LIFE BETWEEN THE CRACKS: USES AND MEANINGS OF A PAST HISPANIOLAN LANDSCAPE AT EL CABO, THE DOMINICAN REPUBLIC

By Erlend Johnson

Photo by the Author

Life Between the Cracks: Uses and Meanings of a Past Hispaniolan Landscape At El Cabo, The Dominican Republic

By Erlend Johnson

Submitted By Erlend Johnson

In Completion of the Mphil in Archaeology

S0731412

Corinne Hofman, Advisor

Religion and Society in Amerindian Culture

Submitted May 15, 2009, Leiden Netherlands

Acknowledgements

Several people deserve to be acknowledged due to their contributions in making this work possible. First and foremost I would like to thank my informants at El Cabo. These informants include Juan “Belto” Dias, Feliz “Manolo” Maldonado Acosta, Kelin Dias, Miguel Silvestre, “Baraona” Cueva Felix, Elias, and Nicolas. This thesis would have been impossible without their help. Without their extensive knowledge of the landscape and location of archaeological remains not nearly as high a volume of sites would have been mapped in 2008. Furthermore, these informants and their families treated me with the utmost hospitality and friendship during my time in the Dominican Republic. Thanks to them I learned much of what I know about both the archaeology of El Cabo and the contemporary culture of the Dominican Republic.

Crucial to the completion of this thesis was my advisor Corinne Hofman. I would like to thank her for her support and ideas. When I first came to Leiden, with a Mesoamerican background, she gave me the opportunity do this project in the Dominican Republic. The experience of doing research in another part of the world, and being exposed to scholarly works in Caribbean archaeology has widened my horizions.Without Corinne’s backing this work would have never been possible. Her revisions and suggestions greatly improved this work. Also, thanks to her expertise with pottery, it was possible to identify a number of specific vessel types from El Cabo’s Diagnostic collection.

I would like to thank Menno Hoogland. His grant, Houses for the Living and the Dead helped fund the work that I did at El Cabo. I would also like to thank him for argreeing to be a reader for this thesis, and for help with equipment and other logistical issues at Leiden.

Also I would like to thank PhD Student Alice Sampson for assistance both in the Field and in making revisions. Alice’s help was invaluable on the ground in the Dominican Republic, providing me with local contacts, logistical support, and invaluable ideas while in the field. She was also kind enough to read and comment on several of the chapters submitted in this Thesis. Her unique perspective on El Cabo, as the PhD responsible for investigating and interpreting the archaeological site of El Cabo gave valuable insights to survey data.

A number of other individuals also deserve thanks. I would like to thank my parents Markes Johnson and Gudveig Baarli for their help in acquiring rare articles for me via ILL, lending me their geological expertise, and help revising sections of this thesis. I would also like to thank Jen Colby for copy editing the bulk of this work. Her efforts have hopefully made this work more grammatically correct and readable. Finally, I would like to thank the Leiden BA and Masters students who went surveying with me during 2008. Without their help, vigilance and enthusiasm, far fewer artifacts and remains would have been recovered during the survey.

Table of Contents

List of Figures

Chapter I: Introduction

An understanding of past landscapes, how people used them, and what they meant to the inhabitants contributes to a more complete understanding of any archaeological site or past people. Surveys and other landscape studies provide insights into past lifeways. Findings of hydraulic systems, such as the *chultuns* seen among the Maya, ancient fields, like those that can still be seen using GIS in Brittain, and other major landscape modifications have helped archaeologists understand how people adopted to varied environments in the past, organized themselves, and lived day to day (Scarborough 1998; Wilkinson 2004). Archaeological remains can also at times shed light on the worldviews and symbolic relationships past peoples had with their environment. Ritually charged landscapes, can potentially tell us much about beliefs associated with past peoples and their conceptual relationship with the larger landscape. Deposits of pottery, human remains, and other ritually important goods in *cenotes*, in the Yucatan have highlighted the cosmological importance of such landscape feautures among the Maya (Sharer *et al.* 2006: 575).

Evidence of both ritual and economic components of landscape use and meaning can be seen in the Caribbean as well, where archaeological evidence associated with caves, water sources, and other landscapes has allowed researchers access to some of these uses and meanings (Beeker *et al* 2002; Roe 2005; Watters 1991; Rouse *et al.*1990; Petersen *et al*. 2003; Oliver *et al.* 2003; Keegan 1982; Dubelaar 1995; Perdomo *et al.* 1993; Morban Laucer 1979; Linville 2005; Lee 2006; Winter 1991; Drewett 2007; Weeks 1996). This thesis explores such relationships in the landscape surrounding the pre-Columbian habitation site of El Cabo. El Cabo is located on the eastern coast of the island of Hispaniola in Alta Gracia province, the Dominican Republic. The site was occupied between around 500 A.D. and 1500 A.D. by a series of pre-Columbian people. Extensive investigations of the site itself have taken place under the directorship of Corinne Hofman, and Menno Hoogland of the University of Leiden, since 2005. The data presented was collected during the summer of 2008 during a six week field campaign.

There is abundant evidence that areas surrounding the site were extensively used in past times. Previous surveys of the region in 2000 (Olsen Bogaert 2000) and 2006 (Coppa 2008 personal communication) uncovered over 15 distinct sites with archaeological remains in this area. Members of the project Houses for The Living and the Dead have also informally visited other sites with archaeological remains. Furthermore, more sustained exploration will build on these finds, hopefully providing new, meaningful insights in understanding Precolumbian behaviors and worldviews for the region.

The goal of this research is to understand how past peoples living at the site of El Cabo used and understood their landscape. Other subquestions were meant to analyze landscape use trends. Were certain types of landscape features, such as different types of caves, consistently used by past peoples? If such consistent uses can be established then it could be argued that these sort of environmental features were preferred by past peoples. Secondly, were there meaningful spatial relationships between distinct sites? Relationships, as simple as close proximity between similar sites, could also tell more about larger multi-site activities or meanings attributed by past peoples. A multidisciplinary approach is used to answer these research questions. Ethnohistorical, archaeological, geological and ecological data are used in conjunction with field data to arrive at past landscape uses and meanings. Powerful data analysis tools, such as GIS are heavily relied on as well to interpret significant spatial patterns and organize the field data.

The greater part of this thesis is organized around the goal of answering these questions. Chapter 2, provides a theoretical oversight, laying bare basic assumptions and philosophies espoused in this thesis. The author believes that spatial techniques more commonly associated with an ecological approach, such as least cost principles and principles of a recursive relationship between the landscape and actors, can consistently be applied to data from El Cabo.

Chapter 3 will give a basic overview of the EL Cabo region. It includes a geological and environmental description of El Cabo. Work previously done at the site also will be outlined in this section. Chapter 4 explores landscape use in the context of other sites on Hispaniola and the wider Caribbean area. Important subjects relating to archaeological data found at El Cabo, such as water use, subsistence practices, cave use, and petroglyphs, will be discussed in this chapter. Insights from this chapter should later show both possible unique behaviors in El Cabo and how this site fits into wider subsistence patterns in worldviews.

Chapter 5 presents field methodology. Certain field methodologies, like using local informants will be justified. Also all analyses done in Leiden, such as the creation and use of a GIS model, will be discussed and explained. Chapter 6 presents the field data. Descriptions of the sites with cultural remains, or sites deemed otherwise important, will be presented. Also results of GIS analyses and other calculations will be covered in this chapter.

The results are discussed and interpretations made in Chapter 7. Specific sites, types of features and larger regions will be examined in light of their possible uses and meanings. Subsistence systems, such as water use and agriculture will be hypothesized. Areas with possible ritual uses or meanings also will be presented, and explored. Finally, conclusions will be represented and summed up at the end of this chapter.

Chapter 2: Limiting Landscapes, Meaningful Ecologies: Reconciling Landscape and Ecological Viewpoints

2.1) Introduction

This thesis contains a hybrid philosophy for interpreting landscapes. Philosophies on survey archaeology have long been divided into two camps - one camp using the ecological approach, and the other using the more recent post-processual approach. While there are many intractable points between these two viewpoints, they are not necessarily antagonistic. As authors such as Hassan (2004) argue, it should be possible to reconcile elements of both philosophies in a conciliatory viewpoint. Both sides utilize useful ideas and tools in their analysis of landscapes. Basic principles of least cost, energetics, and the statistical models used in the ecological approach are valuable tools when estimating how past people may have used the surrounding environment. Landscape approaches may be more useful for analyzing the meanings encoded in environments and behaviors, especially for identifying and interpreting significant areas such as sacred landscapes. The first part of this chapter will present both camps in more detail and attempt a sort of rapprochement.

With this basic philosophical element out of the way, it is also vital to explain and justify the use of broad comparative sources. This thesis will use a range of historical and archaeological data. El Cabo is a site that was inhabited during a finite time in a specific place by specific people. Depending on the question, different sorts of comparisons are useful. Broad comparisons of behavior, which can utilize universal economic and biological principles, can be useful to better understand economic activities and subsistence behaviors. It is more important to be discerning when comparing systems of meaning and belief. The most reliable comparisons can be made between contemporaneous groups, with similar identities, in close interaction. In such groups it may be possible to say that similar or identical belief systems are being used when looking at similar archaeological evidence. More caution must be used comparing less similar, proximate groups. Style, especially ceramic style, is one of the main tools used for making such judgments in the Caribbean. Increasingly, other aspects such as settlement patterns and lithics are being used. It is increasingly important to explore and define the range of such comparisons, as it is becoming increasingly obvious that the Caribbean is more diverse than once thought. Finally, it is important to justify the use of specific historical sources and explore their biases. These sources are full of interesting and potentially important information. However, some sources are more reliable than others, especially those individuals who visited Hispaniola relatively soon after Columbus's initial voyage. Spanish biases, especially biases about religious practices, may make some sorts of information less reliable than others. Archaeologists have often uncritically applied historical

evidence to archaeological remains. It is important to explore the background of the chroniclers themselves, and justify the use of their writings, to attempt to avoid similar uncritical applications of their writings in this work.

2.2) Creating an ecological landscape approach: reconciling antagonistic views

Two large schools dominate the debate on past landscapes. On the one hand, ecological approaches have focused on environmental factors both aiding and constraining local settlements. The landscape archaeology camp, on the other hand, has chosen to aim their efforts at understanding shifting meanings and perceptions of the natural world. Both camps have tools, techniques and views that are potentially useful for understanding past uses and meanings of the landscape around El Cabo. This section will briefly examine each of the positions and suggest a possible middle ground between the two.

The ecological school in archaeology is the older of the two schools. A central belief of the ecological school and the evolutionary school of archaeology, a sub-school within the larger ecological archaeology, is that environmental factors greatly influence and limit potential behavior (Bird 2006: 144). Furthermore, evolutionary archaeology especially emphasizes the influence our own biology and genetic predispositions have on our behavior. Several studies linking the fall of the Maya to climate change presents a modern example of projects that rely on ecological interpretations (Gill 2007). Popular works such as *Collapse*, by Jared Diamond (2005), have further ingrained these ideas in popular culture.

The Landscape approach is a post-processual viewpoint. Most proponents of this view see a dialogue between human agents and their surroundings. The term was first coined in the 80's in reference to the experience of perception inherent in recreating landscapes via painting (Thomas 2001; 167). This view emphasizes the process of experiencing and interacting with the environment. Thus, the landscape as it is experienced is a synthesis of culture and the environment; it is a source of cultural product, and has a dynamic nature that varies through place and time (Anschuetz 2001: 160-61). Meanings projected on the environment mould future interactions and behavior. So, certain environments may be avoided due to oral history, while others may be actively sought out or imbued with sacred importance (Basso 1996). Examples of how narratives and place names mould contemporary interactions with the landscape can be seen in Keith Basso's (1996) work: *Wisdom Sits in Places: Landscape and Language among the Western Apache*. His work demonstrates that specific place names and stories associated with these place names serve to mould contemporary behavior among the western Apache. Each of these viewpoints has its strengths and weaknesses.

There are certain aspects to the ecological approach that are hard to deny. The influence of the environment on our behavior is hard to ignore. Hostile environments repel us and welcoming environments attract us. Technology has allowed us to exploit and live in somewhat hostile environments, but extremely hostile places such as the bottom of the sea or space still have not been successfully colonized.

Furthermore, humans are not above biology or evolution. Basic energetic and physiological needs greatly affect human behavior. Time, energy and sometimes social capital need to be spent securing food to eat, and finding sheltered places to sleep. It seems increasingly obvious that in addition to sharing a similar genetic and physical makeup, there is some underlying similarity in the way humans structure thoughts and ideas (Mithen 2001).

This being said, there is a tendency towards overarching determinism in many ecological or evolutionary archaeological interpretations. Deterministic models where the human actors are seen as little more than cogs in a machine can be seen as one of the chief drawbacks of the ecological and evolutionary points of view (Ashmore *et al.* 1999: 1). Such a mechanistic view of human nature fails to do justice to the concepts of evolution. Evolution is all about change and plasticity, and there are often several, sometimes suboptimal, ways to solve any given problem (Hassan 2004: 315). When there are radical environment changes, generalizing creatures capable of exploiting many niches rather than highly specialized creatures tend to survive. In learned behavior humans have a mechanism that provides a high degree of adaptability, and also sometimes specialization. A certain plasticity and capability to find multiple solutions and learned new behaviors, rather than rigid behavioral programming, may be one of our greatest strengths. This degree of behavioral makes individuals capable of learning behavior that has little to do with survival, and can actually have a negative impact on their survival. Assuming that all human behavior fits neatly into the larger evolutionary game and is adapted for competition and survival is one of the greater weaknesses of many past evolutionary approaches (Bird 2006).

Specific principles such as the principle of least effort can be quite useful for understanding past behavior at El Cabo. Limiting environmental and energetic factors at El Cabo and other sites would have restricted past inhabitants to a potential range of resources and activities for past subsistence behaviors. While it is impossible to pinpoint specific activity areas or behaviors based on these principles alone, it may be possible to estimate a range of likely areas for a given activity based on principles of least cost. Taking into account specific local details, such as terrain, technology, and social organization may create increasingly specific estimates.

The Landscape archaeology perspective is strong chiefly because it acknowledges a degree of human agency. Actors are seen as capable of making numerous choices in their environments. Furthermore, the Landscape approach acknowledges shifting and changing meanings placed on

the landscape. At our current level of understanding of human cognition and genetics, it is often hard to convincingly propose interpretations of such past meanings and concepts. The landscape approach, as it is rooted firmly in anthropology, is well suited to interpret such meaning.

Some prominent archaeologists belonging to the Landscape archaeology camp are firmly rooted in a postmodern perspective that questions our abilities to collect objective data or interpret the past outside of our own fantasies. Major figures such as Tilley show a deep distrust for statistical and spatial models used to interpret past landscapes (Tilley 1994: 10). Even darker yet, postmoderns such as Ingold express a belief that it is impossible to retrieve past meanings and that archaeologists are little more than storytellers (Ingold 1993: 172). Such dark conclusions are somewhat overstated. Data can be collected and analyzed in more abstract terms. As Cowgill points out it is the dreadful quality of many of the statistical studies produced by past archaeologists, who mostly are not trained statisticians or geographers, not the potential of mathematical models themselves that are the source of many of the critiques against using mathematical models (Cowgill 1993: 552).

It is important to remember principles of landscape archaeology when looking at more abstract meanings and beliefs attached to landscapes. Certain areas at El Cabo may have been frequented, while other areas may have been avoided, due to changing beliefs attached to the landscape. While it may be more difficult to link certain areas at El Cabo to specific beliefs or ideals, it may be possible to broadly assign special significance to certain areas. Using historical evidence from Hispaniola and archaeological parallels from the wider Caribbean, it may be possible to interpret ritual significance for certain areas, highlighting possible past sacred landscapes. The designation of such sites may be visible through the deposition of certain artifacts, traces of behaviors such as burning events, traces of feasting, or other archaeological remains, such as rock art. Ideas and concepts from landscape archaeology are most useful for interpreting such sites.

These two philosophies are not necessarily mutually exclusive. Rather, a middle path that advocates limited human agency seems the most logical course. Such a path would be in a classical Bourdieuian mold. Bourdieu (1977) argues against unlimited agency, as it robs us of the structures we need to understand each other (25). Rather, in the concept of *habitus*, he sees human culture and biology as imposing a durable but slowly changeable structure to our behaviors and understandings (Bourdieu 1977: 72). Humans are somewhat constrained by biology and pre-existing culture, yet have some freedom within this structure to act within predefined norms or sometimes even challenge these norms. The challenging of these norms can slowly, incrementally change the underlying structure. Biological commonality may well be a more durable part of this constant negotiation. The different tools used in each approach are not nearly as irreconcilable as the some of the thinkers on either side of the debate believe. Biological and economic limitations

exist on all people's behaviors. However, there is a wide range of behaviors present within these limitations, with a wide range of beliefs and meanings attached to these behaviors. So, depending on what is analyzed, it is argued that tools from both approaches are appropriate. This said, it is important to make judicious use of comparative archaeological and historical sources to best interpret evidence from El Cabo. Different types of evidence may be needed to apply useful concepts and tools from the landscape and ecological approaches.

2.3) Defining identity over time and space: making meaningful comparisons in the Caribbean

To make an effective comparison, one must define meaningful units of comparison and draw tangible connections between distinct places, both through time and space. Of course comparisons are useful largely depending on the questions asked. The following section will explore what types of data are broadly comparable with data from El Cabo. Data from wide ranging times and places, but similar environments, may be quite useful for understanding subsistence strategies. After all, principles such as the least cost and other human needs and limitations are serious limiting factors on such behaviors. However, more specific comparisons may be needed when comparing belief systems, as seen at El Cabo. In this case the strongest data comes from groups with similar identities to the residents of El Cabo, as well as groups in close contact with these past people. Wide ranging overarching beliefs and concepts may also make comparisons with more geographically or temporally different groups feasible, but such similarities must be argued for and justified.

Broad comparisons sometimes provide interesting parallel behaviors in distant environments. For example, it might be useful to look at agricultural or water use practices in similar environments that are geographically and culturally distinct, as shared challenges may have evoked similar solutions. This may be true in one place over long periods of time, where cultures may have changed significantly or multiple cultures may have lived in the same spot – certain strategies may work better than others. However, such comparisons, while going a long way in understanding sustainable behaviors, do little to address the more abstract meanings behind such behaviors. While Aborigines and Bedouins may share certain behavioral similarities, the body of meanings, myths and images associated with such behaviors may be quite different. Especially important for El Cabo, much about past subsistence strategies may be potentially understood by recording ethnographic data from modern inhabitants. While major differences in technology and belief systems exist between modern and pre-Columbian peoples, they all face quite similar environmental limitations. So, comparisons between modern residents at El Cabo and pre-Columbian inhabitants may bring to life useful suites of behavior.

Ultimately, when comparing belief systems and cultural particulars, it is much more important to compare sites and evidence from people with the same or related belief systems and identities. Greatly complicating matters, of course, is the nature of archaeological inquiry: archaeologists study artifacts, architecture and sometimes documents to infer behavior, identity, and meaning. It is assumed that individuals with similar identities may share similar practices and meanings. So, if a site can be argued as belonging to the same or similar networks of contacts and identities at El Cabo, it should be possible to make similar correlations between archaeological evidence and meaning at the two sites.

However, defining core identities and interactions is much messier than once thought. Multiple core identities, such as gender, age, kinship, linguistic identity, social status, occupation, and religion must be recognized as acting on individuals in the larger society, together with ethnicity. Furthermore, the meanings of ethnicity, which was once used as a catch-all to refer to some sort of inherent core identity that could be used to neatly categorize distinct groups, are being further clouded and questioned (Barth 1974; Nash 1989, Emberling 1999). While it is often possible to ascribe political or linguistic units of culture, this is far from always the case (Barth 1974: 11). There is no simple black and white dichotomy between foreign and familiar; rather, there is a spectrum of recognized similarities and differences all people ascribe to. It is important, in sustained human interaction, to minimize uncertainty and create situations where complete strangers will know what to expect from one another. This is true both in war, where often there are set patterns and etiquettes to be followed, and in peaceful endeavors such as trade and travel (Schortman 1991).

The creation, recognition and manipulation of social identities, which have a range of behaviors, markers, and expectations, help make interactions with strangers possible. Some identities, such as religious affiliation or social status, can be shared and recognized over large, diverse areas. Widespread commonalities, be it through shared kinship, class identity or religious beliefs, are often fostered to build trust and create stable long-distance trade models. The shared ideologies and customs seen in modern and possibly past Arawak trade routes as Hornborg (2005) proposes, the sharing of symbols of a Mesoamerican elite culture as proposed by Schortman *et al.* (1991), and the use of common religious identity in the medieval Jewish diaspora to establish trade links spanning from Europe to China (Emberling 1999: 316) are examples of this sort of identity manipulation. Maybe it is more useful to see identity in terms of overlapping and shifting networks of interaction and contact, rather than in the monolithic black and white past view of defining cultural areas. Certain ideas such as ethnicity, which may refer to a shared concept of origin, are important to such ideals but are far from the only identities that pattern our interactions (Emberling 1999: 301).

There is a silver lining to these complications. While specific suites of identity are being seen as increasingly difficult to untangle, such approaches encourage one to look at the spread of networks of identity much more widely than the traditional cultural area approach. It may be possible to look for broader underlying structural similarities between groups in contact over wider regions. The possibility of similar origins and sustained contacts for diverse peoples may nourish these larger structural similarities, and it can be argued that such similarities existed in the Caribbean when comparing technological as well as cosmological ideals from the *Taíno* with the Carib and with mainland groups (Alegria 1978). Such comparisons must, however, be justified with archaeological evidence. Furthermore, philosophical and structural similarities between varied belief systems do not justify uncritical projection of ideas from one group onto another. A much more nuanced analysis must be made to take advantage of such structural similarities.

The main vehicle for expressing identity is, of course, style. The study of style in archaeology has become increasingly popular within the last thirty years. Style is hard to talk about because it is an ambiguous term (Conkey *et al.*. 1990: 2). A variety of definitions have been given for style. Some seem overly technical and verbose. Saurlander defines style as: "a highly conditioned and ambivalent hermeneutical 'construct' worked out at a distinct moment in social and intellectual history" (Conkey *et al.*. 1990: 2). Other definitions such as Ian Hodder's in which style is "a way of doing" seem vague (Hodder 1990: 45). From these definitions we get some idea of what style might be. Style is, in fact, a way of doing. It represents a number of choices, both practical and ideological, inherent in the formation of an artifact or structure. These choices, however, are also confined to distinct places, intellectual traditions and times, as Suarlander points out. Finally, it is worth noting that style only exists in relation to other styles (Hodder 1990: 45). The term loses its meaning without variety and comparison. Style is ambiguous and hard to define satisfactorily. However, most people know style when they see it. While there is little agreement on an exact definition of style, no one can deny that the concept is necessary to nearly all work archaeologists do.

That being said, style is often used for expressing individual and group identity. Certain aspects of dress, architecture, or artifact style may encode information about group affiliation (Wobst 1999). This is not always the case; as Sackett (1990) points out, many expressions of style are passive, though they still may indirectly encode group membership in implicit modes of doing rather than explicit shows of identity. Important for this debate is the use of ceramic remains as expressers of identity in the Caribbean. It is difficult to decide which styles are relevant expressers of identity and which are not. The safest way to isolate and define certain identities is by looking for a suite of related styles and judiciously using historical archaeological evidence to argue the meaning of this suite of styles in various objects.

Ceramic style has traditionally been used as the primary mode for analyzing shifting identities in the Caribbean. The framework for such analysis was pioneered and championed by Irving Rouse (Rouse 1992). Rouse was not attempting to define specific political units, communities or group movements, but larger population changes and movements (Curet 2005: 16). To this purpose, he created a generalizing structure, where ceramic styles were fit into series, subseries, and styles. Series represented broad stylistic similarities seen over larger areas, while styles often referred to smaller regional differences. Rouse's system of classifying ceramics is still widely used today by Caribbean archaeologists. Furthermore, Rouse and Cruxent's work shed light on important past migrations from the Orinoco to the Caribbean (Rouse 1992).

However, he and many other archaeologists seem to have been affected by the "black legend" of the Spanish. The black legend is perpetuated in historical sources referring to a Caribbean parted between the *Taíno* in the Greater Antilles and *Caribs* in the Lesser Antilles (Amodio 1991). Such simplistic views of ethnicity in the region are being increasingly questioned (Wilson 1993). Especially the term *Taíno* seems to be a Western construct first popularized by Rafinesque in 1836 (Hofman and Hoogland 1999). While this term does not necessarily refer to an actual ethnic group, this thesis will continue to employ it in broader reference to several of the groups on Hispanola and Puerto Rico in contact with the Spanish. However, it is important to remebmer the origin of these terms and be careful not to oversimplify identitiy in the region. Rouse's explanations of the contact period may be oversimplified in such a way.

Rouse saw a continued dominance and expansion of colonists of South American origin during the contact period. He coined the still widely used divisions between the Eastern *Taíno* in eastern Puerto Rico and the Virgin Islands, Classic *Taíno* in Western Puerto Rico and Eastern and Central Hispaniola, and Western *Taíno* in North Western Hispaniola, Cuba, Jamaica, and the Bahamas (Rouse 1992). This view has increasingly been challenged as evidence from different areas has been discovered. Early pottery found by Chanlaitte Baik (1981) on Vieques has raised the possibility that multiple, quite distinct groups had migrated to the Caribbean at the same time. Furthermore, archaic influences are increasingly seen in the material culture of later Caribbean peoples. Little change between archaic and later lithics in Puerto Rico seem to support this (Rodriguez Ramos 2008). While Rouse recognizes Meillacan ceramics as belonging to the Western *Taíno*, difference in the type of pottery, its possible archaic origins in the Greater Antilles and morphological differences in site organization and lithic make this classification seem inappropriate (Rodriguez Ramos *et al.* 2008, Ulloa Hung 2005).

Large cultural differences may even have existed between people from Eastern Hispaniola and Western Puerto Rico. Both McGinnis (2001) and Veloz Maggiolo (1993) convincingly argue that there are major differences between artifact assemblages and architectural complexes in these two regions, with aspects such as ballcourts being far more common in Puerto Rico and artifacts

such as effigy vessels and "drug" tables occurring almost exclusively in Hispaniola and the islands further west (McGinnis 2001: 102; Veloz Maggiolo 1993b).

At this point, it is again important to emphasize that a large degree of interaction can be seen between different islands. Amazonian motifs and ideas, still seen in the Arawak and other Amazonian groups today, can be seen in the myths and material culture of Greater Antillean groups (Alegria 1978). Furthermore, sustained contacts and interactions, both peaceful and violent, facilitated the sharing of goods, technology and ideas (Hofman *et al.* 2007). First Ostionoid and then Chicoid motifs can be seen reinterpreted in Mellaciod pottery from certain parts of Hispaniola (Ulloa Hung 2009 personal communication). We must recognize that certain wider ideals were shared in the region. It can be seen from archaeology that technology and subsistence strategies were widely shared, and certain broad ideologies may have been as well. However, equating the same behaviors seen in documents from Hispaniola with those seen in other Caribbean islands is problematic.

El Cabo and Eastern Hispaniola have been categorized with their own typology that fits with their location and history. The Ceramic typology used at El Cabo is based on Rouse's Typology and was developed by Hofman *et al*. (2007a). They developed this subseries to consolidate a number of confusing local typologies and styles into a more homogeneous comparative form that could be more easily compared on a wider scale. This typology divides the local remains into two series, the Ostionoid, spanning from the 600-1200 A.D. and the Chicoid, spanning from 1200-1500 A.D (Hofman *et al.* 2007a). The Ostionoid is split into an early (600-900A.D.) and late (900A.D.) subseries. The carbon dates collected from El Cabo date to 580 A.D +/- 30 years to 1495 +/-30 years, and both Ostionoid and Chicoid ceramic are found at the site, confirming that it was indeed inhabited for this period (Samson 2007: 95). As stated above, Rouse hypothesized that Ostionoid groups moved into Eastern Hispaniola around 600 A.D., displacing previous groups. It seems likely that groups from Puerto Rico did enter this area, but the exact nature of these interactions were probably somewhat more complex, with an exchange of ideas and goods affecting both peoples (Veloz Maggiolo 1993b).

It is of course safest to compare El Cabo with other sites in the region around El Cabo. Areas with sites to the north and south such as Punta Macao and El Parque del Este contain similar environments to El Cabo and were inhabited by peoples that must have been in regular contact with the residents of El Cabo. These areas have similar styles of artifacts and were no doubt part of more extended regional exchange networks (van As *et al.* 2008). This can be seen by the exchange of pottery in the region. Recent studies show that pottery found at El Cabo and other sites may have used clay coming from the Playa de Punta Macao (van As *et al*. 2008). Extensions of these studies will use XRF analysis, to augment this data and further explore potential exchange networks in Eastern Hispaniola. Furthermore, at least during *Taíno* times, sources name

this area as part of the *cacicazgo* of Higuey with a principal cacique Cotubanama (D'Anghiera 1970: [1] 367). There seems to have been a complex organization with multiple levels of caciques, and it is hard to say to what degree the Spanish understood this system, though one suspects they came to understand it rather well as they used it to exact tribute from the caciques. It is harder to say what sort of social or political integration was present in earlier times, especially during the time the Ostionoid series was used. However, similar underlying identities between artifacts in the region and artifacts across the Mona Passage suggest regular communication and exchange.

Furthermore, it should be relatively safe to apply the historical evidence collected by the Spanish chroniclers on Hispaniola for the eastern part of the island. Las Casas especially knew and visited this area. Las Casas is known as one of the most trustworthy and diligent chroniclers (Curet 2002: 263). He was known to have visited Higuey during Ovando's wars there and gives extensive and detailed descriptions of the area. He notes large linguistic and cultural differences seen in the northwest of Hispaniola; surely he would have noticed similar differences if they existed in Eastern Hispaniola (Las Casas 1992: [1] 252).

There is compelling evidence of strong linguistic ties between South America and areas in Hispaniola and other islands (Hofman and Carlin 2009). Furthermore, analysis of mythology from the mainland and the myths collected by Pané show several overarching themes found in each area (Alegria 1978). It may be possible to compare archaeological remains from islands outside of Hispaniola with remains found at El Cabo in broader terms. However, finds from these islands should not automatically be equated as having the same functions or meanings as finds from Southern and Eastern Hispaniola. This thesis will use specific information from proximate archaeological sources, and from historical sources about the *Taíno*s on Hispaniola. But it will rely on broader comparison for evidence from farther afield. Sources from Hispaniola, especially Eastern Hispaniola, will always be presented first and given most credence, while comparisons from farther afield will be dealt with some extra caution. Broad overarching similarities may well be recognizable, but direct equation of one feature with another may no longer be possible or advisable.

2.4) The Historical sources

Five major sources will be cited in the following sections of the thesis. These sources are the logbooks of Cristopher Columbus, *The Relacion* of Ramon Pané, *Il Orbo Novo* by Peter Martyr d' Anghiera, *La Historia de las Indias* (1540) and *La Historia Apologetica* by Fray Bartolomeo De Las Casas, and *La General y natural historia de las Indias* by Gonzalo Fernandez de Oviedo.

Both English translations by reputable scholars and the author's own translations were used when reading these works as English translations do not exist of either the works of Oviedo or Las Casas. The original Spanish will be shown as well as an English translation for works by these authors, as these translations were not made by a professional translator. Besides obvious difficulties in translating historical documents great caution should be used in their use.

Major difficulties must be acknowledged when using historical sources. Historical documents are by no means objective. They very much reflect the backgrounds, biases and objectives of their authors (Wilson 1993b). Furthermore, as is the case even with modern anthropologists, perspective and contacts, as well as comprehension, may greatly color the interpretation and understanding of an observer. This is especially true with the Spanish, for whom understanding Amerindian culture was a secondary objective utilized in the exploitation of Amerindians in *encomiendas* and the conversion of these same people to Catholicism. Further problems arise when chroniclers who never visited an area compound collections of information. Copy errors, distortions and biases can further cloud the veracity of such works. Many of the Spanish accounts are greatly colored by racism and religious intolerance. It is important to know both the works and the backgrounds of the authors of these sources to better understand errors, biases and agendas.

Columbus's logbooks, as transcribed by Las Casas, and his letters to the Spanish Monarchs are some of the earliest accounts of the island of Hispaniola. The logbook was heavily drawn upon by all of the chroniclers and transcribed by Las Casas. The logbook mixes nautical, historical, and ethnographic remarks. While these first descriptions provide interesting tidbits of information, they leave many details of Caribbean belief systems and lifeways to be desired. Detail about local customs and habits diminishes, especially in later descriptions of Hispaniola itself. Columbus's own political motivations must also be taken into account when using the text. He was under heavy pressure t o produce a return on the investments made by the Spanish court. Thus, it was imperative that he put the best economic light on all discoveries that he had made during his first voyage.

The first major history to be published for a wider audience was the work of Peter Martyr D'Anghiera. His work, *Il Orbo Novo*, written in Italian, first appeared in incomplete form in 1511 (D'Anghiera 1970: 10). This first publication included two chapters relating the exploits of Columbus during his first voyage. These two chapters only represented a small part of a multi-volume work, divided into 8 decades. This complete work was published together for the first time in 1530 (D'Anghiera 1970: 10). The work covers the early discoveries and conquests made in the New World, including but not limited to Hispaniola. The author never visited the New World; however, he assiduously interviewed and collected accounts of the new world and eventually turned these accounts into his decades. The work draws heavily from several at the time unpublished firsthand accounts, such as the letters of Dr. Chanca, Columbus's logbook, and

Ramon Pané's *Relacion*. One must also note the influence of Greek and Roman conceptions of the world in the work, as well as strong influences from the prevailing scholasticism and late medieval Spanish thought of the time. Notions of the order of the world from Greeks and Romans such as Herodotus, Thucydides and Pliny abound in the work, though this can be seen to varying degrees in the works of all of the major authors. Also, ideas of what existed further afield were greatly colored by medieval travel writers such as John Mandeville and Marco Polo. Tales of one-breasted Amazons and possibly even the reports of cannibals may come from these medieval and classical influences (Hofman 2008 personnal communication).

Pané's work, the *Relacion*, is a short report which provides us with some ethnographic details from Gaurionex's village and the Macorix region and the only detailed account of any of the religious beliefs of the inhabitants of Hispaniola. The original work was commissioned by Columbus and brought back with him to the Spanish court somewhere around 1500 (Stevens-Arroyo 2006: 78). The original work has been lost. Both Las Casas and Peter Martyr transcribed large portions of it in their works; however, the most faithful transcription is found as a separate chapter in Fernando Columbus's unpublished writings about his father (Stevens-Arroyo 2006: 80). This work contains several short chapters recounting some of the beliefs Pané learned while living with Guarionex and relating Pané's own experiences collecting this data.

We know little about Pané himself, outside of what is told to us in his work. He was a Catalan and a Jeronimite friar (Stevens-Arroyo 2006: 75). He had come with Columbus on his second voyage as one of five clergymen and was chosen to explore the local belief systems, as he was the most fluent in the language spoken around Macorix. His text is direct and relatively uncolored by humanististic conceptions of the world, as seen in the work of some of the other writers, such as Martyr D'Anghiera and Ferndandez de Oviedo. Pané's observations are, of course, colored by his own catholic Spanish viewpoint and imperfect mastery of Gaurionex's language (Stevens-Arroyo 2006: 82). Furthermore extreme caution should be used in transposing his observations, made at a specific place and time on the wider Caribbean area. It is difficult to tell the geographical extent or temporal duration of these stories.

