm, tan paste jar 10 cm, red slip VA plate 40 cm, tan paste jar 20 cm, tan paste jar 20 cm, tan paste jar 25 cm, 15 cm
	Necks	12	Some thick	
	Base	1		
	Body	258	Wall thickness: .92 cm, .93 cm, 1.07, .98, .89, .85, 1.3, 1.4 cm, length 13.31, 7.3, 6.5 cm	
	Bone	9	3 long bone	
	Obsidian	1	1 notched blade with striations	
	Marine shell	1	Opalescent clam piece	
	Lithics, ground s tone	13	1 pinkish granite mano fragment, 1 blade, 1 core, 10 flakes, cylindrical tufa	
East Wall, stacked sherds at SE corner	Rim	1	Unslipped jar rim, blackened; from same vessel as below	15 cm
	Neck	3	All from same vessel as rim, blackened	
East wall, 80 cm from	Rims	3	Stacked c. 4 cm thick; 1 VA red slip bowl- 2 sherds from same	VA red slip bowl 45 cm; unslipped plate 29

SE corner, stacked vessel sherds			vessel, 1 unslipped plate with exterior twist appliqué design c. 3 cm from rim	cm
	Neck	1	Large jar sherd with oily stain on shoulder (lipids?)	25 cm
	Body	2	c. 1 cm thick jar sherds	
East wall, jar	Rims	3	VA red slip plate, VA red slip plate	VA plate rim 30 cm,

2014 Structure 3 Ceramics				
Cat. No.	**Context**	**Artifacts Class**	**Count**	**Description**
2078	101 Fill Cluster 2	Body sherds	44	44 unslipped
		Rims	8	1 tan paste, unslipped bowl 2 tan paste unslipped dishes 5 tan paste, unslipped jars
		Lithics	1	1 charred limestone
2079	101 Fill Southern Half of Unit	Body sherds	219	180 unslipped
				tan paste, brown slip 3 orange paste, red slip 2 tan pate, red slip
				tan paste, maroon slip 34 charred
		Necks	26	12 tan paste, unslipped 4 orange paste, red slip 2 tan paste, red slip
				2 tan paste maroon slip 6 charred
		Bases	4	4 tan paste, unslipped
		Rims	14	1 orange paste, unslipped jar with fingernail impressions
				1 plate
				1 bowl
				3 charred jar
				7 jar
				1 unidentified
2081	101 Fill Original 1X1 m TP	Body sherds	65	55 unslipped
				3 tan paste, red slip 1 decorated
				6 charred
		Necks	2	2 tan paste, unslipped
		Foot	1	1 unslipped
		Bases	2	1 tan paste, unslipped
				1 orange paste, unslipped
		Lithics	1	1 chert flake
2082	101 Fill Northern Half of Unit	Body Sherds	36	34 unslipped
		Necks	3	3 tan paste, unslipped
		Rims	4	3 tan paste, unslipped jars
				1 orange paste, unslipped jar
2080	102 Floor	Lithics	1	1 nearly exhausted obsidian
				core
2069	102 Floor Cluster 1	Necks	1	1 orange paste, unslipped
		Rims	3	3 orange paste, unslipped
				jars
2076	102 Floor East of Unit Cleaning	Body sherds	89	83 unslipped
				5 orange paste, red slip 1 polychrome, orange paste, orange slip
			4	1 tan paste, black slip

				3 tan paste, red slip
		Necks	11	11 tan paste, unslipped
		Rims	21	3 bowl s
				6 plates
				1 dish
				11 jar s
		Shell	1	1 freshwater
2077	102 Floor East of Bulk	Body Sherds	121	111 unslipped
				6 orange paste, red slip 1 tan paste, maroon slip 1 tan paste brown slip
				2 tan paste, red slip
		Bases	3	2 tan paste, maroon slip
				1 grey paste, black slip
		Necks	10	1 tan paste, unslipped
				5 orange paste, unslipped 4 tan paste, unslipped charred
		Rims	12	5 bowls
				2 dishes
				1 charred jar
				4 jars
2083	102 Floor Cluster 3	Body Sherds	77	76 unslipped
				1 tan paste, black slip
		Necks	1	1 tan paste, unslipped
		Rims	3	3 tan paste, unslipped jar
2066	102 Floor South Stacked Vessel Layer	Body Sherds	917	802 unslipped
				16 maroon slip and paste 32 tan paste, red slip
				7 orange paste, red slip 60 charred
		Necks	32	32 unslipped
		Rims	61	36 jars
				5 bowls
				16 dishes
				1 nail incised
				3 unidentified
		Bases	20	8 orange paste, red slip 1 tan paste, red slip
				2 orange paste, unslipped 7 tan paste, unslipped
				2 tan paste, maroon slip
		Bone	4	4 charred
2067	102 Floor Middle Stacked Vessel Layer	Body Sherds	1028	961 unslipped
				10 white
				19 charred
				21 orange paste, red slip 8 tan paste, red slip
				1 orange paste, unslipped 2 tan paste, unslipped
				4 tan paste, maroon slip 2 tan paste, black slip
		Bases	16	2 orange paste, maroon slip 1 tan paste, red slip
				2 orange paste, unslipped 7 tan paste, unslipped
				4 tan paste, orange slip
		Rims	20	8 charred jars
				12 bowls

			31	8 dishes
				2 plates
				21 jars
		Necks	34	34 unslipped
		Lithics	7	1 chert biface
				1 chert angular shatter 1 chert flake
				2 firecracked chert
				2 charred limestone
2068	102 Floor North Stacked Vessel Layer	Body Sherds	741	712 unslipped
				21 charred
				5 white
				3 orange paste, black slip
		Necks	40	40 unslipped
		Jars	25	7 charred jars
				6 dishes
				1 charred tecomate
				3 bowls
				8 jars
		Bases	11	4 orange paste, red slip 5 tan paste, unslipped
				2 orange paste, unslipped
Structure 3 2016 Ceramics				
Cat. No.	**Context**	**Artifact Class**	**Count**	**Description**
2163	Pool 1 Str. 3 Trench 2 Burial 1 Extension	body	1	tan paste (associated w/ burial)
2163	Pool 1 Str. 3 Trench 2 Burial 1 Clean-up	body	2	1 tan paste, 1 black paste
2234	Pool 1 Str. 3 NE Corner Topsoil	rim	33	18 tan paste jar, 1 orange/brown paste jar, 2 VA bowls, 4 red-slipped carbon core orange paste bowls, 3 tan paste bowls, 4 tan paste rims, 1 red-slipped tan paste bowl
		neck	23	5 tan paste, 1 VA, 10 tan paste, 4 orange/brown paste, 2 orange paste, 1 red-slipped carbon core tan paste
		body	214	2 VA w/ridge, 2 red-slipped tan paste w/ridge, 114 tan paste, 3 red-slipped orange paste, 6 red-slipped tan paste, 1 brown-slipped tan paste, 1 red-slipped VA, 9 burnt tan paste, 76 orange paste
		base	8	3 tan paste, 2 orange paste, 3 red-slipped tan paste
2235	Pool 1 Str. 3 South Central #3 Topsoil	rim	11	3 red-slipped orange paste jars, 3 tan paste jars, 1 brown paste jar (2 pieces), 1 orange paste jar, 1 red-slipped tan paste bowl, 1 red-slipped tan pasate rim,
		base	1	red-slipped tan paste
		neck	4	2 tan paste, 1 orange/brown paste
		flange	1	red-slipped orange paste medial flange
		body	130	2 red-slipped tan paste, 79 brown/tan paste, 2 VA, 47 tan paste

2236	Pool 1 Str. 3 SE Portion Topsoil	rim	17	6 tan paste jars, 1 red-slipped orange paste jar, 2 VA jars, 2 red slipped tan paste bowls, 1 brown-slipped tan paste bowl, 1 red-slipped orange paste bowl, 1 brown-slipped orange paste dish w/ridge, 2 tan paste bowls, 1 brown-slipped tan paste bowl w/ medial ridge
		neck	18	2 carbon core tan paste, 5 brown/tan paste, 1 orange paste, 10 tan paste
		body	292	2 dark red-slipped tan paste, 1 dark red-slipped brown paste, 6 red-slipped tan paste, 13 red-slipped orange paste, 25 burned tan paste, 64 tan/brown paste, 1 black-slipped tan paste, 105 tan paste, 75 orange paste
		flange	2	1 red-slipped tan paste, 1 red-slipped orange paste
		base	1	red-slipped tan paste
2237	Pool 1 Str. 3 North Central #2 Topsoil	rim	10	3 tan paste rims, 1 tan paste jar (2 pieces), 2 tan paste jar, 2 brown-slipped tan paste straight-sided bowl, 1 red-slipped tan paste rim, 1 polychrome tan dish w/ medial ridge (4 pieces, Mountain Pine)
		neck	11	5 tan paste, 6 tan/brown paste
		body	201	1 red-slipped VA w/ medial ridge, 1 red-slipped tan paste w/ medial ridge, 1 orange paste medial ridge, 85 orange/tan paste, 100 tan paste, 6 tan paste striated, 2 red-slipped tan paste, 1 dark red-slipped tan paste, 2 red-slipped orange paste, 2 brown-slipped tan paste
2238	Pool 1 Str. 3 NW Corner Topsoil	body	88	22 red-slipped tan paste, 2 dark red-slipped tan paste, 1 orange/red-slipped orange paste, 4 VA, 40 tan paste, 7 brown paste, 9 tan/brown paste striated, 1 polychrime tan paste (in pieces), 2 polychrome orange pasge
		rim	19	6 tan jars, 1 tan/orange paste jar, 5 brown paste jars, 1 tan/brown jar, 1 red/brown jar, 2 red-slipped tan paste bowls, 1 orange/tan paste dish, 2 red-slipped brown paste dish
		base	5	4 red-slipped tan/brown ring base, 1 tan/orange paste dimpled
		neck	19	1 red-slipped tan paste, 2 red/tan paste, 1 pinkish paste, 6 brown paste, 9 tan paste
2239	Pool 1 Str. 3 North of Step 108 Bulk	body	27	6 tan paste striated, 1 dark red-slipped tan paste, 10 tan paste, 1 brown paste, 4 red-slipped orange paste, 5 orange/brown
		neck	5	2 red-slipped tan paste, 1 tan paste, 2 dark red-slipped orange paste
		rim	7	2 red/tan jars, 1 red-slipped burnt black paste straight rim, 1 brown paste jar, 1 red-slipped tan paste bowl, 1 red-slipped brown paste dish, 1 red-slipped tan paste dis
2240	Pool 1 Str. 3 W of West Wall Topsoil	body	55	16 tan paste, 2 orange paste, 10 tan/brown paste, 14 tan paste burnt interior, 10 red-slipped tan paste, 2 red-slipped orange/brown paste, 1 VA w/medial flange

		rim	15	2 tan paste jars, 3 carbon core tan paste jars, 3 brown paste jars, 1 red-slipped brown paste jar, 1 red-slipped tan paste jar, 2 red-slipped tan paste rims, 1 red/tan paste bowl, 1 brown paste bowl, 1 brown paste dish, 1 red-slipped BHVA jar
		base	1	brown-slipped tan/orange paste ring base
		neck	8	4 dark brown/tan paste, 1 tan paste, 1 burnt, 2 red-slipped orange/ tan paste
2241	Pool 1 Str. 3 W of West Wall Above FL	body	81	15 tan paste striated, 31 tan paste, 5 brown/orange paste striated, 15 orange paste, 13 red-slipped tan paste, 1 dark red-slipped brown paste, 1 orange-slipped brown paste
		foot	1	slab foot
		base	4	1 red-slipped tan paste, 1 orange paste, 1 red-slipped tan paste ring base, 1 brown/orange paste ring base
		neck	11	5 tan paste, 1 tan paste striated, 3 orange paste, 1 brown paste, 1 red-slipped orange paste finger-nail incised
		rim	20	4 red-slipped VA (Belize Red) bowls, 1 orange-slipped orange paste (Aguila Orange) jar, 2 red/brown-slipped brown paste (Mountain Pine) plates, 1 orange/red-slipped tan paste (Mountain Pine) plate, 6 tan paste jars, 2 orange/red-slipped tan paste rims, 1 orange paste jar, 1 brown-slipped orange paste jar, 1 brown-slipped brown paste jar, 1 red/brown-slipped tan paste (Vaca Falls) bowl
2242	Pool 1 Str. 3 W of West Wall NW Corner	body	13	3 burnt tan paste, 3 tan paste striated, 6 orange paste, 1 red-slipped tan paste
		neck	2	1 tan/orange paste, 1 red-slipped tan paste
		base	1	red-slipped tan paste ring base
		rim	9	4 tan paste jars, 1 orange paste rim, 3 red-slipped orange paste plates, 1 red-slipped orange paste dish
2243	Pool 1 Str. 3 West Wall Clean-up	rim	1	red-slipped tan paste plate w/ ridge
2244	Pool 1 Str. 3 W of West Wall By Trench 1	body	62	13 tan paste striated, 2 VA, 15 tan paste, 19 tan/orange paste, 3 orange paste striated, 4 red-slipped orange paste, 3 red-slipped tan paste, 3 red-slipped BHVA
		neck	8	5 tan paste, 3 orange paste
		base	1	orange-slipped orange paste ring base
		rim	9	5 tan paste jars, 1 red-slipped tan paste rim, 1 red paste rim, 2 carbon core tan/red paste bowls
2245	Pool 1 Str. 3 S of Str. 3 Topsoil	body	23	7 tan paste, 7 orange paste, 5 burnt tan paste, 2 red-slipped tan paste, 1 red-slipped orange paste, 1 tan/orange paste possible polychrome (red, black and orange)
		neck	6	4 tan paste, 2 red-slipped orange paste

		rim	16	3 tan paste jars, 2 orange paste jars, 1 red-slipped Tinaja Red jar (2 pieces), 2 red-slipped tan paste bowls, 1 red-slipped orange paste bowl, 3 orange paste bowls, 1 VA bowl, 1 dark red-slipped tan paste bowl
		base	1	tan paste ring base
2246	Pool 1 Str. 3 Clustter 5	body	30	10 burnt tan paste, 9 tan paste, 7 BHVA, 1 red-slipped tan paste, 1 red-slipped orange paste, 2 burnt Belize Red
		neck	1	tan paste
		rim	5	1 tan paste jar, 2 Belize Red bowls, 2 Vaca Falls red bowls
2247	Pool 1 Str. 3 S Central Stacked Vessel	body	15	12 tan paste, 3 BHVA
		neck	2	tan paste
		rim	4	1 BHVA bowl, 3 tan paste jars
2248	Pool 1 Str. 3 Top of FL 102, Cluster 4	vessel	24	BHVA red-slipped bowl: 9 rims, 15 body
		rim	1	tan paste jar
		neck	1	tan paste
		body	5	tan paste
2249	Pool 1 Str. 3 Top of FL 102, Cluster 7	body	16	6 brown/red paste, 1 red-slipped orange paste Tinaja Red, 6 brown paste, 1 pinkish paste, 2 tan paste
		neck	1	tan paste
2250	Pool 1 Str. 3 Top of FL 102, Cluster 6	rim	2	1 tan paste jar (5 pieces), 1 red/orange-slipped tan paste plate
		body	4	2 tan paste striated, 2 tan paste
		neck	1	tan paste
2251	Pool 1 Str. 3 Trench 1 FL 102 Ballast	body	67	38 tan/brown paste, 9 tan/brown paste striated, 2 brown paste, 3 tan paste striated, 7 orangish paste, 2 red-slipped tan paste, 2 red-slipped pinkish paste, 2 eroded polychrome pinkish paste, 1 black-slipped orange paste Achote Black, 1 red-slipped orange paste Tinaja Red
		base	4	1 brown-slipped tan paste flat base, 3 red-slipped tan paste ring base
		neck	12	9 tan paste, 2 orange paste, 1 tan paste striated
		rim	17	2 tan paste Tu-Tu Camp Striated jars, 2 tan paste jars, 2 brown paste rims, 1 red-slipped tan paste Vaca Falls/Garbutt Creek bowl, 1 red-slipped tan paste plate, 1 tan paste dish/plate, 6 red-slipped tan paste bowls, 1 red-slipped orange paste bowl
2252	Pool 1 Str. 3 Trench 1 Fill 104	body	273	69 tan/brown striated, 105 tan paste, 36 burnt tan paste striated, 2 VA, 2 red-slipped tan paste BHVA, 23 red-slipped tan/orange paste, 12 red-slipped tan paste, 4 brown-slipped tan paste, 6 eroded polychrome orangish paste, 2 burnt orange Saxche Polychrome, 1 Uacho black-on-orange Saxche Group polychrome, 1 black/red-slipped tan paste Achote Black, 1 orange