The fourth major chronicler that will be cited is Gonzalo Fernandez de Oviedo. Oviedo published the first volumes of his mammoth work, *La General y natural historia de las Indias*, in 1535 (Myers 2007: 20). These initial chapters recounted the early period of exploration and conquest in the New World, including sections on Hispaniola. His final work was never published during his lifetime, due to opposition by Las Casas, among others (Myers 2007: 22). Oviedo was known for careful revision, as he edited and reworked his accounts whenever new evidence was uncovered. However, he too drew heavily on Greco-Roman and Scholastic authors in his interpretation of the new world to explain new world phenomena. Oviedo also is clearly motivated in his writings to glorify the Spanish conquest and himself (Myers 2007: 48). The data

from his work are further colored by the times. Oviedo lived in Hispaniola in the 1540s after much of the *Taíno* population had been killed, and the remainder of this population had had 50 years of Spanish influence. The culture he encountered was no doubt greatly changed, and this too should be taken into account when evaluating Oviedo's writings.

Where Oviedo supported current Spanish policies and actions in his work, Bartolomeo de las Casas became the chief voice calling for reforms in the Colonial system and one of Oviedo's main intellectual adversaries. Las Casas published *La Historia de Las Indias* and *Historia Apologetica* as alternate histories in response to the publishing of Oviedo's first volumes in 1535. He began this work in 1520 but it was not formally published until the 1870's. Where Oviedo's work glorified the conquests of the Spanish, and often dehumanized the Amerindians, Las Casas took it upon himself to become the protector of the Amerindians and chief prosecutor of Spanish excesses (Castro 2007: 61). He, like Oviedo, relied on a mix of his own experience and the accounts of others. However, as with Oviedo, Las Casas has a clear agenda in his work: reforming Spanish policy by painting a picture of Spanish excess (Castro 2007: 69). Las Casas should not be seen as an anti-imperialist. His image of the future for the Amerindians was of conversion to Christianity and freedom within the sovereignty and service of the Spanish crown. However, his work is one of the most heavily drawn upon in this thesis, as he devoted more text to describing the Amerindians and describes what seem like firsthand accounts of a visit to eastern Hispaniola. Las Casas lived in Hispaniola for a long time and experienced *Taíno* culture in various parts of the island. He was an interested spectator and had more sympathetic views to the Amerindians than contemporaries such as Oviedo. Because of his time in Hispaniola relatively early in the conquest, his experience of a wide swath of Hispaniola and Cuba, and his more sympathetic viewpoint, Casas is generally regarded as one of the most trustworthy historical sources (Curet 2002: 313). Las Casas too may be guilty of exaggeration in his attempts to humanize the *Taíno* in an understandable way for contemporary audiences. Finally, Las Casas' empathy with the *Taíno* had limits; like his contemporaries, he saw Tiano religious beliefs as diabolic idolatry. Such views can be seen in his work, especially in the *Historia Apologetica*.

It is important to understand the backgrounds of these chroniclers who first described Hispaniola and the Caribbean. Their evidence must be read and analyzed carefully to expose these biases and purposes. If used uncritically, historical evidence can obscure rather than clarify our knowledge of the past. Furthermore, such evidence is appropriate mainly in our understanding of the contact period. Elements of the culture seen in the contact period may have been present much earlier as well, and it is sometimes possible to convincingly argue such connections. However, on the whole, applying information specific to Hispaniola during the contact period to other times or places is inadvisable.

2.5) Conclusion

It is important to make explicit both the philosophical implications and background of the arguments made in this work. Hopefully, making such details obvious will make it of more value to others, regardless of their theoretical orientations. This thesis attempts to take a middle line between a landscape and ecological approach to interpreting the uses and meanings of the area around El Cabo. Tools and techniques from each school, such as least cost theory or the agency of landscape in human behavior, are not necessarily mutually exclusive (Bradley 2000). It is possible to see the landscape both in the light of sacred landscapes and energetic needs. Furthermore, it is vital to make meaningful archaeological comparisons. Making broad comparisons between people with similar environments or looking at underlying similarities in expressed belief systems are quite viable techniques. However, one must be more careful to establish legitimate links and similarities between peoples when talking about specific regional behaviors meanings or ideas. As has been shown, there is a greater than previously seen diversity in the Caribbean, making the judicious use of such comparisons all the more important. Finally, historical sources are also extensively used throughout this thesis. It is important to understand the backgrounds and biases for the most used and important sources quoted. There are many leaps of logic, biases and agendas in modern archaeology, as well as in historical texts. The best way to account for such biases and agendas is to record and defend them, letting readers judge their viability.

Chapter 3: Introducing El Cabo: Describing El Cabo's Environment and Archaeological History

3.1) Introduction

To reconstruct past landscapes archaeologists rely on a variety of sources. Understanding past ecology and environment as best we can, often through informed juxtapositions with the modern landscape, is vital to this process of interpretation. Historical sources and, to a lesser extent, ethnographical comparisons also play a vital role in complimenting and fleshing out the archaeological record. This chapter will set the stage for future chapters by introducing the reader to the landscape of eastern Hispaniola. It will also present past work done at the site of EL Cabo and in the surrounding area.

3.2) Environmental setting

The island of Hispaniola is the second largest island in the Caribbean and is considered part of the Greater Antilles. This island is split between two modern governments. Francophone Haiti occupies the western third of the island**,** while the Spanish speaking population of the Dominican Republic controls the eastern two thirds of the island.

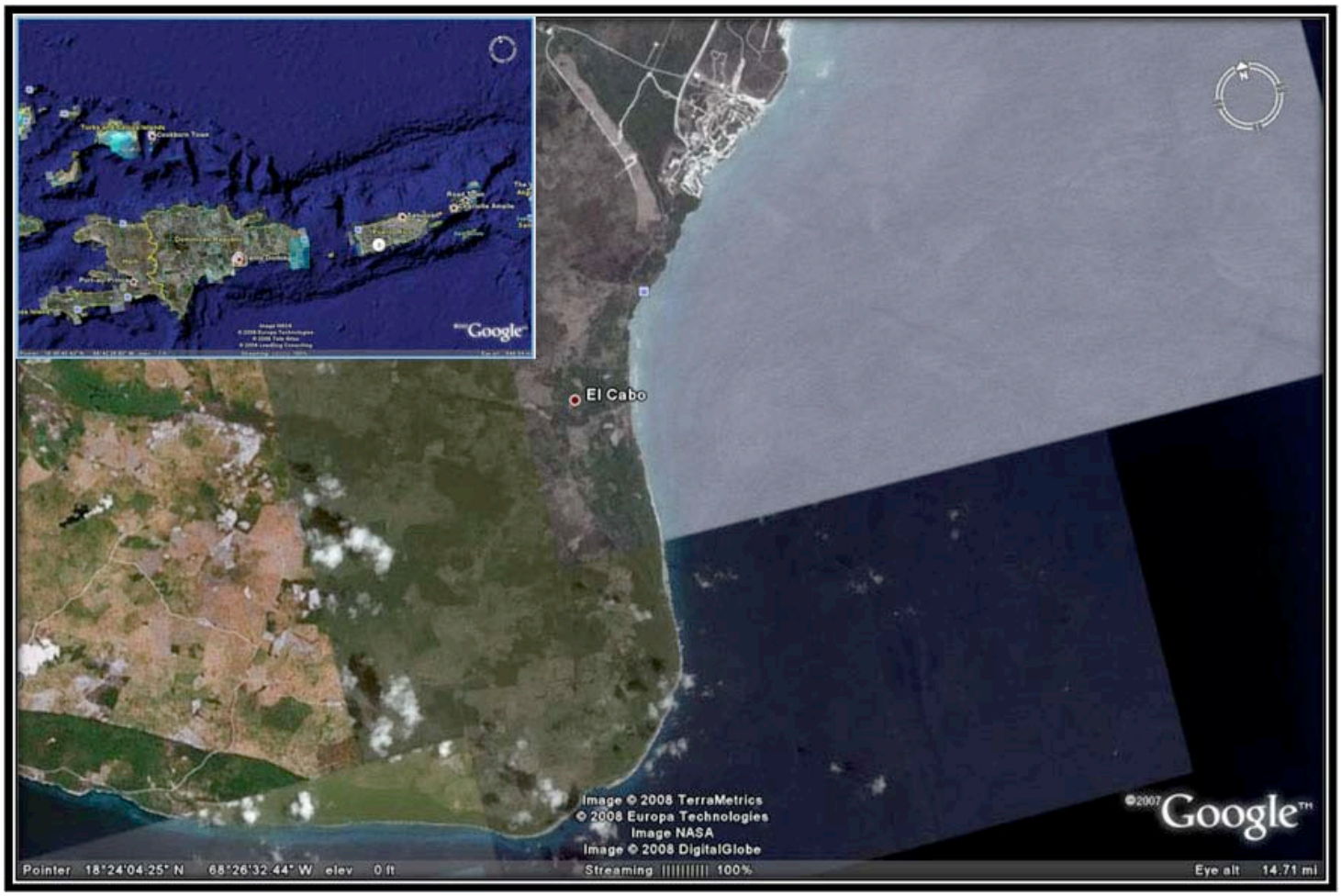
Hispaniola is rich both in mineral and biological wealth. The gold the Spaniards first discovered in the mountains to the north of Santo Domingo**,** in the territory the *Taíno* named Cibao, is still mined today (Columbus *et al.* 1989: 315). There are agriculturally rich valleys in the central cordilliera and large rivers. However, the eastern coast of Hispaniola is relatively poor in resources in comparison with other parts of the country. This area, which will be referred to as Eastern Hispaniola**,** consists mainly of the modern province of Alta Gracia as well as portions of the neighboring provinces of La Romana and San Pedro de Macoris. This part of the Dominican Republic is rugged and barren in comparison with other portions of the country. Until recently Alta Gracia had the lowest density of inhabitants in the Dominican Republic and was relatively undeveloped (Officina Nacional de Estadistica: 2009). A huge increase in tourism in the last twenty years, and the ever increasing number of resorts being built to accommodate these tourists, has greatly increased the population and made La Alta Gracia one of the most prosperous provinces in the country. The Alta Gracia has a tropical climate with 1100mm of rainfall per year (Weather Channel, 2009). While large portions of the area are unsuited for agriculture in comparison with regions farther to the west, the weather is one of the main reasons tourists flock to the area's resorts.

The island of Hispaniola is a relatively complex geological entity compared to many of the smaller islands of the Lesser Antilles, having been formed by multiple geological processes (Draper *et al*. 1994). However, the easternmost part of the island of Hispaniola is geologically young. Pictured below is the investigation area (3.1) The area is made up of limestone that dates from the Pleistocene around 400,000 years ago (Draper *et al.* 1994). Recent fossilized coral and animal finds present an accurate way to date the area. It is quite common to see fossilized coral, most commonly the brain coral *Diploria labyrinthiformis* (Markes Johnson 2009 personal communication) (figure 3.2). Less common but also present are fossilized shellfish and other marine organisms.

Recent uplifting has added this younger rock to the island's coastline. Erosion processes, including the gradual collapse of old caves, and past erosion by the sea have created a series of plateaus in this region. At El Cabo the lowermost region of plateaus consists of the intertidal zone. A couple of meters inland, there is another plateau, which varies from as little as half a meter to three or four meters in height

The sea was and continues to be rich in marine resources. Modern fishermen catch a variety of types of fish off of the coast. Diving for shellfish was and also is a major industry, according to several of our local informants. Many modern Dominicans make their living from the sea and it provides a major avenue of transportation around the area and to neighboring islands to the east such as Isla Mona. The proximity to the sea was no doubt a major attraction for past inhabitants of El Cabo, who placed the site on the coast. It continues to be an attraction today, as tourists come to the region to lounge on sand beaches, both real and manmade, and partake in a variety of water sports.

Two small beaches provide the easiest access to the sea, forming a break in the first plateau. The larger of the two beaches is no more than thirty meters long and is located 630 meters north of the site of El Cabo, close to the modern road along the coast. The second beach is much smaller, only seven meters wide, and is located 3 kilometers south of the site. These beaches have been used in the past as landing sites for drug traffickers and illegal emigrants to Puerto Rico. Beaches are created by the erosion of rock on and off the coast and are thus highly dynamic. The creation and destruction of beaches can be effected by the changing currents, changing weather, or even large storms. Our local informants told us that the modern beaches have existed at least for the last fifty years. It is hard to say where the beaches were, or if there even were beaches in the past.



3.1 Study Area

The second plateau beyond the intertidal zone extends along much of the coastal region of eastern Hispaniola. Solution by rain and the flow of water has turned this limestone plateau into a karst landscape. Over time, rainwater, mixes with the carbon in limestone to create carbonic acid (CO_3^{-2}) (James *et al.*, 1988: 4). The acidic rainwater flows into natural faults and cracks, which creates larger cavities. Thousands of years of these processes can create large caverns (James *et al.*, 1988, 7). There may be hundreds of conventional caves and rock shelters formed by these solution processes around El Cabo. There are also both flooded and dry sinkholes, which have been exposed by the collapse of weakened limestone roofs.

The karst landscapes, though they often appear relatively lush, contain several major shortcomings for human settlement. First of all, as a result of solution processes and the natural porosity of the rock, there is little or no surface water present in the area around El Cabo and in the karst plateau regions of western Hispaniola. Water is absorbed through cracks in the rock into flooded sinkholes and caves (LeGrand 1973). Coastal karst areas are also notorious for the rapid loss of freshwater and incursion of sea water (Fluery *et al.* 2007). In areas with relatively mature

karst, the sea can enter the water table through cracks and caves created when the sea level was lower (Mulligan 2006). A wedge of saltwater forms under the freshwater flowing towards the ocean, and the degree of mixing and distance of saltwater intrusion depends largely on the differential in pressure between the entering sea water and exiting freshwater (Fleury *et al.* 2007: 87). Thus in most coastal areas, especially in areas such as El Cabo where there is a lower volume of fresh water flowing towards the sea, this water is and was somewhat brackish (LeGrand *et al.* 1973).

Secondly, soil tends to erode much more quickly than it is created in karst environments (LeGrand 1973: 860). Large areas of the El Cabo pocket contain no soil, and the soil is only a few centimeters deep at its deepest. This makes conventional agriculture quite difficult. Swidden or slash and burn agriculture is practiced in modern times and was probably practiced in the past as well. Some of the larger caves, sinkholes, and natural depressions contain richer and deeper soil, as they serve as natural traps for eroded soil. However, no intensive agriculture is possible outside of these more sheltered areas.

While other areas of the second plateau contain lagoons, none of these exist near El Cabo. The El Cabo pocket contains a mix of barren rock and sand near the coast, cleared lands, scrub and low forest. This landscape is punctuated by the occasional cave. There are also a couple of large sinkholes, some of which are partially flooded, to the north of El Cabo. Multiple smaller sinkholes that locals use as sources of water for livestock, cooking and cleaning pockmark the landscape. All but the most marginalized local residents rely on rainwater as a source of fresh water, collecting it in large plastic barrels. When our informant's families first moved into the El Cabo pocket in the late 1950s many of them initially drank brackish water from some of the least saline flooded sinkholes and flooded caves. However, only one individual we met during our survey still drinks water from these sources.

The cliffs that mark the third plateau are as close as three or four meters away from the sea at the south end of the El Cabo pocket and less than two kilometers from the coast at the pocket's widest point. These cliffs range from about twenty meters high to over thirty meters high in the south. There are probably hundreds of rock shelters in the sides of the cliff and a few larger caves. To the northwest of El Cabo, where the cliffs are lower and not as steep, there are several pathways up onto the third plateau.

The top of this highest plateau is rocky and barren across much of its extent, especially in the more exposed, higher areas to the south of El Cabo. Erosion caused by wind has blown away what little topsoil there originally was, making the area quite barren. Lower terrain to the north of these high points is somewhat more sheltered and lush. Parts of this area have been cleared for modern cattle ranching. However, there are intermittent trees along the boundaries of different

parcels of land. There is also deeper soil and heavier vegetation in several of the shallow depressions and larger sinkholes on top of the cliffs. Several deep, flooded sinkholes also exist that contain relatively fresh water. The size and scale of caves and sinkholes are massive in comparison to the areas below the cliffs.

Many of the major features mentioned such as the caves and general topography of the pocket may have been similar 500 to 2000 years ago. The underlying geology has changed very little. It is not necessary to worry much about erosion changing the general form of the landscape much, within this timescale at least, as there is relatively little topsoil in the area. Also, features such as caves and sinkholes often take thousands of years to form. General features such as topsoil amounts and climate may have undergone some change. The region has, at varying times, been both wetter and drier due to global climatological events. It has been hypothesized that the larger Caribbean area may have experienced droughts similar to those experienced in the Maya area from 800-1000 A.D. (Beets, 2006; Gill, 2007). Water salinity may also have been quite dynamic in the past. Short term fluctuations caused by the tides, and changing rainfall conditions could influence salinity values. Longer term climatic changes and recent human modifications may have also had effect. Finally, sea level was 60-90cm lower 500 years ago and was as much as 2 meters lower than present levels 2000 years ago on the coast of Texas (Rickliss *et al.* 1997). Conditions were no doubt similar further east in the Caribbean around Hispaniola. Shifting sea levels may have had some affect in water salinity and quality changes. However, the underlying reason that groundwater around El Cabo is brackish is geological and due to the intrusion of and mixing of seawater with freshwater. Thus, it seems very likely that water from this area has been brackish for all of the site's archaeological past.

3.3) Las Casas and the earliest surviving description of Eastern Hispaniola

One of the earliest and only surviving descriptions of the landscape of eastern Hispaniola comes from Bartolomeo de las Casas. Las Casas, arriving in 1502 with Nicolas de Ovando, the new Spanish Governor of Hispaniola, took part in a military campaign to quell unrest in the province of Higuey, the easternmost *cacicazgo* of Hispaniola (Turner 2001: 2; Las Casas 1876: [2] 1358). There had previously been good relations between the Cacique of Higuey, Cutubanama, and the Spanish. Higuey had been the early major supplier of provisions to Santo Domingo. However, an incident on La Isla Saona, where a Spaniard loosed his dog on the cacique of the Island, killing him, caused escalating hostilities between the Spanish and Amerindians of Higuey (Turner 2001: 3). Las Casas arrived on the island just in time for the ensuing invasion of

Higuey in 1503. He joined the Spanish forces, later writing in-depth descriptions of the conquest itself, and the landscape and customs of the Amerindians living in Higuey.

His firsthand accounts provide us with the earliest extensive descriptions of the area. He describes Higuey as having two parts. The western part of the province of Higuey is made up of "llanas and campiñas" or plains and tracts of arable land (Las Casas 1992 [1]: 258). In the eastern part, according to Las Casas,"commienzan algunas peñas cuasi cortados o tejadas… pero se levantan infinitos puntos como diamantes" (Las Casas 1992 [1]: 258). That is to say in the east there are cliffs that are "broken" or chipped", with infinite points rising from them like diamonds. These cliffs, according to Las Casas, are 50 to 100 estadals high or 83-167 meters high, given that an estadal equals 1.67 meters (Carreras Estampas 1949: 10). The top of these cliffs are flat mesas, though they are largely rocky and bare like the cliffs (Las Casas 1992 [1]: 258). Traversing this ground was difficult; Las Casas describes walking over the terrain as "fueramos encima de alesnas" or like they were walking on top of awls (Las Casas 1992 [1]: 258). In fact, the Spanish had to use alpargates, or hemp sandals, because normal shoes did not provide protection or hold up to the rocky terrain. Las Casas describes the terrain as "lleno de arboles y monte bajo" or trees and low scrubland (Las Casas 1992:[1] 259).

Interspersed in this rocky landscape are numerous depressions and holes, containing "una tierra muy colorada y bermeja como almagra, esta tierra es de tanta virtud y fertilidad" or an earth that is very red or light brown like almagre (a type of red earth) (Las Casas 1992:[1] 259). According to Las Casas, the locals used these holes to grow *guayaga* , melons and other vegetables (Las Casas 1992: [1] 259). *Guagaya* has been identified as *zamia,* a root plant found all over the Greater Antilles, which is still utilized as a food of the poor occasionally in the Dominican Republic, Jamaica, Puerto Rico, and Cuba (Sturtevant 2007: 190).

Las Casas goes on to state that in the eastern part of Higuey there are no sources of running surface water. Instead, "estas estan en aljibes obrados por la misma naturaleza , que en lengua de indios se llaman xagueyes": these [sources] are in cisterns made by that same nature, that are in the language of the Amerindians called *xagueyes* (Las Casas 1992:[1] 259). He goes on to describe one of these xagueyes located near Cotubanama's village.

> descubrimos el aljibe, llegamos, pues, donde tenia la boca, que seria como tres o cuatro palmos en cuadro , cuasi como una escotilla del pañol, que llaman los marineros en las naos, paramonos a mirar por ella, y estaba tan oscuro todo lo de abajo que parecia un abismo; alii no nos falto harta grima. Puesta diligencia en buscar unas raices que llamaban bejucos, que sirven de cuerdas, con un vaso de barro sacamos el agua, la mas dulce, delgada , fresca y fria y la mas sabrosa que podia ser vista; habia ocho brazas hasta llegar al agua desde arriba, y queriendo experimentar la hondura, hallose, finalmente, que tenia 40 brazas de hondo , las 32 de salada y las ocho de dulce, la cual, por su ligereza, es

> natural, como suele, estar endma: otros muchos hay y hallamos muy someros , de muy buena agua, clara, dulce y muy fria.

[translation]

> We discovered the cistern, we arrived where it had it's mouth, which was about three or four palmas en area (60 or 80 centimeters), like a hatch of a ship's cabin, which is called that by sailors in the ships, we stopped to look at it, and it was very dark all below looked like an abyss; there we did nearly lack sufficient nerves. With diligence in searching for some roots which were called *bejocos*, which serve for ropes, with a vessel of clay we extracted the water, the most sweet, delicate, fresh and cold and the most tasty which could be seen; there were 8 brazas (6.68 meters if 1 braza is equal to 84cm) before reaching the water from above and wanting to learn the depth, finding it, finally, which had 40 brazas (33.6 meters) depth, the 32 (26.88meters) of salt water and the 8 (6.68 meters) of sweet, of which, for its lightness is natural, like to be on top of the lower layer?: there are many other xagueyes, and we measured very shallow ones, of very good water, clear, sweet and very cold (Las Casas Book 2002 [1]: 260-261).

A section on Las Casas's description of Eastern Hispaniola has been written because he is the only author to write extensively about the area. He is the only one to describe subsistence patterns or the lifeways and culture of the Indians living in this part of Hispaniola, as he witnessed many of these customs as part of the military expedition with Nicholas Ovando.

3.4) A Summary of past archaeological work done in Eastern Hispaniola

The earliest archaeological work in the Domincan Republic was done by an assortment of Europeans and Americans. The first reports of pre-Columbian culture on Santo Dominican were published by Robert Schomburgk in 1854. He was a German who had been installed as the British counsel in Santo Domingo. He mentioned visiting and speculated about the meanings of a large rock art site in an area known as the Pomier caves (Schomburgk 1854). These caves were located in San Cristobal Province north of Santo Domingo and contained several pictographs and petroglyphs. Several other foreigners would work in the Dominican Republic before the turn of the century.

The first exclusively archaeological reports from the area were made by Alphonso Pinart, a Frenchman who was employed by the Dominican Government, in 1881. Pinart discovered and documented several caves in the northern province of Samaná (Perdomo 1999: 32). His excavations of a burial in la Cueva de San Gabriel were some of the first systematic stratigraphically controlled excavations done in Hispaniola (Perdomo 1999: 34). He later published a pan Caribbean study of petroglyphs entitled *Notes sur le petroglyphes et Antiquetes des Grandes et Petit Antilles* in 1890, with some of the first theories of the meanings of these

petroglyphs. A mix of Dominican, American and European archaeologists and amateurs have followed in the footsteps of these early archaeological investigators.

The area around el Cabo, however, had been untouched by archaeologists until the mid 1970's. Elpidio Ortega, an archaeologist employed by the Museo del Hombre Domincana, was the first archaeologist to visit El Cabo (Ortega 1978). His excavations were relatively small scale, as he only dug two testpits at the site. However, he found heavy concentrations of archaeological remains, including Chicoid and Ostionoid sherds in this area, leading him to believe there was a residential site located at El Cabo (Ortega 1978: 80). Besides performing excavations, Ortega also surveyed portions of the pocket. Incredibly, on this survey he found a cache of 3000 carved dog's teeth in an area with several caves near El Cabo (Ortega 1978: 80). No records of where these dog teeth are today, or exactly in which cave they were found. However, a few photos of the teeth were published in Ortega's initial report.

The next archaeological work to take place in the region would not be until 2000, when development and construction in the area spurred a reawakening of interest in documenting sites before they were potentially destroyed. Harold Olsen Bogeart, also of the Museo Del Hombre Dominicano, conducted several regional surveys, including surveys around the El Cabo pocket in 2000 and 2001 (Olsen Bogeart 2000; Oslen Bogaert 2001). He first surveyed the areas around the site below the cliffs in 2000. As a result of this work he mapped 32 areas with archaeological remains, including the site of El Cabo (Olsen Bogaert 2000: 33). Fourteen of these sites contained cultural remains. Half of these sites were scatters of sherds in the open. Olsen Bogaert generally dug test pits in addition to surface collections at several of these scatters and found Chicoid and Ostionoid pottery in these excavations. The other sites he mapped were rock art or cave sites. Only one site contains rock art, with a couple petroglyphs with simple anthropomorphic faces (Olsen Bogaert 2000: 80). Of interest to this thesis in particular is the fact that he visited three flooded caverns, one of which contained artifacts in the water. Finally, he visited one cave in the cliffs that contained Chicoid pottery (Olsen Boggaert 2000: 80). His maps will be displayed and compared with my results as part of Chapter 6.

He returned to the area in 2001 and continued his surveying on the cliffs to the west of El Cabo. This survey produced fewer results than the first. He mapped 43 sites in this survey (Olsen Bogaert 2001: 10). Only three of the sites found on top of the cliffs contained archaeological remains, and the density of finds at this area was quite low (Olsen Bogaert 2001: 14).

Olsen also surveyed large pockets of the pocket north of El Cabo in 2002. During this survey, he mapped 149 sites, 36 of which contained archaeological remains (Olsen Bogaert 2002: 26). As at El Cabo, he dug several 2x2 meter test pits at areas with surface scatter. There were several distinct sites with extensive Chicoid remains, including inscised pottery, adornos, and

threepointers in the south of his survey area. He came across one intact burial at one of these sites (Olsen Bogaert 2002: 94). In addition to excavating scatters Olsen mapped and explored several caves and rock shelters. Of particular interest to this study, he visited three flooded caves containing salty water. All three contained artifacts in or around the caves, though the quantity of artifacts found at each cave were no more than three or four sherds (Olsen Bogaert 2002: 26). Conspicuously, Olsen Bogaert did not encounter rock art in the area north of El Cabo, though we heard rumors of several rock art sites in the region. However, his survey provides an important starting point and an interesting comparison with future surveys including the 2008 survey. No more archaeological studies were conducted around El Cabo for three years until 2005.

The next group to work at El Cabo was the project Houses for the Living and the Dead. In 2004, Professors Corinne Hofman and Menno Hoogland of Leiden and Jose Oliver of University College London did an initial reconnaissance of sites in the eastern and northern Dominican Republic (Hofman *et al.* 2004). The project finally chose the eastern coast of the country as a research area. Excavations started in the area in 2005 and exploratory excavations began at El Cabo and salvage excavations were done at a smaller site, El Pepe which was later turned into a golf course (Hofman personal communication 2009). These initial excavations consisted of a test pitting campaign, where ultimately 64 auger cores were taken to discover the extent of the site of El Cabo, which areas had high densities of remains, and the occupation chronology of different parts of the site (Hofman *et al.* 2006: 97). These excavations helped demarcate two distinct areas of the site, one with more Chicoid remains and another with a mix of Chicoid and earlier remains. They also exposed over 200 manmade features, most of which were post holes for houses (Hofman *et al.* 2006). In addition, a couple of test pits with high densities of features were enlarged to uncover more features during this initial investigation (Hofman *et al.* 2006: 98).

In 2006 it was decided to continue expanding the lateral excavations in the area with predominantly Chicoid remains (Samson *et al.* 2007: 96). During the 2006 season over 300 meters were cleared in a 3x10 area (Samson *et al.* 2007: 96). The local geology of the site provided a unique opportunity to better understand local habitation strategies, as post holes were well persevered and easily uncovered in clearing excavations (Samson *et al.* 2007: 98). A geophysical prospection was also conducted by members of a group from the University of Ljubljana during the 2006 season but results are still preliminary.

Most importantly for this thesis, the first regional survey conducted as part of the Project for the Living and the Dead took place during 2006 as well. The survey was conducted by Italian Alfredo Coppa from La Sappienza in Rome. Coppa shared his coordinates and access to his surface collections with me (Coppa 2008 personal communication). The collection included a number of small sherds, undecorated sherds, marine shell, and coral. During his survey, Coppa mapped 14 sites with cultural remains, three of which contained petroglyphs. He visited one

flooded cave, which contained sherds, though none of the sherds from his collection were identifiable. In addition he mapped three cave sites, which contained artifacts, and four open air scatters. The results of the 2006 survey will be compared with the 2008 survey in Chapter 6.

In 2007 large lateral clearing excavations continued at El Cabo itself. An additional 663 square meters of the site were uncovered during this time, exposing more postholes (Samson Forthcoming). These excavations extended all the way to the edge of the cliff above the sea, uncovering several other features. In the final field season, during 2008, most attention was focused on sorting and cataloging artifacts. However, an additional 25 square meters were excavated. A more detailed discussion of the results and interpretations of these results by Hofman, Hoogland, and Samson will soon be published elsewhere (Samson Forthcoming). Importantly for the interpretations and understanding of the thesis, however, is the fact that Majolica style Spanish pottery and other artifacts have been found at the site (Samson 2008 personal communication). This shows that the site was probably inhabited at least until the contact period if not beyond. The rest of this thesis will publish, contextualize and interpret results from the 2008 survey.

3.5) Conclusion

This chapter provides a background for the area around El Cabo. The coastal karst environment no doubt had a great effect on the subsistence strategies for exploiting this environment. The rocky terrain and lack of surface water likely provided some initial challenges for living in the area, but abundant marine resources and a strategic position on the Mona Passage would have been compelling reasons to settle the area. During the course of habitation local beliefs and meaning were no doubt also projected onto this environment, and somewhat changed by the environment. The area has plenty of potentially ritually charged areas, with its abundance of caves, rock shelters and sinkholes.

Las Casas' description seems to support the claim that the topography of the area has not changed much in recent history. He described phenomena such as flooded sinkholes and the cliffs that we still see today. Furthermore, his description gives us some idea, however vague, of the flora around the area, which no doubt has been greatly changed by the introduction of foreign plants and animals.

Finally, we already have a rich base of archaeological knowledge about the region. This knowledge is especially strong at the site of El Cabo, where excavations started in the late 1970s, but current efforts by the Houses for the Living and the Dead project have cleared over 1000 square meters of features and archaeological remains. Two previous surveys have also uncovered a number of sites surrounding El Cabo and set the groundwork for the 2008 survey.

Chapter 4: Comparative Landscapes: Understanding Caribbean Landscape use

4.1) Introduction

While we have seen a very specific local background and history of El Cabo in Chapter 3, this chapter will focus on comparing similar landscapes in Hispaniola and the greater Caribbean area to begin to come to some understanding of landscape uses and meanings among the *Taíno*. Las Casas already gave us a taste of how the landscape in Higuey was used for farming, how water was collected, and various other details. Further comparison will show some of the ways that *Taíno* landscapes were used for a variety of subsistence, economic, social and ritual uses. Subsistence activities such as water procurement, fishing, and farming were taking place on a daily basis at El Cabo, with ample comparative examples coming from other parts of the Caribbean. Regional movement, long distance trade, and specialized resource procurement most likely also played out over the landscape of Eastern Hispaniola on a regular basis. Also, there is an abundance of evidence that natural spaces such as caves and boulders had symbolic and ritual importance in the Tiano cosmovision. This section will expand on the above-mentioned themes, providing specific examples of evidence for these activities from eastern Hispaniola and appropriate comparisons from other parts of Hispaniola and the wider Caribbean.

4.2) Farming and cultivation

Farming was an especially important subsistence activity throughout the Caribbean. The clearing and modification of land to grow crops was one major way past people engaged with their environment. Domesticated plants provided the main source of carbohydrates and nutrients and were supplemented by fish or animal protein in most of the region. While there is a limited amount of direct archaeological evidence defining specific areas as fields or other areas of cultivation in Eastern Hispaniola, it is still important to explore this subject. The Spanish chronicles provide us with some of our best evidence for past agricultural techniques and crops sown. They mention several crops cultivated specifically on the island of Hispaniola. The principal crops on the island, according to these sources, were cassava, maize, potatoes, sweet potatoes, and zamia. The *Taíno* names for these plants are *yuca, maize, aje, batata,* and *guagaya* respectively (Loven 1935: 359). *Maize* has also been recorded in the ethnohistory and limited evidence of its use has been found at sites such as En Bas Saline (Newsom 2006). However, it is not mentioned in the ethnohistories as being specifically grown in Hispaniola. Other fruits, such as melons and pineapples, and spices and herbs such as hot peppers were also grown by the *Taíno*. Certainly it could be possible to make some indirect inferences about maximum crop yields and such in the area around El Cabo, though more extensive explorations would be needed.

Bitter yuca (*Manihot esculenta)* is widely described as the principal staple crop of Hispaniola. Though Las Cas speaks of *zamia (zamia pulmilla)* being one of the principal crops grown in the Eastern Dominican Republic, there is good evidence that bitter yucca was grown as well. Bitter yucca is a durable plant that needs relatively little water to grow, making it quite possible that it was grown even in the drier climate of eastern Hispaniola (Siskind 1973: 37). Though he doesn't use the word yucca, Las Casas states that in Higuey, they plant the roots "que se hechan en otras tierras y partes desta isla las dichas raices tan grande como la pierna o el brazo" (that they plant in other earths and parts of this island, those mentioned roots large like a leg or an arm") (Las Casas 1992: [3] 272). In *Las Historias*, Las Casas writes that the roots which are used to produce *casabe* are grown in these holes (Las Casas [II] 1318). Furthermore, he explicitly mentions yucca by name when describing its cultivation in Isla Mona, a similar environment to Higuey (Las Casas 1876:[3] 69). It seems that large quantities of yucca were grown during the contact period, as Higuey and specifically the Isla Saona are mentioned as a principle source of *casabe*, the distinctive flat bread made from yucca flour, during Santo Domingo's early history (Turner 2001: 1). However, it may be that more yucca was grown during the post-contact periods to please the tastes of the Spanish, who may have been disgusted by *zamia* bread (Veloz Maggiolo 1993a: 93).

Yucca cultivation took place in a manner of modes. Typically *conucos* or little mounds were created and parts of the plant were placed in these mounds. Oviedo describes the typical mode of planting yucca:

> Para sembrar esta planta, hagen unos montones de tierra redondos por orden é liños…. Cada montón tiene ocho ó nueve pies en Redondo…. é en cada montón ponen seys , é ocho , é diez ó mas troncos de la misma planta é vastago ó rama de la yucca (Oviedo 1851: [1] 269).

(translation)

> To cultivate this plant, they make some round mounds of earth ordered in lines…. Every mound has eight or nine pies (2.2-2. Meters if one pie= .279 meters (Carrera Stampa 1949: 10)) in circumference…. In each mound they put six, or eight or ten or more trunks of the same plant or shoot, or branch of the yucca.

This sort of yucca cultivation would have been quite difficult on a large scale on the eastern coast of Hispaniola, as there is little or no soil present in this area. There is more soil trapped in some of the larger dry or partially flooded sinkholes, and in natural depressions in the land or sheltered places. However, even in these locations, soil depths are relatively shallow. Oviedo describes an alternate method of planting yucca that would have been better suited to Eastern Hispaniola and shows that *conuco* construction was unnecessary. He says:

> Otros no hagen montones, sino allanada la tierra é limpia é mollida , ponen á trechos

> estos plantones de dos en dos ó mas, cerca unos de otros; pero primero se tala ó rosa é quema el monte para poner la yucca (Oviedo 1851: [1] 269).
>
> (translation)
>
> Others don't make mounds, but they flatten the earth and clean it and soften it and they put in intervals these big plants of two by two or more, close some to others; but first they fell or clear or burn the shrub to put the yucca.

Slash and burn and clearing cultivation is still practiced in Eastern Hispaniola. Large fields were burned and cleared to grow watermelons, among other crops, during the time of our survey.

The major crop that Las Casas describes, however, is *zamia*. *Zamia (Zamia pulmilla)* is a small, tough woody cycad. The plant itself is not edible, but its roots, though poisonous when unprocessed, provided a major source of starch for past and sometimes present peoples. It is still used as a staple or emergency food source by poor people in Cuba, Hispaniola, Puerto Rico, and Jamaica (Stuertevant 2007: 191). This root was ideal for growing in the small spaces between the rocks, which made it well suited for the karst terrain in Eastern Hispaniola.

The preparation and appearance of *zamia* bread was quite different from that of *casabe.* The *zamia* root was collected and grated like yucca as it too is poisonous. However, it is common practice to leech zamia in water or to let it ferment/rot (Stuertevant 2007: 187). In a telling passage that thinly masks his disgust with the bread, Las Casas describes how the Higueyans processed *zamia*:

> y hacen della unos globos o bollos redondos, tan grandes como una bola, los cuales ponen al sol, y luego ponense de color de unos salvados o afrechos estan al sol uno y dos y tres dias, y al cabo dellos se hinchen de gusanos como si fuese came podrida, y quedan eso mismo tan negros poco menos como una tizne, como un negro algo deslavado que tira a pardillo: despues que ya estan en esta dispusicion, negros y herviendo de gusanos tan gordos como pinones, hacen unas tortillas dellos (Las Casas 1992:[1] 261).
>
> (translation)
>
> And they make of [this flour] some globes and round balls, the size of a ball, which they put in the sun and eventually it turns the color of some bran, or husks of grain from being in the sun one or two or three days, and finally they fill up with worms like they had become rotten, and it stays this same black a little less dark like a soot, like a black something impudent which is thrown at a yokel; after this and in this form, black and full of worms very fat like pine nuts, they make some tortillas of it.

Las Casas specifically mentions three other major crops - melons, a type of carrot which may have been a sweet potato, and chiles - in his descriptions, and it can probably be inferred that *aje* (potatoes) were grown there as well, as he mentions them being a crop on Isla Mona. The strangest description is the carrot-like plant, which Las Casas describes as "tan gruesas como por

la cinta es un hombre" (As thick as the waist of a man) (Las Casas 1992: [1] 271). It is hard to say for sure, but Las Casas may be describing a sweet potato or yam. He may well be exaggerating his description of the plant to impress the reader. In this section he also mentions melons, which no doubt are the same melons that grow on La Isla Mona. Las Casas describes them as "melones de espana tan grande como botijas de una media arroba de aciete" (melons of spain large like a jug of a half arroba (5.75 kilos given that 1 arroba=11.5 kilos) of oil) (Las Casas 1876: [2] 69). He also describes them specifically in a description of Higuey as "odiferous y como sangre colorados" (fragrant and colored like blood) (Las Casas 1876: [2] 1367). Finally, it seems likely that *ajes* or potatoes may have been a major crop in Higuey. These plants are mentioned in Las Casas' description of Isla Mona, and since they were generally a major Hispaniolan staple, and the environments are so similar, it is not a huge jump to assume they were grown in Eastern Hispaniola as well (Las Casas 1876:[1] 69).

Archaeological evidence from established techniques such as palynology and new, emerging techniques such as phytolith studies and starch grain analysis are giving archaeologists some direct evidence of the plants grown and foodstuffs processed among the *Taíno* and earlier peoples. Starch grain analysis studies by Jaime Pagan Jimenez (2008) in Puerto Rico, and Rodriguez Suarez *et al.* (2008) in Cuba have shown that crops such as *zamia* were more prevalent in these two islands than previously thought. The existence of starch grains and other endemic plants lead Pagan Jimenez to hypothesis more continuity than previously thought between Archaic and ceramic age subsistence practices (Pagan Jimenez 2008). Furthermore, a lack of yucca on the burens from Cuba and lower than expected residue from the plant in Puerto Rico make Rodriguez Suarez *et al.* (2008) and Pagan Jimenez (2008) question if the crop was as widely used as first reported.

In any case, despite its relatively unfertile landscape, it seems that Eastern Hispaniola was capable of supporting a variety of *Taíno* staples, including yucca, potatoes, *zamia*, and melons. Farming was probably done via slash and burn clearing and was especially focused in large sinkholes and pockets where there is deeper, higher quality soil, much as it is done today. The importance of these crops to local subsistence may have lasted from even before the traditional ceramic periods until the contact period (Rodriguez Ramos 2008). Despite a current lack of archaeological evidence sufficient to determine farmed areas or farming techniques, outside of tools such as burens or stone axes, these areas were no doubt important parts of the Tiano and Ostionoid landscapes around El Cabo. Another specific challenge in eastern Hispaniola and similar karst regions in the Caribbean was acquiring water suitable for either drinking or household uses. The following section will explore this issue.

4.3) Water use and meaning in Eastern Hispaniola

Among the *Taíno* of Hispaniola, and quite possibly throughout the Caribbean, water was both an everyday necessity and had profound cosomological and ritual importance. Water use for drinking is a necessity cross-culturally. Secondary uses for bathing, cleaning, cooking and agriculture are also fairly widely practiced in all but the most water poor areas.

Water procurement is a basic human necessity no matter what the environment. Water is essential to most bodily functions, making up 55% to 75% of the human body depending on body size. It is used to provide a stable internal environment for organs, as circulatory liquids containing things such as blood cells and hormones, and as an agent for cooling when excreted as sweat and as a waste disposal fluid for urea and fecal matter (Ladell 1965: 236). While we can go several weeks without food, humans can normally survive only a couple of days without drinking water. Water is also used for a variety of other purposes such as cooking, washing clothes, bathing, food processing, agriculture, and nowadays for industrial uses. Potable water needs to be fresh and relatively clean. A major function of the kidneys is to maintain a gradient between fresh and saline water that lets nutrients exit and enter cells by regulating salt levels. Excessive levels of water salinity in ingested water cause the body to excrete more water than it consumes and leads to dehydration if nothing but highly saline water is consumed during this period (Ladell 1965: 251). It is unhealthy for humans to consume water with salinity above 4000 or 5000 milligrams of salt per liter of water (Ladell 1965: 253). These levels vary based on body type and size, but this number is a generally agreed-upon standard. Both salinity and the cleanness of the water become less important for secondary uses such as cooking, washing and bathing. Obviously, proximity of potable water sources to a site, or methods of collecting water, is an important consideration for most site locations. In his study of water use in East Africa, where many people in rural areas still are without plumbing or manmade wells, White (1971) found that in rugged terrain most women, since women usually collect water in East Africa, traveled no far than one to three kilometers to draw water from wells (107). In flat, easily traversable areas, much farther distances were traversed (White 1971: 104). However, one must remember that often, these stories are of isolated, marginalized individuals rather than a group as a whole. Moreover, mobile hunter-gatherers are known to move large distances in search of water; however, it seems fairly straightforward to assume that settlements were generally placed relatively close to water sources, or at the very least there were compelling reasons, such as proximity to rare, tradable resources, to justify increased effort towards water procurement.

From what we know of the *Taíno*, as with many other peoples, water had highly charged symbolic meanings and uses outside of its purely utilitarian uses. Water has everyday importance as a source of refreshment and an agent for cooking and cleaning, a home of fish and other marine resources, and an efficient avenue of movement. In an insular environment water also serves as a

liminal zone between known lands and more distant unknown or mythical regions. These roles as a barrier and a mode of transportation are especially significant.

Water's role both as a barrier and a pathway for transportation seems to have been an important part of the *Taíno* cosmovision. Ramon Pané describes the Coaybey (the underworld) as "on the other side of an island called Soraya" and as being controlled by the first spirit to make its way there – called Maquetaurie Guayava (Pané 1999: Chapter XII). Other mythical regions, such as *guanine*, and the land of the women, described in Columbus (1989) and Peter Martyr D' Anghiera (1979), are also distant places separated from Hispaniola by vast expanses of water. Such views would suggest that the typical tripartite model of the universe with a heavens, underworld and earth may be remiss. Rather, a worldview with a relatively flat earth surrounded by a vault of constantly circulating water may be more plausible. Stevens-Arroyo, Peter Roe and others hypothesize that the heavens and the underworld are themselves mostly made up of circulating waters (Stevens-Arroyo 2006: 183; Roe 2005: 296). Stevens-Arroyo uses the story of Anacacuya to make this point. In this story, the chief Guahayona convinces his brother-in-law Anacucaya and his wives to take a canoe trip with him. During this canoe trip Guahayona betrays his brother-in-law Anacucaya, throwing him in the ocean and taking his wives for himself (Pané 1999: Chapter V). Stevens-Arroyo uses Arrom's translation of the name "star of the center" to argue that Anacacuya became a constellation, specifically Orion, after his betrayal by his brother-in-law (Stevens-Arroyo 2006: 178). He argues that Anacacuya, by becoming part of this sea that surrounds the world, eventually becomes part of the heavens. Similarly, mythical places such Coaybay are sufficiently distant to be associated with this cycling of the heavens and the underworld. Thus, according to Stevens-Arroyo and Roe, water serves as an important conduit between the terrestrial world, underworld and heavens (Roe 2005: 296). These avenues could be used by the spirits of the dead on their journeys between terrestrial realms (Roe 2005: 334). Petroglyphs have been commonly found on boulders in rivers and in flooded caves or near flooded sinkholes, possibly indicating a special signifigance or liminal quality to the specific natural settings where they are found (Roe 2005: 334). Thus water has a vital role for both subsistence and symbolic importance as a conduit in the *Taíno* cosmovision.

The association of petroglyphs, caches of artifacts and other signs of ritual use in or near water sources attest to the importance that water had for the culture. It also makes the interpretations of potential water sources, such as flooded caves and flooded sinkholes, more complicated. These areas cannot be neatly divided into "ritual" or "utilitarian" spaces. First of all, a neat dichotomy between ritual and utilitarian meaning or behavior often does not exist in traditional cultures; everyday behavior can be intertwined with ritual symbolism. While water sources in some areas may have had implicit symbolic or ritual meanings, other sites have been clearly modified to serve as sites for community rituals. Some of the water sources that will be

reviewed seem to have served both as sources of drinking, cooking, cleaning or bathing water and as ritual sites. However, some appear to have served as only water sources and lack any overt evidence of practiced community ritual. Other sources of water that may not have been ideal for drinking may have been sites of rituals.

While it is not easy to ascribe ritual uses to a site, a number of indicators, especially when seen together, may connote a *Taíno* ritual space. Rare artifacts such as three pointers, duhos, cahoba inhalers and carved figures are sometimes associated with ritual sites (Beeker *et al.* 2002). These artifacts are often found in domestic contexts, such as settlements, but as we can see from the ethnohistory, the chief's house, the *caney*, often served both as a home for *cemis*, a temple of sorts, and a residence. Hernando Columbus describes a wooden idol with a speaking tube found in one of these *caneys* (Columbus 2002: 188). Pané also describes several of the stone or wooden statues and three pointers associated with *cemis* as being kept in a chief's *caney* (Pané 1999: Chapter XXIV). As Pané also associates such artifacts with ritual caves, I believe that the finding of such rare artifacts in areas such as sinkholes and caves may imply that the area had some ritual importance. This may depend on the context, however, as such remote places may have also served as hiding places for artifacts during the conquest period. Needless to say, Hernando Columbus records his father as saying "Indeed if they suspect Christians are coming they pick [the *cemi* artifacts] up and hide them in the woods" (Columbus 2002: 186). Finally, rock art is often interpreted as part of areas where rituals were undertaken. Pané describes the cave containing Boinayhel and Moroya as highly revered and he says "it is all painted in their fashion" implying that there are pictographs present in this cave (Pané 1999: Chapter XII). Archaeologists who have found these sorts of artifacts or have found rock art near water sources or in caves have tended to interpret these areas as having been used in communal rituals (Beeker *et al.* 2002; Weeks et al 1996).

Bathing is one type of water use that had great everyday and possibly ritual importance on Hispaniola and the other islands. From what can be seen in the chronicles, bathing was an important activity among the *Taíno* of Hispaniola. Bathing may have possibly occurred once or more daily. When speculating on the diseases and poor health ravaging the Indians, Las Casas posits that one of the sources of this disease is that "otro es, lavarse muchas veces en las aguas mas, como estos se lavan de noche y de dia" (another [reason] is, they wash themselves many times in the water, like this they wash themselves in the night and in the day" (Las Casas 2002:[2] 406). Aromatic herbs were used like soaps when bathing. Columbus tells of "certain herbs with which [the *Taíno*] rubbed their hands, and they gave him water for washing his hands" as well (Columbus 1989: 285). In addition to being an important part of everyday life for the *Taíno*, bathing seems to have been an important part of ritual as well. The presence of pathways between sites such as Corral de Los Indios and petroglyph sites on rivers has lead Samuel Wilson (1993),

among others, to hypothesize that ritual bathing was an important part of *Taíno* purging/cleaning ceremonies associated with cohoba use, arrietos, and fasting. Stevens Arroyo mentions an interesting ritual among the Black Caribs of St Vincent where participants first paint themselves with *bixa* to commune with the ancestors and then bathe, removing the dye and terminating the connection between themselves and the dead (Stevens Arroyo 2006: 146). This ritual, as Stevens-Arroyo hypothesizes could possibly be linked to pre-contact Caribbean practices. Certainly flooded caverns may have served as ritual bathing spots. Purging as a form of ritual purification using vomiting spatulas was an important part of the *cohoba* ritual, so it makes sense that bathing may have been an important part of the ritual cleanliness. Similar parallels can be seen with the use of sweat baths in the Maya area and ritual bathing as part of Hinduism (Houston *et al.*2001; Babb 1970).

Rivers, which may well have had ritual as well as utilitarian uses, provide a common source of fresh water, especially on the larger islands in the Caribbean. Both Columbus and Oviedo mention the numerous rivers on Hispaniola as a way of impressing readers with the fertility and promise of Hispaniola. In his initial letter to Ferdinand and Isabella, Columbus describes Cuba and Hispaniola, saying: "there are so many rivers and harbours that are better than those in Christendom" (Columbus 1493). Oviedo also mentions ten major rivers in Hispaniola, describing many as large and with bountiful water (Oviedo 1851 [1] 174). Though both authors exaggerate in their descriptions of the rivers, fresh water was plentiful in Western and Central Hispaniola and on many of the other larger islands. As well as being drinking water sites, these rivers may have had greater ritual or cosmological importance. One of the more common surfaces utilized for carving petroglyphs were river boulders. Sometimes, such as at Corral de los Indios, long pavements link rivers with petroglyph sites to sites (Wilson 2007: 127). Prominent examples of these kinds of petroglyphs can be found at sites such as Corral de los Indios in the northwest of the modern Dominican Republic (Weeks 1996).

Collecting rainwater may have also been a major source of water in drier areas. There are no surface sources of fresh water on some of the lesser Antillean islands, including Barbados, Mustique and Carriacou. Due to their size and lack of large mountains with rain shadows, many smaller islands do not have environments capable of sustaining fresh surface water. Rainwater is one potential source of water in such situations and generally in areas without plentiful surface water. In fact, it is common for people today in the province of Alta Gracia to collect rainwater in large plastic drums. It is not inconceivable that past peoples collected rainwater in large jars or built rainwater caches. There is no evidence of areas being modified to create larger, more permanent cisterns such as the ones seen in the Maya area of Mesoamerica (Scarborough 1998). However, on all but the lushest islands, rainwater is an unpredictable source of water. In excavations at Port St. Lucy in the Barbados, Drewett *et al.* (2007) found buried stacks of pots,

which had their bottoms cut out, on a beach near the sea. Drewett *et al.* found at least 53 of these wells during excavations, one lined with wood instead of pots, showing that this was a common practice at the Port St Lucy site (Drewett *et al*. 2007: 50). This trend was also reported on Carriacou, Morell and Guadeloupe (Schultz 1995). Schultz believes that such wells would have been perfect for accessing a thin gradient of fresh water, which would have been closest to the surface near the ocean (Schultz 1995: 221). Building pot-lined wells seems to have been one strategy for gaining access to a dependable supply of water on several islands in the Lesser Antilles. However, I have come across nothing similar in readings on the Greater Antilles.

The other logical water sources on karst islands are flooded sinkholes and flooded caves. One possible *Taíno* term we could use for these features is the term *xaguey*. Both Las Casas and Oviedo use the term in their works. Las Casas uses Spanish terms such *aljibe*, which is defined as a cistern or reservoir, to describe the *xagueys* (Las Casas 1992: [1] 260). Oviedo notes that *xaguey* is a name of a type of tree but is also a term for a *charco* or pond or pool of water (Oviedo 1851:[1] 359). He seems to mean sinkhole rather than pond. He uses the term *xaguey* to describe similar sinkholes on the Island of Cozumel off the eastern coast of Yucata (Oviedo 1851: [1] 508). Oviedo also mentions the lack of *xagueys*, or any other source of fresh water, on the island of Santa Cruz (the Virgin Island currently St Croix) (Oviedo 1851: [1]603). Despite the temptation to use the word *xaguey* throughout this thesis, it is best to be cautious in its use. The terms used by Las Casas and Oviedo are from Spaniards dealing with the *Taíno*, not from a *Taíno* source, so it is hard to say if there are any subtleties the chroniclers missed. For example, are all subterranean water sources defined as *xagueys*? Are ponds and other standing freshwater sources *xagueys* as well? Oviedo's use of the word *charco* to define the word leaves the possibility that ponds and other sources of standing freshwater are *xagueys* as well. For now it is prudent to use other descriptive terms rather than *xaguey*, such as flooded caves and flooded sinkholes.

Flooded caves and flooded sinkholes provide major potential sources of fresh water in areas such as Anguilla and Isla Mona and in the karst regions of larger islands such as Hispaniola, Jamaica and Puerto Rico where there is little fresh surface water. In these regions, collecting rainwater or extracting water from flooded caves and flooded sinkholes would have been the only way to access fresh water without traveling great distances. There is indeed a good body of archaeological evidence on these islands showing a variety of uses for flooded caves and sinkholes (Beeker *et al.* 2002; Conrad *et al*. 2000; De Booy 1915; Borrell Bentz 1978). Most straightforwardly, there is a great deal of evidence that some of these flooded caves and flooded sinkholes were used as drinking water sources. However, the presence of valuable non-water-related artifacts in the water in some of these water sources, or petroglyphs in or near these natural features, shows that they may have served other ritual uses, or may have had utilitarian and symbolic uses and/or meanings.

The finding of the intact or partial remains of water-carrying vessels in or near a flooded cave or sinkhole has widely been interpreted as indicating it was used as a drinking water source. Water vessels seem to have been made of both clay and gourds. Gourds were probably the most common water vessels, as they would have been much less labor intensive to make and were probably more durable. Columbus, Peter Martyr, Oviedo and Las Casas all mention that gourds were used to fashion cups, bowls and other tableware. Peter Martyr describes them in this way : "On all these islands [near Cuba] there is found a tree about the size of our elms, which bears a sort of gourd out of which they make drinking cups; but they never eat it, as its pulp is bitter than gall, and its shell is as hard as a turtle's back." (D'Anghiera 1970: [1]96). While they may have been more common, gourds and other organic materials decompose in most environments. Thus, it is also impossible to say that flooded caves or sinkholes without ceramic remains were not regularly used as water sources.

Columbus and Las Casas mention ceramics as another major water-carrying vessel type. Columbus specifically mentions "clay jugs of a form like those of Castile" during a visit by groups from Eastern Cuba (Columbus 1989: 255). *Potizas* or heart-shaped water bottles with narrow necks and constricted mouths are the vessels most consistently interpreted as being used for carrying liquids. These vessels have been found at multiple water sources in Eastern Hispaniola. Most of the *potizas* mentioned in publications are generally interpreted as belonging to the Chicoid ceramic typology due to their construction and decoration. Other sorts of vessels such as jugs with a less constricted mouth were no doubt used as well. Espenshade's characterization of various Ostionoid vessels shows that some high bodied vessels, different in form from *potizas*, may have been used to carry water in earlier periods also. (Espenshade 2000: 13).

Several water sources contain complete *potizas*. De Booy (1915), and later Borrell Bentz (1978) found several intact vessels in a flooded caves near Punta Macao, in the northern portion of the modern province of La Alta Gracia. They each found intact vessels and large sherds from broken *potizas* within the water of the sinkhole and interpreted that these vessels had fallen by accident into the water while their users had been extracting water. While De Booy had quite low opinion of the quality of the water, he did find one *potiza* that contained a possible filter (De Booy 1915: 89). A complete *potiza* and several large *potiza* sherds were also found in the cave named Cueva de Chicho by Beeker *et al.* (2002). Like De Booy, they interpreted the site as being used as a water source (Beeker *et al.* 2002: 9). The presence of a petroglyph on one of the walls of the cave may indicate it had more than just a utilitarian use, however.

Beeker *et al.* (2002) were primarily concerned with investigating another flooded sinkhole, the *Manantial Aleta*, which probably served as a water source and had ritual uses. This important site was first mentioned by Guerrero (1981) but had not been extensively investigated until the

late 1990s. It is located about 80 meters away from an impressive site containing four open plazas (Atiles *et al.* 2001). The plazas are of varying sizes and are lined by upright boulders, but no petrogyphs were detected on the boulders (Atiles *et al.* 2001: 49). Wooden artifacts, including basketry, a *macana* and a *duho* were found in the flooded sinkhole. 191 sherds, several from complete vessels and large sherds, were found in the water (Beeker *et al.* 2002: 13). These artifacts are interpreted by Beeker *et al.* (2002) as having been deposited as part of caching rituals (16). Beeker *et al.* (2002) does not state whether or not any of these sherds were from *potizas* or other water-carrying sherds. However, la Manantial de Aleta would make an excellent water source. It seems, like similar sites in the Yucatan, la Manantial de Aleta served as a cache and ritual ground. The fact that no evidence of habitation was found around the four plazas only augments the interpretation that the site was primarily used for ritual functions (Atiles *et al.* 2001: 46). Interestingly enough, Atiles *et al.* (2001) believe that the extensive description of the *xaguey* quoted from Las Casas in Chapter 3 may actually be a description of the Manantial de Aleta. This is impossible to verify but not completely unlikely, as Las Casas describes the site as being 4 or 5 ligas (16-20km) inland from the coast opposite Isla Soana and relatively close to a major site (Las Casas 1992:[1] 260).

There are also several other water sources where sherds have been found in or around the water of a flooded cavern or cave. Relatively little is currently published about the site of Cuckold's point in Jamaica. It has been briefly mentioned in two articles by Lee (Lee 1990; Lee 2006). The few sentences devoted to the site, however, contain several interesting bits of information. The site is mentioned in these articles because it contains a single petroglyph, a complex face with mouth, nose, and an outline (Lee 2006: 182). The petroglyph is closely associated with a water source, located only a couple meters away from a flooded sinkhole. Lee describes the site as only 400 meters away from a major habitation site (Lee 2006: 182). He mentions that broken white-marl, a local Jamaican style associated somewhat with the Mellican style found in Hispaniola and Cuba, bottles were found around the water source. The presence of the petroglyph near the site may mean that the site was either not only used as a water source, or that there may have been a more complex symbolic or cosmological meaning for the site that is expressed by the petroglyph.

Two sites on Anguilla, Fountain Cave and Big Springs, may have contained water sources that would have been used as both drinking water sources and ritual sites. Anguilla is a relatively small island to the east of the modern British Virgin Islands. The findings of Elenain Ostionoid and Chicoid sherds at Anguilla make archaeologists such as Crock theorize closer interaction, if not cultural integration, with the Greater Antilles (Crock *et al.* 2004: 141). I would be hesitant to project specific historical evidence from Hispaniola onto the Anguillan situation; however, broader comparative aspects such as similarities in subsistence strategies and in rock art can be

seen between the regions. Big Springs and Fountain Cave are primarily known for their petroglyphs. Fountain Cave contains 12 petroglyphs, including a famous stalagmite that has been carved to look like a figure, which Douglas, among others, has interpreted as a representation of the *cemi* "Jocaho" (Douglas 1991: 577). While I am highly skeptical, it is possible to identify the image with a specific *cemi* mentioned by Pané in Hispaniola; the rock art is impressive and quite probably correlates with ritual use of the area. A finding of a three pointer in the cave seems to confirm this impression (Watters *et al.* 1991: 311). Big Springs, which contains around 28 petroglyphs, probably also had ritual use (Petersen *et al.* 2003: 658). These two flooded caves would have been some of the most logical easy access points to the water table. Petersen *et al.* hypothesize that Big Springs was used as a drinking water site, as oral histories tell that the cave had been used as source of water for cooking, washing clothes and bathing until the 1970s (Petersen *et al.* 2003: 659). Watters also has proposed as a secondary hypothesis that Fountain Cave was used as a source of drinking water (Watters 1991: 311). Both sites contain sherds found in close proximity to the water sources. However, in the case of both these sites, no complete vessels or large sherds were found (Petersen *et al.* 1991: 318; Petersen *et al.* 2003: 659). I did not see any mentions of sherds identified as belonging to *potizas* or other obvious drinking vessels at the site. It is not as easy to link the sherds found at the either site, as a) they were not found in the water itself but were found in dry areas of the cave and b) no *potizas* or other potential water container sherds were positively identified. Sherds at either site may have been cached, used for feasting associated with ritual, or had other uses. Petroglyphs at both sites seem to strongly associate these areas with ritual uses. However, it is difficult to ignore that these caves were some of the few easily accessible sources of relatively fresh water on the island.

Finally, there are also a number of caves that the Dominican archaeologist Olsen-Bogaert found during surveys in Alta Gracia, regions close to Santo Domingo and in Samaná. Olsen-Bogaert has found multiple flooded caves, such as the Cueva del Agua and Cueva de Chicho (unrelated to Beeker *et al.*'s Cueva de Chicho in an area east of Santo Domingo), containing small quantities of sherds within the water (Olsen Bogaert 2001: 50,69). He has also found a similar cave with a few sherds in the water in Samaná (Olsen Bogaert 2004). Finally, Olsen Bogaert mentions several flooded caves in the area directly north of El Cabo, including a cave with sherds in the water (Olsen Bogaert 2002; Olsen Bogaert 2001). This cave was subsequently revisited in 2008 during this most recent survey. Olsen Bogaert found abundant sherds with possible small bones from human remains at the site in El Cabo (Olsen Bogaert 2001: 132). He consistently interprets most of these caves, including the cave found in his survey of El Cabo, as utilitarian water sources (Olsen Bogaert 2001: 132). This interpretation may be incorrect, at least at El Cabo and possibly at some of the other coastal sites as well. This theme will be more substantially explored in Chapter 7.

Needless to say, water sources had a variety of uses and meanings. It is difficult to interpret most of the sites mentioned in this section as purely ritual activity areas or everyday sources of water. It is most likely that many of these sites were used for both. In any case, water is a crucial resource that may well have had substantial symbolic meaning beyond its everyday use for *Taínos* on Hispaniola and possibly throughout the Caribbean. Freshwater is an especially important and rare resource in karst areas such as the area around El Cabo. If anything, the rareness of freshwater may have magnified its ritual importance. A clear parallel can be seen with the Post-Classic Maya in the Yucatan peninsula, where fresh water sources were a scarce and *cenotes* were also often used for rituals in addition to being drinking water sources (Beddows 2007). In any case, understanding water use and meaning among the *Taíno* is one important aspect necessary to understanding uses and meanings of the wider landscape in Eastern Hispaniola.

4.4) The seascape: a source of resources and route for interisland trade

While the ocean off the coast of El Cabo was not surveyed as part of the 2008 survey, it would be remiss not to mention it while talking about it during this general discussion of uses and meanings of the past *Taíno* landscape. Beaches provide important liminal spaces between the seascape and landscape. They provide safer access points to and exits from the sea for vessels and swimmers alike. The ocean provided both a medium of transportation and a source of food and other resources for the *Taíno* and for Amerindians in much of the Circum-Caribbean region. While few traces are left of launch sites on beaches for archaeologists to find, no doubt such areas were frequently used. It is more profitable to search for marine resources in middens and archaeological deposits and for non-local goods from other islands to get some idea of fishing practices and of movement and trade in the Caribbean. The historical sources also provide us with some idea of what things were like at the time of the first contact. While this section will not give a detailed overview of marine resource exploitation and trade, the concepts will be briefly explored. It would be next to impossible to truly deal with past uses and meanings of the landscape for the *Taíno* without emphasizing the importance of the seascape as well.

Boats were used as a principal way of moving over the seascape and extracting marine resources. The principle vessel used by the *Taíno* was the dugout canoe or *canoa*. A similar vessel, which may have had a sail, was used by the Lesser Antilleans (Oviedo 1851:[1] 169) . The passage by Oviedo below gives us a particularly good idea of how canoes were constructed.

> Cada canoa es de una sola pieza ó solo un árbol, el qual los indios vagian con golpes de hachas de piedras enhastadas…y con estas cortan ó muelen á golpes el palo, abocándolo, y van quemando lo que está golpeado y cortado, poco á poco,, y matando el

> fuego, tornando á cortar y golpear como primero ; y continuándolo assi, hagen una barca quasi de talle de artesa ó dornajo (Oviedo 1851:[1] 170-71)
>
> (translation)
> Each canoe is made of only one part or a whole tree, this tree which the Indians fell with blows from stone axes… with these they cut and hack at the trunk, plunging into it, and they burn the part that is hit and cut, bit by bit, and dousing the fire, returning to cut and hit the first; and they continue like this, they make a boat nearly of the shape of a trough

The dugout canoes hollowed out of a single piece of wood could be quite small or, according to D'Anghera, could be capable of carrying up to 80 rowers (D'Angheria 1970:[1] 62). Columbus describes one fleet of 120 canoes approaching his fleet off the coast of Hispaniola (Columbus 1989: 270). While the descriptions are probably a bit exaggerated, they demonstrate that the *Taíno* were capable of making quite large canoes and sometimes in significant numbers. Such vessels provided both transport and platforms for resource gathering.

Fishing and shellfish gathering were important subsistence activities throughout the Caribbean. Fish, turtles, manatees and shellfish served as the major sources of protein for Amerindian peoples in much of the Caribbean (Wing *et al.*. 2001: 1). While the chroniclers report hunting of both birds and animals such as *hutia* and *iguana*, seafood was a more plentiful resource, and sometimes the only sustainable source of animal protein on small islands. Shells of large shellfish such as conch are often found in midden mounds, especially in coastal areas of Hispaniola and the greater Caribbean. Shellfish and other marine resources played an important role for archaic populations (Petersen 1999: 124). At many archaic sites, shell middens are some of the only surviving evidence of human use. According to Petersen, one generally sees a drop in the exploitation of marine resources associated with Ostionoid sites (Petersen 1999: 124). However, fish, shellfish and other marine animals became more popular food sources again during the later Chicoid periods. Sea shells make up the greater part of all faunal remains found at El Cabo (Samson 2009 personal communication). There is little direct evidence of the sort of technology that was used for fishing, beyond shell and stone net weights. Many believe that modern Caribbean fish traps may have been inspired by Amerindian practices (Wing *et al.* 2001: 8; Price 1966). Price gives some idea of what Carib fishing practices may have been like, including the use of fishtraps, lines and small nets, by exploring the Colonial record (Price 1966). It would not be surprising if some of the same techniques were used in the Greater Antilles. Peter Martyr does mention an intriguing form of fishing, presumably from the Greater Antilles, using remora fish to catch other fish (D'Anghiera 1970:[1] 97). While this claim was ridiculed even in his own times, as evidenced by Peter Martyr's own reflections, he had cited a variety of credible sources for this practice (D'Anghiera 1970:[2] 299). There were certainly a variety of techniques employed for fishing and collecting shellfish that varied across the region.

Long-distance trade and communications between islands were also conducted via canoe. Higuey and El Cabo specifically are in a very strategically important area for trade and communications with Puerto Rico to the east. The Mona Passage is about 120km wide and by all accounts has treacherous and complex currents. According to Las Casas, there was a daily flow of canoes crossing back and forth between Puerto Rico and Hispaniola (Lamarche 2005: 135). While this is probably exaggerated, there is no doubt that a great deal of movement and trade was taking place throughout the Caribbean. A large variety of prestige goods, tools, and perishable goods were probably traded to and from Hispaniola. Provenance studies on lithics have shown us that lithics from specific sources, such as greenstone from St Martin and flint from Long Island, were being traded over large portions of the Caribbean, with distributions from Puerto Rico to Guadeloupe and Puerto Rico to Martinique respectively (Hofman *et al.* 2007; Knippenburg 2004). Long distance trade seems to have been especially widespread during the early ceramic age (400 B.C.-200A.D), but seems to have decreased during the later ceramic age (800-1200 A.D.) until the contact with local networks took precedence (Knippenburg 2004: 129). El Cabo's position on the Mona Passage would have made it a logical part of local trade networks between Eastern Hispaniola and Western Puerto Rico.

In any case, though this thesis does not focus its attention on the sea and long distance trade, it is important to mention this subject for a greater overall understanding of the landscape surrounding El Cabo. Furthermore, it is important to contextualize the importance of the sea for subsistence and navigation when talking about beach sites or mentioning marine resources found during the survey. While the focus of this thesis is on the local rather than the regional, it is still important to acknowledge regional influences that may have affected local landscape use and movement patterns.

4.5) Cave uses and meanings, caves as shelters

Caves have a number of uses, as seen in the archaeological and ethnohistorical record. These spaces may have been used as permanent shelters in the Archaic period. Later on they may have served as overnight shelters when permanent shelters were farther away or as shelters during hurricanes and dangerous storms. During the Ostionoid and Chican periods subterranean spaces seem to have been spaces closely associated with ancestors and the dead as well; liminal spaces were charged with supernatural energy. Later people seem to have used important caves as burial grounds, sites for rituals and galleries for rock art. It must be emphasized that, rather than being separate phenomena, these uses may often be linked. I will briefly explore and elaborate on different uses and meanings of caves seen in the ethnohistorical and archaeological record below.