				paste w/medial flange, 2 tan paste w/ decorations, 7 orange/brown paste
		neck	10	7 tan paste, 1 red-slipped tan paste, 1 red-slipped orange paste, 1 brown-slipped tan paste
		flange	1	orange paste
		foot	1	tan/orange paste nub
		rim	37	10 tan paste jars, 1 tan paste striated jar, 5 red-slipped orange paste bowls, 5 orange paste bowls, 1 red-slipped tan paste bowl, 2 red-slipped tan/orange paste jars, 1 brown-slipped tan paste jar, 1 orange paste dish w/ medial ridge, 1 red-slipped orange paste plate w/ medial ridge, 1 red-slipped tan paste plate w/medial flange, 1 black-slipped tan paste bowl, 2 tan paste rims, 1 polychrome tan paste bowl, 1 Uacho Black-on-orange Saxche bowl, 3 red-slipped orange paste Mountain Pien plates
2253	Pool 1 Str. 3 Trench 1 Fill 109	body	11	5 burnt tan paste, 2 orange paste, 1 brown-slipped tan paste, 2 red/orange slipped pinkish paste, 1 red paste
		neck	1	tan paste
		rim	2	1 red-slipped red paste bowl, 1 red-slipped tan paste bowl
2254	Pool 1 Str. 3 Trench 1 Fill 104 clean-up around Cluster 8	body	77	28 brown paste, 8 burnt tan paste, 4 tan paste, 10 brown-slipped tan paste, 8 red/brown-slipped orange paste, 16 red/orange-slipped tan paste, 3 polychrome orange paste
2255	Pool 1 Str. 3 Trench 1 Fill 104 Cluster 8	vessel	19	2 tan paste base, 17 body
2256	Pool 1 Str. 3 Trench 2 FL 102	flange	1	polychrome orange paste
		body	9	5 orange paste, 1 brown paste, 3 tan paste
2257	Pool 1 Str. 3 Trench 2 FL 102 Ballast	rim	5	4 tan paste jars, 1 ~polychrome tan paste jar/dish
		neck	2	red/brown paste
		body	73	1 polychrome tan paste, 1 black-slipped tan paste, 14 red-slipped tan paste, 2 black or burnt paste, 18 red/tan paste, 37 tan paste (~10 striated)
2258	Pool 1 Str. 3 Trench 2 F 105	rim	10	1 red-slipped carbon core tan/red paste jar, 2 red-slipped tan/red paste bowls, 1 tan paste striated jar, 1 red-slipped tan paste plate, 1 brown paste rim, 1 tan paste jar, 1 brown paste jar, 2 red-slipped tan paste dishes
		neck	5	1 tan paste, 1 red/tan paste, 3 brown paste striated
		body	64	11 red-slipped tan paste, 3 red paste, 6 burnt tan paste, 11 brown paste, 33 tan paste (~8 striated)

2259	Pool 1 Str. 3 Trench 2 Fill 103	rim	4	1 BHVA bowl, 1 tan paste striated jar, 1 red-slipped carbon core red/tan paste jar, 1 red-slipped carbon core tan paste jar
		body	67	1 red-slipped BHVA, 1 polychrome tan paste, 1 polychrome orange paste, 4 red-slipped tan paste, 7 red-slipped red/tan paste, 1 burnt, 13 burnt red/tan paste, 7 red paste, 32 tan paste (~8 striated)
		neck	2	1 tan paste, 1 tan/red paste
		base	1	carbon core brown paste
2260	Pool 1 Str. 3 Trench 2 FL 106 Ballast	rim	3	1 red-slipped tan paste jar, 1 red-slipped tan/red paste carbon core bowl, 1 red-slipped tan paste carbon core bowl
2261	Pool 1 Str. 3 Trench 2 Bottom of FL 106 Ballast, Cluster 9	body	4	tan paste + ~20 bits
2262	Pool 1 Str. 3 Trench 2 Fill 104	body	142	17 brown paste (1 striated), 9 burnt, 32 red/tan paste (2 striated), 52 tan pasted (~15 striated), 1 red-slipped BHVA, 5 red-slipped orange paste, 18 red-slipped tan paste, 4 red-slipped red/orange paste, 2 polychrome tan paste, 1 red-slipped red paste, 1 red-slipped brown paste
		foot	1	red paste nub
		base	1	tan/orange paste
		neck	9	6 tan paste, 2 red/tan paste, 1 red paste striated
		rim	14	1 polychrome orange paste bowl/vase, 1 tan paste jar, 2 tan/red paste jars, 1 polychrome red paste bowl, 1 tan/orange jar/dish, 1 red-slipped tan paste plate, 1 red-slipped tan paste dish, 2 red-slipped tan paste bowls, 1 tan paste bowl, 1 tan/red paste bowl, 1 red-slipped brown paste rim
2263	Pool 1 Str. 3 Trench 2 Fill 109	ceramic	1	clay rattle ball
		body	6	3 tan paste, 1 burnt black/brown paste, 1 red/brown paste, 1 burnt tan paste
		rim	4	1 brown/black paste jar, 1 red-slipped carbon core tan paste jar, 1 black paste jar, 1 red-slipped brown paste bowl
2264	Pool 1 Str. 3 Trench 2 FL 106/Fill 104	rim	1	tan paste rim
		base	1	red-slipped carbon core tan paste (7 pieces)
		neck	3	tan paste
		body	24	2 brown paste, 2 burnt tan paste, 14 tan paste, 5 red-slipped tan paste, 1 red/tan paste
2265	Pool 1 Str. 3 Trench 1 Extension of Cleaning to Bu. 2	rim	15	1 brown paste dish, 2 carbon core tan paste jars, 1 tan paste jar, 1 tan/red paste jar, 1 red-slipped red/tan paste jar, 1 red-slipped tan paste jar, 2 tan paste dishe, 1 tan/red paste dish, 1 orange-slipped tan/red bowl, 2 red-slipped tan paste dishes, 2 red-slipped tan/red paste dishes

		body	23	3 black-slipped tan/orange paste, 6 red-slipped tan paste, 1 red paste, 11 tan paste, 1 dark red-slipped tan paste, 1 red-slipped brown/orange paste
2266	Pool 1 Str. 3 Trench 1 Fill 104 tunnel above Bu. 2	neck	1	dark red-slipped brown paste
		body	11	dark red-slipped tan/red paste, 2 red paste, 6 tan paste, 2 red-slipped orange paste
2267	Pool 1 Str. 3 Trench 1 E extension above stones covering Bu. 2	rim	2	1 red/paste jar/dish, 1 dark red-slipped brown paste bowl
		~neck	1	red-slipped tan/orange paste neck or eroded jar rim
		flange	1	dark red-slipped brown paste
		body	16	5 orange-slipped black paste, 1 red-slipped tan paste, 2 tan paste, 8 burnt brown paste
2268	Pool 1 Str. 3 Trench 2 Step 108 Fill 104	body	5	2 burnt brown paste, 1 red/brown paste, 1 carbon core red paste, 1 red-slipped carbon core pinkish red paste
2269	Pool 1 Str. 3 Trench 2 FL 102 extension	body	4	3 tan paste, 1 BHVA
		rim	1	carbon core brown paste jar
2270	Pool 1 Str. 3 Trench 2 Extension Ballast 102	body	1	orange/red body
		rim	1	burnt tan paste
2271	Pool 1 Str. 3 Trench 2 Extension Fill 103	body	8	4 tan paste, 2 red-slipped tan/orange paste, 1 red/orange-slipped tan paste, 1 red-slipped brown paste
		flange	1	tan paste
2272	Pool 1 Str. 3 Trench 2 Extension ext. all	body	6	1 orange-slipped tan paste, 1 possible eroded polychrome tan/red paste, 1 tan/red paste, 1 red-slipped tan paste, 2 tan paste
2273	Pool 1 Str. 3 Wall 110	neck	1	carbon core tan paste
		body	1	brown paste
2274	Pool 1 Str. 3 Ballast 102/Fill 103 under Wall 110	neck	3	2 striated tan paste, 1 striated brown paste
		body	13	2 burnt tan paste, 4 tan paste, 4 red/tan paste, 1 red-slipped tan paste, 2 red-slipped ash paste
		rim	8	1 carbon core red paste jar, 1 tan paste rim, 1 carbon core tan paste jar, 1 tan paste jar, 1 red-slipped tan paste bowl, 1 eroded polychrome dish, 1 orange-slipped red/orange paste basin, 1 tan paste plate
2275	Pool 1 Str. 3 Fill 104 under Wall 110	rim	15	1 red-slipped brown paste bowl, 1 red-slipped (~polychrome) carbon core red paste bowl, 1 red-slipped brown paste dish, 2 red-slipped red paste plates, 2 red-slipped BHVA bowls, 1 red-slipped BHVA jar, 1 brown paste plate, 2 red-slipped red paste bowls, 3 red-slipped tan paste bowls, 1 red paste jar/dish
		base	2	1 brown/red paste, 1 polychrome

		body	191	1 BHVA, 48 red/brown paste, 65 tan paste, 49 brown paste, 19 red-slipped tan paste, 9 red-slipped dark tan/brown paste
2276	Pool 1 Str. 3 Trench 2 Wall Clean-up	rim	2	1 red-slipped BHVA bowl, 1 eroded polychrome bowl or vase
		body	8	2 red-slipped BHVA, 3 tan paste, 3 tan/red carbon core paste
Structure 3 2018 Ceramics				
Cat. #	**Site & Context**	**Artifact Class**	**Count**	**Description**
2332	CB P1 Str 3 W of Wall - Collapse 101	body	245	13 brown paste, mixed temper; 2 tan paste, sand temper; tan paste, mixed temper, striated; 11 orange/pink paste, limestone temper; 87 tan paste, mixed temper; 4 orange paste, mixed temper, red slip ext.; 1 orange paste, mixed temper, striated; 4 tan/brown paste, VA; 3 tan paste, mixed temper, red slip int.; 2 tan paste, mixed temper, red slip ext.; 11 tan/brown paste, sand temper; 20 mixed temepr, burned; 1 brown paste, mixed temper, fingernail incised
		rim	20	7 tan paste, mixed temper, jar; 1 tan paste, mixed temper, vertical striation on neck; 1 orange paste, limestone temper jar; 5 tan paste, limestone temper jar (25 cm neck dia.; 24 in. rim dia, 20 cm neck dia.), 1 orange paste, mixed temper, black slip int. jar (2 pieces); 2 tan paste, mixed temper bowl (c. 50 cm rim dia.); 1 tan paste, mixed temper, red slip int. bowl (two pieces, 31 cm rim dia.); 1 tan paste, VA, red slip int. dish; 1 tan paste, limestone temper, burned bowl
		neck	16	2 tan paste, sand temper jar; 3 tan paste, limestone temper jar; 1 tan paste, mixed temper, finger nail incised neck; 10 tan paste, mixed temper jar necks
		foot	1	1 tan paste, mixed temper foot (bulb?)
2333	CB P1 Str 3 W of Wall - Above F-111	body	65	2 tan paste, mixed temper, striated; 5 orange/pink paste, limestone temper; 1 tan/brown paste, VA; 2 tan/brown paste, mixed temper, red slip ext.; 17 tan paste, mixed temper; 21 tan paste, limestone temper; 17 burned
		rim	7	1 orange paste, fine limestone/VA temper, red slip ext. vase (7 cm rim dia.); 2 tan paste, mixed termper jar (24 cm rim dia., 24 cm neck dia.); 1 tan paste, limestone temper, jar; 2 tan paste, mixed temper, burned jar; 1 brown/orange paste, mixed temper, red slip int./ext., carbon core jar (50 cm rim dia., 25 cm neck dia.)
		neck	2	1 tan paste, limestone temper jar; 1 tan paste, mixed temper, burned jar (2 pieces)
		base	1	Tan/brown paste, VA(?) with red slip int. ring base

		ridge	1	Tan paste, mixed temper body with medial ridge
2334	CB P1 Str 3 W of Wall - On top of F-111	body	96	13 orange/pink paste, limestone temper; 25 tan paste, mixed temper; 25 tan paste, limestone temper; 1 tan/orange paste, limestone temper, red slip ext., striated; 1 tan paste, mixed temper, eroded red slip ext.; 2 tan paste, sand temper, eroded red slip ext.; 5 brown/orange paste, sand temper; 7 tan paste, sand temper; 5 tan paste, mixed temper, striated; 1 orange/red paste, sand/VA temper, red slip ext.; 7 burned; 2 burned, striated; 1 burned, finger nail incised
		rim	8	1 tan paste, mixed temper, jar with vertical striation on neck (24 cm rim and neck dia.); 2 tan paste, limestone temper, jars (20 cm neck dia.); 1 tan paste, mixed tmper jar; 1 tan paste, mixed temper, burned jar; 1 tan paste, mixed temper (with a lot of limestone), burned bowl; 1 tan paste, limestone temper, open oriface jar (5 cm rim dia.); 1 tan/brown paste, mixed temper jar (19 cm rim dia., 20 cm neck dia.)
		neck	4	2 tan paste, limestone temper jar; 1 tan paste, limestone temper, burned jar; 1 tan paste, mixed temper burned, jar
2335	CB P1 Str 3 W of Wall - F-111 Plaster Floor	body	4	3 tan paste, va, red slip int.; 1 tan paste, mixed temper, striated
		flange/ridge	2	1 orange paste, limestone temper, medial flange (2 pieces); 1 tan paste, mixed temper medial flange (?)
2336	CB P1 Str 3 W of Wall - Fill Below F-111	body	20	4 brown paste, mixed temper; 1 pink/orange paste, mixed temper, striated; 4 tan paste, sand temper; 6 tan paste, mixed temper; 2 tan paste, mixed temper, striated; 1 orange paste, mixed temper, red slip int.; 1 tan paste, VA, red slip ext.; 1 burned striated
		rim	2	1 tan/orange paste, mixed temper, red slip int./ext., carbon core, out-flaring bowl, 1 tan/brown paste, sand temper, red slip int./ext. rim (?)
2337	CB P1 Str 3 Tr 3 - Cleaning top of Flr 102	body	7	4 tan paste, limestone temper; 1 brown paste, mixed temper, red/brown slip in./ext.; 2 orange/pink paste, limestone temper, red slip int.
2338	CB P1 Str 3 Tr 3 - Flr 102	body	5	1 tan/orange paste, mixed temper; 1 brown paste, sand temper, striated, with eroded red/brown slip, carbon core; 2 tan/orange paste, VA, red slip ext.; 1 orange paste, mixed temper, red slip int.
2339	CB P1 Str 3 Tr 3 - Fill 103	body	106	28 tan/brown paste, mixed temper; 8 orange paste, mixed temper; 2 tan paste, mixed temper, brown slip ext.; 2 orange paste,

				mixed temper, striated, red slip ext.; 1 orange/tan paste, VA, red slip int.; 2 orange paste, mixed temper, striated, with carbon core; 1 orange paste, mixed temper, red slip int./ext; 2 tan paste, VA, red slip ext.; 11 tan paste, mixed temper, red slip int.; 2 tan paste, grog temper, black slip ext., fine (high firing temp); 3 tan paste, VA; 1 tan paste, sand temper, red slip ext.;2 orange paste, limstone temper; 4 tan/brown paste, sand temper, large carbon core; 3 tan paste, mixed temper, large carbon core; 1 orange paste, limestone temper, straited; 1 tan/orange paste, sand temper, striated, red slip int., carbon core; 1 tan paste, sand temper, striated, carbon core; 1 tan paste, mixed temper, cream slip int.; 5 tan paste, limestone temper; 14 tan paste, mixed temper, striated; 5 VA, red slip int.; 1 VA, red slip int. with lacount inset
		rim	75	1 tan paste, mixed temper, jar with beveled rim (2 pieces; 45 cm rim dia., 25 cm neck dia.); 2 tan paste, mixed temper, red slip ext, beveled rim jar (2 pieces, 34 cm rim dia.; 25 cm neck dia.); tan paste, sand temper, beveled rim, carbon core jar (2 pieces, 25 cm rim dia., 25 cm neck dia.); 1 tan/brown paste, mixed temper, vertical striations on neck, jar (2 pieces, 25 cm rim dia., 25 cm neck dia.); 2 tan paste, mixed temper jars with vertical striation in the neck (25 cm rim dia.); 1 brown paste, mixed temper, carbon core, jar with vertical striations on neck (20 cm rim dia., 21 cm neck dia.), 3 tan paste, mixed temper jar with beveled rims; 1 tan paste, mixed temper, red slip ext. jar rim (27cm rim dia., 20 cm neck dia); 1 tan paste, VA, jar with vertical striations on neck; 2 tan paste, VA jars (both 23 cm rim dia., 20 cm neck dia.); 2 brown paste, sand temper (20 cm rim dia., 21 cm neck dia.); 1 brown paste, sand temper, large carbon core (2 pieces, 25 cm rim dia., 23 cm neck dia.); 1 tan paste, sand temper, jar with carbon core; 1 tan paste, mixed temper, large carbon core jar (39 cm rim dia, 30 cm beck dia.); 1 tan orange paste, limestone temper jar rim; 9 tan paste, mixed temper jar; 1 tan paste, mixed temper, red slip int., beveled rim jar (2 pieces, 34 cm rim dia., 34 cm neck dia.); 1 tan paste, mixed temper, red slip int./ext. jar; 2 tan paste, mixed temper, open mouthed jar (both 20 cm neck dia.); 1 tan paste, mixed temper, red slip int./ext. open mouthed jar; 1 tan paste, VA, open mouthed jar (24 cm rim dia., 15 cm neck dia.); 1 orange paste, mixed temper, carbon core open-mouthed jar ; 2 tan paste,

				mixed temper outflaring bowl (24 cm rim dia., 30 cm rim dia.); 2 tan paste, mixed temper, red slip int./ext. outflaring bowl with carbon core (20 cm rim dia., 25 cm rim dia.); 2 tan paste, VA, red slip int. bowl (40 cm rim dia.); 1 tan/orange paste, VA, red slip int./ext. bowl; 1 tan paste, VA bowl; 1 orange paste, mixed temper, red slip int., carbon core, bowl with medial flange (45 cm rim dia.); 1 tan paste, sand temper, red slip int., carbon core bowl with medial flange ; 1 tan paste, mixed temper, out flaring bowl (20 cm rim dia.); 1 tan/orange paste, limestone temper bowl; 1 tan paste, mixed temper, red slip int./ext with medial ridge; 1 tan paste, mixed temper, red slip int., carbon core bowl with medial ridge (33 cm rim dia.); 1 brown paste, mixed temper, red slip int./ext plate; 1 tan paste, mixed temper plate with medial ridge; 1 tan paste, mixed temper, carbon core open mouthed jar; 1 tan paste, VA vase (14 cm rim dia.); 1 tan paste, VA , red ext. slip vase; 1 orange paste, sand temper, carbon core, red slip int./ ext. dish; 1 tan paste, sand temper, carbon core jar; 1 brown paste, mixed temper, carbon core dish; 2 VA red slip int. dish; 1 tan paste, mixed temper, red slip int. dish (25 cm rim dia.); 1 orange paste, mixed temper dish; 1 orange paste, mixed temper, red slip ext straight sided bowl; 1 orange/brown paste, red slip int. dish with medial flange (25 cm rim dia.); 2 tan paste, mixed temper dish; 1 orange paste, mixed temper, red slip int./ext. dish; 6 tan paste mixed temper rims; 1 orange paste, mix temper, red slip int./ext. rim
		neck	34	10 tan paste, mixed temper jar; 1 tan/orange paste, VA jar; 1 tan/brown paste, mixed temper, carbon core jar; 1 tan paste, mixed temper, red slip ext. jar; 2 tan paste, mixed temper, vertical striations on neck, jar; 1 burned, vertical striations on neck, jar; 3 orange paste, mixed temper, jar; 1 orange paste, mixed temper, red slip int./ext., large carbon core, jar; 2 orange paste, VA, red slip ext. jar; 12 tan/brown paste, mixed temper, large carbon core jar
		base	6	3 tan paste, mixed temper ring bases; 1 tan/brown paste, brown slip int., ring base; 1 tan paste, mixed temper, red slip int. ring base; 1 oranage paste, mixed temper, red slip int. ring base;
		flange	9	2 tan/brown paste, mixed temper, red slip int. basal flange; 1 orange paste, mixed temper, red slip int. basal flange; 1 orange paste, mixed temper, red slip ext. medial flange; 2

				orange paste, mixed temper, medial flange; 1 orange paste, mixed temper, red slip int./ext., medial flange; 1 brown paste, mixed temper, carbon core, medial flang; 1 brown paste, sand temper, carbon core, medial flange;
		ridge	5	1 tan paste, VA, medial ridge; 1 tan paste, mixed temper, red slip int., medial ridge; 3 tan/orange paste, mixed temper, medial ridge
		polychrome	10	10 tan paste, VA, body
2340	CB P1 Str 3 Tr 3 - Fill 103 End	body	99	7 tan/brown paste, sand temper, striated; 4 tan temper, sand temper; 1 orange paste, sand temper, striated; 1 orange paste, sand temper; 1 orange paste, sand temper, red slip int.; 9 tan paste, limestone temper; 1 orange temper, mixed paste, red slip int.; 3 tan paste, mixed temper, red slip int.; 1 pink paste, limestone temper, red slip ext., cream slip int.; 20 tan paste, mixed temper; 14 tan/brown paste, mixed paste, striated; 8 orange paste, mixed temper; 2 tan paste, VA(?), black slip int./ext., thin; 3 tan paste, mixed temper, brown slip ext.; 2 pink slip, mixed temper, red slip ext., striated; 1 pink/red paste, sand temper, striated; 5 tan paste, VA, red slip int.; 2 tan paste, VA, red slip ext.; 6 orange paste, VA (?), red slip ext. thin
		rim	26	2 tan paste, mixed temper jars with vertical striations on neck; 3 tan paste, mixed temper, open mouthed jars; 1 tan paste, sand temper, open mouthed jar (12 cm rim dia.); 1 tan paste, mixed temper, red slip int./ext. open mouthed jar; 1 tan paste, mixed temper, red slip ext. narrow orficed jar (9 cm rim and neck dia.); 1 think tan paste, limestone temper, carbon core open mouthed jar (45 cm neck dia.); 1 tan paste, mixed temper, beveled rim, jar (29 cm rim dia., 30 cm neck dia.); 2 tan paste, mixed temper, large carbon core jar (25 cm rim dia.); 6 tan paste, mixed temper, jar rim frags; 1 pink paste, limestone temper, red slip ext., cream slip int. in-curving bowl (36 cm rim dia.); 1 tan paste, VA, red slip int. in-curving bowl (40 cm rim dia.); 1 brown paste, mixed temper bowl with medial flange (29 cm rim dia.); 1 orange paste, sand temper, red slip ext., carbon core bowl with slight bulb; 1 tan paste, mixed temper dish with medial ridge (2 peices, 45 cm rim dia.); 1 tan paste, mixed temper, red slip int. bowl; 1 tan/orange paste, limestone temper, large carbon core rim with medial ridge with indentations; 1 tan paste, mixed temper, red slip int. rim
		neck	9	1 brown paste, mixed temper, red slip int./ext.jar neck (20 cm neck dia.); 2 tan paste, mixed temper, jars with vertical

				striations; 2 orange paste, mixed temper; 1 tan paste, sand temper, burned jar; 3 tan paste, mixed temper jar
		base	2	1 tan paste, mixed temper nearly flat base; 1 tan paste, sand temper, red slip int, ring base
		flange	3	1 orange paste, mixed temper, red slip int./ext. medial flange; 1 orange/brown paste, limestone temper, medial flange; 1 tan paste, limestone temper medial flange
		ridge	2	1 tan paste, limestone temper, carbon core, medial ridge; 1 orange paste, mixed temper, red slip int. medial ridge
2341	CB P1 Str 3 Tr 3 - Fill 104 Cluster/Refit Vessel	body	9	pink/red paste, sand temper red slip int.
		rim	4	all refit, pink/red paste, sand temper, red slip int., 30 cm rim dia., one rim piece has a lacehole
2342	CB P1 Str 3 Tr 3 - Fill 104	body	412	4 brown paste, sand/VA temper, cream slip int./ext.; 15 tan paste, mixed temper, red slip ext.; 2 tan slip, mixed temper, dark red/black slip int.; 30 tan paste, mixed temper, red slip int.; 48 burned; 12 orange paste, mixed temper, striated; 18 orange paste, mixed temper; 61 tan paste, mixed temper, striated; 121 tan paste, mixed temper; 5 orange paste, mixed temper, red slip int.; 1 orange paste, mixed temper, striated, red slip ext.; 12 tan paste, limestone; 2 tan paste, limestone temper, red slip int.; 3 tan paste, limestone temper, eroded red slip ext.; 2 tan paste, limestone temper, striated; 9 orange paste, mixed temper, red slip ext.; 6 tan paste, VA, red slip ext.; 4 orange paste, VA, red slip ext.; 2 tan paste, VA, red slip int. with flire clouding; 5 tan paste, VA; 10 tan paste, sand temper, striated; 15 tan paste, sand temper; 12 orange paste, sand temper; 5 orange paste, sand temper, striated; 7 tan/orange paste, sand temper, red slip int.; 1 tan paste, sand temper, red slip int./ext.
		rim	85	1 tan paste, mixed temper, carbon core, beveled rim jar (2 pieces, 29 cm rim dia., 20 cm neck dia.); 4 tan paste, sand temper jar (25 cm rim dia.); 3 orange paste, sand temper, carbon core jar (20 cm rim dia.); 3 orange paste, mixed temper, carbon core jar; 3 tan paste, mixed temper, carbon core jars; 2 tan paste mixed temper, jars; 2 tan paste, mixed temper, carbon core, beveld rim jars (25 cm rim dia.); 2 tan paste, mixed temper, fine jar with possible red slip ext./int. and carbon core (28 cm rim dia., 25 cm neck

				dia.); 2 tan paste, mixed temper, possible red slip int./ext., fine (.5 cm thick) open mouthed jar with some fire clouding (20 cm rim dia.); 1 orange paste, sand temper, red slip int./ext., carbon core jar; 2 orange paste, mixed temper, red slip ext., carbon core jar; 1 tan paste, mixed temper, red/brown slip int./ext. jar (22 cm rim dia.); 1 burned jar with sand temper; 1 tan paste, VA (with a little bit od sand), red slip ext. unknown rim (posibble tecomate?), see laura notes and photos (c. 20 cm dia.); 1 tan/brown paste, mixed temper, open-mouthed jar (18 cm rim and neck dia.); 1 orange paste, mixed temper, carbon core, open-mouthed jar, thick(1 cm); 1 tan paste, VA temper, medial ridge (with a little bit of sand), red slip int. dish (3 pieces; 20 cm rim dia.); 1 tan paste, sand/VA temper. red slip int./ext, medial ridge dish; 1 tan paste, sand temper jar with vertical striatinos on neck (22 cm rim dia., 15 cm neck dia.); 2 tan paste, sand temper dish; 2 orange paste, mixed temper dish with red slip int. (33 cm rim dia.); 1 brown paste, sand/VA temper, red slip int. dish with medial ridge; 1 ornage paste, mixed temper, waxy red slip int. dish with medial ridge (25 cm rim dia.); 1 tan paste, sand/VA temper, red slip int., brown slip ext. dish (22 cm rim dia.); 2 orange paste, mixed temper, red slip int./ext. carbon core dish; 1 tan paste, mixed temper, red slip int, dish with medial ridge (31 cm rim dia.); 2 tan paste, VA with a little sand temper, red slip int. dish; 1 orange paste, sand paste, carbon core dish; 2 orange/brown paste, sand/VA paste, red slip int.; 1 brown paste, VA temper with a little sand, red slip ext. dish; 1 orange/brown paste, sand temper, orange slip int. dish; 1 orange/brown paste, sand/VA temper, red slip int. dish; 1 tan paste, sand temper, large carbon core, slightly waxy red slip int./ext. plate (3 pieces, 45 cm rim dia.); 1 orange paste, sand temper, red slip int. plate; 3 tan paste, mix temper, red slip int. plate (27 rim dia.); 2 tan paste, VA with a little sand temper, red slip int. plate ; 1 tan paste, VA with a little sand temper, red slip int. plate with medial ridge; 2 brown paste, mixed temper, red slip int./ext. bowl with medial ridge (one incurved and 35 cm rim dia.); 4 tan paste, mixed temper, red slip int. bowl (15 cm rim dia.); 3 orange paste, mixed temper, red slip int./ext.; 1 tan paste, VA with a little sand temper, red slip int. bowl; 1 orange paste, sand/VA temper, red slip int. thin (.48 cm), bowl with medial

				ridge (21 cm rim dia); 1 orange paste, sand temper, carbon core bowl; 1 tan/orange paste, mixed temper, red slip int./ext. thick bowl (1.45 cm); 2 tan paste, limestone temper bowl; 1 tan paste, sand temper, red/orange slip int./ext. with large carbon core (30 cm rim dia.); 1 orange paste, limestone temper, red slip int. bowl; 1 ornage paste, VA, red slip int. vase (8 cm rim dia.); 5 orange paste, mixed temper red slip int./ext. rims; 1 tan paste, mixed temper, carbon core thick (1.4 cm) rim; 1 tan paste, sand temper, red slip int. rim; 1 orange paste, red slip int./ext. rim with medial flange; 1 brown paste, sand temper, carbon core, red slip int./ext. rim; 1 tan paste, VA, red slip int. rim; 1 tan/brown paste, VA, red slip int./ext. rim; 1 burned, with red(?) int./ext. slip, think (.45 cm) rim
		neck	36	14 tan paste, mixed temper; 1 tan pate, VA (14 cm neck dia.); 3 tan paste mixed temper, vertical striations in neck; 2 tan paste, sand temper, vertical striations on neck; 2 tan paste, limestone temper, vertical striation on neck; 2 orange paste, sand temper, red slip ext.; 1 orange paste, mixed temper, vertical striations on neck; 1 tan paste, VA, red slip ext.; 2 orange paste, sand temper, large carbon core, horizontal striations; 4 tan paste, sand temper, large carbon core; 1 orange paste, mixed temper, red slip ext.; 1 tan paste, sand temper, red slip int.; 1 tan paste, mixed temper, red slip ext.; 1 tan paste, mixed temper
		base	6	1 orange paste, sand temper, red slip int.; ring base; 1 tan paste, VA, red slip int., ring base; 2 tan paste, mixed temper, ring bases; 1 tan paste, mixed temper, red slip int./ext., large carbon core, almost flat base; 1 tan paste, limestone temper, red slip int, ring base
		ridge	4	3 pink/oragne paste, limstone temper, red slip int., medial ridges; 1 tan paste, mixed temper, red slip int., medial ridge
		flange	4	2 tan paste, sand temper, red slip int./ext. medial flange with carbon core; 1 tan/orange paste, sand temper, medial flange; tan paste, mixed temper, red slip int., medial flange
		special	1	tan paste, mixed temper, red slip int./ext., design on the exterior
		polychrome	15	1 tan/pink paste, mixed temper dish (2 pieces, c. 29 cm rim dia.); 2 tan/pink paste, sand temper bowl; 2 tan paset, VA, thin bowl (30 cm rim dia.); 1 orange paste, mixed temper bowl, 5 tan paste, VA; 2 orange paste, mixed temper; 2 brown paste mixed temper