It is clear from the ethnohistorical sources that caves played a central role in the *Taíno* cosmology during the contact period. The writings of Pané, among others, demonstrate that caves were strongly associated with ancestors and the underworld. In Pané's *Relacion* he records that the first ancestors lived in a pair of caves in the central cordillera of Hispaniola. The caves were called *cacibajagua* and *amayuana* (Pané 1999: Chapter 1). According to Stevens-Arroyo, one cave, *cacibajagua* (the cave of the jagua), contained the *Taíno*'s ancestors and the other cave, *amayuana*, (without meaning) was the origin point for all other peoples (Stevens-Arroyo 2006: 137). Caves were the homes of the first ancestors and continued to be recognized as the homes of later ancestors as well. Pané records that the *Taíno* were afraid of *opia*, the souls of the dead who would come out from hiding places at night and eat guayaba fruits (Stevens-Arroyo 2006: 230). To Stevens-Arroyo and other scholars, this sounds suspiciously like bats, and the bat motif is one of the most prominent and repeated motifs displayed on artifacts. Furthermore, depictions of individuals wrapped in cotton bands, which are generally interpreted as the dead, often have long bat-like ears (Roe 1987: 334). This motif of the bat is one of the most common motifs on adornos from El Cabo and a common motif generally in Hispaniola (Oudhuis 2008). If the *opia* are bats, then the hiding places Pané refers to are logically caves. This strong symbolic association with the underworld and ancestors would have made caves logical places for the burial of dead caciques and charged areas where ancestors and *cemis* could be consulted. While caves where symbolically charged places, they had a variety of practical and ritual uses which varied greatly over time. Caves also seemed to be a major part of the sacred geography of Hispaniola. Pané states the sun and the moon originated from a cave in the east of the island called *Yvovaya* (Pané 1999: Chapter XI). At the same time, Martyr D'Anghiera ascribes life to the island of Hispaniola and describes a marine cave in the west of Hispaniola, saying: "This cavern corresponds to the sex organs of the woman, and at the same time to the anal canal, through which she discharges her excrement and impurities" (D'Anghiera 1970:[2] 298). If these passages are to be taken as true, then caves are places charged with supernatural powers with close associations to both the dead and *Coaybay*.

Caves seem to have been used from Archaic times onward. They are generally interpreted as having been shelters and burial areas, due to high concentrations of faunal remains, ash and sometimes burials in the lower stratigraphic levels of cave excavations. Next to nothing is known about the beliefs surrounding archaic cave use. Several caves have definite archaic remains (Veloz Maggiolo *et al.* 1977; Calderon *et al.* 1977; Ayes Suarez 1996; Rouse 1990) while others (Aitken 1918;Perdomo 1983) may have contained archaic burials, due to a lack of ceramic remains found at the site. However, it is generally difficult to positively date or establish stratigraphic chronologies in many caves due to modern disturbances. Practices such as mining guano for fertilizer have disturbed the context of many sites (Keegan 1982; Winter 1997). Also,

the irregular shape and conditions in caves often make normal stratigraphic excavations quite difficult (Strauss 1990: 258).

However, archaeologists have positively identified a number of cave sites in Hispaniola and Puerto Rico which seem to have archaic habitation layers. Thick layers of ash mixed with faunal remains and human remains were found in the lowermost stratigraphy in excavations at the Cueva de Berna in the Dominican Republic and the Cueva de Maria de la Cruz in Puerto Rico (Veloz Maggiolo *et al.* 1977; Rouse *et al.* 1990). A lack of ceramic remains except in the uppermost stratigraphic layers and a high density of faunal remains and lithics, as well as a lack of cranial deformation at Cueva de Maria de la Cruz, caused Rouse *et al.* (1990) and Veloz Magiollo *et al.* (1977) to interpret these caves as having archaic occupations. Furthermore, dense concentrations of faunal remains lead these authors to believe that caves were sometimes used as shelters during archaic times.

It is commonly understood that ceramic age peoples were not troglodytes. Las Casas, Oviedo and Peter Martyr state that the *Taíno* did not live in caves (Loven 1935: 3). However, it is still quite possible that caves were used as temporary shelters. According to Las Casas, caves were occasionally used as shelters during hurricanes (Loven 1935: 121). Faunal remains found mixed with pottery in the highest stragraphic layers have caused Rouse, among others, to speculate that caves may have been used as temporary shelters as well (Rouse 1990: 23). It would make sense that caves, rock shelters and overhangs were occasionally used as shelters for travelers or resource gatherers relatively far away from home. Caves and rock shelters provide logical points of shelter from the elements. Shallow rock shelters and overhangs may also not have had the same strong symbolic association with the ancestors and the underworld as larger caverns.

4.6) Burial practice and burials in caves

There is good evidence that the burial of individuals in caves was part of a range of burial practices in the Caribbean, which varied greatly over time and place. Burying individuals within a settlement is one of the forms of burial most well documented in the archaeological record. The largest cemeteries that have been found to date often occur in settlements. The remains of buried individuals were found within the settlement portions of sites in Puerto Rico, such as Tibes, Maisabel, and Punta Candelero. The known Puerto Rican sites contain many styles of burial which vary greatly according to age and location. In a closer analysis of these trends, Curet and Oliver (1998) see a marked shift in burial patterns at settlements in Puerto Rico from the early Ostiones (600-900 A.D) to the late Ostiones (900-1200 A.D.). A similar shift is seen by Hofman *et al.* (2004) when looking at sites in the Lesser Antilles. There they see communal burials in plazas give way to individuals or small groups of people being buried inside of houses or in

middens (Curet *et al.* 1998: 226). It seems that the practice may have differed in Hispaniola and communal burials were still practiced during the Chicoid period (Curet 2002: 269). .

The ethnohistoric sources go into some detail as to specific burial customs on Hispaniola. It seems that, at least during the contact period, there may have been a wide discrepancy between the burial practices of commoners and the elite among the *Taíno*. Elite *Taíno* seem to have had an elaborate series of mortuary practices based around their remains that commoners never received. Las Casas briefly goes in to the treatment of commoners, saying he thought that they were buried in the forests, due to fear of *opias*; however, he readily admits he is not quite sure himself if this is the case (Las Casas 1992: [1] 376). Both Oviedo and Las Casas provide some details as to the burials of Caciques. Both chroniclers may have drawn their information on funerary practices from the burial of one specific cacique, Behechio, who was the cacique of *Xaragua* until his death (sometime between 1496 and 1504). Both Las Casas and Oviedo mention the practice of interring a cacique's wife or wives with him – a detail that no doubt would have shocked and titillated Spaniards reading their accounts – a practice Oviedo describes as a "pecado abominable contra la natura" (an abominable sin against nature) (Oviedo 1851: [1] 134; Las Casas 1992: [1] 497). While Las Casas fails to mention Behechio specifically and tends to generalize his description of burial events, it would not be surprising if he received his information from the same source as Oviedo. The details following the description of the chief being buried vary between the two authors. Oviedo gives a more in-depth description of the chief's body. He notes that caciques were often wrapped in cotton strips for burials and interred on a duho saying:

> después que era muerto , le faxaban todo con unas vendas de algodón texidas, como cínchas de caballos, é muy luengas, y desde el pié hasta la cabeca lo envolvían en ellas muy apretado, é hagian un hoyo é alh lo metían, como en un silo , é poníanle sus joyas é las cosas que él mas presgiaba. Y para esto en aquel hoyo , donde avía de ser sepultado, hagian una bóveda de palos, de forma que la tierra no le tocasse , é asentábanlo en un duho (que es un banquillo) bien labrado , y después lo cubrían de tierra por sobre aquel casamento de madera é rama (Oviedo 1851: [1]134)
>
> (translation)
> after he was dead, he is completely wrapped with some bandages of cut cotton, like the Girth (tack) of a horse, they are very long, and from head to toe they wrap him in them very much tightened, and they make a hole and put him in there, like in a cavern (or subterranean granary for storing grain), and they put his jewels and things he value most in the hole. And for this in this hole, where they prepared a tomb, they make a vault of poles, in a vault so the earth will not touch him, and they seat him on the duho, well carved, and later they cover [the tomb] with earth over that little house of wood and branches

Due to their perishable nature, no cotton bandages have survived in any discovered or excavated burials. However, certain petroglyphs, which were at first interpreted by Bullen (1973), among others, to be swaddled infants, are now interpreted as representing dead bundled ancestors

(Roe 1991: 334). While Las Casas fails to mention these details about the preparation of the body, he does mention that burials took place in "cuevas y sepulturas" (caves and tombs/graves) (Las Casas: 1992: [1] 497). Even with this relatively narrow view into the ethnohistoric sources, it seems that burial practices may have been highly variable through time and space and that practices varied greatly between the elite and commoners. The remains of dead ancestors were not always left separate from the living in their tombs, unlike in western culture.

The practice of keeping and venerating the bones of ancestors seems to have been a major part of the ritual practice in both the Greater and Lesser Antilles at the time of contact. In his letter, Dr Chanca, who went with Columbus on his second voyage, gives accounts of finding human bones and skulls in baskets in huts in both Guadeloupe and Hispaniola (Chanca 2003: 289, 302). Hernando Columbus mentions this practice in Cuba as well (Columbus 2002: 101). In his review of mortuary practices, Morban Laucer argues that it was common to prepare an important person's body after death by drying it over a fire to separate meat from important bones that might be extracted and venerated (Morban Laucer 1979: 22). He bases this argument on a passage from Hernando Columbus, describing the practice of drying dead caciques over a fire as one of several burial practices (Columbus 2002: 186). These remains may have been kept in baskets, as mentioned above, or possibly placed in *cemis* themselves. Las Casas mentions this practice, saying:

> Tienen ciertas estatuas de madera. Segun escribio en una carta el almirante don cristobal colon a los reyes donde metian huesos de sus padres y debien ser de los reyes y senores y esta llambaman de la nombre de la personsa cuyos huesos alli enterraban (Las Casas 1992 [3] 870).
>
> (translation)
> They have certain statues of wood. The admiral Cristopher Columbus wrote about this in a letter that the kings put the bones of their father and they ought to be the bones of kings and noble (sirs) and to this statue they give the name of the person whose bones are entered there.

Not only do the ethnohistoric sources seem to support this, but there is some compelling archaeological evidence of this practice as well. When a famous cotton figure found in a cave near Baraona in the Dominican Republic was X-rayed, fragments of a human skull were found in its head (Kerchache 1994). In this case human remains may have literally been incorporated into a *cemi*. Morban Luacer claims that the burning event seen in some caves where human remains are buried in or below an ash layer, especially when the bones themselves are charred, may reflect these sorts of customs.

Burning bodies may also have been a custom used to communicate with the recently dead, according to Morban Luacer (1979: 36). A passage in Pané that he cites supports this theory. Pané

talks of a ritual way of communicating with people who recently died, in this specific case someone who was killed despite treatment from a behique:

> They take the dead man and make a great fire like that used for making charcoal, and when the wood has turned to live coals, they throw the body into that fierce blaze; then they cover it with earth, as the charcoal-burner does the charcoal, and leave it there as long as they think advisable. (Pané 1999: Chapter XVII)

It also seems that some bones may have first been separated from a skeleton and then later reinterred as part of partial ossuaries, either being buried in a cave or left on a ledge (Morban Laucer 1979: 36). In any case, based on the ethnohistorical evidence, there seems to have been a variety of customs that varied by social status, region, and time with the dead. What seems strange is that bones associated with archaic occupation are the human remains most often found charred (Morban Luacer 1979: 38). This may be explained as continuity from archaic to the contact period, as an unrelated practice, or as burning due to later events.

There have been a variety of burials of complete or partial individuals found in caves in Hispaniola, Puerto Rico, Jamaica and the Bahamas. As stated above in the discussion about archaic burials, modern disturbances such as guano mining and looting and complexities of excavation in caves have greatly reduced the amount of data available to archaeologists. A number of caves seem to contain some clearly ceramic remains in these regions.

Early amateur archaeologists such as William Gabb, who did a geological survey of the Dominican Republic in 1873, and Alphonse Pinnard both claimed to find skeletons during their investigations (Perdomo 1999:25,29). Both finds apparently came from caves with ceramic remains in them. However, it is hard to evaluate the age of these early finds since the authors did not include good stratigraphic information in their reports (Perdomo 1999: 25, 29). In 1929, while surveying caves in Samaná, Krieger also found the fragmentary remains of several individuals on the islands of Upper and Lower Orange Key (Krieger 1929: 9). These remains, according to the author, were associated with sherds, beads and other ceramic age remains. Veloz Maggiolo *et al.* (1983) found fragments of a femur and some unidentifiable bones among Chicoid remains at the Cueva de Collantes, making it another possible later burial site. Finally, Morban Luacer (1979) briefly mentions several cave interments from La Cueva de las Marvillosas and La Cueva de La Madama (85). While there were relatively few reliable reports of cave burials, rumors of skulls and other human remains are common in areas with dense archaeological remains. In all these cases, it seems more common to find fragmentary human remains than complete skeletons. This may be due to poor preservation or disturbance, or it may reflect secondary burials or interments of bones, like the practice described by Chanca.

There are many reports of cave burials in Puerto Rico as well. The site of Maria de La Cruz (Rouse 1990) has been mentioned earlier in this paper as having archaic remains. They also found fragments of bone mixed with early Ostiones ceramics in shallow startigraphic layers in the cave (Rouse *et al.* 1990: 13). This means that the cave was possibly used for burial in both archaic and later times (Rouse *et al.* 1990: 13). Similarly, the partial remains of several buried individuals were found by Oliver *et al.* (2003) at San Juan Miguel cave in a layer of carbon, which were carbon dated to between 1170 and 1300 (233).

Finally, there is evidence of cave burials both in Jamaica and the Bahamas. While she does not give specific details about the burials in this essay, Atkinson (2001) states that 18% of the caves she includes in her survey of cave sites were burial sites and that these caves have remains dating both to the Ostionoid and Meillacan periods (307). Winter *et al.* (1987; 1997) and Keegan (1982) give much more specific information for the Bahamas. Keegan reviewed collections of skeletal remains from Freeport on the Grand Bahamas; his research was consolidated from collections made by Rainey on other islands (Keegan 1982). This review covers 32 skeletons from the Grand Bahamas and six other islands from the central Bahamas (Keegan 1982: 57). Unfortunately, Keegan's descriptions tend to focus more on the state of the skeletal materials than the context these remains come from. Several of the caves seem to have had small quantities of pottery associated with the remains, while one or two caves such as the Gordon Hill caves have significant amounts of artifacts associated (Keegan 1982: 59). However, Keegan generally fails to give specific details of the age or quantity of artifacts at most of these sites. Winter *et al.* (1997) contributes significantly more contextual information. He states that remains are found both in wet and dry caves in the Bahamas, though more artifacts have been associated with dry than wet caves (Winter *et al.* 1997: 197). They found ceramics, faunal remains and a wooden bowl dated to between 1410 and 1515 associated with the remains of one individual at the Majors Cave site on Hog Cay (Winter 1997: 199). Food remains, including parrot, trigger fish and an iguana were also found in the cave (Winter 1997: 200). Finally, several sherds of White Marl ware were found at the site as well. The authors interpret this site as a possible elite burial due to the quality of both food remains and artifacts associated with the burial (Winter 1997: 201).

In any case, information is spottier than one would like about cave burials; it seems that caves were used as burial sites from the Archaic period onward. Whether continued cave burial practices are part of the same tradition or similar parallel traditions is debatable. It is also debatable how greatly the reasons and meanings behind cave burials varied over space, even over the different regions of Hispaniola. This study lacks the amount of information and depth to adequately tackle this question; however, the historical sources, especially Las Casas, reflect some of the customs in the Eastern Dominican Republic and Higuey.

4.7) Caves as sites for ritual and homes of *cemis*

Cave use was not strictly confined to burials. Both archaeological and ethnohistorical evidence show that some caves were used as areas where *cemis* may have been kept, as well as possibly areas where rituals involving feasting or food offerings took place. These caves are by no means a distinct entity from burial caves. In fact, the remains of ancestors may have played a part in rituals preformed in caves. While this thesis separates different types of cave use into sections, it does not mean that certain types of caves were used only for one function or another or that certain features such as rock art occur separately from other features. In many cases the opposite may be true.

There is good evidence that different stone and wood artifacts have been associated with caves in both the archaeological and ethnohistoric record. Pané describes one particular cave that contained a couple of stone figures:

> This cave is called Yovovava, and they feel great reverence for it. It is all painted in their fashion, without any figure, but with many leaves and the like. In this cave there were two stone cemies, about half a man's arm in size, their hands tied; they seemed to be sweating. They held these cemies in much regard; they say that when they needed rain they would visit these cemies, and the rain would immediately come. One of these cemies was called Boinayol, and the other Maroya. (Pané 1999: Chapter XI)

Peter Martyr also has a similar passage, which he probably added in his work after reading Pané (D'Anghiera 1970: [1] 171). This cave that was also the origin point of the sun and moon, would have been an important, ritually charged area, which would have increased the significance of keeping figures there. Furthermore, natural condensation of moisture on stone in the humid environment of cave would only have added to the effect that these statues had.

While rumors abound about the findings of statues, duhos and other ritual paraphernalia in caves, there are not many reports of these finds found in their original context. One find mentioned above is the cotton *cemi* found in a cave near Baraona (Kerchache 1994). Another report is a reprint by Fewkes (1919) of an early report an American mining executive, Albert Warren Kelsey, had published in 1878. This paper shows pictures of and describes a wooden figure, which may have possibly also served as a *duho*, that was found in a cave in La Vega Province (Fewkes 1919: 145). The figure was found by a miner and no other conext was recorded for it. These items may have been purposely hidden to preserve them from the Spanish, a practice mentioned by Hernando Columbus (Columbus 2002: 186). However, some of these figures may have been housed in these caves even before contact with the Spanish. It is hard to tell one way or another, but such stories are common, and most of them are impossible to ultimately verify.

Another argument that has been made is that the ash layers containing faunal remains and sometimes burials were the remains of feasting associated with ritual. This argument is strengthened by the findings of rarer or more prestigious food items, such as iguanas in some caves. As mentioned before, Winter *et al.* (1997) describe finding iguana and fish bones in one cave in the Bahamas associated with a burial. Oliver *et al.* (2003) make one of the more compelling arguments for feasting in caves in their report detailing findings at Jose Miguel cave and the site of Finca Doña Rosa. This site has already been mentioned above as containing several burials clearly associated with the Late Ostiones period. The cave also contains 33 petroglyphs. Oliver *et al.* (2003) did a comparison between faunal remains found in the Jose Miguel cave and the nearby site of Finca Doña Rosa, which they interpret as a residential site (234). Over 2000 remains of crab shells were found in the cave, while only three remains were found at the site (Oliver *et al.* 2003: 234). Larger than average hutia skeletons were also found in the cave than at the site (Oliver *et al.* 2003: 234). Based on these remains Oliver *et al.* (2003) make the argument that the area was a site used for ritual feasting. Faunal remains are fairly common in cave sites, with or without burials, and are often found in ash. Some of these remains have been associated with archaic activity. However, it may well be possible that feasting or sacrifices of food were sometimes made in caves as well.

4.8) Rock art on Hispaniola and in the Greater Antilles

This brings us to our last section of the chapter about rock art. Painting or carving rock is a fairly common phenomenon across the globe. There are famous examples of rock art on all the major continents, from Lascaux in France to Australia. This tradition has often been associated with magic and shamanism on a cross-cultural basis (Lewis-Williams 2002). However, it is increasingly becoming clear that we must interpret rock art based on the region and its context rather than applying a one-size-fits-all explanatory framework (Bradley 2000). Rock art is one of the first archaeological subjects seriously studied, with early pioneers such as Schomburgk (1854), Fewkes (1903) and Hostos (1923) writing articles about sites and making inventories in the 19th and 20th centuries. Subsequent studies have found rock art throughout the Caribbean, from Cuba (Nuñez Jimenez 1985; Linville 2005) and the Bahamas (Winter: 1991) in the northwest to Aruba (Dubelaar 1995) and Trinidad and Tobago in the southeast (Dubelaar 1995: 448). Its origins have traditionally been linked with rock art in South America (Periera 2001; Dubelaar 1983). However, Dubelaar (1983), among others, has pointed out that major stylistic and thematic differences exist between rock art from the two regions (421). In fact, Roe (2005) postulates that the rock art tradition, at least in the Greater Antilles, may have begun in the early Ostionoid with the emergence of *cazicazgos* (289). However, it will hard to objectively prove or disprove this until there are reliable methods to date rock art.

There are two major types of rock art that occur in the Caribbean: petroglyphs and pictographs. Petroglyphs are images carved in the rock with chisels or other percussive instruments (Veloz Maggiolo 1971: 1). There are a variety of techniques used for carving these petroglyphs, from making incisions to pecking points (Veloz Maggiolo 1971:1). Pictographs are created by using vegetable or mineral dyes to paint the rock surface (Veloz Maggiolo 1971: 1). The vast majority of pictographs in the Greater Antilles have been painted using black, carbon-based dye, but there are some examples of pictographs in white, red, and grey (Lopez Bolando 2007: 148, Atiles 2003: 35).

The two categories of rock art are distinct from each other both in the areas they are found and in their thematic focus. Pictographs are almost exclusively found in the dark parts of caves (Lopez Bolando 2007: 145). Petroglyphs are generally found in areas with some exposure to natural light (Lopez Belando 2007: 144). Petroglyphs have been found in caves that have natural lighting, in rock shelters, on boulders, on border stones for ball courts, and one has even been found on a beach (Fewkes 1903; Roe 2005; 296). As mentioned above, rivers as well as caves seem to have been a prime place for petroglyphs (Weeks 1996).

There is generally some overlap on thematic focus between petroglyphs and pictographs. All Caribbean rock art contains a mix of anthropomorphic, zoomorphic, and abstract designs. That said, a majority of petroglyphs seem to be anthropomorphic. Dubelaar found that 80% of the petroglyphs he recorded and put in his database from the Lesser Antilles were anthropomorphic, many consisting of simple depictions of faces (Dubelaar 1995). Such faces make a large, though not systematically quantified portion of petroglyphs in the Greater Antilles. The sophistication of the designs varies from quite crude and simple depictions of faces to full figures. Various archaeologists have claimed that some of the more complex full figure petroglyphs, which are mainly found carved on border stones in ball courts, may be identifiable with *cemis* identified in Pané's work (Oliver 2005; Douglas 1985). Others also believe that it may be possible to date petroglyphs based simply on their technical sophistication (Hayward *et al*. 2001). However, I personally question both of these interpretations. Technical sophistication does not necessarily correlate with age. Furthermore, there is no way to know for sure to what degree belief systems recorded by Pané correlate with belief systems in Puerto Rico and other islands.

At least on Hispaniola, however, the simple facial motif may well have a basis in Pané's work. As Lopez Belando (2007) points out, such faces are often located in the entrances of caves. Such figures, such as the petroglyph found carved on a stalagmite at "El Baño de Telanquera", could be interpreted as guardian faces or figures (Perdomo *et al.* 1983: 46). Pané tells of a man called Marocael, who was the guard against the sun at the entrance to the primordial cave where the ancestors first lived (Pané 2002: Chapter II). This man was negligent in his duties one day and

as punishment for this negligence "they closed the door on him, and he was changed to stone near that door" (Pané 2002: Chapter II).

While there is a portion of pictographs that are anthropomorphic, the majority of these images depict zoomorphic or abstract designs. Designs at the Cueva de la Cidra, for example, display prominent animals in the *Taíno* mythology, such as the woodpecker, which created women in Pané's mythology (Atiles 2003: 37). Abstract designs, which are seen both in petroglyphs and pictographs, have been closely associated with drug use both in Amazonia and the Caribbean (Oliver 2005: 248; Periera 2001: 222). These authors argue that common designs such as spirals are often seen during the use of hallucinogens and drawn figures often come "alive". Such designs may well be reflections of what was seen during *cohoba* use; thus, the drawing of petroglyphs and pictographs was probably closely associated with the use of *cohoba* (Oliver 2005: 248).

Finally, there seem to be a few regional differences between petroglyphs. An area that shows some of the most pronounced differences is Cuba, where there was a known cultural boundary between the Guanahatabeney culture in the west and the *Taíno* in the east. There is a higher proportion of petroglyphs in the Western part of the island, which was *Taíno*, with some provinces containing nearly exclusively petroglyphs, while many of the eastern provinces of Cuba contain mostly pictograph sites (Linville 2005: 90). There are also marked differences between Puerto Rico and Hispaniola. A major site for petroglyphs in Puerto Rico is on the border stones of ball courts (Oliver 2005). However, there are very few similar known ball courts or stone lined plazas in Hispaniola (McGinnis 2001: 102; Veloz Maggiolo 1993b: 116). The petroglyphs in the windward islands (northern lesser Antilles) such as the Virgin islands and Anguilla, seem to have some similarities to petroglyphs from Puerto Rico and the Greater Antilles, with ball court petroglyphs at sites such as Salt River on St Croix and complex anthropomorphic figures found in Fountain Cave (Faber Morse 1999: 38; Watters 1991). However, designs tend to generally be simpler in the southern Lesser Antilles, with few of the complex figures one sees, especially on ball court stones at sites like Caguana and Utuado in Puerto Rico (Dubelaar 1995: 38). This being said, there seem to be general broad themes that are shared throughout the area, including the drawing of simple faces and the presence of "swaddled" figures (Dubelaar 1995: 39). The challenge for future scholars of petroglyphs will be to further define regional differences and overarching similarities.

In any case, petroglyphs seem to have been closely linked to rituals such as the *cohoba* ritual and to demarcating sacred geographies in the Caribbean area and, more specifically, Hispaniola. Petroglyphs are some of the most obvious modifications to the landscape. As stated before, petroglyphs, especially those in caves, were often associated with other practices, such as the ritual use of caves for housing *cemis* and their use as burial grounds for the elite. Hopefully this chapter has helped to provide some background on important uses and meanings of the landscape

in Hispaniola and the wider Caribbean area that will provide important insights when we explore the meaning of the survey's findings at Hispaniola.

4.9) Conclusion

Using a mix of ethnohistorical and archaeological sources, it is possible to begin reconstructing some of the uses and meanings of *Taíno* landscapes. On the one hand, like all humans, these people were somewhat constrained in how they went about collecting resources. In rocky karstic areas, common in eastern Hispaniola, northern Puerto Rico and many other places in the Caribbean, local cultures had to adopt subsistence practices based around relatively scarce surface water sources and thin layers of topsoil. Subsistence strategies were adapted or created to successfully live in this environment and take advantage of its riches. Sites like El Cabo would have had access to a bounty of marine resources and an advantageous position for trade with Puerto Rico.

At the same time, it's obvious that these groups continually engaged in a dialogue with their surroundings, fitting new surroundings into existing belief systems. Unlike our society, where we are somewhat divorced from the natural world, numinous aspects of the supernatural surrounded the *Taíno* as they went about their everyday business. Objects such as rocks and trees could at times be more than just inanimate objects, being possessed by a *cemi*, and the forests came alive with the spirits of the dead feasting on gaunabanas at night. Certain areas were recognized as liminal places in the landscape, such as caves sinkholes, river banks, and rock shelters. Unfortunately we do not have evidence for all these areas. Preserved traces, such as burials, rock art and rare artifacts associated with impressive natural features may, however, give us an idea of where some of these liminal spaces were. This review of uses and meanings of similar landscapes will hopefully contextualize new findings at El Cabo, presented in Chapter 6 and discussed in Chapter 7, in the wider body of archaeological work.

Chapter 5: Survey Methodologies and Data Analysis Techniques used at El Cabo

5.1) Introduction

This section will present field methodology and data collection techniques. It was important to define a meaningful study area, choose a survey technique, design a feature classification scheme, choose appropriate measuring instruments, and decide what factors were most profitable to measure. The section below will explain the decisions made and examine the strengths and weaknesses of the chosen techniques. It is the goal of this thesis to map and examine both identifiable archaeological landscapes and landscapes that could potentially have been used. The methods and techniques used below have been designed to best accomplish this goal in the time frame available for these investigations.

5.2) The survey area

An early priority of the survey was to define a survey area. The site of El Cabo was a convenient center point for the survey. After all, a primary goal of the survey was to understand nearby archaeological sites in relation to the settlement of El Cabo. The modern village where our guides lived is located virtually on top of the archaeological site, making the site a convenient daily starting point.

Before arriving in the Dominican Republic, it seemed logical to survey areas within a 5x5 km box centered on El Cabo. It was assumed that past inhabitants were walking less than 5 kilometers one way in their daily activities. However, the situation on the ground complicated this thinking. The topography of the region makes spatial distances less meaningful. El Cabo is on a marine terrace, flanked by cliffs on three sides and the ocean on the fourth. One can follow the coastline to the north and south into neighboring pockets, and there are areas that are less steep where one can walk to the top of the cliffs. However, much of the cliffside is extremely difficult to traverse. This topography, in addition to distance, is a major factor influencing the mobility of El Cabo's inhabitants.

Thus, it seemed more logical to use journey times rather than distance as a criteria for defining the survey area. It seemed likely that most areas were primarily navigated on foot. There are two modern sand beaches on the pocket surrounding El Cabo, both covering a limited area, though there may have been more in the past. It is possible past people were traveling by sea along the coast. However, the rough water would make landings today and in the past dangerous.

According to a local informant, the seas to the south of El Cabo can be especially dangerous and get extremely choppy.

So it was decided that areas within two hours walking distance from El Cabo should be mapped. It is unknown what past vegetation was like; movement may have been more or less efficient in past times. However, this limit should approximate a meaningful survey area, based on the assumption that modern archaeologists do not move significantly faster or slower than past peoples and that sedentary peoples were not using more than four hours on transit for their daily activities.

5.3) Survey strategy

Several survey techniques were employed during the course of the project. The survey primarily relied on local informant knowledge and past oral histories. A transect was done to the north of El Cabo, and two sections of cliffs were mapped to augment informant based knowledge. While these techniques may not have uncovered every single archaeological site, they did generate a wealth of data.

The project alternately employed three local men: Juan "Belto" Dias, Feliz "Manolo" Maldonado Acosta, and Kelin Dias. Other locals such as Elias, Miguel Silvestre, Baraona Cueva Felix and Nicolas were consulted or employed for a short period of time. Rather than asking about archaeological sites, informants were asked to take the survey team to natural features, such as caves and sinkholes, only later broadening the survey to ask about scatters and other possible sites. This line of questioning proved more useful than asking specifically about areas with known archaeological sites. Taking a broader environmental technique, and mapping unused as well as used caves and areas of interests, provided insights into why some areas may have been more attractive than others. It also allowed for the exploration of areas with archaeological remains local guides may never have known of.

The survey mainly used informants that already had a close working relationship with the Houses for the Living and the Dead project. These informants knew specific areas around EL Cabo due to subsistence activities such as goat herding, fishing, and preparing *conucos*. They were familiar with the local archaeology, due to working with Houses for the Living and the Dead and possibly with Dominican looters before that. The looter's impact was evident at many of the most spectacular sites, where dirt piles and trenches as well as rum bottles and, in one case, a discarded screen had been left by them. The informants also told many stories about great pieces found by the looters, ranging from large threepointers to whole vessels and duhos.

Juan Dias, who goes by the name Belto, ended up being our primary informant. He is 37 years old and has lived in El Cabo for most of his life. He is married with four children and serves

as a guardian for one granddaughter. Margot, Belto's wife,supports the family on the earnings of a small *colmado* (general store) and slash and burn farming, whilst Belto herds goats. He was born in a village on top of the cliffs an hour and a half away from El Cabo but has lived in El Cabo for most of his childhood and adult life. His goat herding has given him an especially good knowledge of the landscape over a large area of the valley around El Cabo and some areas on top of the cliff. His involvement with Houses for the Living and the Dead, as well as possible employment as a guide by looters, has given him a good eye for archaeological remains; he is quite good at identifying local ceramics, lithics and shell artifacts. He was a guide for the survey team for seventeen days.

The team also occasionally worked with Belto's son Kelin Dias. Kelin is seventeen years old and has assisted his father in taking care of the family's goats and *conucos*. He also knows the area around El Cabo fairly well, though he often consulted with his father before taking us to sites in the region. Kelin worked on the project for eight days.

Feliz "Manolo" Maldonado Acosta is a 29 year old man who spent much of his life in El Cabo. When the project arrived, he was working as a construction worker in the city of Higuey, but he returned to El Cabo to work with us when he heard that the project was working at El Cabo again. Manolo was born on top of the cliffs near El Cabo but moved to El Cabo at a young age. Manolo is quite familiar with the southern part of the valley, which Belto and Kelin do not often visit, as he often has gone fishing in this part of the valley. He also proved quite good at searching for information from other villagers and making valuable contacts for us. He worked as a guide for ten days.

Our other guides, such as Elais, Miguel Silvestre, Baraona Cueva Felix and Nicolas, all worked with us for no more than two or three days, often in concert with one of our primary guides. Elias is an employee of one of the main landowners of the region and takes care of Bobby's goats and cattle on a piece of land to the north of El Cabo itself. He was very helpful in providing information and leading the team to several areas of interest near his home, many of which the other guides were not aware of. Miguel Silvestre is a cattle rancher who lives on top of the cliffs. He led the team to several caves on top of the cliffs and may be a useful informant for future investigations. Baraona Ceuva Felix is an old man who lives about 15 minutes driving distance north of the village. He too showed the team several caves near his home. Finally, Nicolas assisted the team in diving for artifacts in a couple of flooded caves; he has worked as a diver for much of his life.

The survey was informant based because it was known that several locals had a good knowledge of the landscape and archaeological remains around the site of El Cabo. Taking advantage of this knowledge was all the more important as there were only six weeks to conduct

the survey. Given this limited time frame, a systematic survey that consisted of transecting for the study area seemed unproductive for the type of data being collected. There is thick vegetation in several areas around El Cabo that is difficult to traverse and makes discovering archaeological sites via a systematic survey difficult. Weighing the costs and benefits of relying on local knowledge versus systematic transecting, it seemed much more efficient to use the informant based technique.

Informant based surveying has several weaknesses. There can be problems of communication between an investigator and an informant. An informant will take an investigator where they think the investigator wants to go based on their request. Thus, if a request is poorly phrased or incorrectly interpreted, areas of archaeological importance may be missed. There could be a bias in this study reflecting the author's own priorities. It was expected that sinkholes, flooded caverns and caves would contain some of the higher concentrations of archaeological remains. Thus, much of the energy and time of both the investigator and informants was used in finding and mapping caves and sinkholes. These are therefore better representated than scatters and smaller caves. Other potential problems with informant surveys include major informant biases and the limits of an informant's knowledge, which are not an issue with systematic surveying. However, given the extent of our informant's knowledge and our timeframe, informant based surveying was the most practical course to follow.

Representative samples were collected in the small area that was transected and by following sections of the cliffs. This data gives an idea of the effectiveness of objective surveying. The transect is a source of representative data for a relatively small part of the pocket. This 30x 400 meter area indicates artifact density to the north of El Cabo, an area thought to have relatively low densities of archaeological materials. The survey team also followed two sections of cliff to estimate the density of caves and other features along the cliff.. Both of these techniques strengthened and supported the primary survey technique by providing other avenues of information, and in some cases testing hypotheses from the opportunistic survey.

Ultimately it needs to be stressed that this study should be seen as a promising beginning to continued investigations of the environment around the site of El Cabo, rather than a definitive and representative survey of that space. With the mapping of over 108 features, great inroads have been made into mapping the area and many interesting trends can begin to be described. However, an even better picture of the area will be gotten in future surveys.

5.4) Instrumentation

A Garmin Legend HCx handheld GPS receiver was used to record geospatial data. This receiver was chosen because it is relatively rugged and has a more powerful antennae, which is

supposedly able to receive weaker signals in high foliage areas or in canyons. The GPS proved both rugged and able to record data in areas where it was visible to only a few satellites. One major weakness of the receiver, however, is that it does not have an altometer.

The receiver generally recorded the position of sites to + or – 3m accuracy. When recording caves, the position of the feature was recorded within the cave entrance, or as close to the entrance as possible, where satellite reception was possible. When recording scatters points were taken in the area with the highest density of archaeological remains.

Photographs were also taken of both features and archaeological remains using two digital cameras. One camera was 7.2 Megapixels and the other was 10 megapixels. Most photos contain either a person as a scale for larger features or a photo board with scale for artifacts and smaller features. It was especially difficult to take good pictures inside of caves. The size and light conditions make taking photographs difficult even with expensive cameras. Thus, unfortunately, there are less high quality photos from inside of the caves or in areas with poor lighting conditions.