2343	CB P1 Str 3 Tr 3 - Fill 109	body	2	1 tan paste, mixed temper, striated;; 1 orange/red paste, sand temper, red slip int. with fire clouding
		neck	1	1 tan paste, sand temper jar
2344	CB P1 Str 3 Tr 3 - Fill 109 Bottom	body	7	5 brown paste, sand temper, striated; 2 sand temper, striated, burned, 1 tan paste, sand temper, red/pink slip ext., carbon core
		base	1	1 tan paste, limestone temper, red/pink slip int./ext., large carbon core flat base
2345	CB P1 Str 3 Tr 3 - Flr 113	body	56	tan/brown paste, mixed temper striated; 3 orange paste, mixed temper, red slip ext.; 2 tan/orange paste, mixed temper; 5 tan paste, mixed temper; 1 tan/orange paste, VA, cream slip int.; 1 tan paste, sand/VA temper, red silp int.; 1 tan paset, VA, red slip int.; 2 orange paste, mixed temper, red slip int.; 1 brown paste, mixed temper, red slip int.; 5 brown/orange paste, sand temper; 10 tan paste, sand temper; 6 tan paste, limestone temper; 4 tan/brown paste, sand temper, dark red slip int.; 1 orange/pink paste, sand temper, red slip int.; 7 burned
		rim	5	1 tan paste (?), sand temper, burned, open mouthed jar (20 cm rim dia.); 1 orange paste, sand temper, thick (1.37 cm) rim; 1 tan paste, VA, red slip ext.; vase (11 cm rim dia.); 1 tan (?) paste, sand temper, burned rim; 1 orange paste, sand temper, red slip int./ext., carbon core rim
		neck	6	2 tan paste, sand temper, jar necks with vertical striations on neck; 1 orange/brown paste, mixed temper, jar neck with veritcal striations on neck; 1 brown paste, VA with a little bit of sand with red slip int.; 1 brown paste, sand temper; 1 orange paste, mixed temper, red slip ext. neck of straight necked jar;
		base	1	1 tan/orange paste, VA, possible eroded red slip int.; perhaps flat base
		polychrome	3	1 rim, 2 body--tan paste, mixed temper polychrome dish
2346	CB P1 Str 3 Tr 3 - Fill 118	body	38	6 burned; 3 tan brown paste, mixed temper, striated; 4 brown paste, sand temper; 3 tan paste, limestone temper; 2 tan paste, sand temper, carbon core, red slip int.; 2 brown paste, sand temper, striated; 1 orange/pink paste, sand temper, carbon core; 2 orange/pink paste, sand temper, red slip int.; 2 tan/brown paste, limestone temper; 1 pink paste, limestone temper; 2 pink paste, limestone temper, red slip ext.; 1 tan paste, mixed temper, red slip int.; 2 orange paste, sand/VA temper, striated; 4 orange paste, VA, red slip ext.; 1 tan paste, VA, red slip

				ext.; 2 orange/brown paste, VA with a little bit of sand, decorated sherds
		rim	5	1 brown paste, sand temper, blackslip int. bowl (20 pieces, 20 cm rim dia.); 1 tan paste, sand temper, burned bowl rim (37 cm rim dia.); 1 tan paste, mixed temper jar; 1 orange paste, sand/VA temper, carbon core jar; 1 orange paste, sand temper, red slip int.
		neck	2	1 tan paste, limestone temper jar neck with verical striations; 1 pink paste, mixed temper, red slip int.
		ridge	1	1 orange paste, mixed temper, red slip ext. medial ridge
2347	CB P1 Str 3 Tr 3 - Fill 119	body	23	5 tan paste, sand temper; 1 tan/orange paste, sand temper, carbon core; 3 pink/orange paste, sand temper; 2 tan/orange paste, sand temper, striated; 1 tan paste, sand temper, red slip int.; 1 brown paste, sand temper, striated; 1 orange paste, mixed temper, striated, carbon core; 2 tan orange paste, mixed temper; 2 brown paste, sand temper, burned; 1 tan paste, limestone temper; 1 tan paste, VA/sand temper, red slip int., brown slip ext.; 1 tan/orange paste, VA, brown slip ext.; 1 orange paste, VA, red slip ext.; 1 pink paste, limestone tmper
		rim	8	1 tan paste, limestone temper, light brown slit int. jar (37 cm rim dia, 15 cm neck dia.); 1 tan/brown paste, VA rim; 1 tan paste, sand temper, light brown slip int./ext., carbon core rim; 1 orange paste, mixed paste, red slip int. bowl; 1 orange paste, mixed temper, red slip int./ext., carbon core bowl; 1 orange paste, sand temper jar; 1 tan paste, sand temper, carbon core jar; 1 tan/brown paste, sand/VA temper, striations on int. and ext. dish with indentation around rim
2348	CB P1 Str 3 Tr 3 - Fill 119 Bottom	body	5	1 tan paste, sand/limestone temper, striated; 1 tan paste, sand temper, large carbon core; 1 sand temper, burned; 1 tan/orange paste, mixed temper, brown slip ext.;1 tan paste, mixed temper, red slip ext.
		rim	1	1 tan paste, limestone (with some VA) temper, red slip ext. jar (19 cm rim dia.)
		flange	1	1 tan paste, mixed temper, red slip int./ext., carbon core medial flange
2349	CB P1 Str 3 Tr 3 NW Ext - Collapse	body	13	3 tan brown paste, sand temper, striated; brown paste, sand/VA temper; orange paste, mixed temper, striated, carbon core; 1 tan paste, VA; 2 tan paste, sand temper
		rim	1	1 tan paste, mixed temper, cream slip int./ext. jar (19 cm rim dia.)
2350	CB P1 Str 3 Tr 3 NW Ext	rim	1	1 tan paste, mixed temper, carbon core jar rim with fingernail incisions around the neck (2 pieces, 20 cm rim dia.)

	- Flr/Ballast 102			
2351	CB P1 Str 3 Tr 3 NW Ext - Fill 104	body	43	5 tan paste, mixed temper; 1 burned, striated; 1 tan paste, VA, red slip int./ext.; 1 tan paste, VA, red slip int.; 3 tan paste, mixed temper, red slip ext.; 1 orange paste, mixed temper, striated, red slip int.; 3 orange paste, mixed temper, rd slip int.; 1 tan paste, mixed temper, red slip int.; lacount inset; 4 orange paste, mixed temper, red slip ext.; 2 tan/brown paste, sand temper; 7 tan paste, mixed temper, striated; 1 tan paste, mixed temper, striated, red slip int.; 1 brown paste, mixed temper; 2 brown paste, sand temper; 4 tan/brown paste, sand temper, striated; 1 orange paste, sand temper, red slip ext.; 2 tan paste, limestone temper; 2 oranpge paste, sand temper; 1 tan paste, limestone temper, red slip ext.
		rim	8	1 orange paste, mixed temper, red slip int. rim with medial ridge (2 pieces); 1 tan paste, VA, dark red slip int. bowl; 1 tan paste, limestone temper (15 cm rim dia.); 1 orange paste, sand temper, open mouthed jar (16 cm rim dia.); 2 tan paste, sand temper jar (15 cm rim dia.); 1 tan paste, sand/VA temper, red slip ext. carbon core jar; 1 tan/orange paste, mixed temper, carbon core, open mouthed jar (25 cm rim dia.)
		neck	2	1 tan paste, mixed temper, red slip ext. jar; 1 tan paste, limestone temper jar
		ridge	1	1 tan paste, VA, red slip int. with medial ridge
		special	1	1 tan paste, sand temper, fingernail incised with applique something?? See photo
2352	CB P1 Str 3 Tr 3 - Fill 104/109 Mix	body	21	7 tan paste, mixed temper; 2 tan paste, mixed temper, striated; 5 tan paste, mixed temper, red slip ext.; 2 brown paste sand temper, striated; 2 tan/brown paste, sand temper; 1 orange paste, sand temper, red sli pext.; 2 orange paste, sand temper, red slip int.
		rim	1	1 orange paste, mixed temper, red slip int./ext. dish (25 cm rim dia.)
		neck	1	1 tan paste, mixed temper, red slip int./ext.
		ridge	1	1 pink/orange paste, limestone temper, medial ridge with incising on either side
2354	Unknown 2--possibly CB M-186 - Rm 2 E wall S side cleaning	body	2	1 tan paste, sand temper, red slip ext., carbon core; 1 tan paste, mixed temper, red slip int. with incised ridge (2 pieces)
		rim	1	1 tan paste, sand/VA temper dish (37 cm rim dia.)
		neck	2	1 tan paste, mixed temper jar (15 cm neck dia.); 1 tan paste, sand temper jar

2355	Unknown 3 - Unknown 2	body	4	1 tan paste, limestone temper; 1 tan paste, sand temper, carbon core; 1 orange paste, mixed temper, carbon core; 1 tan paste, mixed temper, red slip int. (2 pieces)
		ridge	2	1 orange paste, mixed temper, carbon core, medial ridge; 1 tan paste, mixed temper, red slip int., medial ridge
		rim	2	1 tan paste, VA, red slip int. dish (15 cm rim dia.); 1 brown paste, mixed temper, red slip int., bowl with medial ridge (17 cm rim dia.)
		neck	1	1 tan paste, sand temper, jar neck
2356	CB M186 Rm 3 - Upper Wall LT clean-up	rim	40	Chilar fluted achote black-; Barrel shaped saxche organge ridged bowls; Intentional dichrome rim (Early Classic with Flange); Tinaja red jars
2357	UEC 2 - Tree well	rim	2	1 brown brown paste, sand temper bowl; 1 tan paste, sand temper, open mouthed jar
		body	1	tan paste, sand temper

Structure 3 Non-Ceramic Data			
Cat. No	**Context**	**Artifact Class**	**Count and Description**
2234	NE Corner Topsoil	Lithic	1 pink, fire-heated nodules
		Groundstone	1 metate fragment
2235	S Central (portion 3) of Str. 3 Topsoil	Lithic	Chert biface stem
2236	SE Portion of Str. 3 Topsoil	Lithic	1 blue chert biface point; 4 blue ch ert nodules; 5 pink, heat-treated cherts nodules; 1 worked rose chert nodule
		Obsidian	1 blade
		Bone	1 non-human fragment
2237	N Central (portion 2) of Str. 3 Topsoil	Lithic	6 white/blue chert nodules, 2 white chert flakes, 1 rose chert flake
		Shell	1 Jute
2238	NW Corner Topsoil	Groundstone	2 mano fragments
		Lithic	1 chert nodule
		Bone	1 non-human fragment
2240	W of W Wall Topsoil	Groundstone	1 mano fragment
2241	W of W Wall Above floor	Lithic	1 chert spall with worked surface
		Shell	1 Jute
2242	W of W Wall, NW Corner	Lithic	1 chert flake

2244	W of W Wall, By Trench 1	Lithic	1 shaped quartzite nodule, 1 worked blue chert nodule
2248	Top of Floor 102, Cluster 4	Groundstone	1 metate (in two re-fit pieces)
2251	Trench 1, Floor 102 Ballast	Bone	7 non-human fragments
2252	Trench 1 Fill 104	Lithic	14 brown/tan chert flakes, 4 blue chert flakes, 2 rose chert flakes, 2 brown/tan worked chert nodules
		Bone	1 burned, 2 not burned non-human fragments
		Obsidian	1 microflake
		Shell	12 shell fragments
2253	Trench 1 Fill 109	Lithic	1 rose/red chert flake
2255	Trench 1, Fill 104, Cluster 8	Shell	1 Jute
2256	Trench 2, Floor 102	Bone	2 faunal bone fragments
2257	Trench 2 Floor 102 Ballast	Bone	1 burned faunal bone fragment
2258	Trench 2 Feature 105	Bone	2 burned faunal bone fragments
		Lithic	1 chert nodule
2259	Trench 2 Fill 103	Lithic	1 chert pulley, 1 chert biface fragment, 1 worked chert nodule
2262	Trench 2 Fill 104	Shell	3 shell fragments
		Lithic	3 chert flakes
2267	Trench 1 E extension above stones covering Human Cache 2	Shell	1 Shell fragment
		Lithic	1 chert nodule, 2 chert flakes
2275	Fill 104 under Wall 110	Obsidian	2 blades
		Lithic	1 unifacially worked chert flake, 5 chert flakes
2163	Trench, Burial 2 Clean-up	Shell	1 shell fragment, 2 modified marine shell fragments
2169	Floor 102	Charcoal	1
2170	Floor 102 Ballast	Charcoal	1
2171	Trench 1, Fill 102	Charcoal	Sample 1, 0.835 mbd
		Charcoal	Sample 2 0.850 mbd
2172	Trench 2, Feature 105	Charcoal	Sample 3, 0.290 mbd
		Charcoal	Sample 4, 0.305 mbd

2173	Trench 2, Fill 104	Charcoal	Sample 5, 0.850 mbd
		Charcoal	From near HC3
2174	Trench 1, Under Wall 110 Fill and Ballast	Charcoal	1
2175	Trench 1, Fill 104 under Wall 110	Charcoal	1
2302	CB P1 Str 3 Tr 3 - Fill 118	charcoal	1 Sample 8 from 1.35 mbd
2303	CB P1 Str 3 Tr 3 - Fill 104	charcoal	1 Sample 6 from 1.155 mbd
		charcoal	1 Sample 5 from 1.155 mbd
		charcoal	1 Sample 4 from 1.075 mbd
		charcoal	1 Sample 3 from 1.0055 mbd
		charcoal	1 Sample 2 from .935 mbd
2304	CB P1 Str 3 Tr 3 - Fill 103 just on top of Fill 104	charcoal	1 Sample 1 from .835 mbd
2332	CB P1 Str 3 W of Wall - Collapse 101	lithics	1 possibly shaped limestone; 2 pink/red chert chunks; 2 grey/blue chert chunks
2335	CB P1 Str 3 W of Wall - F-111 Plaster Floor	lithic	1 white/brown/grey worked chert anuglar debris
		shell	fresh water
2339	CB P1 Str 3 Tr 3 - Fill 103	lithic	4 possibly worked limeston; 1 red/pink chert core
2340	CB P1 Str 3 Tr 3 - Fill 103 End	lithic	2 grey/blue chert chunks, 1 red chert chunk, 1 brown firecracked flake
2342	CB P1 Str 3 Tr 3 - Fill 104	lithic	12 white/grey chert flakes; 1 blue/brown unifacailly worked tool; 1 brown/pink chert, fire-cracked, worked; 1 blue/brown/white chert chunk; 1 brown/white fire-cracked chert chunk; 2 obsidian blade fragments; 1 obsidian flake; 2 brown/red chert flakes; 1 dark grey chert flake
2342	CB P1 Str 3 Tr 3 - Fill 104	shell	8 freshwater
2344	CB P1 Str 3 Tr 3 - Fill 109 Bottom	lithic	1 brown/black fire treated (pot lidding) chert chunk; 1 brown/blue/grey chert biface
2345	CB P1 Str 3 Tr 3 - Flr 113	lithic	2 grey/brown chert flakes, 2 grey/brown chert fire treated flakes, 1 grey blue chert chunk (flake?)

2346	CB P1 Str 3 Tr 3 - Fill 118	lithic	1 red/grey fire treated chert chunk; 1 blue/grey chert flake; 1 obsidian blade fragment
2347	CB P1 Str 3 Tr 3 - Fill 119	lithic	2 brown chert flakes; 1 blue/white chert chunk; 1 white chert chunk; 1 brown/grey chert flake
2348	CB P1 Str 3 Tr 3 - Fill 119 Bottom	lithic	1 burned limestone
2350	CB P1 Str 3 Tr 3 NW Ext - Flr/Ballast 102	lithic	1 White/grey chert chunk
		shell	1 freshwater shell frag
2351	CB P1 Str 3 Tr 3 NW Ext - Fill 104	lithic	3 limestone (?) slabs; 1 white chert flake
2352	CB P1 Str 3 Tr 3 - Fill 104/109 Mix	lithic	2 blue/grey chert angular shatter

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MI86 2016 Ceramics				
Cat No.	**Context**	**Artifact Class**	**Count**	**Description**
2217	Pool 1 M186 Sweatbath Center Looter's debris	body	2	tan paste striated
2218	Pool 1 M186 Sweatbath West Doorway Looter's debris	rim	4	3 tan paste jar, 1 brown-slipped tan paste dish
		neck	3	tan paste
		base	1	orange paste ring base
		body	10	2 VA, 3 tan paste, 1 orange paste, 2 red-slipped tan paste, 1 red-slipped orange paste, 1 dark red-slipped orange paste w/ medial ridge
2220	Pool 1 M186 Sweatbath SE Corner Looter's debris	body	8	5 tan paste exterior striations, 1 red-slipped orange paste, 1 orange paste, 1 tan paste
		rim	1	brown-slipped tan paste bowl
2221	Pool 1 M186 Sweatbath East Wall Collapse	body	21	7 tan paste, 2 VA, 2 orange paste, 6 tan paste exterior striations, 1 red-slipped orange paste, 2 red-slipped tan paste, 1 black-slipped tan paste
2222	Pool 1 M186 Sweatbath General Wall Clean-up	rim	4	1 red-slipped tan paste bowl w/ medial ridge, 2 tan paste jars, 1 red-slipped orange paste carbon core dish/plate w/ flange
		base	1	brown-slipped tan paste ring base
2223	Pool 1 M186 Sweatbath	rim	1	red-slipped tan paste bowl
		neck	1	tan paste

	SW Corner Bulk above floor	body	14	2 brown paste striated, 5 tan paste exterior striations, 3 tan paste, 1 VA, 1 brown paste, 1 brown/black-slipped brown VA, 1 red/black-slipped tan paste
2224	Pool 1 M186 Sweatbath SW Corner FL 102	body	8	1 polychrome tan paste, 1 brown-slipped tan paste, 4 tan paste striated, 2 tan paste
2225	Pool 1 M186 Sweatbath West Wall FL 103 ballast	rim	1	VA bowl
2226	Pool 1 M186 Sweatbath SW Corner Feature 104	rim	1	red-slipped tan paste bowl
		body	8	2 tan paste striated, 1 VA, 5 tan paste
2227	Pool 1 M186 Sweatbath SW Corner FL 105 (in FL plan view)	body	1	tan paste striated
	Pool 1 M186 Sweatbath SW Corner FL 105	rim	2	tan paste jar
2228		neck	2	1 tan paste, 1 brown-slipped tan paste
		body	40	3 brown-slipped tan paste, 2 orange-slipped tan paste, 1 red-slipped tan paste, 2 polychrome tan paste, 1 cream-slipped tan paste, 1 red-slipped VA, 4 VA, 9 tan paste striated, 8 tan paste, 9 tan/brown paste
2229	Pool 1 M186 Sweatbath SW Corner FL 105B	body	1	tan paste
2230	Pool 1 M186 Sweatbath SW Corner Ballast 105B	rim	1	red-slipped tan paste plate w/ ridge
		neck	1	orange-slipped orange paste
		base	1	brown-slipped tan paste
		body	21	1 VA, 2 red-slipped orange paste, 1 dark red-slipped tan paste, 5 tan paste, 7 tan/brown paste, 5 tan paste striated
2231	Pool 1 M186 Sweatbath NE Corner Top of FL 106	vessel	5	1 red/black slipped plate rim (Daylight Orange?), 4 body
2232	Pool 1 M186 Sweatbath NE Corner Below FL 106	body	8	2 tan paste striated, 2 tan paste, 1 VA, 3 red-slipped tan paste
		rim	1	brown-slipped tan paste plate
		flange	1	brown-slipped tan paste

M-186 2018 Ceramics				
Cat. No.	Context	Artifact Class	Count	Description
2277	CB M186 Rm 1 - South, Collapse	body	94	21 tan paste mixed temper (VA, ls); 23 brown paste striated mixed temper (VA, ls); 18 tan paste mixed temper (VA, ls) striated; 3 tan paste mixed temper cream ext. slip; 1 brown paste mixed temper; 3 tan paste mixed temper red-slip int.; 1 tan paste VA striated; 2 tan paste VA; 4 VA tan paste red-slip int.; 1 tan paste VA red-slip thin vase (3 mm); 2 tan paste VA red-slip both sides; 1 tan paste grog red-slip ext.; 1 brown paste grog; 2 tan paste ls; 3 tan paste ls striated; 2 brown paste ls striated; 2 mixed temper, tan paste, striations, red slip ext.; 2 brown paste, mixed temper, striations; 1 mixed temper, orange paste with striations; 1 VA red slip ext; 1 VA, red slip int
		rim	15	3 mixed temper jars (14 cm, 22 cm), 1 VA dish; 1 int red-slip mixed temper jar; 6 mixed temper, tan paste jars (21, 19, 15, 20, 20, 18 cm diameter); 1 tan paste, red slip int./ext. bowl (22 cm dia.); 3 tan paste, red slip int. dishes (35, 35, 26 cm dia.)
		base	4	1 VA tan paste annular ring; 1 brown VA; 1 annular ring; 1 sandstone foot
		neck	11	1 VA tan paste (25 cm); 1 mixed brown striated ; 2 tan paste mixed temper; 7 necks mixed temper, tan paste (20, 30, 35, 30, 25, 40, 30 cm dia.)
2278	CB M186 Rm 1 - On top of F-104, rocks on top of HR 1	rim	1	1 tan paste, limestone temper jar rim, everted, neck =c. 20cm, rim diameter = c. 21 cm, striations on interior
2279	CB M186 Rm 1 - Above HR 1	polychrome	1	1 volcanic ash, orange/tan paste polychrome body sherd, thin (5.2 mm)
2279	CB M186 Rm 1 - Above HR 1	body	34	1 VA, tan paste, red slip int., striated ext.; 9 VA striated; 2 orange paste, sand temper, striated; 2 VA; 1 brown/grey paste, limestone temper, striated; 3 mixed temper, tan paste; 7 dark

				brown (burning/soot?); 2 dark orange paste, limestone temper, striated; 7 limestone temper, tan/orange paste (lots of visible surface limestone)
		neck	2	1 VA with limstone temper (20 cm diameter); 1 brown mixed (20 cm diameter)
		rim	5	1 small VA, int red slip bowl; 1 VA in.ext. red slip bowl (30 cm rim diameter); 1 VA tan paste jar; 1 mixed temper, orange/tan jar (24 cm rim diameter); 1 mixed temper, tan paste jar (14 jar rim diatmeter)
2280	CB M186 Rm 1 - Within rocks on HR 1	body	36	8 brown paste, mixed temper, striated; 8 tan paste, mixed temper, striated; 5 tan paste, mixed temper; 3 orange paste, sand temper, striated; 1 tan paste, sand temper, striated; 1 tan paste, limestone temper; 1 orange paste, sand temper, red slip int./ext; 3 orange paste, VA, red slip ext; 1 tan paste, VA, red slip ext.; 2 tan paste, VA, red slip int./ext; 2 tan paste, VA; 1 grey paste, possible VA, black slip int./ext.
		rim	3	2 tan paste mixed (limestone/VA) jar (14 cm rim diameter, 10 cm neck); 1 grey paste, possible VA, black slip int./ext. vase (14-15 cm. diatmeter)
		neck	6	1 tan paste, limestone temper jar; 2 tan paste, mixed temper jar (one is 17 cm), 3 tan paste, sand temper (one is 20 cm)
2281	CB M186 Rm 1 - TR N Fill 105	body	31	1 VA int. red slip; 1 thin (,37 cm thick) ext. red slip VA; 1 ext. black slip limestone temper with carbon core; 1 orange paste, mixed temper, ext. dark slip; 1 orange paste, VA, ext. red slip; 1 tan paste, mixed temper with ext. sooting; 5 VA; 7 mixed temper, striated; 5 orange/tan paste, mixed temper; 5 dark brown paste, mixed temper, striated; 2 orange paste, mixed temper; 2 dark tan, VA
		rim	6	1 thin (.42 cm thick), black slip, same as vase in cat#2280; 1 int./ext. red slip on rim/neck, tan paste, mixed temper, jar (21 cm diameter); 1 tan paste, mixed temper, jar (19 cm diameter); 3 tan paste, mixed temper jar
		neck	1	1 tan paste, limestone/VA temper, c. 20 cm
2282	CB M186 Rm 1 - Fill 105 South	body	54	17 brown paste, mixed temper, striations; 12 tan paste, mixed temper, striations; 10 tan paste, mixed temper; 2 tan paste, mixed temper, red slip int.; 1 orange paste, mixed temper, red slip int.; 3 brown paste, mixed temper; 2 brown paste, sand temper; 9 tan paste, limestone temper
		rim	5	1 grey/brown paste, limestone/VA temper, black int./ext. vase (10 cm rim diameter, 5.4 mm thick); 1 orange paste, limestone temper red int./ext. slip dish; 1 tan paste, limestone/VA temper, brown slip ext. vase (9 cm diameter); 1

				tan paste, limestone temper jar; 1 orange paste, limestone/VA temper jar
		neck	3	2 tan paste, mixed temper, striated ext.; 1 black slip int./ext. brown paste, possible VA?
		applique sherd	1	1 tan paste, VA neck with applique "button"
2283	CB M186 Rm 1 - Tr Fill 107, just below Flr 106	body	5	1 .03 cm thick, dark tan, mixed paste; 1 VA with limestone, tan paste; 1 VA, tan paste; 1 VA red slipped ext.; 1 mixed temper, dark orange/brown paste
2284	CB M186 Rm 1 - Mixed N and S Collapse 101	body	26	1 thin (.4 cm) black slip int., black/red ext. mixed temper; 3 red slip int. VA; 1 red slip ext. VA; 1 VA tan paste; 4 dark tan paste; 2 brown paste, mixed temper, striated; 6 dark brown paste, mixed temper, striated; 2 limestone surface, organge/tan paste; 7 orange/tan paste, mixed temper, striated
		rim	8	1 red slip int. VA plate (23 cm rim diameter); 1 mixed temper, brown paste jar (18 cm rim diameter); 1 mixed temper, dark tan paste jar (19, 18 cm rim diameter); 3 mixed temper, tan paste jars; 1 mixed temper, tan paste jar with verticle striations (17 cm rim diameter)
		neck	5	14 mixed temper, tan paste (17, 15 cm neck diameter)
		base	2	1 tan paste, mixed temper, surface limestone, annular ring base; 1 VA, red slipped int. ring base
		ridge	2	1 pourous orange paste, mixed temper, small medial ridge; 1 medium medial ridge (.71 cm wide), int. red slip, mixed temper, dark tan paste
2285	CB M186 Rm 1 - Collapse 101 North	body	176	2 orange paste, mixed temper, striated; 57 tan/brown paste, mixed temper, striated; 32 tan/brown paste, mixed temper; 10 tan paste, mixed temper, int. red slip; 14 tan paste, VA, thin (.31 cm), ext. red slip; 1 orange paste, VA, red slip ext. thin (.37 cm); 3 tan paste, VA, red slip int.; 1 tan paste, VA, red slip int./ext., 3 tan paste, mixed temper, red slip ext.; 1 tan paste, mixed temper, red slip int./ext.; 12 tan paste, VA; 2 tan paste, VA, striated; 3 thin (.26 cm), tan/grey paste, possible VA?, black slip int./ext., 11 tan paste, sand temper; 6 tan paste, limestone temper; 1 orange paste with carbon core, sand temper; 2 orange paste, sand temper, striated, red slip ext; 15 tan/brown paste, limestone temper, striated; 10 pourous tan/brown paste, sand temper; 2 orange paste, sand temper; 2 tan/brown paste, sand temper, red slip int.