5.5) Site classification system

Devising a classification system was vital for interpreting and comparing survey data from different areas of the valley. A classification system with eleven categories based on archaeological and geological terms was used to create this comparative framework. These terms are defined below, using definitions of geological features from the glossary of terms in a 2002 EPA (Environmental Protection Agency) report entitled: *A Lexicon of Cave and Karst Terminology with Special Reference to Environmental Karst Hydrology* and other articles (Beeker *et al.* 2002; Frank *et al.* 1998). Each category will be briefly defined below.

Cave: A cave is primarily defined by its accessibility. It is defined as "A natural hole in the ground, large enough for human entry" at its most basic (EPA 2002). This eliminates artificially built cavities and small fissures and pockets. The term can be used to refer to simple, horizontal cavities that do not contain multiple chambers or passageways and do not have massive heights or extents, but are large enough so that sunlight does not fully illuminate the interior.

Cave Complex: A cave complex is "An underground network of passages, chambers, or other cavities" (EPA 2002). Larger, more complex systems of caves with multiple passageways and chambers fall into this category.

Cavern: A cavern refers to "a large, underground opening in soluble rock" (EPA 2002). This term refers to large, open caves. Like caves, a cavern does not include multiple chambers or passageways. However, it has a larger size.

Rock Shelter: a rock shelter is "a shallow cave under an overhanging ledge" (EPA 2002). The shallowness of the Sinkhole as well as the penetration of light into the sinkhole were important factors for differentiating between rock shelters and caves. Rock shelters were one of the most common features we encountered, and we were unable to map all rock shelters we encountered, especially along the cliff, due to the limited time frame of the survey.

Flooded Cave: The term flooded cave comes from Beeker *et al.* (2002). These caves consist of diagonal shafts, which broadened out and opened up into pools. These caves are by their nature easily accessible to people. The entrances of these shafts were often horizontal windows, though the entrances were sometimes vertical due to rock fall processes.

Sea Cave: A sea cave as defined by the EPA Lexicon is: "A cave cut in any rock type where a geological weakness is exploited by the highly selective erosion power of wave action" (EPA 2002). This definition refers to any caves on the coast, with mouths opening directly onto the sea and filled with highly saline water.

Sinkhole: A sinkhole is "a deep hole, generally circular in outline, having vertical or nearly vertical walls" (EPA 2002). Generally, sinkholes have dry, vertical shafts of some depth that a human could potentially enter. Some features defined as sinkholes may have been access points to caves of varying extents; due to a lack of climbing material it was difficult to enter and explore some of the deeper sinkholes.

Flooded sinkhole: A Flooded sinkhole, according to the EPA Lexicon is a "basin- or funnel-shaped hollow in limestone, ranging in diameter from a few meters up to a kilometer and in depth from a few to several hundred meters" (EPA 2002). The distinguishing feature between sinkholes and flooded sinkholes is that flooded sinkholes contain water. It was better to use this term than more regional terms such as Manantial.

Settlement: This term is used to define areas with archaeological remains that, due either to extensive extent or the presence of postholes, were probably sites of some size with permanent habitation. There are only two settlements present on the map: the site of El Cabo and site 68 ("Bartolo").

Scatter: A scatter is any area containing a surface distribution of archaeological remains.

Beach: The survey team also mapped the two modern beaches at El Cabo. A beach refers to a sand-covered coastline. The beaches at El Cabo have been in the same position as long as our informants can remember. However, it is impossible to say whether they were in that position in

the more distant past. Events such as large storms and changing oceanic conditions are known to create and erode beaches all the time. Despite this uncertainty, it is still important to note that there are beaches at El Cabo – a fact that until this past season was unknown.

5.6) Environmental descriptors

During the course of the survey, it was important to measure and describe a variety of other features in the areas visited. These measurements include areal extents, entrance orientations and dimensions. Entrance dimensions were measured from the highest vertical point in the entrance. Sometimes, as was the case with several large caverns, the sides of the entrance were sufficiently large or inaccessible so that it was only possible to make an estimate of its size. The depth of vertical shafts was also measured.

Estimates were made of the overall area of caves. The complexity of the cave forms and the size of many caves made measurement impractical. More precise measurements and mapping of some of these caves might be a profitable exercise in future research. It was more straightforward to measure scatter areas, but for larger areas these measures were estimated as well.

It was important to document features with standing water. Water depth was measured when possible. A terminology was developed to describe water opacity. Clear water had no visible suspended particles in it. Water with low opacity had a few suspended particles visible but was still of relatively high quality. Cloudy water had a significant number of suspended particles visible. Finally, areas with standing water that were impossible to access received the classification unknown opacity.

Water salinity was also an important factor to measure. At first a qualitative system was used to document salinity. However, with help of the Jose Matteo Water and Food labarotory more precise measurements were possible. These measurements were done using a water testing kit made by Seimens. The kit works by placing a charged membrane in a water sample and measuring the flow of ions through the membrane. This gives measurements in milligrams per liter of salt. Fresh water is defined as at or below 500 milligrams salt per liter (World Health Orginization: 2003). Brackish water ranges from 500- 30000 milligrams per liter (WHO: 2003). Seawater is usually between 30000 and 35000 milligrams per liter (World Health Orginization: 2003). Salinity was not measured in all of the water sources we previously visited, only at features with cultural materials or otherwise deemed significant. Samples were taken at 15 of 49 features which contained standing water.

Finally modern usages were also noted. Informants often provided this information. Modern usage was quite pertinent, especially for water use, as it often provided a secondary indication of the water quality. There were a few sources of water, especially closer to the cliffs and on top of

the cliffs that were used as sources of drinking water by the locals. Many other sources of water were used for cooking and cleaning. Some of the most saline but still usable water sources served as water sources for goats and other livestock. At times it was possible to find flooded sinkholes and flooded caverns simply by following pvc piping to these sources. Other water sources seemed to be used for recreation or bathing, while some seemed completely unused due either to high salinity or remoteness. There was evidence of modern usage in some of the larger caves as well. There were pathways, stairs and, in some cases, guide lines set up in the two largest caves. These may have been used for curiosity seeking and looting. Other rock shelters or small caves were used as shelters for livestock. Finally, there was one large cavern that had been used as a shelter against hurricanes by the locals.

5.7) Archaeological descriptors

It was common to spend ten minutes to several hours exploring features looking for archaeological remains. Ultimately 52 of the 103 features mapped contained some archaeological remains. Diagnostic collections were collected from areas with archaeologcial remains and these samples have been brought to Leiden. Non-moveable features such as rock art were also recorded.

There was some attempt made to fit ceramics into typologies in the field. However, the diagnostic samples have also been classified at Leiden. A basic field count was done, and in some cases with high densities, field densities in a meter square were recorded. It was impossible to do complete field counts at large sites with significant quantities of artifacts. At sites where this was the case, artifact density was recorded. An area with a relatively high density of artifacts near the center of the site was chosen and a meter was measured out around this area. All artifacts on the surface in this area were counted.

A small sample of sherds from each site visited was taken to create a diagnostic sample. Large rim sherds, over 5cm in length, highly decorated or unusual sherds, and adornos were completely collected. In addition, at least one sample of each type of sherd found was also included in the diagnostic sample. This sample was shipped back to Leiden and has been analysed in the pottery labs.

Field counts of stone and shell artifact categories were also made. In some cases, shells, which could be potentially used to date sites, were brought back in the diagnostic sample. Three stone blades were also brought back to be appraised by lithic specialists.

Finally, the quantity of rock art was also noted and all rock art was documented. All rock art sites were extensively photographed. Rock art was also traced on sheets of plastic in areas where it was more difficult to make out. These sheets have been scanned and traced in Adobe Illustrator.

5.8) Ceramic analysis techniques

Ceramic samples were taken at 31 of the sites visited. Samples were not collected from al areas mapped as our initial policy was to leave ceramics at the sites. This policy changed halfway through the field season on advice from Corinne Hofman. At this point, all major sites were revisited and ceramic samples were taken from them. Also, samples were taken from all sites visited after St 50. These samples were re-examined out of the field. Diagnostic sherds and adornos were separated and taken back to the Netherlands. The rest of the ceramic sample can be found with the El Cabo material at the Museo de Hombre in Santo Domingo.

All of the material brought back to Leiden was examined by Corinne Hofman to determine vessel types; a table (Appendix 2) contains the pertinent findings. Such Remains were placed in the local typology created by Hofman *et al.* (2007). Vessels shapes were determined using the Leiden Ceramic Codebook (Hofman 2007). These remains were also photographed and drawn and are presented in the results section of this thesis. There are field photographs available for some of the other remains.

5.9) GIS techniques

All data was compiled and updated during the survey on a GIS. These maps were created and can be accessed using ArcGIS 9.3. This program is the industry standard and the investigator has been trained to use this program. ArcGIS also has a host of powerful plugins and analysis tools which can be used to analyse data after it has been compiled in a geospatial database.

The 90m DEM (Digital Elevation Model) produced by Nasa's SRTM (Shuttle Radar Topography Mission) as well as topographical maps produced by the Dominican military were used as base maps. The 90m DEM is available free of charge on the United States Geological Survey's seamless data server. While the 90m DEM gives some idea of the topography, it has a lower resolution than optimally desired. It was impossible to find other free sources of data at higher resolutions.

5.10) GIS survey comparison

Sites from 2000 (Olsen Bogaert 2000; Coppa 2009 Personal communication) and 2008 need to be compared to understand the full extent of the sites in the El Cabo pocket. Spatial coordinates, descriptions, and sometimes photos were acquired from each of these earlier surveys. GPS coordinates from these previous surveys was placed on a map with the current results of the 2008 survey. A 20 meter buffer, which should more than account for typical GPS error, was created around the earlier points. By comparing descriptions of points from the 2008 survey occurring within these buffer zones with data from earlier sites, it should be possible to determine

any sites that were visited by both surveys. If there is errors or other factors that impede comparing these points it may be possible to use descriptions and photos to determine which sites were visited by each survey.

5.11) GIS site density analysis

Site density analysis provides a meaningful way to look for clusters of sites which may have been related or have been part of larger systematic areas of use and/or meaning in a past landscape. Raster maps can be generated using spatial positions and ceramic counts for sites visited. These rasters are generated using the density function in ArcGIS's Spatial Analyst extension. One defines an arbitrary radius for all the sites; in this case a radius of 100 meters. Area density is calculated according to how many points are present in each circular radius. This calculation can be further be tweaked by giving added weight to the density or quantity of ceramics found at each site.

This technique admittedly works the best systematic surveys. It will be impossible to say if maps generated represent a true picture of site density in the El Cabo Pocket without large scale systematic transecting. However, it should still be possible to highlight areas known to have especially denser remains as potentially important areas, which may or may not have been integrated by related activities or overarching meanings.

5.12) Conclusion

This section has presented the methods and theories used to gather, process and understand data collected during the 2008 survey. This body of data represents a strong initial sample to begin understanding how past people used and understood El Cabo. Using local informants proved to be quite efficient, as over fifty sites with ceramic remains and 108 sites in total were mapped. It may be that some sites are more well represented then others, due to my own biases in this research and to the biases of the informants. There is probably much better data for caves and water sources than there is for scatters. Mapping scatters outside of these contexts only become a priority halfway through the project and took a back seat to continuing to find caves and water sources. However, I believe this data set is fairly strong and extensive. Any inconsistencies or shortcomings in the data can and hopefully will be addressed in future research around El Cabo.

Chapter 6: Field Data and Results

6.1) Introduction

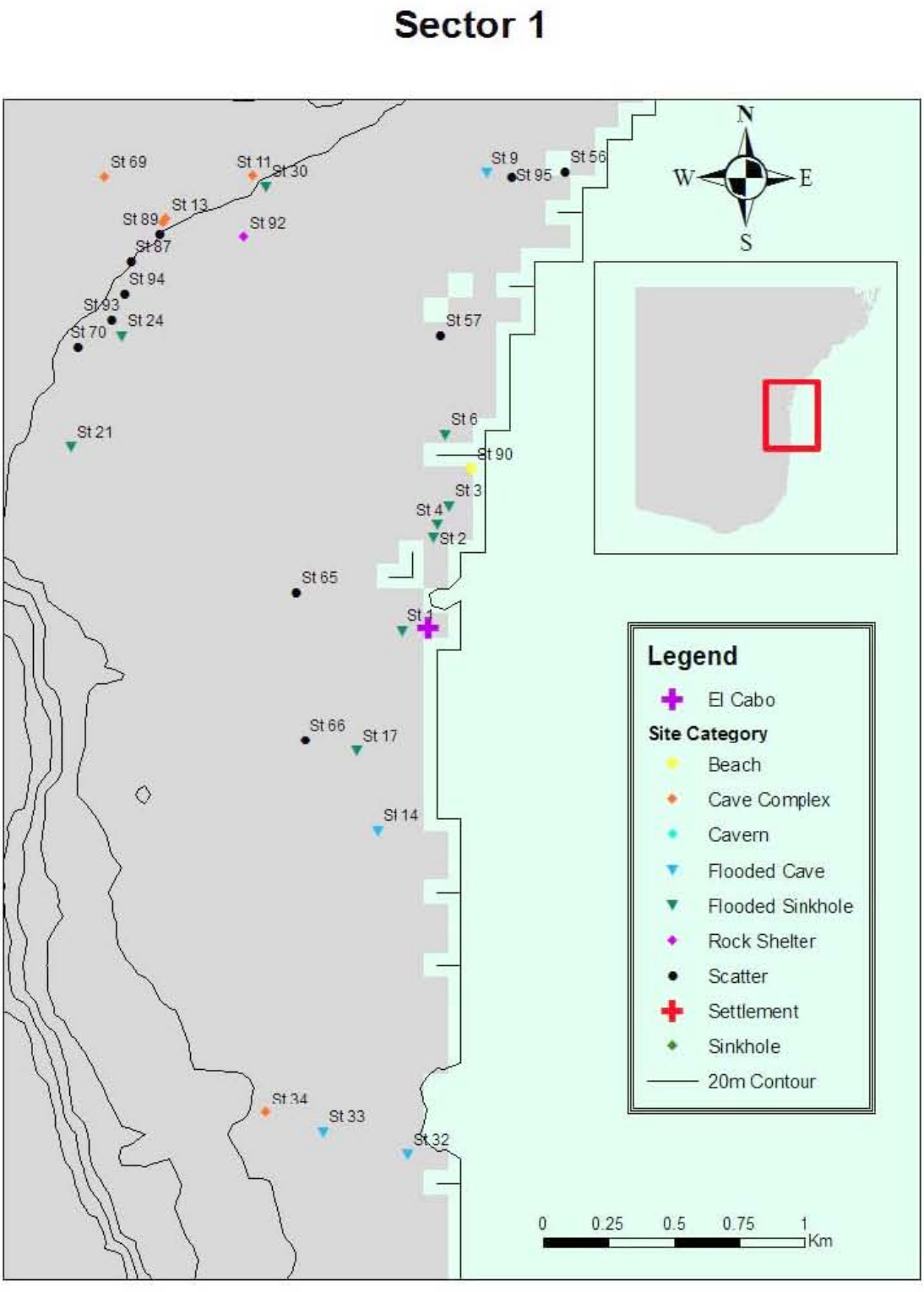
The following section will present field data and results from the 2008 survey around El Cabo. A summary of the results will first be described. Then, more in depth descriptions will be made of each mapped area where cultural remains were found. Data was compiled in Excel tables and in a GIS. These complete field data tables can be found in Apendix 1.

Brief descriptions will be made of all sites that contained cultural remains. Maps and ceramic tables will be included as part of these descriptions. Photographs and drawings of diagnostic sherds will be included where possible. Diagnostic sherds were not collected from all sites, especially early on in the survey, as our initial policy was to photograph cultural remains on site and leave these remains behind. Subsequently major sites were revisited and collections were made. It was deemed unnecessary to revisit smaller scatters and sites with low concentrations of artifacts. Some photographs of locations will also be included where these photographs clearly demonstrate important details or features of a site.

In the sections below, all sites containing archaeological remains or otherwise deemed important by the author will be presented. These sites have been divided into four sections on the map. The map is divided into a central section, a northern, western, and southern section so that there is higher detail on all the maps and it is easier for readers to locate each site. The central section is referred to as Sector 1, the northern section Sector 2, the western section Sector 3 and the southern section Sector 4. Summaries of the findings at each site are presented. Photos of the sites and artifacts can be found in Appendix 3.

6.2) Sector 1

Sector 1 contains the site of El Cabo itself. It is the central zone and contains the highest density of sites mapped. The environment generally consists of flat plateau in between the sea and the cliffs to the west, alhough one site featured in Sector 1 is on top of the cliffs. Some areas are cleared due to farming or other factors, while other areas contain dense shrubs or low-lying trees (figure 6.1).



6.1 Sector 1

St 1:

The first location mapped was a flooded sinkhole 110 meters away from the site of El Cabo and 200 meters from the ocean. The flooded sinkhole itself is relatively small with a

circumference of roughly a meter and a half and a total depth of three meters. The water level in the flooded sinkhole is relatively shallow, with a depth of 53cm at its deepest point. This flooded sinkhole is used heavily by the modern inhabitants of El Cabo for cooking and bathing water. It is possible to climb down onto a low lying rock to access the water or to use buckets to extract the water. Water here was clear but relatively brackish, with a salinity of 8290mg of salt per liter of salt water. It is unsafe for humans to drink water this salty, with salinities of 4000 mg of salt per liter or lower considered safe for humans to drink over a protracted timeframe.

Twenty-one sherds were found by the survey team during our explorations in and around the flooded sinkhole. The majority of the sherds are relatively small and weathered and were on the rocks and shallow sediments around the flooded sinkhole. However, one decorated chicoid sherd was found in the water of the flooded sinkhole itself. Unfortunately this sherd was replaced in the water during the initial investigation of St 1. It could not be found during subsequent visits. Seven of the sherds are Chicoid. However, it is difficult to determine the typology for majority of the sherds. One stone artifact was found as well.

St 2:

Site two is also located relatively close to the site of El Cabo, 350 meters to the north. It is a slightly larger flooded sinkhole than St 1, with a two meter circumference. It has a total water depth of 1.64 meters and a water depth of 30 centimeters (you have depth here 2x – I assume one of these is supposed to be width). The area was also used in the past as a source of bathing and cooking water by modern inhabitants. However, it has currently fallen into disuse and is overgrown, possibly due to the exodus of modern inhabitants from the area. Water here was clear but brackish as well, though the exact salinity of the site was never measured.

4 sherds were found in the area surrounding this water source. These sherds are small and weathered. None of these sherds were decorated or otherwise able to be placed in the local ceramic typology.

St 3:

Site 3 is an open, shallow flooded sinkhole 490 meters north of El Cabo. It has a maximum width of seven meters and a minimum of four meters at its most restricted point. The water is shallow, only 16 cm deep at its deepest point, but it is easily accessible. The sea is clearly visible from this site and is about 100 meters away. The water is of a lower quality than sites one and two, with suspended particles clearly visible, and is also quite brackish, though a measure of salinity was not taken. According to the informants, this flooded sinkhole is currently used to water livestock, which have a higher tolerance for brackish water than humans do.

There was a low density of artifacts present around this water source as well. Five sherds were found in the area around the flooded sinkhole. It was possible to classify one of these sherds as Ostionoid. The Ostionoid sherd forms the upper part of an anthropomorphic adorno, the eyes still preserved. However it was impossible to identify the other sherds in the typology. One fragment of marine shell was found in addition to the 5 sherds.

St 4:

St 4 is a water source 400 meters north of El Cabo. The flooded sinkhole is two meters deep with a one meter circumference. The water is 30cm deep with few visible particles suspended in it. Though salinity tests were not preformed on this site, it was considered to be fairly brackish. Modern people use this site, as well as site one, as major sources of water for cooking and cleaning.

One sherd was found near the lip of the flooded sinkhole. However, it was small, eroded, and undecorated, making it difficult to place in the local ceramic typology.

St 6:

St 6 is a water source 750 meters north of El Cabo. This flooded sinkhole is a relatively narrow, vertical shaft about 1.5m in diameter. It is two meters deep with standing water that is 60cm deep. The water is relatively clear and clean, though it is brackish and unsuitable for drinking. People used to use this water source for cooking and cleaning. However, according to the informants, it is currently unused.

Six sherds were found in depressions in the karst a few meters away from the flooded sinkhole. Sherds were generally small and eroded. However, it was possible to clearly identify one sherd as Chicoid.

St 9:

Site nine is a flooded cave 1.75km north of El Cabo. It takes a little less than an hour on foot to reach this location from El Cabo. The cave is accessible via two small openings. The larger opening is roughly two meters tall and four meters wide. One descends on an incline, about two meters tall, formed by rock fall. The chamber itself is about ten meters wide and twelve meters deep. A small, shallow pool of water is located along the cave wall, in the deepest region of the cave. This pool is 70 cm deep at its deepest part. The water deepens closer to the back wall of the cave, and continues deepening for an indeterminate length past this wall. The water is clear and of relatively good quality. The modern salinity levels were measured at 3300 mg of salt per liter, which is one of the lower salinities in the area below the cliffs. In fact, being below the 4000 mg

per liter threshold, it would be safe to drink for protracted periods of time. The informant Elias, who lives about 40 meters away from the flooded cave, informed us that it is currently not used for drinking water, but is on occasion used as a bathing site.

Ninety sherds were found in the water in this small pool. Some sherds were easily accessible on the bottom of the pool. However, most of the sherds we recovered were located in pockets near or underneath the back walls of the cave, making members of the survey team dive into the completely submerged portions of the cavern to retrieve them. Three adornos and several diagnostic sherds were collected from this pool. It is possible to identify vessel types from seven of these diagnostic sherds. Five sherds belonged to bowls, with restricted forms, while two sherds seemed to belong to more complex vessels with composite, flanged contours. Two of the adornos are clearly from highly decorated bowls. These adornos, with a possible reptilian motif, served as decoration on the rim of the vessel, masking a small vessel handle. The third adorno is somewhat eroded and unidentifiable. In any case, 9 sherds, including the three adornos are Chicoid. The majority of the sherds were unidentifiable. One large flooded sinkhole and a flooded cavern are located in close proximity to this location. However, both locations show no signs of past use.

St 11

This location is the largest cave mapped during the survey. The cave is located in the cliff face, about 1.85 north of El Cabo. The cave is entered via a large hole in the cliff face, estimated to be eight meters wide and four meters tall. From there, one descends about 2 meters to the cave floor. Modern inhabitants have made a wooden ladder to make the cave more accessible. The cave is a cave complex, as there are at least three discernable rooms in the cave complex. Its area was vast and complex enough to make meaningful size estimates difficult. There is a small pool of brackish water in the northern corner of the cave. A separate chamber, in the southwestern corner of the cave, entered by a one meter wide and two meter high opening, contains a colony of bats. The cave contains multiple stalagmites and stalactites, and other interesting rock formations.

One of the four petroglyphs discovered during the survey was located in this area. The petroglyph is modeled on a one and half meter tall stalactite, giving it a humanoid feel. It could be defined as a simple face, containing a simplistic rendering of a face – two dots and a curved line. In addition two sherds were found in the area around the petroglyph. These sherds were relatively small and unadorned, so it was impossible to place them in the local ceramic typology.

St 12 and 13

These two locations are entrances to a single, large cave complex, probably the second largest complex in the area. St 12 is 18.2 km north of El Cabo. The larger entrance to the cave complex is located around 50 meters to the south of St 11. St 12 is the most accessible entrance to the cave.

This entrance is roughly three meters wide and two meters tall. St 13 is another entrance located about 20 meters farther to the south of St 12 and higher up a steep slope on the edge of the cliff. This hole is much smaller, measuring a two meters wide and two meters tall. It is partially blocked by a barbed wire fence and there is a two meter drop to a collapsed boulder on the cave floor, making this a less convenient access point.

A broad room opens up after entering St 12. This gradually narrows as one moves deeper into the cave; after about 20 meters, it becomes a narrower passage that only one person can traverse at a time. Past explorers of the cave have strung a string at waist level along this narrow passage to mark the way to and from the main chamber. This narrow passage makes several twists and turns before entering another larger room. It is hard to tell the distance of the passage, due to the twists and turns of the route. It took about 15 minutes to traverse the distance, though this was due in part to the rough terrain. This second room was approximately 10 meters long, 10 meters wide and 3 meters tall. It was partly illuminated with natural light, as the exit St 13 was present on the farther side of the room. It was possible to climb up some boulders and exit the cave via St 13.

`There is clear evidence of looting in this cave. Looters abandoned tools, including a screen near the entrance at ST 12. There are several piles of dirt, as well as several discarded artifacts. Past members of Leiden team had visited this site and seen human bones in the refuse piles. However, in 2008 only a few stone tools, pieces of sea shell and two sherds were visible. It was difficult to identify the sherds in the local ceramic typology as they were undecorated, small and weathered. There were three stone tools, several which were probably part of stone adzes. Three sherds were found around the entrance at St 13. However, all three were undecorated and small, making them difficult to place in the ceramic typology. There are several local stories based around this cave complex. The informant Belto claimed that his grandfather found a duho near the entrance to St 13. In any case, the signs of heavy looting make it likely that this cave once contained a high density of artifacts and possibly human burials as well.

St 14

St 14 is a flooded cave located 775 meters to the south of EL Cabo. It is around 300 meters from the ocean. It is accessible by a hole that is about 4 meters wide and a meter and a half high. After entering the cave, one descends five meters down a slope to reach the pool of water. This pool of water is 115 centimeters deep at its deepest point and perhaps extends 8 meters farther into the cave. The water is crystal clear without any visible suspended particles in it. In fact it is so clear it is difficult to see the water level when one first enters the cave. With salinity levels of 5600 milligrams of salt per liter the water would be dangerous for humans to drink.

Past the pool there is a dry area, created by rockfall. This area extends ten meters farther back. In the back of the cave there are two other small pools of water. They are both quite shallow, having a maximum depth of 40cm, and have relatively small areas.

The modern inhabitants of El Cabo use this site as an occasional bathing site. The presence of a worn out tire and plastic piping make it quite evident that it is occasionally used as a trash dump as well. The area may have been looted as well. It contained charred logs, ash and other evidence of a recent fire in the dry area, past the first pool of water. Interspersed with the ash were many small fragments of Ostionoid pottery, the largest being no larger than 6 cm long. In total there were 150 small Ostionoid sherds. Though it is impossible to say for sure, it is likely that this pottery came from the cave and was disturbed or possibly broken by modern looters. In addition to the 150 burnished Ostionoid sherds, there were 43 sherds in the pool of water. Two of these sherds were decorated and could be identified as Chicoid. It was only possible to identify one restricted bowl from the diagnostic sherds.

St 17

St 17 is a flooded sinkhole 530 meters to the south of El Cabo. The flooded sinkhole is wide and narrow. The hole has a circumference of 9 meters at its widest point and 4 meters at it's narrowest. The hole was probably created by roof collapse due to solution. There are three small chambers on different sides of this hole. Water is accessible through a narrow 50x50cm hole in one of these chambers, though it was difficult to measure the depth of the water or the hole due to the restricted nature of the hole. The informant reported that modern peoples had used this hole as a source for cooking and cleaning water when the village was more populated. However, it has currently fallen into disuse and contains articles of trash.

There were four sherds in the area around the flooded sinkhole. All of these sherds were undecorated and eroded so we were unable to place them in the ceramic typology. It is quite possible that there are several more sherds present in the area around this flooded sinkhole. The informant Belto said that when his family had farmed the area in the past it was common to come across sherds. However, the area is currently overgrown with shrubs and other vegetation, making these assertions difficult to verify.

St 21

St 21 is a flooded sinkhole 1.47 km northwest of El Cabo. The site is accessible both by an open shaft and a cave. The investigators entered via the cave. The entrance of the cave was quite small – about .5 meters high by one meter wide. The room inside slopes downwards, heightening to the size where it is possible to stand. One must crawl through a small passage in the back of this first room to get to a second room where there is a shallow pool of water. The roof is open in

this room and it is possible to access the water from both outside and inside. Abandoned buckets and plastic bottles show that this site has previously been used as a water source by local inhabitants.

There were four small weathered sherds in the first chamber of the cave leading to the flooded sinkhole. These sherds, however, were impossible to place within the ceramic typology, as they were relatively small and devoid of decoration or other distinguishing marks.

St 24

St 24 is a flooded sinkhole located 1.58km to the north west of El Cabo. This flooded sinkhole is relatively close to the cliffs. One accesses the water below via a hole roughly one and a half meters in diameter, which drops three and a half meters to a relatively shallow 30 cm pool of water. Water from this source is of relatively high quality. It is clear and, though brackish, its salinity was 3510 mg per litre at the time we measured it, meaning it would be healthy to consume water from this doline for a sustained period of time. In fact, according to the informant Kelin, this flooded sinkhole had been used as a source of water by a number of the modern inhabitants when they first settled in and around El Cabo. However, it is currently not used as a source of drinking water. Rather, a nearby water trough marks its use as a source of drinking water for goats and other livestock.

A few artifacts were found several meters away from the flooded sinkhole. There were two small undecorated sherds, which could not be positively placed in the local typology. A broken piece of a greenstone axe or adze was also found.

St 25

St 25 is a shallow sinkhole located 2.3km to the north of El Cabo. The sinkhole is roughly circular with a circumference of about 2 meters and a depth of about one and a half meters. It currently has no known use.

Two weathered sherds were found in the area surrounding the sinkhole. There is no decoration or other traits to firmly identify them in the ceramic chronology.

St 30

St 30 is a flooded sinkhole located 1.79km to the north west of El Cabo near the cliffs. The flooded sinkhole has a narrow vertical entrance, with a circumference of 70 cm. However, it is quite deep. The water level is 8 meters below the surface. The water depth was too deep to measure at the time it was visited. A local informant also tried to enter the flooded sinkhole, which opens up into a large subterranean cavern below its narrow entrance. However, this proved impossible with the available equipment. The water is clear but was quite saline when it was

measured; it contained a salinity of 6190 mg of salt per liter. While no sherds were found in the area directly around the flooded sinkhole, this may still be an important site. According to a local informant Belto, who was quite eager to enter the flooded sinkhole, looters had explored the subterranean cavern below with diving equipment and had recovered several complete vessels. While it is impossible to evaluate the veracity of this claim, it would be worth it to acquire proper equipment to more extensively explore the flooded sinkhole in the future, should additional surveys of El Cabo be conducted.

St 32

St 32 is a small flooded cavern located close to the coast, 1.98km to the south of El Cabo. The flooded cavern is accessed through a shallow vertical hole created by part of the rough of the cave collapsing. This hole has a roughly 4 meter circumference and the hole below is only a meter and a half deep. The cave gradually slopes as one moves deeper into it and there is a small pool of standing water located at the lowest point in the cave. The water is no more than 30cm deep. It is clear water but is quite brackish, containing 5200 mg of salt per liter. It seems that this cave was never used by modern inhabitants of El Cabo.

One small sherd and a seashell were found outside the entrance of the cave. However, it was impossible to place this sherd within El Cabo's ceramic typology.

St 33

St 33 is a flooded cave located 1.92km south of El Cabo. It is about 30meters away from St 34, another major site. The entrance to the site is a small hole three meters wide and one meter high. The cave extends about 12 meters into the rock from the entrance, sloping down to gain a maximum height of about 5 meters. There is a large pool of water located in the deepest points of the cave. The water is 1.4 meters deep at its deepest part. It is crystal clear with no visible suspended particles. The water is fairly brackish and borderline undrinkable, with a salinity of 4300 mg of salt per liter. The area is occasionally used by modern visitors as a bathing site.

Fifty-five sherds were found in the water in St 33. Twelve of the sherds were clearly identifiable as Chicoid. These included five rims that could be analyzed for vessel shape and size. All five rims seem to have come from bowls with restricted openings. One of these sherds was relatively large and highly decorated. The sherd contained an intact strap handle which was decorated to resemble the head of a bird. The bird is holding a rope or cord of some sort in its beak, which dips down to forma lower line on the vessel. Another strap handle and an adorno, which seemed to have a goggle eyed motif, was also recovered from the water. Several of the sherds seem to have been burned, as they were heavily blackened on both sides of the sherd. Some of these blackened sherds were decorated.

St 34

This site is a cave complex 1.93km to the south of El Cabo and 30meters farther to the west from St 33. The cave consists of two distinct chambers. The outer chamber is nearly completely illuminated by sunlight. It has a 5 meter wide and a two and a half meter high entrance into a rapidly narrowing chamber, which extends about 15 meters into the rock. The back portion of this chamber gradually shrinks until it finally becomes a crawl space. After crawling through a narrow hole, one enters the second chamber of the cave. This chamber is slightly smaller than the first cave, and one must most crawl to move around in it. It is about a meter and a half high at its tallest point. This chamber winds around several corners and is relatively narrow. It extends roughly ten meters further in the rock. This cave contains a floor of dark, brown organic soil, which is possibly an accumulation of bat guano, as there were one or two bats present in this second chamber.

86 sherds were recovered on the floor of the first chamber of the cave complex as well as several lithic artifacts. 8 sherds were decorated and could be clearly identified as Chicoid. The rest were unable to be identified in the local ceramic typology. Of these sherds, one rime was large enough to clearly be identified as belonging to a bowl with a restricted opening. Five lithic artifacts, mainly from broken axes or adzes, were also found in the entrance of the cave, as well as several small fragments of sea shell. No sherds were found in the second chamber of the cave complex. However, 12 complete and large fragments of seashells were found near the entrance of the second chamber. All of these remains were found near the entrance of the second chamber.

St 56

St 56 is a scatter of sherds located 1.86 km north of El Cabo. The area that contains the scatter extends for about 60 meters along the coast and at least 20 meters inland. The environment in this part of the pocket consists of low coastal rocky shores, less than a meter high, with an intermediate zone of craggy bare karst that gives way to thick bushes and small trees four or five meters away from the coast. 60 sherds were collected; however, this density was relatively low given the size of the area surveyed. All of the sherds were small and extremely weathered. Consequently, it was difficult to identify them in the local ceramic typology.

St 57

St 57 is a scatter 1.1km north of El Cabo, a few hundred meters from the coast. The area, which has partly been cleared to create a road, was covered by dense bushes and small trees. There is a natural depression in the karst to one side of this area. 37 sherds were found in a 30 meter by 20 meter area. These sherds were generally small, weathered and otherwise unidentifiable in the ceramic typology.

St 58

This site is a small scatter located 1.1km to the south of El Cabo. It is a scatter near a large boulder which is a short distance to the south of El Cabo. Twenty sherds were found in a 10 by 10 meter area. Some of the sherds from this scatter are Chicoid, though the majority is unidentifiable in the local typology.

St 64

This site is a flooded cave 2.1km north of El Cabo and about 100 meters away from the coast. It can be accessed via an entrance created by a partial cave-in of the cave's roof. The entrance is a vertical hole with roughly a four meter diameter drop. This hole drops down onto a sloping floor created by rock fall. The floor slopes down about three meters to a large pool of water a little over a meter deep. It extends some distance in a narrow passage to the left as one faces into the cave. The water contains fine particles of earth and is easily silted up by movement, as there is a fine earth or sand sitting on the bottom of much of the pool. It is relatively brackish, with a salinity of 4900 mg per liter of salt when we measured it. The area does not seem to be used by modern people.

There were five sherds and a couple of large pieces of sea shell in the flooded cave. The sherds are all of indeterminate age. Most of these sherds were found in the water close to the entrance of the site.

St 65

St 65 is a scatter in an area 500 meters west of the site of El Cabo. This area is currently used as a cunoco or garden, so it has probably been disturbed by agricultural practices. There were nineteen sherds found in this scatter. Most of the sherds were griddle pieces. However, a couple sherds belong to identifiable Chicoid adorno pieces.

St 66

St 66 is another scatter located 620 meters west of El Cabo. The scatter was found in a modern conuco where one of our informants used to farm. Apparently many artifacts have been found there in the past; in the past school children came to the site one day and picked up sherds and adornos in hopes that they would be able to sell them. There were 6 sherds in a 3 by 3 meter area. They were all undecorated, making them difficult to place in the local ceramic typology.