		rim	27	17 tan paste, limestone/VA temper jar (18, 20, 19, 20 cm neck diameter) (20, 24, 23, 24 cm rim diameter); 3 tan paste sand/VA temper jar rims (20, 19 cm neck diameter) (23, 25 cm rim diameter); 1 tan paste, mixed temper, red slip int. bowl (17 cm rim diameter); 1 tan paste, mixed temper, brown slip int. bowl (21 cm rim diameter); 1 orange paste mixed temper, red slip int./ext. bowl; 1 tan paste, VA, red slip int./ext. straight edge bowl with medial ridge (27 cm rim diameter); 1 tan paste, VA, red slip int., with Lacount offset, straight edge bowl; 1 tan paste, limestone temper, red slip int. dish (25 cm rim diameter); 1 orange paste, limestone/VA temper, red slip int. dish; 1 brown paste, limestone temper, red slip int., bowl
		neck	23	13 tan paste, limestone/VA temper; 6 tan paste, sand temper; 1 VA, red slip ext.; 3 tan paste, VA
		polychrome	1	1 tan paste, limestone/VA temper, narrow orfice, thin walled jar
		base	1	2 tan paste, VA, red slip int. annular base
		foot	1	1 tan paste, VA foot
2286	CB M186 Rm 1 - Just below HR 1	body	4	2 limestone surfaced tan paste; 1 VA; 1 orange/brown paste, mixed temper, striated
2287	CB M186 Rm 2 - Collapse 101	body	66	2 VA, red slip ext., thin (.38 cm thick); 1 VA, red slip int., thin (.5 cm thick); 1 dark tan paste, mixed temper, black ext. slip; dark brown int. slip;12 limestone surface, mixed temper, tan paste; 7 tan paste, mixed temper, striated; 17 dark brown paste, mixed temper, striated; 18 tan paste, mixed temper; 6 pourous, dark brown paste, mixed temper; 3 orange paste, mixed temper
		rim	11	3 dark orange paste, mixed paste jar (26, 29, 31 cm rim diameter); 2 dark brown paste, mixed temper jar (19, 21 cm diameter); 2 tan paste, mixed temper jar (22, 22 cm diameter); 1 VA bowl; 1 dark tan paste, mixed temper jar (19 cm diameter); 2 brown paste, mixed paste jar (22, 21 cm diameter)
		neck	11	1 grey/tan paste, mixed temper (27 cm diameter); 1 orange paste, mixed temper (17 cm dia.); 1 dark orange paste with dark grey core, mixed temper, 2 pieces (21 cm dia); 1 tan paste, mixed temper, striated (29 cm dia); 1 dark grey paste, mixed temper, striated (20 cm dia.); 5 VA/mixed tempers; 1 dark tan paste, mixed temper
		base	2	1 brown paste, mixed temper, striated, flat base; 1 tan paste, mixed temper, flat base
2293	CB M186 Rm 1 - Above HR 1	body	2	tan paste, VA/sand temper bodysherds

2294	CB M186 Rm 1 - Ontop of Dry Core 103	body	2	2 tan paste, limestone/VA temper, red int./ext. slip, same vessel as refit rims
		rim	3	2 tan paste, limestone/VA temper, red int./ext. slip, straight sided bowl with medial ridge (c. 45 cm dia.)--same vessel; 1 tan paste, limestone/VA temper bowl with medial ridge (different vessel)
2298	CB M186 Rm 1 Tr - Flr 106 South	body	11	1 tan paste, VA, red slip ext.; 1 tan paste, VA striated; 2 tan paste, mixed temper; 1 limestone/sand temper, tan paste; 4 tan paste, mixed temper; 1 tan paste, VA, red slip int.; 1 tan paste, sand temper, striated
		rim	1	1 tan paste, VA jar rim
2299	CB M186 Rm 1 Tr - Fill 107 South	body	54	1 VA, black slip int. and ext.; 1 tan paste, mixed temper with large carbon core; 3 tan paste, VA; 8 tan paste, sand/VA temper; 12 tan paste, mixed temper, striated; 2 tan paste, limestone temper; 2 VA red slip ext.; 4 tan paste, mixed temper, cream slip ext.; 7 tan paste, mixed temper; 6 tan paste, sand temper, striated; 2 VA, red slip int.; 1 VA, tan paste; 2 sand temper, orange paste, striated; 1 tan paste, limestone temper, striated; 1 tan paste, limestone temper, red slip int.
		rim	11	1 tan paste, VA jar rim (21 cm rim dia, 19 cm neck dia); 4 tan paste, sand temper jar rim (23 cm rim dia, 23 cm neck dia.); 1 sand/VA temper, tan paste jar; 1 limestone temper, organge paste jar 1 mixed temper, tan paste, large carbon core jar 1 tan paste sand/VA temper, red slip int. bowl rim with medial ridge (c. 28 cm)
		neck	5	tan paste, mixed temper, jar necks; 1 orange paste, limestone temper
		base	2	1 tan paste, sand/VA temper, red slip int. ring base plate; 1 sand tempter, orange paste, ring base
		polychrome	1	1 tan paste, VA, polychrome dish rim (c. 35 cm rim diameter)
2300	CB M186 Rm 1 Tr - Fill 107 North	body	22	11 tan paste, mixed temper, striated; 1 orange paste, mixed temper, striated; 1 VA red slip ext.; 1 tan paste, VA; 4 tan paste, sand/VA temper, striated; 1 tan paste, VA with large carbon core; 1 tan paste, mixed temper, red slip ext.; 2 tan paste, mixed temper, red slip int.
		rim	5	3 tan paste, mixed temper jar (c. 18 cm); 1 VA, red slip int.dish with medial ridge; 1 tan/grey paste, limestone temper, red slip int./ext. rim (?)
		neck	2	1 tan/brown paste, sand/limestone temper jar; 1 tan paste, mixed temper, red slip ext. jar(?) nect
		ridge	2	1 tan paste, mixed temper, red slip int. medial ridge; 1 brown paste, sand temper, red slip int./ext. with large medial (?) ridge (spout??)

		polychrome	1	1 tan paste, mixed temper polychrome dish rim with medial ridge
2301	CB M186 Rm 1 Tr - Flr 106, North	body	6	2 tan paste, mixed temper; 2 tan paste, mixed temper, striated; 1 tan paste, limestone temper, striated; 1 brown paste, carbon core, sand temper, black slip ext.
2306	CB M186 Rm 2 - S of Flr	body	14	3 oraange paste, sand temper (refit with jar rim), 4 tan paste, mixed temper, striated; 3 tan paste, mixed temper; 4 tan paste, limestone temper, striated
		rim	4	1 orange paste, sand temper jar; 1 tan paste, mixed temper, red slip int./ext. dish with lacount inset (in two pieces, c. 32 cm dia.); 1 tan paste, mixed tmeper jar (15 cm neck dia, 34 cm rim dia.); 1 orange paste, sand temper jar (39 cm rim dia.; 18 cm neck dia.) (refits with 3 body sherds)
2307	CB M186 Rm 2 - Below Flr	body	27	4 tan paste, mixed temper, red slip int; 1 tan paste, mixed temper, red slip ext.; 2 tan/brown paste, mixed temper, red slip int/.ext., with lacount inset; 1 VA, red slip int.; 2 VA, red slip int., eroded slip ext.; 2 VA eroded red slip int., cream slip ext. (?); 1 VA, red slip ext.; 9 tan/brown paste, mixed temper, striated; 1 brown/orange paste, sand temper, pourous; 4 brown/orange paste, sand temper, striated
		rim	1	1 tan paste, mixed temper jar (two pieces, 23 cm rim dia.); 1 tan/brown paste, limestone temper, black slip int./ext straight sided bowl/vase; 1 tan paste, VA red slip int./black slip ext. with incised medial ridge bowl (40 cm rim dia.); 1 orange paste, sand temper red slip int./ext. dish, 1 tan paste, mixed temper, red slip int./ext. bowl (24 cm rim dia.); 1 brown paste, mixed temper, red slip int./ext. bowl
		neck	3	2 tan paste, mixed temper necks; 1 tan/brown paste, sand temper jar rim
		base	1	1 orange paste, VA , red slip. Int. ring base
		polychrome	5	5 tan paste, VA plychrome body sherds
2308	CB M186 Rm 3 - cluster on surface	body	172	8 tan paste, sand temper, striated, with large carbon core; 24 tan paste, mixed temper, striated; 4 tan paste, mixed temper, red slip int.; 35 tan paste, sand temper, striated, burned; 2 tan paste, grog temper, striated, burned; 3 tan paste, mixed temper, striated, burned; 13 tan/brown paste, sand temper; 7 tan paste, sand temper; 3 tan paste, limestone temper, striated; 10 tan paste, sand temper, striated; 3 orange/brown paste, mixed temper; 20 tan/brown paste, VA, red slip int./ext.; 6 orange paste, mixed temper, striated; 6 tan paste, VA(?), black slip int./ext.; 1 btown paste, limestone temper; 1 orange paste, sand temper, red slip int.; 8 brown paste, VA, dark maroon slip ext.; 2 tan/brown paste, mixed

				temper, eroded red slip ext.; 1 brown paste, VA, possible cream slip ext.; 1 orange paste, limestone temper; 5 tan paste, sand/VA temper, red slip ext.; 8 tan/orange paste, mixed temper, red slip ext., very fine vase (one sherd has design on interior,--see photo), 1 tan/brown paste, red slip ext
		rim	25	6 tan paste, mixed temper jar (22 cm rim dia, 23 cm neck dia; 25 cm rim dia., 20 cm neck dia.; 21 cm rim dia, 23 cm neck dia. In two pieces); 1 tan paste, sand/VA temper jar (25 cm rim dia. In two pieces); 1 VA, red slip int./ext. plate with slight inset on ext. (c. 41 cm rim dia.); 1 brown paste, sand temper, red slip int./ext., medial ridge bowl (c. 42 cm rim dia.); 1 brown paste sand/VA temper, red slip int./ext. bown with lace hole; 1 thin tan paste, mixed temper, black slip int./ext. straight sided bowl (or vase)? (24 cm rim dia.); 5 tan/brown paste, sand/VA temper, red slip int./ext. bowl; 1 VA, red slip int./ext. dish with medial ridge (30 cm rim dia.); 4 tan paste, mixed temper, red slip int./ext. bowl (30 cm rim dia.); 1 tan/brown paste, sand temper, red slip int./ext. plate, 2 tan paste, sand temper (with some VA) jar (19 cm neck dia., 23 cm rim dia.; 24 cm rim dia); 1 tan/orange paste, VA, red slip ext. vase (14 cm rim dia); 1 tan/brown paste, mixed temper, red slip int./ext. (2 pieces, 22 cm rim dia.)
		neck	6	4 tan paste, mixed temper jar necks; 2 brown/orange paste, sand temper jar nacks
		base	3	1 tan paste, VA flat base; 1 tan paste, mixed temper, black slip int./ext. flat but slightly rounded base
		ridge	2	2 tan/brown paste, sand temper, red slip int. body sherds with medial ridges
		flange	1	1 tan paste, mixed temper dark red/black slip int./ext. vase(?)
		refit	1	1 tan paste, mixed temper, red slip int./ext. plate with inset on ext. and ring base (41 cm rim dia., 7 rim pieces, 3 body pieces, 2 base pieces
		refit	1	1 tan paste, mixed temper, red slip int./ext. jar (25 cm rim dia., 23 cm neck dia.) (3 rim pieces, 11 body pieces, see photo from Larmon iPhone May-29)
2309	CM M186 - Cleaning around Str	body	1	1 large orange paste, mixed temper, striated, jar body
		rim	2	1 tan paste, sand/VA temper jar (19 cm rim dia., 15 cm neck dia.); 1 tan paste, limestone/sand

				temper jar with large carbon core and a beveled rim (22 cm rim dia., 20 cm neck dia.)
		neck	1	1 tan paste, sand/limestone temper, large carbon core jar
		base	1	tan paste, mixed temper, black slip int. rings base
2310	CB M186 Rm 3 - Cleaning by East wall	body	58	7 tan paste, mixed temper; 5 tan paste, mixed temper, striated; 10 tan paste, sand temper, striated; 7 tan paste, sand temper; 4 tan paste, VA; 1 tan paste, mixed temper, black slip int., red slip ext; 3 tan paste, sand/VA temper, striated; 1 tan paste, mixed temper, black slip ext.; 1 tan paste, VA, black slip int./ext.; 2 sand temper burned; 4 tan paste, mixed temper, red slip int.; 8 tan paste, VA, red slip ext.; 1 orange paste, sand/VA temper, red slip int.; 2 orange paste, sand temper, red slip ext.; 2 tan paste, mixed temper, striated, red slip int.; 1 orange paste, sand temper, striated, cream slip int.
		rim	14	7 tan paste, mixed temper jar (21 cm rim dia., 19 cm neck dia.; 22 rim dia., 20 cm neck dia.; 25 cm rim dia., 25 cm neck dia.;23 cm rim dia; 25 cm rim dia.; 23 cm rim dia.); 1 tan paste, sand temper, red slip int./ext., carbon core jar; 1 tan pastw, mixed temper, red slip int./ext. carbon core bowl; 1 tan paste, sand temper out-flaring bowl; 1 tan paste, sand temper, carbon core dish (24 cm rim dia.); 1 tan paste, sand temper, carbon core, red slip int./ext. (40 cm rim dia.); 1 tan paste, VA, red slip int., plate (32 cm rim dia.); 1 tan paste, VA, red slip int./ext., plate with incising on the ext. (see photo) (39 cm rim dia.)
		base	4	2 brown paste, VA, dark red slip ext. falt base;1 tan paste, sand temper, red slip int. ring base; 1 tan paste, mixed temper, black slip int. ring base
		neck	6	2 tan paste, mixed temper jar; 2 tan paste, sand temper jar; 1 tan paste, mixed temper, dark red slip int./ext.; 1 tan paste, sand temper, red slip int./ext.
		polychrome	7	1 tan/orange paste, sand temper body; 2 tan/orange paste, mixed temper body (one does not have the polychrome but I believe it is from the same vessel); 2 tan paste, mixed temper body; 1 orange paste, mixed temper body; 1 tan/pink paste, VA flat bottom
2311	CB M186 Rm 3 - Bench Column, upper floor bulk on which ceramic cluster was found	body	27	8 tan paste, mixed temper; 2 tan paste, mixed temper, striated; 5 tan paste, sand temper; 1 tan/brown paste, sand temper, red slip ext.;3 tan paste, limestone temper; 2 tan paste, VA; 3 tan paste, VA, red slip ext.; 1 tan paste, VA, red slip int./ext; 2 tan paste, VA red slip int.

		rim	8	3 tan paste, mixed temper jar; 1 tan paste, mixed temper, carbon core dish; 1 tan paste, mixed temper, dish; 1 tan paste, limestone temper, carbon core, wide orifice jar (20 cm rim dia.); 1 orange paste, VA, red slip int. bowl; 1 brown/orange paste, mixed temper, red slip int./ext. outflaring bowl (?) (10 cm rim dia.)
		neck	1	1 tan paste, limestone temper neck
		base	2	1 tan paste, mixed temper, red slip int., flat base; 1 tan paste, sand temper, flat base
2312	CB M186 Rm 3 - Bench Column	body	10	1 tan paste, sand/VA temper; 2 tan paste, VA , red slip ext.; 1 orange paste, VA, red slip ext.; 1 orange paste, mixed temper, red slip ext; 4 tan paste, mixed temper, striated; 1 orange paste, mixed temper, striated
2313	CB M186 Rm 3 - Bench Column, Lower plaster Flr and Ballast	body	1	tan paste, mixed temper
2314a	CB M186 Rm 3 - Bench Column, Fill below lower Flr/Ballast	body	2	1 tan paste, mixed temper; 1 tan paste, mixed temper, red slip ext.
2314b	CB M186 Rm 3 - Fill below ceramic cluster	body	1	pink paste, limestone temper, red slip ext.
2315	CB M186 Rm 5 - Cleaning W Wall	body	24	5 brown paste, sand temper; 4 tan paste, mixed temper; 1 tan paste, VA, striated; 1 tan paste, limestone temper; 1 grey paste, limestone temper; 3 tan paste; mixed temper, red slip int.; 1 tan paste, limestone temper, striated; 1 tan paste, VA, eroded red/brown slip ext.; two brown paste, mixed temper, striated; 1 orange paste, mixed temper, red slip ext.; 1 orange paste, mixed temper, striated; 1 brown paste, mixed temper; 2 orange paste, mixed temper; 2 tan/brown paste, mixed temper, striated
		rim	4	1 grey paste, limestone temper jar; 1 orange paste, mixed temper, red slip int. dish; 1 tan paste, mixed temper, red slip int./ext. bowl with medial ridge and carbon core (c. 49 cm rim dia.); 1 brown paste, limetstone temper jar with carbon core
		neck	2	1 tan paste, VA, red slip ext. jar; 1 tan paste, mixed temper jar
2316	CB M186 Rm 5 Ext - Above Flr	body	6	3 tan paste, limetsone temper; 1 tan/brown paste, sand temper, carbon core; 1 orange paste, mixed temper, red slip ext.; 1 orange paste, mixed temper, red paste int./ext.
		rim	1	1 tan paste, mixed temper, carbon core, rid slip int. dish rim

		refit	8	3 tan/brown paste, mixed temper, red int.; 1 tan/brown paste, mixed temper, red slip int./ext.; 2 tan/brown paste bases , mixed temper, red int. almost flat with slight ring base; 2 tan/brown paste, mixed temper red slip int. bowl rims (29 cm rim dia.)
2317	CB M186 Rm 5 Ext - Below Flr	body	35	10 tan paste, limestone temper; 8 tan paste, mixed temper, striated; 4 tan paste, mixed temper; 1 tan paste, mixed temper, red slip int.; 4 tan paste, mixed temper, striated, burned; 2 tan paste, mixed temper, striated, burned, red slip int.; 1 tan paste, sand/VA temper, striated, red slip int.; 1 tan slip, sand temper, striated; 1 tan paste, VA; 1 tan paste, sand/VA temper, red/brown slip ext.; 2 tan/orange paste, mixed temper, red slip int.
		rim	7	1 tan paste, VA, carbon core, red slip int./ext. bow (20 cm rim dia.); 2 tan paste, mixed temper, striated body, jar; 3 tan paste, mixed temper jar; 1 tan/brown paste, mixed temper, red slip. Ext. jar;
		polychrome	2	1 tan paste, VA body; 1 tan paste, VA dish rim
2318	CB M186 Rm 2 - Plaster floor clean-up W+S	body	4	2 tan paste, mixed temper, striated; 1 orange paste, mixed temper, black slip int.; 1 orange paste, mixed temper, red slip ext.
		rim	3	3 tan paste, mixed temper jar
		neck	2	2 tan paste, mixed temper
		ridge	1	1 tan paste, mixed temper, red slip int. medial ridge
2319	CB M186 Rm 1 Tr Ext. - Collapse/Topsoil 101	body	51	9 orange paste, mixed temper, red slip ext.; 2 tan paste, mixed temper, red slip ext.; 2 tan paste, mixed temper; 7 tan paste, mixed temper, pourous; 1 VA, red slip int.; 6 orange paste; mixed temper, red slip int.; 2 tan paste, mixed temper, red slip int.; 1 tan/orange paste/ mixed temper, red slip int./ext.; 1 tan paste, mixed temper, black slip int.; 2 VA; 10 tan paste, mixed temper, striated; 1 tan paste, sand temper, striated; 1 tan paste, sand temper, striated; 1 tan/brown paste, mixed temper, striated, burned; 1 tan paste, sand temper, red slip int./ext. with diagonal incising; 1 tan/orange paste, sand temper, with red slip ext.; 1 orange paste, mixed temper, red slip ext.; 1 tan paste, sand temper, possible base with foot scar; 1 tan paste, sand temper, red slip int.
		rim	6	2 orange paste, mixed temper, red slip ext. bowl; 1 tan/orange paste, mixed temper, jar; 1 tan paste, VA jar; 1 orange paste, sand temper, red slip, int./ext. jar; 1 tan paste, sand temper, large carbon core

		polychrome	4	1 benque viejo polychrome flat base with nubbin foot; 3 benque viejo polychrome body sherds
2321	CB M186 Rm 6 Column - Topsoil 101	body	4	2 tan paste, mixed temper; 1 brown paste, limestone temper; 1 tan paste, VA, red slip int.
2322	CB M186 Rm 6 Column - Collapse below topsoil	body	3	1 orange paste, mixed temper, large carbon core, red slip int.;2 tan paste, mixed temper, striated
		rim	1	1 orange paste, mixed temper, red slip ext., black slip int. outflaring bowl (30 cm rim dia.)
		neck	1	1 tan paste, mixed temper, jar neck
2323	CB M186 Rm 6 Column - Fill below collapse	body	11	2 tan paste, mixed temper, red slip int.; 1 tan paste; limestone temper; 1 tan paste, limestone temper, striated; 1 orange paste, sand temper, with vertical striations abutting horizontal striations; 1 orange paste, VA, with red slip ext.; 1 tan paste, sand temper, striations, burned; 4 brown paste, sand/VA temper, striations;
		neck	1	1 tan paste, sand temper, vertical striations on body
2324	CB M186 Rm 6 Column - Beneath Flr	body	7	5 orange paste, sand temper; 2 orange paste, mixed temper
		rim	1	Tan paste, sand temper, carbon core, jar
2325	CB M186 Rm 6 - Collapse/Debris	body	37	2 tan paste, mixed temper, black slip int./ext, burned; 4 tan paste, sand temper, carbon core, striated; 9 tan paste, mixed temper; 3 tan paste, sand temper with carbon core and vertical body striations; 1 brown paste, sand/limestone temper; 4 tan/brown paste, mixed temper, striated; 5 tan paste, limestone temper, striated; 2 orange paste, mixed temper, red slip int./ext., 1 orange paste, mixed temper, red slip int./ext. with striations; 1 tan paste, mixed temper, red slip ext.; 1 orange paste, mixed temper, red slip ext.;2 tan paste, mixed temper, red slip int.; 1 brown paste, mixed temper, red slip ext.; 1 orange /pink paste, sand/VA temper, cream slip ext
		rim	13	1 tan paste, sand/VA temper, vertically striated body jar (2 pieces, 55 cm rim dia.); 1 tan paste, mixed temper, vertically striated jar (20 cm rim dia.); 1 tan paste, mixed temper, jar with organized vertical striations (20 cm neck dia.); 1 tan paste, sand/VA temper jar; 2 tan paste, mixed temper, vertically striated body jar; 1 brown paste, sand/VA temper, jar (25 cm rim dia, 20 cm neck dia.); 1 tan paste, mixed temper, cream slip ext.(?) with carbon core, open-mouthed jar jar (23 cm rim dia., 19 cm nech

				dia.); 1 orange paste, mixed temper, red slip int. dish (35 cm rim dia.); 1 orange paste, mixed temper, red slip int./ext. dia with lacount inset (32 cm rim dia.); 1 tan paste, VA, red slip ext. bowl with bulb rim (35 cm rim dia.); 1 tan paste, mixed temper, red slip int. bowl with medial ridge and lacount inset (c. 55 cm rim dia.), 1 orange paste, mixed temper, red slip int./ext. plate with medial flange
		neck	6	4 tan paste, mixed temper jar necks; 2 tan paste, sand temper jar neck
		base	1	1 tan paste, mixed temper ring base
		flange/ridge	2	1 tan paste, mixed temper, red slip int. medial ridge; 1 orange slip, mixed temper, red slip int./ext. flange with large carbon core
		polychrome	3	2 tan paste, mixed temper body; 1 orange paste, mixed temper body
2326	CB M186 Rm 6 - Fill below collapse	body	4	1 tan/orange paste, mixed temper, red slip int.; 1 tan paste, VA; 1 brown paste, sand/VA temper, red slip int.; 1 brown paste, sand/VA temper
		rim	4	2 tan/orange paste, limestone temper jar (25 cm rim dia., 20 cm neck dia.); 2 tan paste, mixed temper (19 cm neck dia.)
		neck	1	1 tan paste, sand temper, jar neck
2327	CB M186 Rm4/7 - Collapse/Debris	body	11	3 tan paste, mixed temper (thin); 1 tan paste, mixed temper, striated (thin); 1 tan/orange paste, limestone temper, striated; 1 tan paste, VA; 1 orange paste, mixed temper, red slip ext.; 2 tan paste, limestone temper, striated, burned; 1 tan paste, limestone temper; 1 tan paste, mixed temper
		rim	1	1 tan paste, mixed temper, eroded red slip ext. bowl (19 cm rim dia.) with flat base. Possible polychrome
		neck	2	2 tan paste, mixed temper, carbon core jar

M186 Non-Ceramic Artifacts			
Cat. No.	Context	Artifact Type	Count and Description
2277	CB M186 Rm 1 - South, Collapse	lithic	1 blue chert chunk
2279	CB M186 Rm 1 - Above HR 1	lithic	exhasuted blue/grey chert core
2282	CB M186 Rm 1 - Fill 105 South	lithic	1 blue/brown chert chunk
		flange	1 orange paste, limestone temper, red slip int./ext. medial flange

2283	CB M186 Rm 1 - Tr Fill 107, just below Flr 106	lithic	3 tooth sized bluish/greyish chert chunks
2284	CB M186 Rm 1 - Mixed N and S Collapse 101	shell	1 orange, sprial, freshwater
		lithic	2 reused exhausted chert core; 1 fire-cracked flake
2285	CB M186 Rm 1 - Collapse 101 North	lithic	2 granite mano fragments; 2 blue grey chert chunks; 1 grey/white chert flake
2286	CB M186 Rm 1 - Just below HR 1	lithic	1 Dark grey flake, fire-cracked
2288	CB M186 Rm 1 - HR 1	Femur	1 probable right femur, found with two other long bones
2289	CB M186 Rm 1 - HR 1	Femur	1 probable left femur, broken in two, found with two other long bones
2290	CB M186 Rm 1 - HR 1	Tibia	1 probable right tibia, found with two other long bones
2291	CB M186 Rm 1 - TR N-S, 1 m below HR 1	bone fragments	1 probably humerus; 4 probably femur fragments; 3 probable fibula fragments; 20 unidentified long bone fragments
2292	CB M186 Rm 1 - HR 1, bone fragments found with long bones	bone fragments	1 probably fibula; 4 probable femur fragments; 2 probable tibia fragments; 13 unidentified long bone fragments; 13 unidentified small fragments
2293	CB M186 Rm 1 - Above HR 1	bone fragments	25 long bone body fragments; 7 epiphysial beads (possible femur?); 12 unidentified fragments; 2 clavicle bon fragments (?); 1 tibia fragment (?)
2295	CB M186 Rm 1 Tr - Fill 107	teeth	9 teeth…more info from amy?
		bone	10 long bone fragments; 10 unidentifiable fragments
2296	CB P1 Str 3 Tr 3 - Fill 103 End	bone	7 long bone fragments
2297	CB P1 Str 3 Tr 3 - Fill 104	bone	1 probable phallange
2298	CB M186 Rm 1 Tr - Flr 106 South	lithic	1 White chert flake
2301	CB M186 Rm 1 Tr - Flr 106, North	lithic	1 blue/brown chert chunk
2305	CB M186 Rm 3 - Fill 103 just on top of Fill 104	charcoal	1 charcoal sample from surface with ceramic cluster, 1.54 mbd
2307	CB M186 Rm 2 - Below Flr	Lithic	1 Blue/brown chert chunk
2310	CB M186 Rm 3 - Cleaning by East wall	lithic	blue/grey worked chert
2311	CB M186 Rm 3 - Bench Column, upper floor bulk on which ceramic cluster was found	shell	1 fresh water (?) shell
		lithic	1 Obsidian blade fragment
2312	CB M186 Rm 3 - Bench Column	lithic	1 grey/brown chert flake

2315	CB M186 Rm 5 - Cleaning W Wall	bone	1 small bone fragment
		lithic	1 blue/grey chert possible exhausted core; 1 grey/brown chert chunk
2317	CB M186 Rm 5 Ext - Below Flr	lithic	1 blue grey chert chunk, possibly worked
2318	CB M186 Rm 2 - Plaster floor clean-up W+S	lithic	1 white chert biface
2319	CB M186 Rm 1 Tr Ext. - Collapse/Topsoil 101	lithic	1 grey chert, fire cracked chunk, perhaps worked
2320	CB M186 Rm 6 Column - On top of Flr	lithic	1 obsidian blade fragment
2321	CB M186 Rm 6 Column - Topsoil 101	lithic	1 White/grey chert chunk

APPENDIX B: POLLEN

Raw fossil pollen data from the Pool 6 core by core sample.						
Type	10-11 cm	24-25 cm	126-127 cm	148-149 cm	176-177 cm	198-199 cm
Poaceae	11	11	6	1	8	8
Zea mays		1				
Celtis	1	3			1	4
Pinus	6	7	7	1	8	11
Melastomataceae	8	19	11		260	236
Asteraceae	7	5	9			1
Combretaceae			2			
Moraceae	3	3	5	1	5	6
Malpighiaceae	4					
Cheno-Am	1	1	2			
Sapotaceae	1					
Hippocrataceae	1					
Arecaceae	2	1	1	1		1
Coccoloba	2					
Bursera	1					
Citrus		4				
Salicaceae		1				
Cyperaceae		9	9		7	13
Eugenia		3	1			2
Rubiaceae		1			2	
Typha		2				
Zanthoxylum			6			
Trichilia		1				
Malvaceae		1				1
Cecropia		1	1			
Bignoniaceae			1			
Bombacaceae						1
Indeterminate	10	13	14	0	20	17
Beads	432	505	388	29	232	442
Total Pollen Count	58	87	75	4	311	301

Methods

For the chemical digestion of sediments to isolate fossil pollen, I followed procedures originally outlined by Heck (2010), but modified for the Pool 6 sediments. For each sample, 1 cc of sediment was processed. This is a standard volume that generally allows for a large enough concentration for adequate analysis. I subsampled at areas of interest according to the chronology obtained by Lindsay. To each subsample, 0.50 mL of microbeads was added. During analysis, microbeads are counted along with pollen so that a concentration volume can be calculated for each sample. I then followed the following protocol for the processing of samples. Between each step, unless otherwise noted, the samples were washed in distilled water three times in order to neutralize them.

1. Screen samples through 150 micron mesh: this step removes larger particles to help with analysis and make the subsequent chemical digestion more efficient.
2. Wash samples in 6 mL of 10% hydrochloric acid (HCL): this step removes the carbonates. High carbonate samples will sometimes need two washes but these samples required only one.
3. Wash samples in 6-7 mL of 10% potassium hydroxide (KOH), leave in hot water bath for 10-20 minutes depending upon reaction: this step removes humates by making them water soluble. The Cara Blanca samples needed an 18-20 minutes hot water bath in KOH.
4. Wash samples in distilled water until the supernatant is clear, fully removing colloids and humates.
5. Wash samples in 6 mL of 48% hydrofluoric acid (HF), leave overnight: this step removes silicates from the samples.

6. Dehydrate samples in Glacial Acetic Acid with two washes: this step dehydrates the samples for acetolysis, which is volatile when it comes into contact with water. Do not use water after this step.
7. Wash the samples in Acetolysis (nine parts acetic anhydride and one part sulfuric acid), leave in hot water bath for 1 minute: this step removes excess, non-pollen organics and darkens the grains for analysis. Do not wash in water after this step.
8. Wash samples twice in acetic acid to remove the acetolysis fully from the sample.
9. Wash sample in alcohol (ETOH) and add silicone oil to each sample for curation.

APPENDIX C: ISOTOPES

Raw isotope data from all 58 samples extracted from the sloth tooth.