St 69

St 69 is a possible cave complex accessed by a deep vertical shaft. It is located on top of the cliffs 2.08km northwest from El Cabo. The entrance of the cave is a vertical shaft that has a five

and a half meter diameter. The shaft is 11 meters deep and leads into what looks like a large cave below. There is a beam placed over the top of this cave, meaning that people, possibly looters, have accessed the cave in the past. The cave was never entered due to a lack of appropriate equipment.

No artifacts were found around the cave entrance. However, there are several probable features located a few meters to the west of this cave. These features are fifteen small circular holes that penetrate the ceiling of the cave below. The round and consistent shape of the shafts, which go through a meter of rock to penetrate the cave's ceiling, as well as possible traces of tool marks on the sides of these shafts, make it probable that they were manmade. There is no universal size or apparent overall organization to these holes. This said, it would be worthwhile to come back to this cave in the future with rope or a ladder and explore it. The cave may even extend into and exit out of the cliffs to the east, according to the informant.

St 70

St 70 is a small scatter located 1.67km west of El Cabo near the edge of the cliffs. The area is currently cleared and being used as a conuco. Three sherds were found in a 3 by 3 meter area. It is impossible to determine where these sherds fit in the local chronology due to their small size, lack of decoration and weathered state.

St 87

This is a scatter located 1.77km to the north of El Cabo near the cliffs. There were 8 sherds in a 4 by 4 meter area. This area is close to sites St 11 and St 12-13. There is a generally a high density of small scatters in this area close to the cliffs. It impossible to identify any of the sherds there were in this scatter in the local ceramic typology.

St 88

This site is located 1.73km north of El Cabo near the cliffs and near the entrance of St 12. Even though St 88 is classified as a scatter, there was only a single lithic blade at this site. The blade is bifaced. It is difficult to determine what time period the blade is from.

St 89

This is another small scatter located 1.796 north of El Cabo and close to the cliffs. Six sherds were found in a three meter area. None of these sherds were able to be placed in the local ceramic typology.

St 92

This is a small rock shelter located to the 1.64km to the west of El Cabo. The rock shelter was created by boulder fall near the cliff. It has a small one meter high and four meter wide entrance. Two sherds that cannot be identified in the local typology were found outside of the rock shelter.

St 93

This is a scatter located 1.66km to the north of El Cabo. There were forty-two sherds in a three meter area. This is a cleared area near the cliffs and relatively close to St 11 and 12-13. However, these sherds were all small and heavily weathered. Thus, there were no diagnostic sherds that we were able to collect or identify in the ceramic typology.

St 94

This is a scatter located near St 9. The area is 1.7km north of El Cabo, close to three flooded caverns, including St 9. The area is a few meters from the home of our informant Elias. The site contains a high density of artifacts; there were 30 small, eroded sherds in a 5 by 6 meter area. None of these sherds were able to be identified in the ceramic typology.

6.3) Sector 2

This area of El Cabo is to the north of Sector 1. There is generally a lower density of archaeological finds to the north of El Cabo. Only one major site was found in this area. However, this is also the path of easiest access to the large pocket to the north. The transect was done in this part of El Cabo. Below is a figure of all archaeological sites in Sector 2 (figure 6.2).

St 48

A small granule of “green stone”, the type of rock used to create local lithics, was found at this site. The nodule was located directly on the road to El Cabo, 3.01km away from the site. It is about 40cm long, 20cm wide and 12cm high. This was the only “greenstone” nodule found during the survey.

St 49

St 49 is a large flooded cave with multiple chambers. It is located 2.2km to the north of El Cabo and is fifty meters from the coast. The cave can be entered through a hole that is 4 meters wide and two and a half meters high. One descends about 4 meters on a ramp created by rock fall into the floor of the cave. It is long but relatively narrow throughout the majority of the cave. There are at least three distinct chambers in the cave. A small dark passage that extends at least 30 meters can be followed to the right as one descends the main entrance of the cave. This passage is

narrow enough that one must climb along the inclined wall of the cave to have enough space for unrestricted movement. There were a couple of small pools of brackish water in this portion of the cave. The other chambers to the left of the cave's entrance are much larger. They are also well lit, as several portions of the cave's roof have collapsed. The first chamber contains a narrow, deep pool of water that is over two meters deep at its deepest point. The chamber is generally narrow, never more than 3 meters wide. The pool extends as far as 30 meters before

The cave narrows and rises again near a second area of rockfall, where another entrance to the cave is present. This part of the cave is well lit by daylight peeking through large holes in the cave's roof. Past this chamber, the last section of cave extends into the rock about 30 meters more. It is again enclosed but is wider than the first two sections. One must cross about twenty meters of sharp rockfall before arriving at another large pool of water. This pool is over two meters deep at its deepest point and contains crystal clear water. While we were not able to take a water sample from this cave, its water seemed quite brackish, which makes sense given its proximity to the sea. The cave seems to have been used as a water source for livestock in the recent past, as there is a large cement basin forty or fifty meters away from the cave.

After a fairly an extensive search, only two sherds were found in shallow water in the narrow second section of the cave. The sherds were both undecorated and relatively small so they could not be placed in the ceramic typology.

St 81

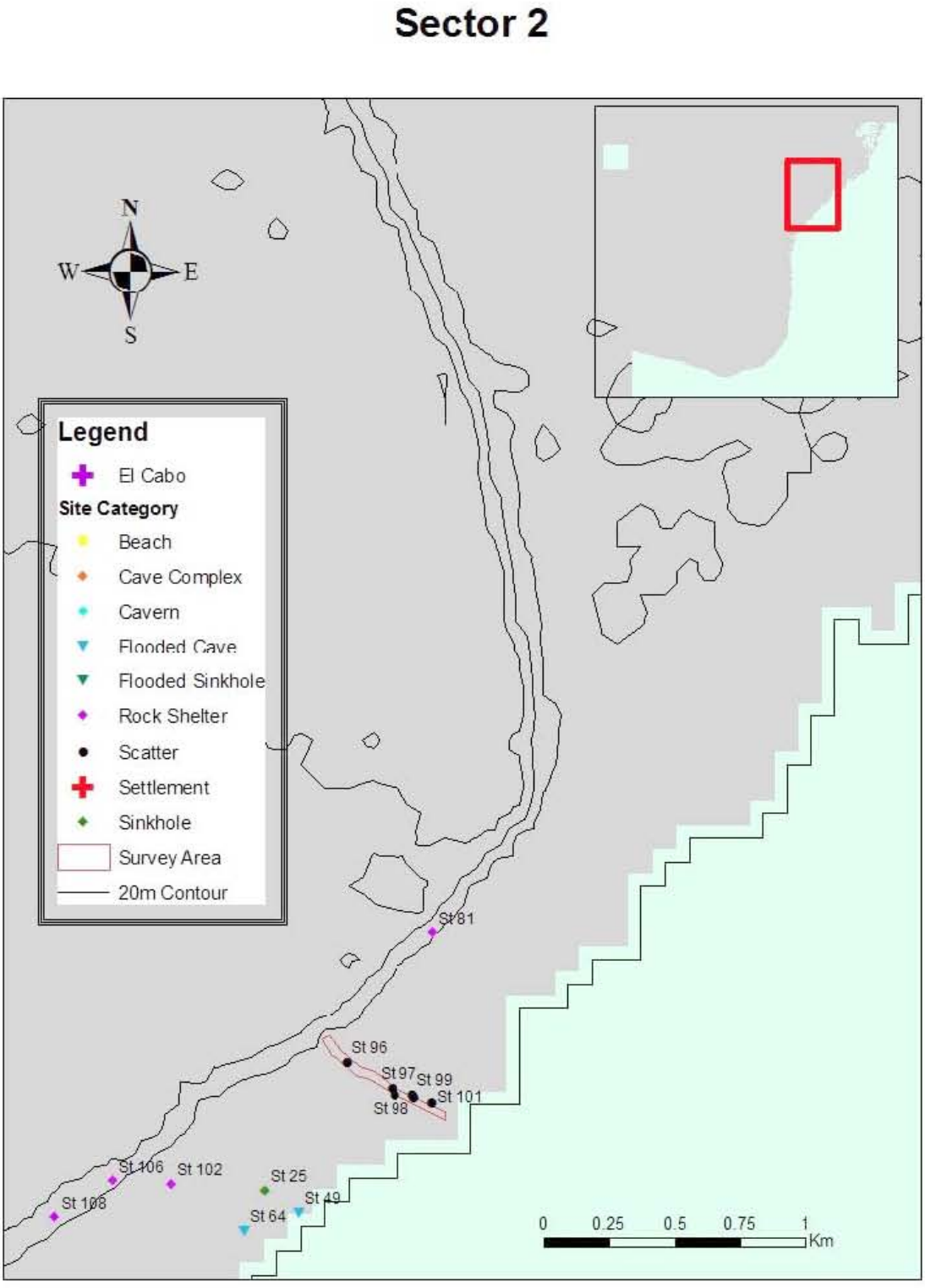
St 81 is a rock shelter located in a boulder 3.41km to the north of El Cabo. A large 10 meter wide and two meter high room was created by a boulder falling on top of another boulder. The boulder most recently served as a shelter for one of the informants, Nicholas.

There were three small, extremely weathered sherds around the rock shelter. They were impossible to identify in the typology.

St 95-101

These areas are individual points in the transect that contain ceramic remains. The transect is 30 meters wide and 540 meters long. It was located in a narrow area of the valley and spans the environment from the cliff edge to the sea coast about 17km north of El Cabo. The area had been recently burned and cleared and will probably be planted in the near future.

There were 162 sherds total. Many of the sherds were small and weathered. About 140 of the 160 sherds were found within 50 meters of the coast. Refer toAppendix 1 for individual figures for each point of interest in the transect. Overall there were 8 sherds that were clearly Ostionoid and 5 sherds that seemed to be Chicoid. It was hard to identify the rest of the sherds.


Sector 2
N
W
E
S
Legend
El Cabo
Site Category
Beach
Cave Complex
Cavern
Flooded Cave
Flooded Sinkhole
Rock Shelter
Scatter
Settlement
Sinkhole
Survey Area
20m Contour
St 81
St 96
St 97
St 99
St 101
St 98
St 106
St 102
St 25
St 49
St 108
St 64
0
0.25
0.5
0.75
1
Km

6.2 Sector 2

St 102

Site 102 is a rock shelter located 2.25km to the north of El Cabo. The rock shelter is a small, half a meter high by two meter wide hole located in the side of a boulder. All of the sherds were found in the area around the rock shelter.

Sixteen sherds were found in the area. Twenty fragments of marine shell were found, as well as two stone blade fragments. The ceramics were not clearly identifiable in the typology. The two stone blades are pictured in Appendix 3.

St 106

This site is a rock shelter located in the side of the cliffs 2.22km to the north of El Cabo. It is a large, open overhang in the cliff that is roughly 10 meters wide and 5 meters high, possibly 5 meters deep. This is one of numerous rock shelters located along the side of the cliff, the vast majority of which contain absolutely no cultural remains. Such rock shelters are often used as outdoor shelters for goats and livestock, though this one was not. This site, however, contained 5 sherds in the rock shelter. These sherds were not able to be identified in the ceramic typology.

St 108

This is another rock shelter located 2.09km from the site of El Cabo in the cliffside. The rock shelter is large, five meters wide, six meters high and four meters deep.

There were three sherds in the rock shelter and one shell artifact. The sherds were unidentifiable. The shell artifact is a small sea shell with a hole drilled in one side, which seems to have been used as a tinkler.

6.4) Sector 3

Sector 3 is located on top of the cliff (figure 6.3). Preliminary investigations were done in this area, due to reports of extensive archaeological remains. The area is generally in a bit of a depression and somewhat shielded from the wind. This has preserved some more soil than in areas on top of the cliff further to the south. The area also includes some of the freshest known sources of drinking water.

St 28

St 28 is a large cavern located on top of the cliffs 1.83km to the west of El Cabo. The cavern is accessed via a narrow ravine that opens onto a small clearing. Its entrance is quite massive and much of the cavern itself is illuminated by sunlight. It was hard to measure its exact dimensions due to the sheer size of the cavern. However, it looked like the entrance was 20 meters wide and

15 meters high. One must climb down several fallen boulders to one side of the cavern to access its floor, which is about four meters below. The cavern consists of one main room, which is not at all deep. There is a thick layer of rich, reddish brown soil. The guide, Kelin, said that people had used the area to grow yucca in the past. He also said the area had also served as a shelter for some particularly bad hurricanes.

Two small, undecorated sherds were found in one corner of the cavern. It was impossible to place these sherds in the typology. Two pieces of marine shell were also found near the ceramics.

St 29

St 29 is a rock shelter located on top of the cliffs about 2.7km to the west of El Cabo. The entrance to the rock shelter measures roughly 12 meters wide by 2 meters high. It is relatively shallow, extending no more than 5 meters into the rock. The modern site is used as an occasional shelter for goats by Belto.

Six sherds were found in and around the rock shelter. Two sherds were actually inside of it while the other four were found around the entrance of the rock shelter. All of the sherds, however, were relatively small and undecorated, making them impossible to place in the ceramic typology.

St 68

St 68 is a large archaeological site named Bartolo, which is probably a settlement. It is located 3.3km west of El Cabo on top of the cliffs in a large, meter-deep bowl that contains relatively deep soil in comparison to surrounding areas. Fruit trees and other vegetation grow well in this area; which until recently was cultivated and inhabited by local peoples. It was impossible to measure the extent of the site in any meaningful way, due to the short amount of time spent at the site. However, it became quite clear while making surface collections that the extent of dense ceramic remains was quite large. This area has previously been visited by both looters and members of the Leiden team. Parts of a human skeleton had been noticed in a previous visit, so there may well be burials located at the site, though no human remains were seen in 2008. There was widespread evidence of looting, with what looked like filled in trenches occurring in the sides of several low mounds at the margins of the site.

There was no time to make a complete surface collection for the site. However, a total of 200 adornos, decorated sherds, and diagnostic rim pieces were collected during an hour of exploration. There were many more pieces left behind. Of the sherds collected, thirty sherds were clearly Chicoid. A couple of the sherds brought back to Leiden in the diagnostic sample were also Ostionoid. Fifteen sherds came from whole or broken adornos. Five rim sherds clearly belonged to restricted vessels with closed contours. One vessel was a restricted vessel with an open contour.

There were also stone artifacts, sea and land snail shells present at the site. However, these remains seemed to be at a much lower density compared to coastal sites such as El Cabo.

St 71

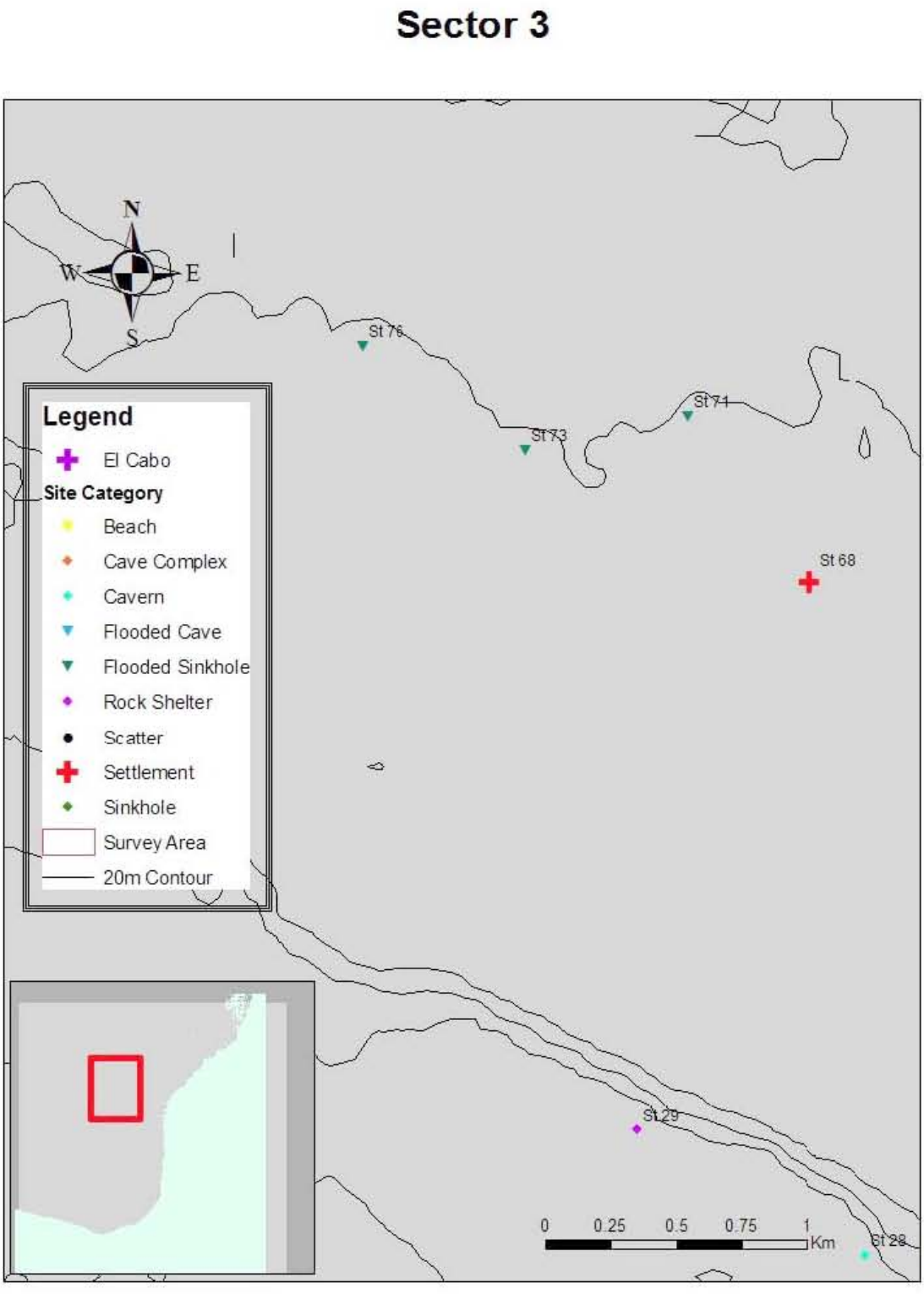
St 71 is an enormous flooded sinkhole located 4.1km to the west of El Cabo on top of the cliffs. The flooded sinkhole was too large to accurately measure; however, it must have been at least 20 meters in diameter and more than 20 meters deep. There is a pool of water of indeterminate depth located on the west side of the flooded sinkhole. Modern people are using an electric generator and pvc piping to pump water into a nearby basin. The water is crystal clear, lacking suspended pariticles. It is also the least saline water we encountered, with a salinity of 466 mg per liter, which is low enough to classify it as sweet water. The modern inhabitants use this area as a water source for drinking, to water cattle and for domestic uses.

No artifacts were found around this water source, and it was impossible to descend into the flooded sinkhole itself at the time. As this is the freshest water encountered in the area it might be worth exploring the interior of this flooded sinkhole in the future.

St 73

This is another large flooded sinkhole 4.39km from El Cabo on top of the cliffs. It is located about 200 meters from St 73. The flooded sinkhole is even larger than St 71. It was impossible to measure the circumference or depth, due to its immense size, but it may even be as wide as 60 meters and is over 20 meters deep. There is a pool of water in one corner of the flooded sinkhole. This water is also pumped by the local people into a nearby concrete cistern, which is used to water cattle as well as for drinking and other purposes. This water is crystal clear as well. It is slightly more saline than St 71, with 677 mg of salt per liter, which technically makes the water brackish. However, local people consider the water sweet and drink it on a regular basis.

There were no artifacts around this flooded sinkhole. It was too difficult to enter the flooded sinkhole itself, however, due to a lack of appropriate climbing equipment. However, it may be worth exploring the inside of the flooded sinkhole more closely in the future.


Sector 3
N
W
E
S
St 76
St 74
St 73
St 68
St 29
St 28
Legend
El Cabo
Site Category
Beach
Cave Complex
Cavern
Flooded Cave
Flooded Sinkhole
Rock Shelter
Scatter
Settlement
Sinkhole
Survey Area
20m Contour
0
0.25
0.5
0.75
1
Km

6.3 Sector 3

St 76

Site 76 is a large flooded cave located 5.06km west of El Cabo. The flooded cave is located to one side of a massive sinkhole on top of the cliffs. There is a cieba tree located outside of the flooded cave. One enters a straight passageway to access the cave. The entrance is one and a half meters wide by 1 meter 30 centimeters high. This horizontal passage extends 20 meters in a low cave. There are two steep, diagonal passageways that descend deeper into the cave in the back of this first room. The descent into the cave is incredibly steep and dangerous and use of a rope would be recommended if this site is visited again. A passage descending 30 meters was the first to be explored. There were multiple smaller shafts that sometimes bisect the main passage. Near the bottom of the shaft, there is a flatter room that was covered by a thick layer of ash and broken pottery sherds. Judging by the break marks on the pottery, it seems to have been broken recently. The local informant Miguel Silvestre reported that looters had visited this cave multiple times in the past. There were more sherds in another room past the first small passage. Though Miguel reported there was a deep pool of water, it was impossible to access. It was possible to see this pool in some holes in a rock pavement in the deepest accessible parts of the cave. However, it seems this water is no longer accessible due to a recent rock fall. There is also a second passage way to the surface parallel to the first. It contains more sherds and ash.

Eleven diagnostic sherds were collected from the cave, though there were probably more than one hundred sherds located in the ash. All of the sherds found were burnished and could be clearly identified as Ostionoid. One of these sherds belonged to a restricted vessel with a composite contour type of vessel, as defined by the Leiden ceramic codebook (Hofman 2007).

6.5) Sector 4

Sector 4 is located in the south of El Cabo (figure 6.4). This area contains several large sites and a concentration of petroglyph sites. There are several impressive seastacks and boulders to the south of El Cabo. It is also a route of access to another smaller pocket to the south of El Cabo.

St 44

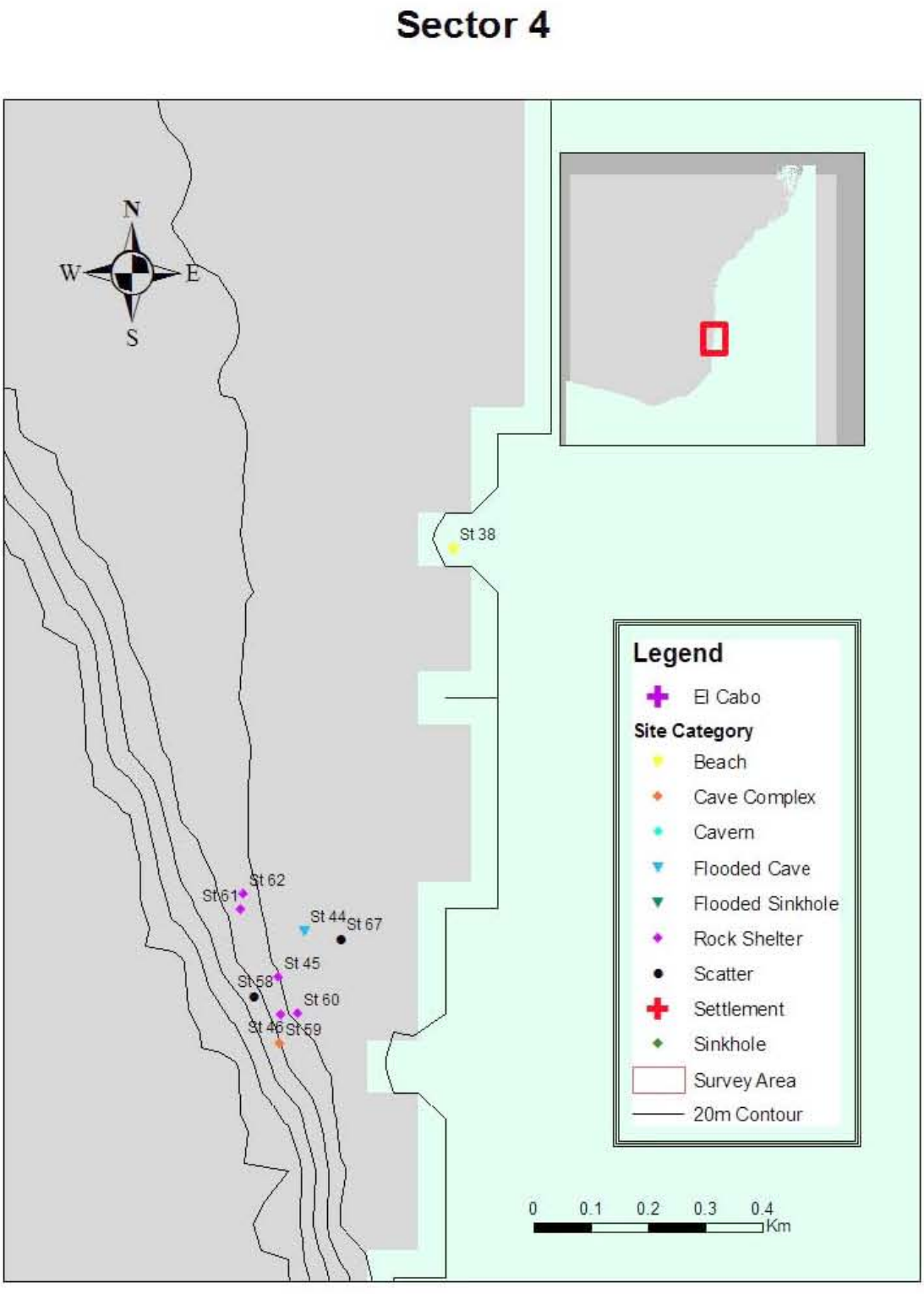
St 44 is a flooded cave located 3.7 km to the south of El Cabo and 80 meters west of the ocean. The entrance of the cave was created by part of the cave roof falling in. It is possible to enter the cave on one side of this collapsed area through a 1 meter high and 5 meter wide hole. The floor slopes steeply down about five meters towards the back of the cave. The cave extends perhaps 10 meters into the rock. There is a relatively narrow, shallow pool that spans the back of the cave. The water is no more than one meter deep at its deepest point but much shallower over much of this space. The water is crystal clear. A water sample was taken from the site, which was quite brackish, with 7090 milligrams of salt per liter.

Thirty-one ceramics were collected from this pool of water. A collection of ceramics was made to be analyzed; unfortunately the collection was lost. However, there are still several pictures of the collection, which were taken on site. Of the 31 sherds, four are clearly chicoid while the rest are unidentifiable. Two adornos were found in the water. One is a clearly humanoid appliquéd face, with one preserved eye, an eye, nose and mouth. The second adorno contains the goggle eyed motif and may be zoomorphic, but is more difficult to clearly identify. This source of water is the closest flooded cave to ST 45, which is located about 10 minutes walking distance inland from St 44.

St 45

St 45 is located in an area with several sites close to one another. It is located 3.8km to the south of El Cabo in the southernmost portion of the El Cabo pocket. It is classified as a rock shelter. It is a partially enclosed, cave-like space formed by one boulder falling on top of another. This space is clearly lit and open on both sides. The sinkhole is roughly triangular and about three meters wide at the bottom and over two meters tall. The passageway extends about seven meters before exiting on the other side. The area is referred to as Cementario de los Indios by the locals and has clearly been looted in the past.

Despite its name, no human remains were discovered during the visits the survey team made to St 45. However, numerous archaeological remains and rock art were found in the rock shelter and in the area surrounding it. Included in these remains was one petroglyph. These remains were numerous enough to make a full surface collection too time and labor intensive to conduct. Most of the sherds were concentrated in a small clearing near the eastern entrance of the rock shelter. However, sherds were seen in the area all around the rock shelter and found at other nearby boulders in lower concentrations. The site seems to have been already disturbed by looters. There were discarded rum bottles, some small mounds that seemed like dirt piles, and other evidence of disturbance in the area. Since a surface collection was not completed, a complete collection was made from a meter square area with a high number of visible sherds to get an idea of ceramic density. This sample contained 144 sherds. Rims, adornos and interesting decorated pieces were collected from the site. Thirteen rim pieces with a variety of forms were collected. These forms included 7 restricted vessels with closed contours, 1 restricted vessels with composite contours and 2 independent restricted vessels with a composite contour. An adorno with a possibly zoomorphic motif was also found. The petroglyph was traced on polyethelene plastic sheets. The image is carved into the northern wall of the rock shelter. This image seems to be a face, which I would classify as a complex face petroglyph in Dubelaar's classification (1995), with a oval line for the outline of the face, a nose, mouth and eyes (Dubelaar 1995: 28).


Sector 4
N
W
E
S
St 38
St 62
St 61
St 44
St 67
St 45
St 58
St 60
St 46
St 59
Legend
El Cabo
Site Category
Beach
Cave Complex
Cavern
Flooded Cave
Flooded Sinkhole
Rock Shelter
Scatter
Settlement
Sinkhole
Survey Area
20m Contour
0 0.1 0.2 0.3 0.4
Km

6.4 Sector 4

St 46

St 46 is another rock shelter located 3.86km to the south of El Cabo. It is 30 meters to the south of St 45. The rock shelter is relatively small. Its entrance is a meter and a half high by two meters wide and it extends a few meters into the rock.

Four sherds were found outside the entrance of the rock shelter. They are small, weathered and undecorated, making it difficult to place them in the local typology. It is worth mentioning that this area near St 45 seems to be generally fairly densely packed with sites.

St 59

St 59 is a small cave complex 3.8km to the south of El Cabo. It is relatively close to St 45. The cave is enterable via a narrow crack that is 30 cm wide and nearly a meter high. The cave widens out from the narrow entrance into three rooms that are all roughly at the same height or elevation. The cave extends no longer than 30 meters from the entrance.

Five sherds and a couple of sea shell pieces were found in the first room of the cave. The sherds are all Ostionoid at this site.

St 60

This site is a rock shelter 3.9km to the south of El Cabo and to the north of St 45. The rock shelter could be classified as more of a large overhang in the cliff face. It is over 2 meters tall and its opening has a width of about 7 meters.

Five sherds were found in the rock shelter. They are all undecorated, which made it difficult to identify them in the ceramic typology.

St 61

This is a rock shelter located 3.86km south of El Cabo in the southern part of the pocket, where there seems to be a dense concentration of archaeological remains. The rock shelter consists of a large overhang in the cliffs that is over two meters high and extends 15 meters. There are several stalagmites and other rock columns in this space.

There are two petroglyphs located on one of the columns in the rock shelter. There were also five sherds in the surrounding area. It is an area that has already been documented by Olsen Bogaert (2000) and in 2006 by members of the Leiden team, so ceramic remains may have already been collected from the area. The sherds collected during this campaign were all ostionoid. The rock art at this site seem to be simple representations of human faces located on a column of rock in the rock shelter. The bottom face contains three circular carvings which represents two eyes and a mouth. The upper carving is somewhat more complex. This seems to

contain two eyes outlined by a kidney bean shaped line with no mouth.

St 62

St 62 is a rock shelter that is about 50 meters north of St 61, located 3.67km from El Cabo. The rock shelter is basically an overhang that is about 2 meters high and 20 meters wide, extending about 3 meters deep into the rock.

A small scatter is located outside of the overhang, with 9 sherds which could not clearly be identified in the ceramic typology. The site has previously been visited and possibly collected from by other members of the Houses for the Living and the Dead project, so there may have originally been a larger density of archaeological remains.

St 67

St 67 is a scatter located 3.7km to the south of El Cabo. The scatter is located about 10 meters away from the ocean in a cleared patch of sand. This scatter is relatively close to St 44. There were 5 sherds in a 3 meter by 3 meter area. All of the sherds were weathered and undecorated, making them difficult to place in the ceramic typology.

6.6) Summary of results

This survey mapped and described 108 locations in and around the site of El Cabo (figure 6.5). These sites were further categorized into a typology, which has already been explained in chapter four. Including El Cabo, there are two potential settlement sites. The second site, which is located about four kilometers to the west of El Cabo, and was recorded as St 68 as part of the survey, has been given the name Bartolo. In addition to these two sites, 19 scatters were mapped, with varying densities of archaeological remains. These scatters are generally clustered in three areas of the map. One cluster of scatters should be noted in particular as it is in the area of the transect. The other two areas with dense scatters represent areas of especially dense arechaeological remains.

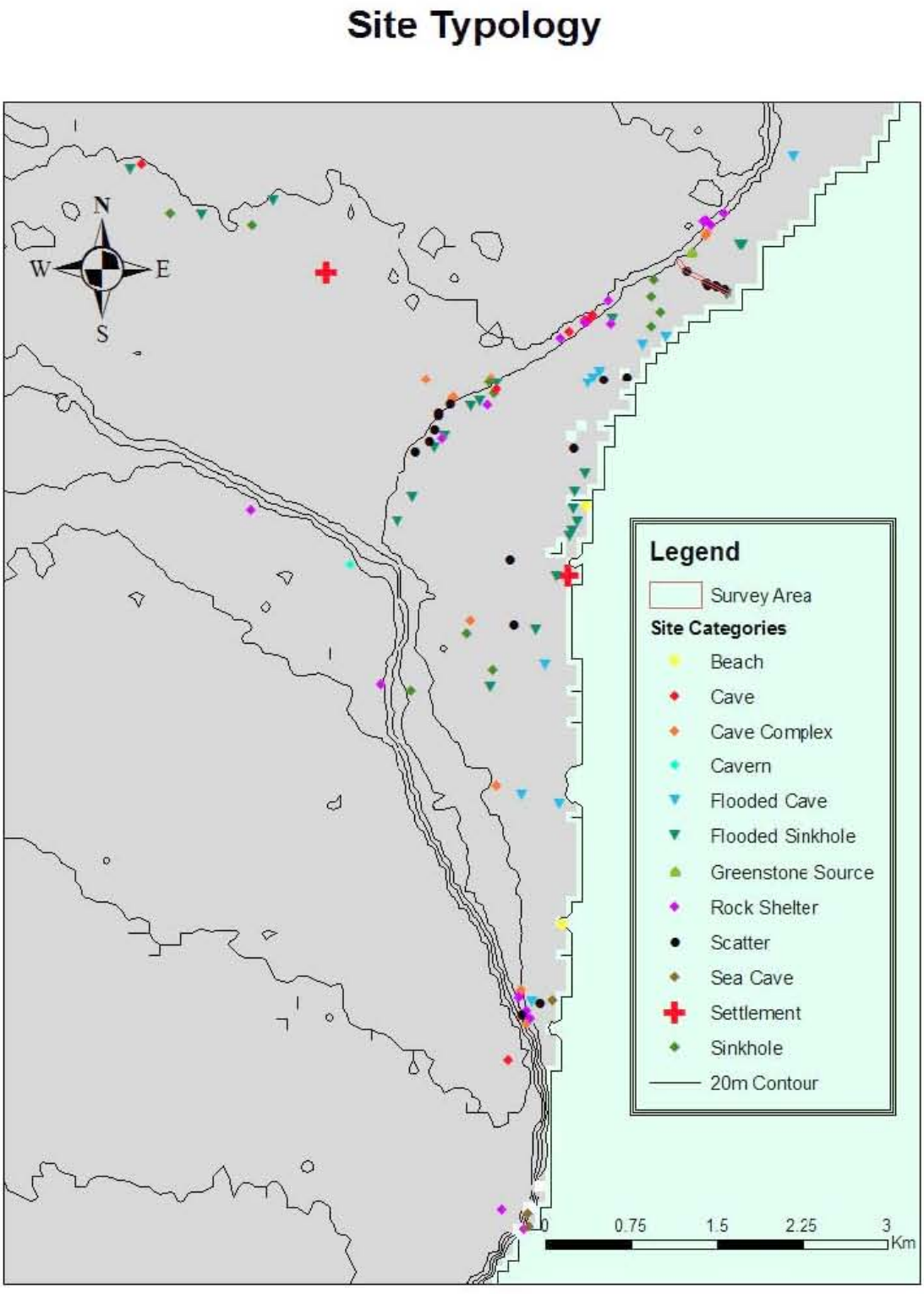
As a primary objective of the survey was to find natural features such as caves and water sources; thus, there may be a larger density of these features on the map. There are 33 water sources total. Eleven are flooded caves and 22 are flooded sinkholes. There were also numerous caves. There are 53 caves and other depressions.

The most numerous type of site we generally classified as caves were rock shelters, with 19 shelters mapped. There may be hundreds of rock shelters in the area. However, there was not time to systematically map or explore all of these rock shelters and we tried to make our priority visiting water sources and larger caves, only extensively exploring rock shelters that may have

had archaeological remains. In addition, there were also 11 sinkholes that we mapped; again, there may be more but these features were not a top priority. 10 cave complexes were mapped, which represented the largest types of caves, two caverns, seven caves, and four sea caves.

In addition to these relatively widespread standard categories, two more unique categories were found during the survey. These categories are beaches and green stone sources. Two beaches were mapped. There were no artifacts located at either beach. However, these beaches, or past beaches which have been moved by storms or other processes, would have been important sites to the *Taíno*, so it is important to note the presence of these beaches. The second category, green stone sources, was included because one nodule of green stone was dicovered. This nodule was small – about 30x15x5 cm – and no other obvious sources were found during the survey.

Caves and other features were mapped regardless of whether archaeological remains were found associated with the location. However, there did prove to be an abundance of archaeological sites in and around El Cabo. There were 53 locations that contained cultural remains. The vast majority of these locations contained relatively low concentrations of sherds or other artifacts. Thirteen locations, however, did contain more than twenty sherds or other artifacts. It was difficult to place the majority of the sherds found during the survey into the existing ceramic typology due to a lack of identifying details on the sherds. However, 11 sites have clearly Chicoid remains and 5 sites contained Ostionoid remains. It seems likely that many more of the sites would have been able to be identified by closer analysis of the sherds, but unfortunately such studies were impossible within the timeframe of the project. Three sites contained four petroglyphs, all of which had anthropomorphic themes, which could be defined as simple and complex faces (Dubelaar 1995).



6.5 Site Typology

6.7) A comparison of the 2008 survey with earlier campaigns

This section will compare the results of the 2008 survey with earlier campaigns conducted by Harold Olsen Bogaert (2000) and Alfredo Coppa (Coppa 2009 personal communication). The figure below (Figure 6.6), shows points for sites visited during all three of the surveys.

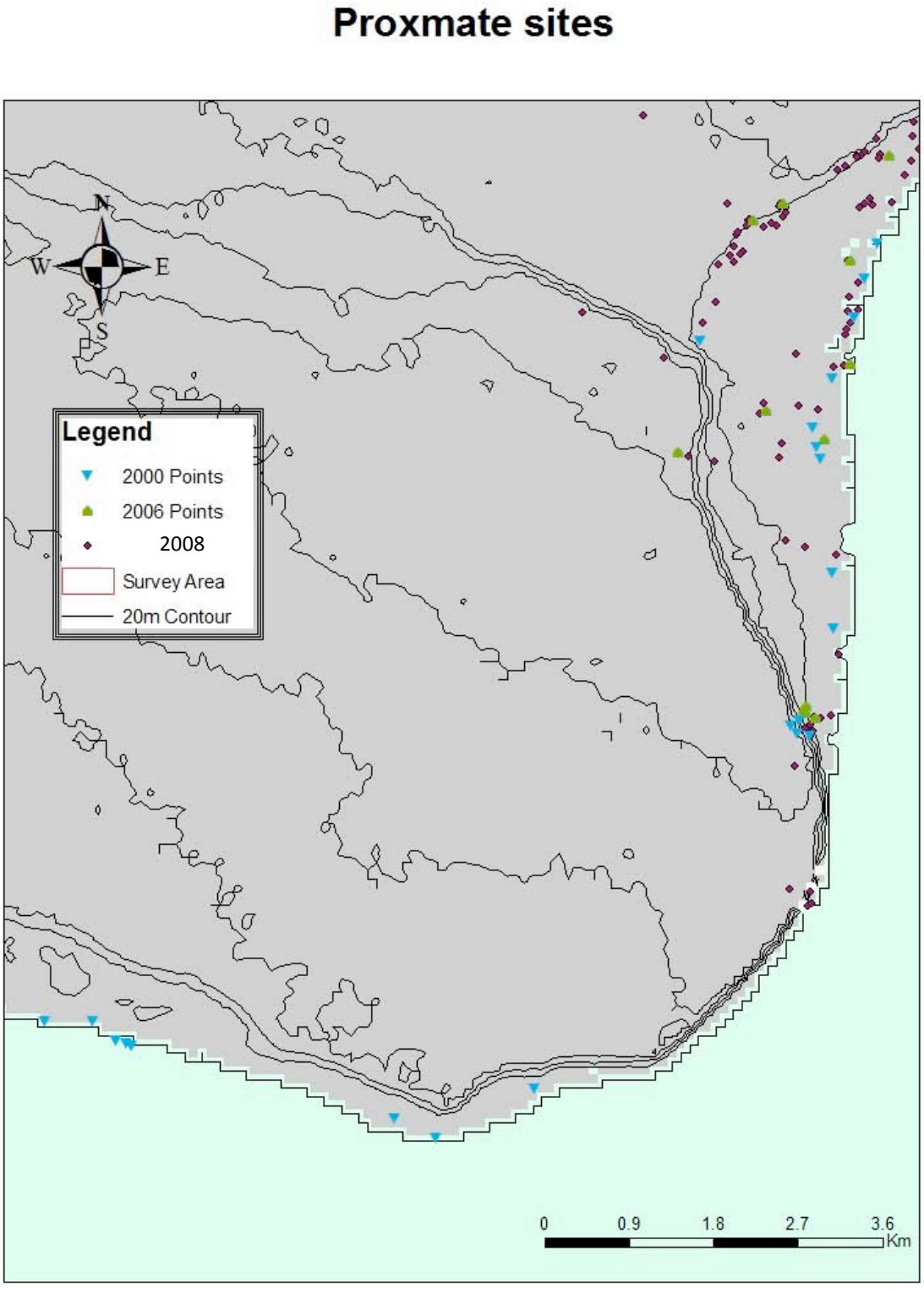
It was possible to easily compare results from the 2006 and 2008 survey quite well. Coppa mapped and collected archaeological material from 13 sites in the area around EL Cabo. By using buffers and comparing site descriptions, it was possible to determine that six of these sites were also visited during the 2008 survey. Alfredo Coppa visited the area north of El Cabo containing St 11, one of the petroglyph sites, and the nearby large cave at St 12.

He also visited the flooded cave site St 14 south of El Cabo. This is the closest flooded cave to El Cabo, located 770 meters southwest of the site. It seems his visit to this site was brief, as only four or five sherds were collected by him, while 176 sherds were found at the site in 2008. It is possible to say the Coppa mapped a couple of the scatters, mapped during 2008 as well. Coppa, visited and collected from St 57, a large but sparse scatter located on the coast northeast of El Cabo. He also mapped another small scatter, mapped during 2008 four kilometers south of El Cabo. This scatter is close to the southernmost flooded cave and the two other rock art sites mapped in 2008.

Coppa visited one of these rock art sites, the site labeled as St 61 during the 2008 survey. This site contains 2 petroglyphs carved on a column of rock and some sherds in the surrounding area. Interestingly, Coppa also mapped another rock art site about 100 meters north of St 61. This site was never mapped or visited during 2008 and may represent a 4rth petroglyph site in the area.

He also mapped two features he classified as mounds, that were not visited during 2008. While there is little description of such mounds, the low mounds at the sites of El Cabo and El Bartolo sometimes represent denser scatters of archaeological remains. However, only a few small weathered sherds were collected by Coppa from each site so it is difficult to say what sort of density of remains these areas may have contained.

Based, purely on descriptions it was possible to positively identify two sites. First of all, pictures and detailed descriptions of a petroglyph site make it possible to identify Olsen's (2000) Site 17 with the site labeled in 2008 as St 61. However, Olsens point is located about 200 meters to the southeast of both Coppa's and the more recent point. It also seems likely that Olsen Bogaert (2000) visited the flooded cave St 44, labeled St 16 in his survey. He describes this site as containing sweet water with sherds in the water (Olsen Bogaert 2000: 25). His point seems to be offset to a similar degree as his Site 17 was from 61, making this identification all the more likely.



6.5 Comparison of Previous Surveys with the 2008 Results

It is also possible he visited St 33. This site is recorded by him as Site 11 (Olsen Bogeart 2000: 23). He describes this site as a cave containing salty water and a fragment of a buren (Olsen Bogeart 2000: 23). Olsen's point is around 300 meters southeast of the St 33. However, it is quite possible that his site represent another flooded cave rather than St 33.

Finally, it seems likely that Olsen Bogaert first mapped St 57. This site is a scatter of sherds on the coast, northeast of El Cabo. Olsen Bogaert maps a point , he records as Site 5, with a similar description (Olsen Bogaert 2000: 20). This site is located about 300 meters southeast of St 57 as well, however, again this site may represent another scatter. Due to the possible error in Olsen's points, it is impossible to correlate any other sites with each other. His descriptions were sufficiently vague to make a positive identification with sites from 2008 difficult.

During the 2000 survey, Olsen Bogaert also visited a small neighbouring pocket to the southwest. He mapped 8 sites in this neighboring region, several containing *Taíno* ceramics. This smaller pocket was never visited by the 2008 survey. The area may be interesting to visit if future work is done in the El Cabo area.

Olsen Bogaert also performed a survey on top of the cliffs, to the southwest of El Cabo in 2001. The results of this survey are interesting because it was an area not explored during 2008. He took 48 GIS coordinates for this campaign (Olsen Bogaert 2001). However, only of these sites contained cultural remains, with Olsen Bogaert, describing these remains as low density scatters. Given this low density of finds it is safe to say that this area was not heavily used, and may not be worth visiting in future surveys.

So its seems that some of the major petroglyph sites, such as St 61, and St 11 were recorded by previous surveyors. Also each survey recorded a couple flooded caverns, however, finding possibly only 3 of the 11 flooded caves mapped in 2008. Also several large scatters on the coast, such as St 57 seem to have been visited multiple times.

Furthermore, Coppa and Olsen Bogaert's surveys point to several areas not visited during 2008. Most interestingly Coppa mentions a possible rock art site that was not mapped during this time, in close proximity to St 61. Each author also mentions several scatters and caves. Since Coppa's points correlated well with the points taken in 2008, it can safely be said that 7 of the sites he visited in 2006 were not visited in 2008. It is much more difficult to evaluate points from Olsen Bogaert's survey. However, each of the earlier surveys may potentially have a high number of sites not revisited during 2008. Augmenting the argument that there is a high density of sites in the region, and meaning that there still may be much to discover in the El Cabo pocket, and on the cliffs above in future surveys.

6.8) **Settlement and site density in the survey area**

There is a relatively dense spread of archaeological remains throughout the EL Cabo pocket. 66 areas mapped in 2006 and 2008 have archaeological remains. This number may be higher with the addition of sites mapped in 2000, though as seen above it is difficult determine, outside of a few large sites identifiable alone, exactly how many of these areas had been previously surveyed. While without a systematic survey, it would be difficult to positively identify areas without much use, it should be able to start identifying areas surveyed that had especially dense use. These areas may represent environments or larger regions with special importance or meaning. Until more meaningful surveys can be carried out a mix of data analysis tools, such as GIS and the archaeologists own judgment must be used to identify such areas (figure 6.6).

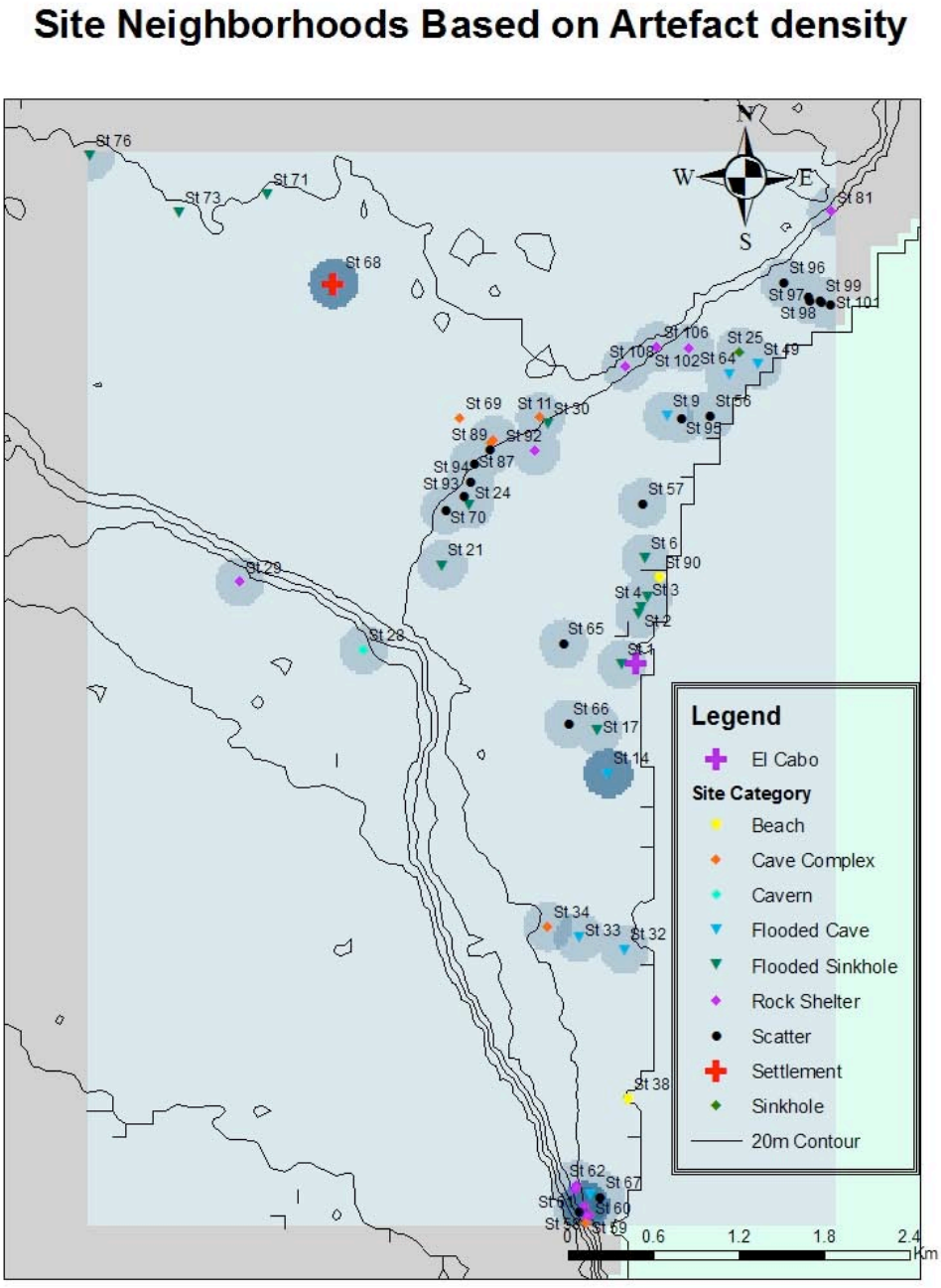
One such cluster would, of course be around EL Cabo itself. The density of and spread of materials was not systematically recorded during this survey, but can be found elsewhere (see Samson in preparation). However, it is possible to see a number of outlying sites outside immediate extent of the site. Such sites include St 1, the most proximate flooded sinkhole to El Cabo, and a number of other closeby sinkholes. Also if data of the spread of sherds at El Cabo itself were included, closeby sites such as St 65, and 66 would possibly also fall within a larger cluster of sites near El Cabo. It seems safe to say that flooded sinkholes, when used were used as water sources.

Another definite cluster of sites with dense remains occurs in the southern region of the EL Cabo Pocket. 8 sites, including St 45, which had a high density of artifacts are clustered in a 300 meter area. This area contains one flooded cavern, 3 rock art sites with sherds, and four scatters. The extent of this area is hard to definitively determine as it was only explored for 3 days, however, there is no doubt dense remains throughout the region. While more excavations need to be done, it at least initially seems that this cluster of remains was not a permanent settlement. Scatters of sherds are concentrated in relatively limited areas, at these different scatters. Furthermore, this area contains possibly 4 of the 5 rock art sites, including Coppa's rock art site, in El Cabo. The implications of this dense concentration of material remains will be discussed more thoroughly in the following section.

While only one large site is currently mapped ontop of the Cliffs, El Bartolo or St 68 this area may also prove to be a cluster of sites on further inspection. Needless to say, the ceramic remains found at this site were very dense. So dense, a complete collection was not made. Furthermore this density of sherds took place over a large extent, which unfortunately was not fully measured during this initial exploratory visit. However, it seems quite likely that the heavy concentration of remains may indicate significant and enduring use.

Other areas may also represent clusters of sites. Such areas include a medium density scatter of points northwest of EL Cabo, centered around St 11 and St 12/13, the two largest caves at the site. However, due to the lower density of remains, it is hard to say if these areas really represent a distinct nexus of sustained or heavy use.

Systematic transecting will be the best way to shed light on true densities and concentration of remains at the site. Without such data is difficult to tell if dense scatters of points truly represent distinct clusters or are part of larger networks of points. Furthermore questions about the overall density of points.



6.6 Site Density Map

Chapter 7: Meaningful Landscapes: Conclusions Regarding Past Uses and Meanings of the Landscape at El Cabo

7.1) Introduction

The area around El Cabo contains a dense scatter of sites representing varied activities and holding different meanings. The following section will examine the results of the survey with the purpose of better understanding both the uses and meanings of these landscapes. Principles from the Ecological approach to landscapes will be used to understand certain aspects of landscape use.

Much of the data, especially from small scatters with limited numbers of sherds, is difficult to meaningfully interpret. However, some types of sites, such as flooded caves, seem to have been actively sought out and preferred for certain activities. Dense clusters of sites in certain areas may also indicate integrated uses or special meanings. This chapter will systematically examine the evidence presented in previous chapters and explain ways that people at El Cabo both went along with and differed from other regional practices. The chapter will first examine water use. Next, short sections will present agricultural practices and marine use. A section will also explore the varied uses and meanings of cave sites and rock art sites around El Cabo. Finally, there will be a section exploring the density of settlements and remains around El Cabo, where it will be proposed that El Bartolo may well be a residential site.

7.2) Settlement patterns and density of sites

While a larger study would be better suited to fully determine the density of sites in the region, something can already be said from the 2008 survey. The transect systematically walked at the end of the 2008 season shows that even areas considered to have a low density of sites contain relatively large densities of remains. Over 200 sherds were found in the transect area, a 30x500m area, with most of these remains found near the coast. Over 66 distinct sites have been mapped in the area, which further attests to the density of remains in the area.

At least one of these 66 sites mapped may be another residential site, given the density of remains found at the site. The site referred to as El Bartolo or St 68, is located in a shallow dip in the rock on top of the cliffs, where there is relatively deep, fertile soil. Furthermore, two fresh water sources, St 71 and St 73, are less than a kilometer away from this site. The presence of deeper soil and fresh water would have been interactive incentives for a permanent settlement.

This area on top of the cliffs contains relatively dense concentrations of remains and many small, low mounds. A variety of pottery was collected from the site, including 18 adornos and many decorated sherds. Both Ostionoid and chicoid sherds were collected during the survey. Green stone tools and shell remains were also present at this site, though interestingly there seemed to be much lower concentrations of shell remains at this site, 4km away from the ocean, than at El Cabo.

Skeletal remains were also found in an earlier visit to the site by Corinne Hofman and Menno Hoogland (Hofman 2009 personal communication). It may well be that the site contains burials rather than a settlement, though it was common throughout the Caribbean to bury people at settlement sites (Curet *et al.* 1998; Hofman *et al.* 2004). Ultimately it will be impossible to definitively determine the use or meaning of this site without further excavations.

7.3) Water use at El Cabo

As we have seen in previous sections, the availability of fresh water is a major limiting factor on human settlement. Life becomes increasingly difficult the farther one lives from dependable, fresh water sources, as a greater amount of energy needs to be used in water procurement. El Cabo's position on the coast placed it in a good position to exploit marine resources in the nearby ocean, and possibly communicate and trade with neighboring groups in Hispaniola, Isla Mona and Puerto Rico. Such resources provided strong incentives to permanently settle in the El Cabo pocket.

However, finding and using fresh water would have been a major challenge during the whole time the site was occupied. El Cabo is located on a highly permeable karst area; also, salinity tests were conducted at most of the major water sources, and no fresh water sources were recorded inside the El Cabo pocket. Many of the water sources in the pocket have high enough salinities to make drinking from them on a regular basis both dangerous and unhealthy. There are some water sources that would have been able to be exploited as drinking water sources. Two water sources visited in 2008 had salinities below 4000 mg salt per liter, the lowest being 3200 mg of salt per liter. However, these water sources are generally avoided by modern inhabitants with only the most marginalized individuals using them for drinking water sources. It may be that salinities varied in the past. Factors such as rising sea level may have lead to higher salinities today. However, due to the properties of karst it seems likely that areas close to the coast always contained somewhat brackish water.

Fresh water sources, such as St 71 and St 73 were available on top of the cliffs 5kms away from El Cabo. It seems unlikely that these water sources were major source s of drinking water for past residents as such journeys would have been onerous to make on a daily basis, especially

for supplying a whole village with fresh drinking water. It is especially appropriate to apply least cost principles to activities such as water use. Studies done in eastern Africa with modern women who still have to walk varying distance to water sources for drinking and household water, show that there are general limits to the distance that such people will walk and the amount of water they can transport(White 1971). One exceptional individual, in White's study was recorded as walking over 4 kilometers and using over three hours to collect water daily (White 1971: 107). However, White generally found that most women spent less than an hour walking as far as a kilometer and a half to find water. The trip to and from these sources took the survey team four hours to make over 10 kilometers of varied terrain including a short but steep climb up and down the cliffs. So, then the question remains, where were past people getting fresh water from, and how did they use water in the past.

Comparisons with modern inhabitants are informative for understanding past behavior. Modern people are constrained by many of the same factors that past people would have had. They do have beasts of burden and in some cases cars and motorcycles, but still seem prefer proximate water sources and local solutions over traveling long distances, for obvious economic reasons. Most modern inhabitants, and more generally people in the Alta-Gracia do not get their water from subterranean sources. Rather large plastic drums are used to cache rain water, which is used for drinking water. Ground water from the least brackish sources is sometimes drunken but is generally avoided due to its taste and perceived quality. Our informants told us that this water was first used by the village during the 1970's and 1980's when the pocket was settled by their families and some individuals who don't have the means to buy the plastic drums still use this water, but it is generally avoided if possible.

Local ground water, depending on its proximity and salinity is used for domestic uses such as cooking food and cleaning clothes, dishes and one's self. Drilled wells and small sinkholes close to the modern village and the archaeological site are generally preferred for this use. More distant and lower quality water sources are also used for watering livestock, with generators and pvc piping in some cases being installed to draw water from deeper sinkholes and caves into livestock troughs.

Finally, modern people also occasionally use flooded caves for bathing and recreation. The closest such cave to the site is St 14, which is about 2 kilometers away. These flooded caves are cool in the summer and have beautiful, crystal clear water making them appealing places to cool off during the warmer summer months. According to our informants, they only occasionally went bathing there, due to perceived dangers of collapse.

It seems reasonable to hypothesize that past residents of El Cabo may have had similar water use patterns. As stated above, it seems unlikely that these people were using either flooded

sinkholes or flooded caves in the El Cabo pocket as primary water sources, due to salinity. Ceramic remains were found around the sinkholes closest to El Cabo, such as St 1, 2,3,4 and 6. All of the sites had relatively low densities of sherds, mostly in the form of scatter around the sinkhole. However, a large, decorated Chicoid sherd was found in St 1, more closely linking it to past use as a water sources. These sinkholes are relatively close to the site, St 6 the farthest away being only 750m from El Cabo. They are also all highly brackish due to their proximity to the sea. St 1, the site only 100m away from EL Cabo, had a modern salinity reading of 8292 mg per liter. So it seems logical to conclude that these sites were not used for drinking water but for other domestic uses such as cooking and cleaning, much like they are today. These sites are both convenient and proximate and still widely used today.

Generally no ceramic remains were found around more distant flooded sinkholes. This does not necessarily mean that they were not used, but does seem to indicate that they were not heavily used. The only exception to this is St 24. This site is located 1.5km northwest of El Cabo. Modern residents generally regard it as the freshest drinking water source in the pocket, and though by no means fresh, its salinity of 3500 mg per liter is quite drinkeable. A couple sherds and a broken greenstone axe were found about 10 meters away from the edge of the sinkhole. It is difficult to definitively associate the artifacts with the sinkhole, itself, though as they were found a ways away from its lip and no artifacts were seen inside of the sinkhole. This site may well have served as a source of drinking water during times of drought or for more marginalized people.

Most artifacts found in or around a water source were found in flooded caves. These flooded caves, which are easily enterable by humans seems to have been a significant category in the landscape for past people, which were heavily used. Seven of eleven caves visited contained archaeological remains in the water. Four of the seven, St 9, St 14, St 33, and St 44 contain 20 or more sherds. The majority of the sherds identified in the water seem to have been from Chicoid vessels, with Ostionoid remains only being found in St 14, mostly out of the water in a dry part of the cave. This may mean that the use of these caves shifted over time, with their use, especially for their water becoming most prevalent in the Chicoid subseries. All caves contain a mix of decorated and plain sherds. Seven anthropomorphic adornos were among some of the more ornate decorated Chicoid sherds recovered.

It has been argue that similar features in other parts of the Eastern Dominican Republic were used as drinking water sources (De Booy 1914; Borrell Bentz 1978; Beeker *et al.* 2002). These arguments are largely based on water quality and artifact analysis. Both broken and whole *potiza* vessels were nearly exclusively found in these flooded caves at Punta Macao and El Parque del Este. The presence of fresh water, and *potizas* made these archaeologists conclude that these areas were used as water sources, and the *potizas* were whole vessels lost in the water or discarded broken vessels. Whether this interpretation is accurate or not can be left for another work.

However, similar types of artifacts and water quality are not found in the flooded caves around El Cabo. Water is generally brackish, with only one of the four most heavily used caves, St 9, having currently drinkeable brackish water. Furthermore there is a variety of modern salinities for these caves, ranging from 3200 mg per liter at St 9 to over 8,000 mg per liter at St 44, showing that salinity, which we assume to be at least proportional between sites in the past since it is decided by slowly changing geological factors, was not a major reason these sites were chosen. These flooded caves are not all proximate to El Cabo, with St 44, the most distant site located 4 kilometers away from El Cabo, showing that distant was not a major reason they were chosen either. Finally, based on the sherds and rims recovered, these sites did not contain *potizas* or preserved artifacts appropriate for carrying water over long distances. Rather, of the seven rims identified from the site, 7 of them belonged to vessels described as restricted vessel with simple contours and 2 belonged to restricted vessels with composite contours (Hofman 2007b). These vessels are often synonymous bowls (Hofman personal communication 2009). So, it seems safe to conclude that these sites were probably not used as water sources. But the question remains what were these sites used for?

The most plausible interpretation is that these sites were used for bathing. Bathing as seen by the Spanish chroniclers was recognized as a common and important practice (Las Casas 2002:[1] 260). Rivers were commonly used as bathing sites, but given El Cabo's lack of rivers, these caves would have been the most easily accessible and attractive bathing spots. While it would have been possible to bathe in the sea at beaches as well, the currents, tide and sharp rocks would have made bathing there more dangerous, than in these flooded caves. Less saline water and a cooler atmosphere would have made these spaces attractive bathing spots for modern people. They no doubt were attractive in the past as well.

Using ethnographic comparisons, and archaeological evidence it has been argued that bathing may have been part of certain rituals as well (Alegria 1978: 134; Wilson 2007; Wilson 1993a; Wilson 1990; Stevens-Arroyo 2006). Such subterranean spaces would have been symbolically potent, given the special ritual meaning of both caves and water. Associations between caves and the underworld may have made these areas potent parts of the sacred landscape. Bathing may have been another form of ritual cleansing, along with vomiting, for the cohoba ritual. It may have also been an important ritual element to activities such as body painting, an activity still seen today among the Black Carib on St Vincent (Stevens-Arroyo 2006: 146). Decorated ceramic bowls may have been used to mix herbs and fruits used as soaps, such as the *jobo* fruit recorded by Las Casas, with water. Broken vessels from such activities may have been discarded in the water.

Another possibility is that these sites were used for caching, much like the Manantial de Aleta (Beeker 2002; Conrad 2000). The size of sherds found and their fractured nature contrasts greatly

with the Manantial de Aleta, where whole vessels or large sherds have been used to argue that complete vessels were being dropped in the water. While some of the decorated adornos are quite ornate, and there are decorated shards in the water of these flooded caves, the types of artifacts emerging from the caves do not compare in quality with the Manantial de Aleta. While the caves at El Cabo could have been charged with some special ritual significance, the size, depth and other features of the Manantial de Aleta make it stand apart as a liminal spot. Despite these differences, it seems possible, though unlikely, that the sites were used for ritual caching.

So, the final question remains – if past people were not largely using flooded caves or flooded sinkholes around El Cabo, where were they getting their drinking water? While the evidence seems to indicate that people were not regularly using ground water in the El Cabo pocket for drinking water, there is no direct evidence where they were getting their drinking water from. It seems plausible that they may have engaged in rainwater collection, like local people, to supply most of their drinking water. But there is as not yet evidence either for or against this theory in the archaeological record.

7.4) Farming in the El Cabo pocket

It is clear from ethnohistoric sources that the farming of a variety of plants was an important part of subsistence strategies during the contact period. The plants included cassava, maize, potatoes, and zamia. There is little direct evidence of these practices at El Cabo. However, it may be possible to make some educated guesses about farming by looking at modern usage and examining the landscape for areas with deeper, more fertile soil. Karst landscapes are often excessively poor at trapping and keeping soil. In many places in the El Cabo pocket, there is only a shallow covering of soil, and in some places soil has eroded away, exposing the underlying rock.

Slash and burn agriculture was practiced in some parts of Hispaniola (Oviedo 1871: [1] 279). This is the case in many karstic areas, including the Yucatan peninsula, as most of the nutrients and biomass are taken up in trees and vegetation in these areas. Modern farmers practice slash and burn agriculture as well for growing water melons, papaya and other assorted fruits and vegetables suited to the environment. This seems to happen more in large flat areas with relatively shallow soil. Large areas of these flatlands may have been cleared in the past, as well as the present, for crops such as zamia and cassava.

Las Casas talks of the practice of planting cassava and other plants in holes, both large and small, when describing the area of Higuey (Las Casas 1992:[1] 259). Today, several of the large sinkholes in the pocket and on the cliffs above stand out as potentially fertile areas that are exploited for agriculture in the present and may have been used in the past. These sinkholes serve

as sinks that trap and retain eroded soil from the surrounding area. Soil is sometimes relatively deep in these sinkholes and they can be quite large as well. The sinkhole on top of the cliffs containing St 76 had a large radius, which was impossible to measure with the equipment on hand. Many of these sinkholes are much smaller, often measuring about 20m across. Modern people use the thick soil to plant fruit trees, such as mangos and other garden plants. Such sinkholes may have been exploited as areas for growing gardens in the past as well. No sherds were found in any of the larger sinkholes visited in 2008. More extensive investigations, including possible nitrogen or potassium sampling, may provide better proof of past use in these areas.

7.5) Past seascapes

Needless to say, shellfish remains are some of the most common faunal remains found both at El Cabo itself and at sites visited, such as St 44, where seven or eight whole conch shells were found in the back of a cave. Obviously, exploiting marine resources and trade was a major attraction for people settling El Cabo.

This being said, most of the coast is relatively rocky, and there are few suitable places to launch canoes along the coast of the El Cabo pocket. Beach sites had previously remained undiscovered until the 2008 season, when Alice Samson, after talking to locals, discovered the location of one of these beaches, St 90 (Samson personal communication 2009). Another smaller sand beach, St 38, is also located about 3 kilometers south of El Cabo, though this beach is only 8 meters wide. No artifacts were found associated with either area and it is impossible to say whether these areas existed in the pre-Columbian past. Local informants assured us that these beaches had existed for as long as they had lived there, but beaches are relatively ephemeral landscapes which can be eroded and moved by gradual processes or suddenly moved by large storms. However, based on the existence of these two beaches, it may not be unreasonable to postulate that beaches existed there or somewhere else in earlier times as well. These sites would have made the best spots to launch canoes for fishing and other activities, as seagoing vessels would run the risk of destruction when landing on rockier areas. The two beaches, especially St 90, are still quite rocky and relatively unprotected from rough seas. So these spots are not great sites for embarking and disembarking boats. However, it is still possible to land boats at these points.

7.6) Cave sites as temporary shelters: two possible sites at El Cabo

Caves could sometimes have been used as temporary shelters, for Las Casas states that caves were the preferred area to shelter from hurricanes and large storms (Loven 1935: 121). Generally any kind of cave would have made a good shelter from storms. However, caves further inland that were relatively large and sheltered, such as the cave at St 28, would have made ideal shelters.

According to our informants, St 28 had been used by modern people about ten years ago as a shelter from a storm. A couple of sherds were found in the cave as well, suggesting it had been used in the past.

As seen in Chapter 4, cave sites may have had a variety of uses and meanings in the past. One potential use of such caves may have been as temporary shelters. Two sites visited during the 2008 campaign may have been used as shelters. These sites, St 34 and St 29, are both relatively shallow caves that are well lit by natural light. Ceramic scatters are found inside both caves.

These caves may have been used as convenient overnight camps for people ranging farther from the site. St 34 is the larger of the two sites, located 2 km south of El Cabo. The cave consists of a large entrance which narrows progressively into a crawlspace as one moves deeper into the cave. Most of this space is well illuminated by natural light yet gives good protection from the elements. 82 sherds were found in this first chamber. There is a narrow passage one must enter by crawling that connects the first chamber of the cave with a second chamber. The second chamber is devoid of sherds. However, 8 or 10 nearly complete large sea shells, including specimens of conch, were found in the back chamber of the cave, along with relatively deep deposits of rich, black soil.

The presence of the faunal remains at St 34, linked with broken sherds in the first chamber, suggests that food was eaten and prepared at this site, making it more likely that it may have been a temporary shelter. Then, remains were discarded in the entrance of the smaller second chamber. The smaller size and open shape of these caves may have set them apart from the larger caverns full of bats, which were probably both considered sacred areas and feared due to their association with opias.

Site 29 has far fewer remains, with only six sherds being found at the site. However, it too has a good shape for a shelter. It is large enough for several people to easily lie down in, yet due to its shape is well illuminated by natural sunlight. It is harder to convincingly argue this cave was a shelter than it is for St 34; however, this cave is on top of the cliffs, about 2 km west of El Cabo, and this proximity may have made it an attractive shelter. Such spaces were relatively safe, being well lit in the day and lacking the bats and owls so often associated with death, yet providing shelter from the elements. Such caves contrast with other, larger caves, which seem to have possibly been associated with burials or ritual usage.

7.7) Caves as burial and ritual sites

There are four larger caves that deserve to be talked about as possible ritual sites. Unfortunately all of these sites have been heavily looted, so a great deal of archaeological

evidence has been destroyed or moved. However, based on the fragmentary data available, it may be possible to correlate some of these sites as important points in a local sacred landscape.