Wt.% C in carbonate	1.48	1.65	1.53	1.50	1.60	1.57	1.57	1.66
δ18O VSMOW (‰)	27.605	27.464	27.956	28.132	28.532	28.177	28.742	28.418
δ18O VPDB (‰)	-3.206	-3.343	-2.865	-2.695	-2.307	-2.651	-2.103	-2.417
δ13C VPDB (‰)	-10.793	-9.235	-10.340	-10.712	-10.755	-10.643	-10.875	-10.737
Total CO2 (µbar)	909	962	939	939	964	944	934	974
M/Z 44 (V)	5.300	5.708	5.294	5.231	5.354	5.084	5.001	5.064
Wt. reacted (µg)	658	648	670	684	671	660	647	657
Mass spec analysis #	6510	6511	6512	6513	6514	6515	6516	6517
UI Anth lab Sample ID #	27139	27144	27145	27146	27147	27148	27149	27150
Wt. % Apatite	76.62	80.00	80.00	76.00	74.65	73.33	74.24	80.43
Treated sample wt. (g)	0.0059	0.0072	0.0072	0.0057	0.0053	0.0055	0.0049	0.0074
Sample wt. (g)	0.0077	0.0090	0.0090	0.0075	0.0071	0.0075	0.0066	0.0092
Dental tissue type	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer
Position above tooth base (mm)	90.48	85.68	81.51	77.37	73.53	69.58	65.74	62.04
Sample ID	JTL-01	JTL-02	JTL-03	JTL-04	JTL-05	JTL-06	JTL-07	JTL-08

1.67	1.57	1.63	1.73	1.68	1.78	1.75	2.00	1.82	1.77	3.07
28.251	28.623	28.316	28.253	28.120	28.048	28.128	27.831	28.787	29.054	26.864
-2.579	-2.218	-2.516	-2.577	-2.706	-2.776	-2.699	-2.987	-2.059	-1.800	-3.925
-10.541	-10.328	-10.148	-10.579	-10.444	-10.338	-10.760	-10.768	-10.026	-9.905	-8.796
961	947	917	1013	927	1050	996	1113	1004	962	1317
5.287	5.235	4.776	5.723	4.847	6.101	5.462	6.716	5.642	5.353	4.049
638	662	605	669	597	691	646	676	630	604	584
6518	6519	6521	6522	6523	6524	6525	6526	6527	6528	6529
27151	27152	27154	27155	27156	27157	27158	27161	27162	27163	27164
78.72	76.32	75.00	77.46	73.97	73.97	70.00	72.97	74.32	72.46	71.43
0.0074	0.0058	0.0060	0.0055	0.0054	0.0054	0.0049	0.0054	0.0055	0.0050	0.0055
0.0094	0.0076	0.0080	0.0071	0.0073	0.0073	0.0070	0.0074	0.0074	0.0069	0.0077
Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer	Orthodentin outer
58.05	54.07	49.96	44.91	39.09	35.15	29.72	25.83	21.97	17.97	13.16
JTL-09	JTL-10	JTL-11	JTL-12	JTL-13	JTL-14	JTL-15	JTL-16	JTL-17	JTL-18	JTL-19

1.64	1.73	1.72	1.79	1.66	1.75	1.54	1.81	1.80	1.72	1.76
29.004	29.037	29.043	28.844	28.577	27.572	27.801	28.184	28.229	28.553	28.592
-1.849	-1.817	-1.811	-2.004	-2.263	-3.238	-3.016	-2.644	-2.601	-2.286	-2.248
-9.693	-9.071	-8.852	-8.696	-8.998	-9.559	-9.471	-9.653	-9.761	-9.898	-9.642
946	919	1015	975	962	1039	912	991	996	1005	1071
5.132	4.851	5.838	5.365	4.921	6.390	5.100	5.844	5.960	6.123	6.739
635	574	676	608	641	690	634	620	628	667	721
6530	6532	6533	6534	6535	6536	6537	6538	6539	6540	6541
27165	27175	27176	27177	27178	27179	27180	27181	27182	27183	27184
72.60	80.00	59.38	61.64	56.34	65.88	59.42	61.97	64.94	64.10	68.24
0.0053	0.0060	0.0038	0.0045	0.0040	0.0056	0.0041	0.0044	0.0050	0.0050	0.0058
0.0073	0.0075	0.0064	0.0073	0.0071	0.0085	0.0069	0.0071	0.0077	0.0078	0.0085
Orthodentin outer	Orthodentin outer	cementum	cementum	cementum	cementum	cementum	cementum	cementum	cementum	cementum
9.18	5.56	86.73	82.73	78.70	74.72	70.67	66.86	60.96	56.98	53.00
JTL-20	JTL-21	JTL-22	JTL-23	JTL-24	JTL-25	JTL-26	JTL-27	JTL-28	JTL-29	JTL-30

1.73	1.71	1.82	1.79	1.73	1.75	2.06	1.74	1.48	1.35	1.54
28.765	28.864	28.534	28.391	27.743	27.731	27.490	27.977	28.208	28.536	28.259
-2.081	-1.985	-2.305	-2.443	-3.072	-3.084	-3.317	-2.845	-2.621	-2.303	-2.572
-9.429	-9.345	-10.008	-9.443	-9.243	-8.904	-9.227	-8.621	-8.408	-8.311	-9.020
979	962	970	965	951	988	1073	951	844	813	906
5.684	5.270	5.821	5.785	5.678	5.882	6.756	5.743	5.232	4.882	5.803
634	625	594	600	605	637	618	602	584	603	630
6543	6544	6545	6546	6547	6548	6549	6550	6587	6588	6589
27186	27187	27188	27189	27190	27191	27196	27197	27333	27334	27335
63.89	61.43	65.79	66.67	69.62	67.95	64.79	73.91	68.97	66.22	72.63
0.0046	0.0043	0.0050	0.0048	0.0055	0.0053	0.0046	0.0068	0.0060	0.0049	0.0069
0.0072	0.0070	0.0076	0.0072	0.0079	0.0078	0.0071	0.0092	0.0087	0.0074	0.0095
cementum	cementum	cementum	cementum	cementum	cementum	cementum	cementum	cementum	cementum	cementum
49.08	45.21	41.23	37.29	33.25	29.32	25.33	21.38	17.37	13.39	9.40
JTL-31	JTL-32	JTL-33	JTL-34	JTL-35	JTL-36	JTL-37	JTL-38	JTL-39	JTL-40	JTL-41

1.20	1.19	1.08	1.13	1.13	1.22	1.12	1.21	1.28	1.00	1.28
27.895	27.752	27.938	27.872	28.471	28.121	28.516	28.676	28.241	28.389	28.418
-2.925	-3.063	-2.883	-2.947	-2.366	-2.705	-2.322	-2.167	-2.589	-2.445	-2.417
-5.921	-6.214	-7.072	-7.266	-7.294	-7.421	-7.161	-6.929	-7.114	-6.891	-6.591
793	737	706	752	731	789	710	771	771	685	816
4.741	4.214	3.982	3.999	4.311	4.444	4.112	4.502	4.426	3.802	5.136
651	584	604	638	611	635	587	619	587	621	642
6590	6591	6592	6593	6594	6595	6596	6598	6599	6600	JTL_52
27336	27337	27338	27339	27340	27341	27342	27344	27345	27346	27347
70.00	69.33	66.67	66.67	68.97	69.41	65.75	80.68	86.89	78.08	84.80
0.0056	0.0052	0.0048	0.0054	0.0060	0.0059	0.0048	0.0071	0.0106	0.0057	0.0106
0.0080	0.0075	0.0072	0.0081	0.0087	0.0085	0.0073	0.0088	0.0122	0.0073	0.0125
Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner
90.99	87.01	83.04	79.04	75.04	71.09	67.01	63.03	58.57	54.51	50.00
JTL-42	JTL-43	JTL-44	JTL-45	JTL-46	JTL-47	JTL-48	JTL-49	JTL-50	JTL-51	JTL-52

1.14	1.27	1.15	1.34	1.33	1.49	12.67	7.35
28.293	28.355	28.160	28.270	27.867	28.015	29.998	27.013
-2.539	-2.478	-2.668	-2.561	-2.952	-2.808	-0.885	-3.780
-6.810	-6.942	-7.356	-7.008	-5.388	-6.046	-18.278	-19.871
754	820	746	824	813	887	770	650
4.372	4.891	4.306	4.842	4.692	5.349	4.576	3.020
632	650	617	620	613	630	59	78
6602	6603	6604	6605	6606	6607	6730	8183
27348	27349	27350	27351	27352	27353	27401	28860
77.63	84.91	82.28	84.15	76.71	85.58	100.00	100.00
0.0059	0.0090	0.0065	0.0069	0.0056	0.0089	0.0039	0.0004
0.0076	0.0106	0.0079	0.0082	0.0073	0.0104	0.0039	0.0004
Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Orthodentin inner	Carbonate concretion	Calcite crystals
45.50	38.76	34.71	30.03	23.14	19.14	Base of tooth fragment	Crack in vasodentin
JTL- 53	JTL- 54	JTL-55	JTL-56	JTL-57	JTL-58	JTL-60	JTL 65

Methods

Isotopes

I prepared samples for apatite $\delta_{13}C$ and δ $_{18}O$ analysis from 58 distinct locations of the sloth tooth, including three distinct apatite layers. In preparation for this, I used a saw to cut the tooth lengthwise and then smoothed the surface of the tooth with a grinder. This insured that the interior face of the tooth was sufficiently clean for photographs and sampling. I then followed the protocol outlined for the UIUC Anthropology Department Environmental Isotope Paleobiogeochemistry Laboratory.

Using a 0.9 mm diamond burr microdrill tip, at each of the 58 locations, 5-15 mg of sample were removed from the tooth and collected in a microcentrifuge tube. During drilling, all cracks in the surface of the tooth were avoided to prevent contamination. In order to remove organics, 1.5 ml of 2.6% NaOCL was added to each sample and they were left, uncapped, overnight. In the morning, the NaOCL was rinsed from the sample with three washes in distilled water. When the samples were clean, 0.1 M acetic acid was added to remove carbonates. The samples were left for precisely four hours before they were rinsed clean with three distilled water washes. The samples were then placed in the freezer for 45 minutes before being freeze-dried in the desiccator. The weight of each sample was recorded and they were transferred to the Illinois State Geological Survey (ISGS) for isotopic analysis. Samples weighing 550 to 700 μg were placed in glass tube reaction vessels for phosphoric acid reactions. Samples were run on the Finnigan MAT 252 Isotope Ratio Mass Spectrometer with an attached KIEL III carbonate device. The precision values are 0.1 and 0.2‰ for $\delta^{13}C$ and δ ^{18}O, respectively. All results (Table C.1) are reported using δ notation, $\delta = [(R\text{sample}/R\text{standard} - 1) \times 1000]$, where oxygen isotope values $R = {}^{18}O/{}^{16}O$ and all values are reported against V-SMOW. For carbon isotope values, $R = {}^{13}C/{}^{12}C$ and all values are reported against V-PDB.

AMS Dating

In addition to the apatite carbonate isotope analyses, organics from within the vasodentine layer of the tooth were isolated in order to test them for collagen, which could be subsequently radiocarbon dated, if present. Having a date on the tooth with greatly aid in the analysis of the Cara Blanca space and further contextualize these isotope studies. Following the protocol outlined for the UIUC Anthropology Department Environmental Isotope Paleobiogeochemistry Laboratory, fragments of vasodentine were isolated and ground into large-grained powder using a mortar and pestle. The powder was then screened through nested sieves in order to retain the 1000-250 μm fraction of particle sizes for collagen purification.

Using an annealed filter funnel and Pyrex glass wool fibers, 1.0 g of the sample was processed. The sample was rinsed with an acid, base, acid (A.B.A.) combination, as follows: demineralization with 50ml of 0.2 M HCl until reaction ceased, rinse to neutrality with distilled water, treated with 50 ml of 0.125 M NaOH (20 hours), rinse to neutrality with distilled water, heat with 50ml of 10^{-3} M HCl in the gravity oven at 70°C overnight. In the morning, 100μl of 1 M HCl was added to the sample and it was placed back in the oven. The sample was then filtered into to a 250 ml Erlenmeyer flask, condensed to 2 ml at 70°C in the oven, transferred to a 20 ml scintillation vial, and, again, condensed to about 2 ml. The sample was then placed in the freezer for at least an hour before being transferred to the freeze-drier for 48 hours. The dried weight of the sample was recorded. At the ISGS it was prepared for the elemental analyzer. A sample weighing 817 μg weighed out into a tin capsule and analyzed by combustion and purification of N_2 and CO_2 in a Carlo-Erba NC2500 elemental analyzer interfaced with a Thermo-Finnegan Delta V-Plus isotope ratio mass spectrometer.

The results showed that no collagen was preserved in the tooth. As is common in tropical environments, postdepositional diagenetic processes affected the collagen within the tooth, a fact further complicated by the specimen's deposition in a *cenote* where it was submerged for thousands of years, causing the leaching of collagen. In this case, because of the lack of collagen, dentin was used as a replacement, as has been done in previous studies (*Krueger 1991).* Although this has not been specified in previous studies, to ensure that the results were accurate, we only sampled the inner orthodentin layer, the portion of bioapatite expected to be most resistent to diagenesis. All cracks in the tooth, where contaminants could infiltrate the inner orthodentin layer, were avoided. Approximately 200 mg of inner orthodentin was drilled from the tooth, and 25 ml of 0.1 M acetic acid was added using a modified procedure designed to minimize isotopic exchange between apatite structural carbonate and modern air CO_2 and diagenetic carbonate during acid treatment. During reaction under vacuum, small CO_2 bubbles expand rapidly and are evacuated. Repressurization with N_2 from a liquid N_2 vessel guarantees exclusion of ^{14}C-enriched air CO_2 while forcing the acid deeper into the orthodentin microstructure. Cycling between vacuum for ca. 15 to 20 min and brief repressurization with N_2 continued until the sample ceased to produce CO_2 bubbles under vacuum (2 to 3 hours). The sample was rinsed four times with distilled water and freeze-dried. In the ISGS Radiocarbon Laboratory, the sample was reacted with phosphoric acid to release apatite carbonate CO_2 and was cryogenically distilled. Radiocarbon dating was performed at the W. M. Keck Carbon Cycle Accelerator Mass Spectrometry Laboratory, University of California, Irvine. The dates were calibrated using IntCal13.

Cathodoluminescence Analysis

To determine which layer of apatite is most resistant to diagenesis, we used CL [e.g., (Ségalen et al. 2008)]. CL uses electron beam bombardment to stimulate visible light emission from the minerals comprising the fossilized tooth based on their major and minor element compositions. This analysis allows us to identify differences in diagenetic mineral recrystallization and replacement of the three distinct tissues, or to determine which tissue is most intact and most altered. After sawing and smoothing a portion of the tooth, we mounted it on a slide and bombarded it with an electron ray accelerated up to 9 keV within a vacuum-sealed microscope stage. CL produces high-resolution images of luminescent material within the tooth, including contaminant elements that might reflect diagenesis. CL analysis allows us to ensure that we take into account only the isotopic analyses of bioapatite material that is unaltered, in the process elucidating which layer of bioapatite produces results least affected by post-depositional processes. The CL analysis shows the relative diagenesis between the inner and outer orthodentin layers. We determined that the inner orthodentin is the most resistant layer of apatite in enamel-less teeth and will therefore provide the most reliable results. Subsequently, we compared the stable isotope signatures of tissues that experienced more and less diagenesis.