The first two caves worth talking about are St 11 and St 12/13. These two caves are the largest caves fully investigated during the 2008 survey, with entrances in the cliff face a kilometer northwest of El Cabo. Limited amounts of ceramics were associated with each cave, and multiple small scatters were found in the areas near the entrances to these two caves. St 11 is the larger of the two. A petroglyph which depicts a simple face was found near the entrance of the cave (Figure 7.1). Lopez Bolando (2007), among others, mentions that such faces are often located in large caves, in the transitional zones of the cave that still receive natural light. These sorts of faces may be related to the myth of Marocael, who got turned to stone by the sun at the entrance of the cave of creation (Pané 2002: Chapter II). There were both bats and an owl, which were noted by Pané as symbols of the underworld and are common motifs on Chicoid ceramics, in this cave. Not much could be said from the sherds found, since they were small and eroded, but the presence of the petrogyph as well as the sheer size of the cave makes it seem plausible to argue that it may have had ritual connotations in the past. This argument strengthens when taking into account St 12/13 a few meters away.

Figure 7.1: Petroglyph at St 11

St 12/13 cave is nearly as large as St 11. It consists of two large chambers with a narrow passage connecting the chambers. St 12 is one entrance and St 13 is the entrance to the second chamber. Unfortunately this site has been heavily disturbed by looting, which is quite visible due to the large mound of moved dirt and a discarded screen at the entrance at St 12. Several stone tools are discarded near this pile of dirt but no sherds were recovered. Menno Hoogland reports that on a previous visit he saw skeletal remains in this cave (Hoogland 2009: personnal communication). No remains were found in 2008, but if this is true the cave may have contained burials in the past. In any case, something must have been found in these caves given the amount

of effort expended by the looters. Several small sherds were found at the St 13 entrance, though none were able to be identified. Our informant also told us a story of how his grandfather found a *duho* inside the cave at the St 13 entrance. This story is impossible to verify, and may well be made up to impress the investigators. However, similar stories are often attributed to other duhos and carved objects found in caves that are presently in museum collections (Fewkes 1919). It seems logical to treat both of these caves together, as they are the two largest caves fully explored in the El Cabo pocket. The large size of these caves, which are dark and filled with bats and other creatures, may have made stand out in the overall landscape as places with greater connections to ancestors and the underworld. The placement of burials and the creation of petroglyph are strong indicators of such a connection. Unfortunately, due to looter activity, it will be difficult to understand more about these sites, especially ST 12/13, as its context has been disturbed and most artifacts and/or skeletal remains have been removed.

Another intriguing large cave site is St 69. This is a cave located on top of the cliffs west of El Cabo. The cave contains a large vertical entrance, dropping about 4 meters into a cave of unknown dimensions. Unfortunately it was impossible to enter the cave due to a lack of climbing equipment. However, 15

7.2 Posthole at St 69

posthole-like features were discovered in the roof of the cave, about three meters to the north of its entrance. These holes were varied in diameter, with the widest measuring about 14 cm. The circular and uniform shape, as well as chip marks seen on the wall of these holes, makes it probable that they were created by past peoples. These holes were obviously not postholes, as they penetrated the roof of the cave, whose floor was about four meters below. It seems more

likely that the holes were used for lighting the cave below. Little else can be said about the contents of the cave until it is explored by future projects. However, light must have been important for people using the cave below (figure 7.2).

Finally, the last cave with artifacts worth mentioning is St 76. This cave is one of the most distant sites visited during the El Cabo survey, located over 5km to the west of El Cabo. It is located in a large sinkhole on top of the cliffs, near a large and possibly quite old cieba tree. The cave itself is quite deep, possibly as much as 30 meters deep with a pool of water at its bottom. The pool is currently partly blocked due to rock fall, but had been visited by informants in the past. Deep within this cave, in a couple of small rooms about 20-30 meters below the surface, a layer of ash was found with freshly broken Ostionoid sherds located on top of the ash. The fresh breakage of many of these sherds shows that they were probably broken by modern looters rather than by past peoples. It is extremely difficult to determine what this area was used for in the past. It is tempting to hypothesize that the area may have been a burial site or other type of ritual site. Ash layers, and to a lesser extent cached pottery, are commonly found with cave burials from the Ostionoid and other periods in Hispaniola (Morban Laucer 1979). However, no bones were found during the short and inexhaustive explorations of these remains. The area with cultural remains is by no means easily accessible, as it is a steep climb both into and out of these rooms of the cave. Furthermore, they are located deep underground and close to water. Such an area deep underground may have had special meaning as a sacred spot in the past. This is certainly the case with the *Taíno*, as Pané and other's document their views of caves. It seems quite plausible such associations were common in earlier times as well. However, more extensive exploration and documentation of remains will need to be done to more fully understand this somewhat enigmatic site.

7.8) Petroglyph sites in the southern El Cabo Pocket

A dense cluster of sites are present at the extreme southern portion of the El Cabo pocket. This cluster has already been superficially dealt with in Chapter 5. Three of the four petroglyph sites, including the site reported by Coppa, were found in this cluster of sites. The cluster also includes several scatters of Chicoid and Ostionoid sherds, and St 44, a flooded cave. It seems likely that this space may represent a larger sacred landscape, where a number of non-residential activities took place.

St 45 is the site in the cluster with the densest remains. It was first discovered during the 2008 survey. The site is located at a small rock shelter created by a boulder leaning on another. Over 140 sherds with both Ostionoid and Chicoid remains were found in the area surrounding the rock shelter. A single petroglyph depicting the outlines and features of a simple face was found on the northern wall of the rock shelter. Surface finds were quite dense at some points, with over 140

sherds found in a 1x1m area laid out in front of the cave. A number of plain and decorated vessels of a variety of types were found around this rock shelter. All sherds that could be identified were identified as Chicoid, meaning the site and possibly the petroglyph were probably only used during later times. Some sherds were quite large, suggesting that they were possibly parts of broken vessels recently removed from the earth by looters, rather than more exposed and widely scattered fragments from pottery breakages during a pot's use-life.

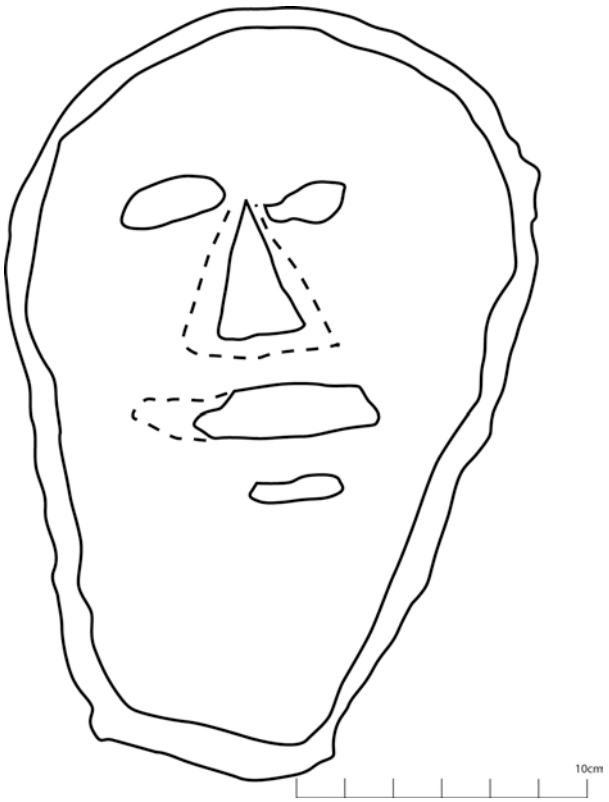
The petroglyph itself (figure 7.1,7.2) portrays what is either a face, or mask. The outlines of the petroglyph are somewhat suggestive of a skull shape, rounded on top of the head, but with a flat angled jaw. Furthermore a triangular nose is somewhat evocative of a skull. The outlines of the head, which are far from realistically proportioned and vaguely kite shaped, may also represent a mask.

The presence of old rum bottles and other disturbances make it clear that this site has been looted in the past. The local name, "El Cementario de los Indios" is quite evocative, to say the least. No human remains were found during 2008, giving little basis to this name. While ceramic remains were dense at certain points, these remains did not seem extensive enough to merit a permanent settlement at the site.

However, more extensive investigations and excavations will need to be done to determine the meaning of this site.

St 61 is the other petroglyph site, located about 100 meters north of St 45. It consists of a long overhang in the rock, creating a wide rock shelter. The site has been visited both in 2000 and 2006. It contains the two other petroglyphs, carved on a natural rock column (figure 7.3). Both Chicoid and Ostionoid sherds were found in close proximity to this site. It is hard to say what the original density of remains at the site was, due to collecting by past projects.

One of the petroglyphs may well depict a stylized owl (figure 7.4,7.5). It consists of two deeply pecked eyes, a motif commonly associated with owls, surrounded by a vague oval shape. This may also be a stylized depiction of a face or a mask, though it seems more likely that an owl is depicted. Below it on the rock column is a representation of a simple face (figure 7.6,7.7). The face is made up of three ovals in a triangular formation, making two eyes and a mouth, the mouth oval being larger than the eyes. No doubt, as is commonly seen at other sites, the carvers of the petroglyph were tempted by the



7.3 Drawing of Petroglyph at St 45

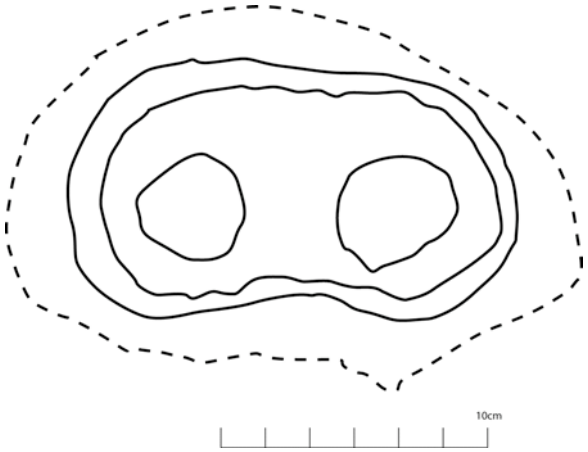
7.4 Photo of Petroglyph at St 45

natural rock column. The natural features of stalagmite and rock columns are often used to add extra depth and style to carved rock art (Watters 1991; Perdomo *et al*. 1983). If petroglyphs can be considered as *cemis*, which Roe (2005) and Oliver (2005) have argued, then vaguely humanistic rock formations such as stalagmites and rock columns may have been seen as communicating this quality through their form to *behiques* or earlier ritual specialists.

All in all, it seems logical to argue that the cluster of scatters and rock art to the south of the El Cabo pocket signifies an important area with possible ritual connotations. The area is littered with boulders, which may have had special significance to inhabitants at El Cabo, as remains are found associated with other boulders in the pocket, such as St 102 and rock shelters. This cluster of sites is also located in one of the most naturally beautiful regions of the El Cabo pocket (figure 7.8). It is impossible to say what past land cover was, or if the coast was visible from most sites in the cluster, but pink inland sand beaches, small bays cut in the rock, and sea stacks in the extreme south of the pocket create a visually striking and unusual backdrop in proximity to these sites. Either the natural beauty of this area or special properties of certain boulders or rock shelters must have attracted past people to the area. St 44, the flooded cave, may also have been associated with

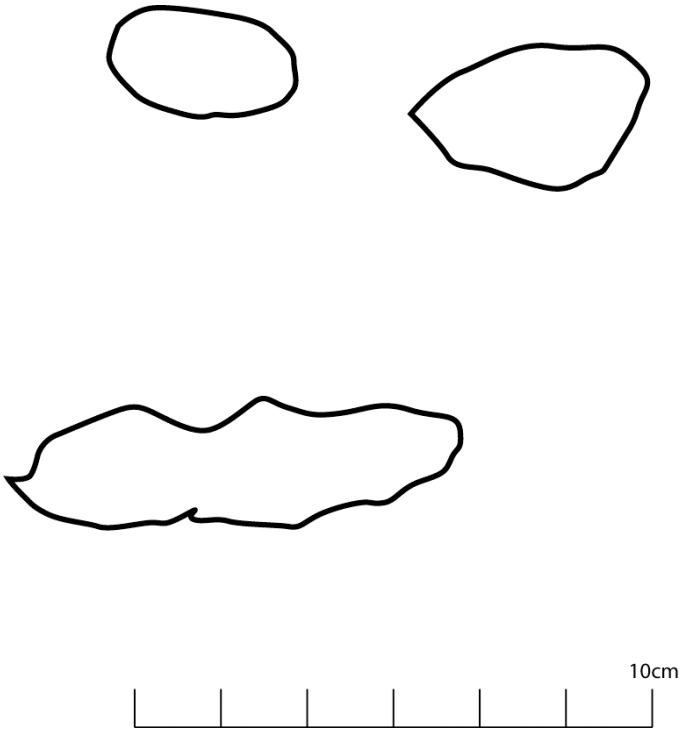
these sites. It may have served as a bathing area, associated with its own rituals and/or rituals performed at petroglyph sites. It also may have been simply a source of water for various uses at these nearby sites. Water from the cave was probably not drinkable, as modern salinity levels were over 7000 mg per liter, the highest salinity of any of the flooded caves with extensive remains. In any case, it seems most appropriate to argue for wider uses and meanings for the cluster of sites located in the south. It seems likely that more systematic explorations of the area would unearth more scatters and possibly more rock art sites.

7.5 Rock Column with Petroglyphs at St 61



7.6 Drawing of upper petroglyph at St 61

7.7 Photo of upper petroglyph



7.8 Drawing of Lower Petroglyph at St 61

7.9 Photgraph of Lower Petroglyph at St 61

7.9) Ostionoid vs. Chicoid landscape uses and meanings

7.10 Landscape in Southern El Cabo Pocket

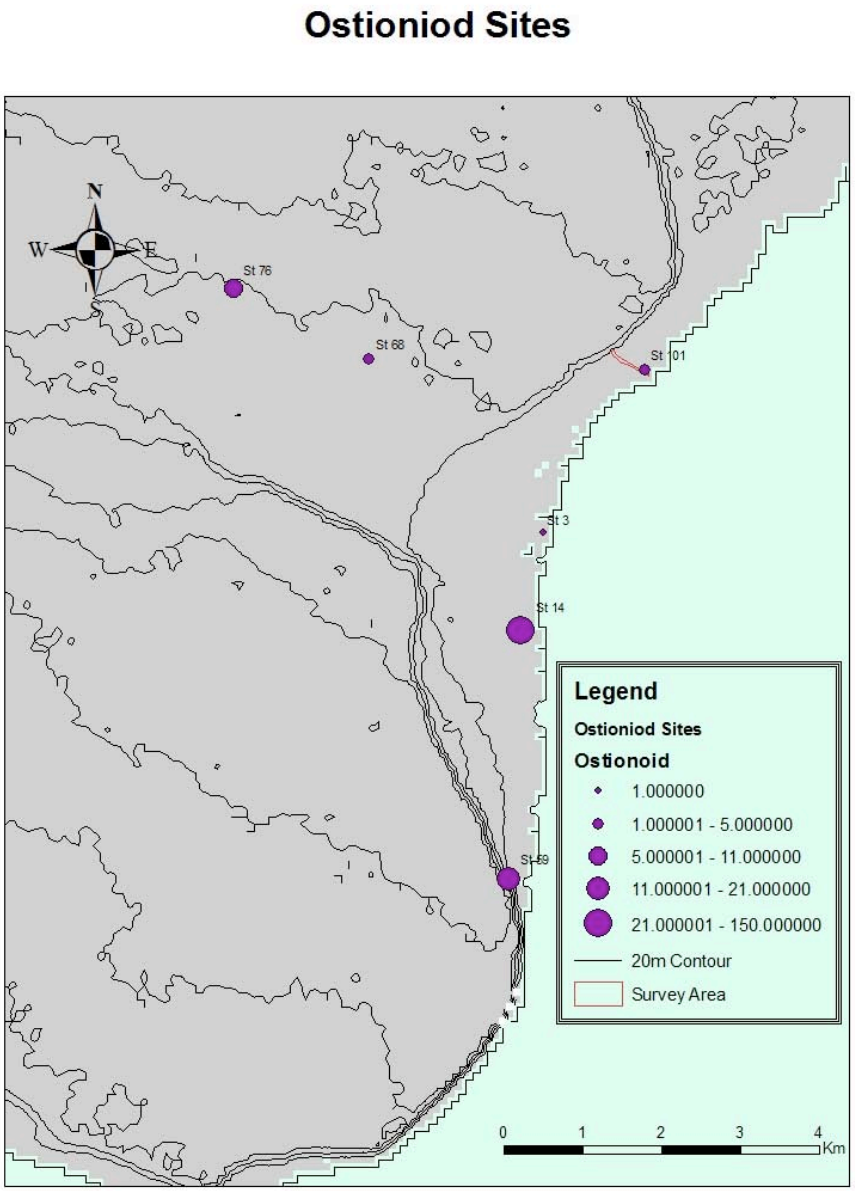
Unfortunately, due to the difficulty of identifying sherds in the field, it was possible to place sherds at less than half of the sites visited during the survey securely into the ceramic chronology. Sherds from 11 sites were securely associated with Chicoid remains (figure 7.10) and sherds from 5 (Figure 7.9) sites were associated with Ostionoid remains. Some sites contain both Ostionoid and Chicoid sherds, showing they may have been used over larger time periods. El Bartolo contained both Chican and Ostionoid sherds. The site is in an attractive spot for a residential site, so this find may show that the site was occupied for a long time. Other scatters of sherds in the cluster located in the southern corner of the El Cabo pocket, such as St 62 and 64, seem to contain both Ostionoid and Chicoid sherds as well, possibly noting the area was frequented for an extensive period of time.

St 14 also contains a mix of Chicoid and Ostionoid remains. This site was the only flooded cavern in the El Cabo pocket to contain Ostionoid remains. There was a clear distinction of where remains were found inside of St 14. Most Chicoid remains were recovered from the pool inside the flooded cave. However, the majority of small, eroded Ostinioniod sherds were found on boulders elevated out of the water inside of the cave. It is difficult to say if this is meaningful or not. However, it does seem that, on the whole, flooded caves were more widely used as water sources during the chican period than earlier, based on the evidence collected. It may be possible that activities such as ritual bathing only became important in later times.

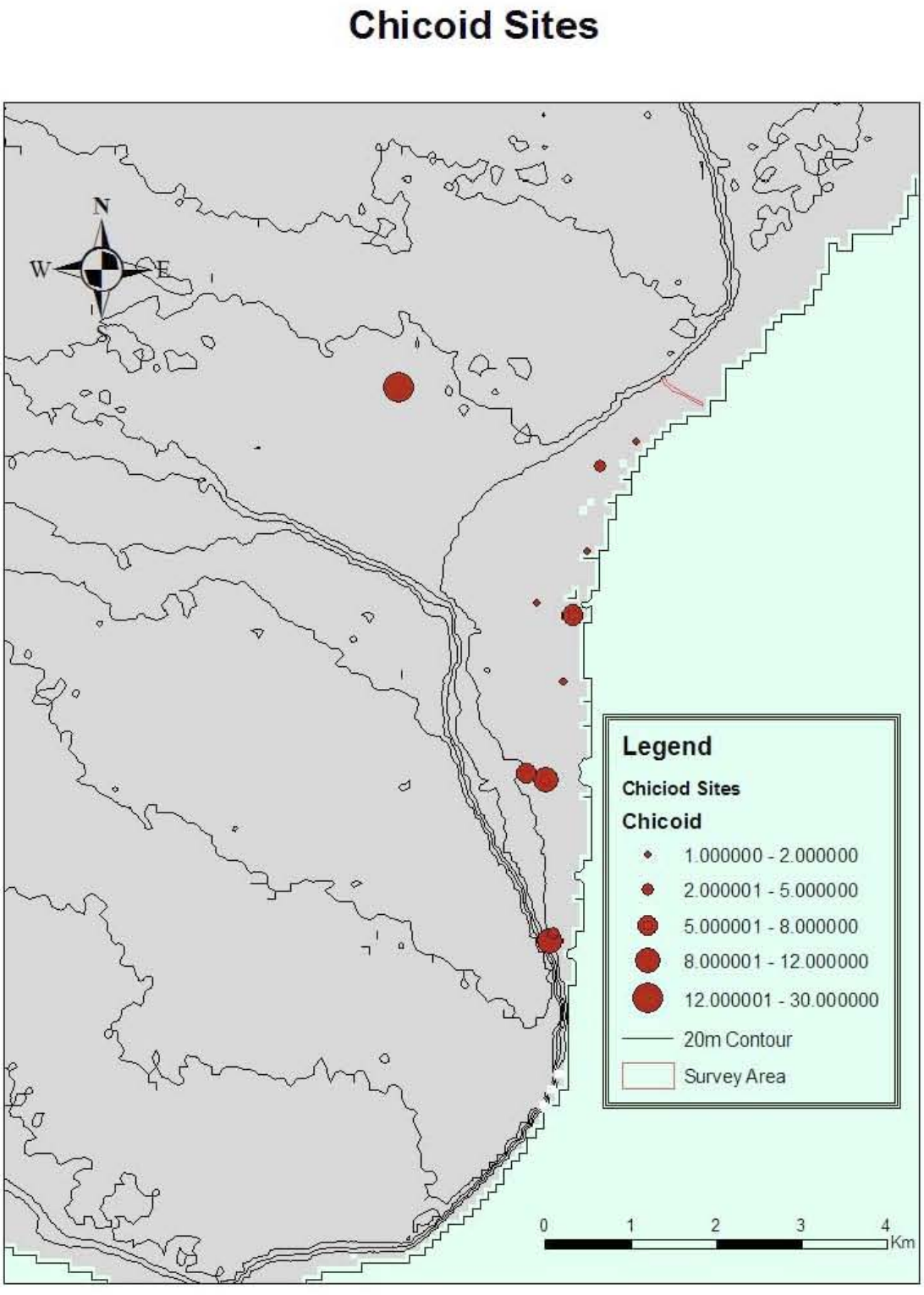
St 76, which contained exclusively Ostionoid remains, can also be considered a flooded cave, as there is a deep pool of water in the deepest recesses of the cave. Unfortunately this water was not able to be explored, due to a recent rock fall impeding our access to it. However, it seems the site was extensively used during Ostionoid times, only to fall into disuse during later periods. This was one of the only large sites with exclusively Ostiniod remains.

Other large sites, such as St 45, seem to be exclusively associated with Chicoid remains. This may mean that St 45 and other sites, such as the three other flooded caves, St 9, St 33, and St 44, were only used in later times. It may also imply that the petroglyph at St 45 was carved by later people.

Overall, it seems like the landscape was most heavily used in the Late Ceramic, given the higher density of clearly Chicoid remains. Such a situation is beginning to be seen at the site of El Cabo too (Hofman 2009: personal communication). Lower densities of Ostionoid pottery can be found at several



7.11 Ostionoid Sites



7.12 Chicoid Sites

sites throughout the valley. The use of specific sites, such as flooded caves as bathing sites, may be possible to associate with the Chicoid period as well. More systematic surveys can expand our knowledge of these trends in the future. Furthermore techniques such as XRF analysis can provide further insights into the origins and spread of Ostionoid and Chicoid sherds, and possibly substyles within these subseries as well. In any case, while there is still much to be discovered about the spread of Ostionoid and Chicoid sherds in the El Cabo pocket, some conclusions can already be made. Most importantly, it can be concluded that Chicoid remains are more numerous and widespread than Ostionoid remains. This may signify heavier occupation during later time periods.

7.10) Conclusion

There is generally a dense spread of archaeological remains in the El Cabo pocket. Over 66 sites have been mapped in this and in past surveys. While there is still much to be learned about how this landscape was used in the past, these sites have provided several useful insights into past lifeways and systems of meaning. Clear chronologies of use can begin to be determined for some sites in the pocket. Also, certain types of features, such as large caves and flooded caves, seem to have been actively sought out and used by residents of El Cabo. Finally, there are clusters of sites, such as the cluster seen in the south of the El Cabo pocket, which may have been linked in shared usage or meanings.

It has also been possible to make a few conclusions about the specific uses and meanings of the landscape based upon the archaeological evidence recovered. Major limiting environmental factors influenced many behaviors at El Cabo. Water use is one prominent example of this, where environmental conditions may have posed major challenges to past inhabitants. It seems most likely that water use may well mirror present day practices, where ground water is not drunk but is used for other domestic uses and bathing. Also, given the mix of ethnohistorical evidence, and ecological limitations it seems logical that slash and burn farming was utilized on much of the pocket. Large sinkholes, which serve to trap eroded soils and keep these soils from escaping, may have been especially fertile and heavily exploited. Beaches found at the site may have served as launching zones for canoes.

By using the ethnohistoric sources, and archaeological work it is also possible to identify some sacred landscapes. These sources show that caves, rivers and other water sources sometimes had deep meanings for past inhabitants. It seems that caves and caverns at El Cabo had special places and meanings to past inhabitants, parallel to other cave sites in the Greater Antilles. The presence of burial sites or petroglyph give set these areas apart as liminal zones with special

meanings. Large size, or unique shape, or the presence of bats may have set some caves apart as especially important. Also, boulder zones, such as that seen in the extreme south of the pocket, may have sometimes been ritually potent environments. Finally, petroglyphs seem often to have been carved on stalagmites or rock columns, which vaguely evoke the human form. These petroglyphs mostly represent faces, but one petroglyph may depict an owl, a creature associated with death and the underworld in Pané's work. So, it is possible to make some conclusions about sites located in the El Cabo pocket.

It is believed that good, reliable results were achieved through this opportunistic survey. More representative results may be obtained by walking transects in the future. Remote sensing may also be a viable technique to uncover more cave sites in the area. It may be possible to detect these features, using high quality satellite images or it may even be worth making LIDAR images using new vegetation penetrating technology (Crow 2007, Donneus 2008, Gallegher 2008). Also chemical testing for nitrogen or potassium may be used to determine past agricultural practices or determine activity areas in the larger sites, such as El Bartolo or "El Cementario de los Indios". Such studies have been successfully undertaken in Mesoamerica to discover activity areas, where fires may have regularly been built or cooking might have taken place (Wells 2004).

Further investigations are needed at two sites, El Bartolo and St 45 "El Cementario de los Indios". More intensive explorations, including excavation need to take place at these sites to more fully determine how they were used. The area around St 45 also needs to be more systematically explored. It would not be surprising if more remains were found in this area, given the overall density of remains found in the short time used to explore that area. Two other sites also need to be revisited as they were unable to be fully explored during 2008. Firstly, St 69 needs to be revisited. This site contained the 15 anthropogenic holes. The cave below, however was never explored. At the time it was deemed unsafe to enter it, due to a lack of rope or any other climbing equipment. St 25 is the other site that needs to be revisited. This site was classified as a flooded sinkhole as it is accessed by a vertical shaft. However, the space below opens up into a large, submerged flooded cavern. Rumor has it that looters entered this hole with diving equipment and extracted several whole vessels. It would be interesting to enter this cave in the future with proper climbing equipment and possibly diving equipment.

Finally, further surveys on top of the cliffs need to be done. During the brief time spent in this area, informants reported on a number of large caves.More archaeological remains could be found in this area. Another smaller pocket, to the southwest of El Cabo may also be worth visiting. It is accessible by following the coastline south until it swings west. Evidence from these areas may expand our understanding of the area. So, much work remains to be done understanding the area around El Cabo. Such research may eventually add to our understanding of larger, regional relations in Eastern Hispaniola.

Work Cited

Aitken, R. T.
1918 A Porto Rican Burial Cave. *American Anthropologist* 20(3):296-309.

Alegria, R.
1978 *Apuntos en Torno a La Mitologia de los Indios Taínos de los Antilles Mayores y sus Origienes Suramericanos*. Museo Del Hombre Dominicano, Santo Domingo, Dominican Republic.

Amodio, E.
1991 Relaciones Interetnicas en el Caribe Indigena Una Reconstruccion a Partir de los Primeros Testimonios Europeos. *Revista de Indias* LI(193): 571-608.

Anschuetz, K., R. Wilshusen and C. Scheick
2001 An Archaeology of Landscapes: Perspectives and Directions. *Journal of Archaeological Research* 9(2):157-211.

Ashmore, W. and B. Knapp
1999 Archaeology of Landscapes: Constructed, Conceptualized, Ideational. In *Archaeologies of Landscape*, by W. A. and B. Knapp eds. Pp. 1-33. Blackwell Publishers, Oxford, England.

Atiles, J. G.
2003 La Cueva de La Cidra: La Pictografia de un Pajaro Carpeintero, su Coincidencia con el Mito de Pané y las Leyendas Suramericanas Del Origen de las Mujeres. *Boletin Museo del Hombre Dominicano* 34: 31-40.

Atiles, J. G. and E. Ortega
2001 Un Sitio Llamado el Manantial de La Aleta. *Boletin Museo del Hombre Dominicano* 30: 33-51.

Atkinson, L. G.
2001 The Distribution of *Taíno* Cave Art Sites in Jamaica. *In* the proceedings of the XIX International Congress For Caribbean Archaeology, vol 2., L Alof and A.C.F. Dijkhoff, eds. Pp 300-313. Aruba: International Association for Caribbean Archaeology.

Ayes Suarez, C. M.
1996 *La Cueva del Cupey*. 1 ed. Serie Arqueológica. Publicación Ocasional 1. Centro Gráfico Grafito, San Juan.

Babb, L.A.
1970 The Food of the Gods in Chhattisgarh: Some Structural Features of Hindu Ritual. *Southwestern Journal of Anthropology*, 26(3): 287-304

Barth, F.
1974 *Ethnic Groups and Boundaries*. Waveland Press, New York.

Basso, K.
1996 *Wisdom Sits in Places: Landscape and Language among the Western Apache*. University of New Mexico Press, Albuquerque, New Mexico.

Beddows, P., P. Blanchon, E. Escobar and O. Torres-Talamante
2007 Los Cenotes de la Peninsula de Yucatan. *Arqueologia Mexicana* 13(83):32-35.

Beeker, C., G. Conrad and J. Foster
2002 *Taíno* Use of Flooded Caverns in the East National Park Area, Dominican Republic. *Journal of Caribbean Archaeology* 3:1-26.

Beets, C. J., S. R. Troelstra, P. M. Grootes, M. J. Nadeau, K. van der Borg, A. F. M. De Jong, C. Hofman and M. Hoogland
2006 Climate and Pre-Columbian Settlement at Anse a la Gourde, Guadeloupe, Northeast Caribbean. *Geoarchaeology* 21(3):271-280.

Bird, D. W. and J. F. O'Connell
2006 Behavioral Ecology and Archaeology. *Journal of Archaeological Research* 14:143-188.

Borrell Bentz, P.
1978 Buceo tras los *Taínos*. *Boletin Museo del Hombre Dominicano* 11: 17-26.

Bourdieu, P.
1977 *Outlines of a Theory of Practice*. Cambridge University Press, Cambridge.

Bradley, R.
2000 Seeing Through Stone: Rock Art Research as Landscape Archaeology. In *An Archaeology of Natural Places*, R. Bradley ed. Pp 64-80. Routledge, London.

Bullen, R. P.
1973 Certain Petroglyphs of the Antilles. *In* Proceedings of the Vth International Congress for Caribbean Archaeology. Pp 94-109. Antigua: International Association for Caribbean Archaeology.

Calderon, F. L.
1977 Enterramientos Humanos y Patologias de Cueva de Berna. In *Arqueologia de Cueva de Berna*, M. Veloz Maggiolo ed. Universidad Central de Este, San Pedro de Macoris, Dominican Republic.

Carrera Stampa, M.
1949 The Evolution of Weights and Measures in New Spain. *The Hispanic American Historical Review* 29(1):2-24.

Castro, D.
2007 *Another Face of Empire: Bartolome de Las Casas, Indigenous Rights and Ecclesiastical Imperialism*. Duke University Press, Durham, NC.

Chanca
2003 Letter of Dr. Chanca on the Second Voyage of Columbus. In *American Journeys Collection*. Wisconsin Historical Society Digital Library and Archives, Madison, W. http://www.americanjourneys.org/pdf/AJ-065.pdf

Chanlatte Baik, L. A.
1981 *La Hueca y Sorce (Vieques, Peurto Rico): Primeras Migraciones Agroalfareras Antillanas.* Published by Author, Santo Domingo, Dominican Republic.

Columbus, C.
1493 Monarch's letter. In *Early Modern Spain*. vol. 2009. King's College, London. http://www.ems.kcl.ac.uk/content/etext/e024.html

Columbus, C. and B. Las Casas
1989 *The Diario of Cristopher Columbus's First Voyage to America 1492-1493*. Translated by O. Dunn and J. E. Kelley. University of Oklahoma Press, Norman, OK.

Columbus, H.
2002 *Historie Concerning the Life and Deeds of the Admiral don Cristopher Columbus. In* Nouva Raccolta Colombiana: vol 4. E.Taviani and I. L. Caraci, eds. Instituto Poligrafico e Zecca dello Stato, Roma.

Conkey, M.W.
1990 Introduction. In *The Uses of Style in Archaeology*, M. Conkey and C.A Hastorf eds. Pp 1-10. University of Cambridge Press, Cambridge.

Conrad, G., J. Foster and C. Beeker
2001 Organic Artifacts from the Manantial de Aleta, Dominican Republic: Preliminary Observations and Interpretations. *Journal of Caribbean Archaeology* 2:1-20.

Cowgill, G.
1993 Distinguished Lecture in Archeology: Beyond Criticizing New Archeology. *American Anthropologist* 95(3):551-573.

Crock, J. G. and J. B. Petersen
2004 Inter-Island Exchange, Settlement Hierarchy and a *Taíno*-Related Chiefdom on the Anguilla Bank,

Northern Lesser Antilles. In *Late Ceramic Age Societies in the Eastern Caribbean*, A Delpuech and C.L. Hofman eds. pp. 139-156. Archeopress, Oxford UK.

Crow, P., S. Benham, B. J. Devereux and G. S. Amable
2007 Woodland Vegetation and its Implications for Archaeological Survey Using LiDAR. *Forestry* 80(3): 241-252.

Curet, A., Oliver, J.R.
1998 Mortuary Practices, Social Development, and Ideology in Pre-Columbian Puerto Rico. *Latin American Antiquity* 9(3):217-239.

Curet, A.
2002 The Chief is Dead, Long Live... Who? Descent and Succession in the Proto-Historic Chiefdoms of the Greater Antilles. *Ethnohistory* 49(2): 259-280.

2005 *Caribbean Paleodemography*. University of Alabama Press, Tuscaloosa.

D'Angheira, P. M.
1970 *De Orbo Neuvo:* the Eight Decades of Peter Martyr D'Anghiera. Translated by F.A. Macnutt. Lenox Hill, New York.

De Booy, T.
1915 Pottery from Certain Caves in Eastern Santo Domingo, West Indies. *American Anthropologist* 17(1):69-97.

Diamond, J.
2005 *Collapse*. Penguin, New York, NY.

Doneus, M., C. Bries, M. Fera and M. Janner
2008 Archaeological Prospection of Forested Areas Using Full-Waveform Airborne Laser Scanning. *Journal of Archaeological Science* 35:882-893.

Douglas, N.
1985 The Fountain: An Amerindian Ceremonial Cavern on Anguilla, Its Petroglyphs and other Finds, Related to Surface Archaeology of Anguilla's Major Beach Sites. *In* Proceedings of the XIth International Congress for Caribbean Archaeology, A.G. Pantel Tekakis, I Vargas Irenas and M Sanoja Obediente eds. Pp 141-152. San Juan Puerto Rico: International Association for Caribbean Archaeology.

1991 Recent Amerindian Finds on Anguilla. *In* Proceedings of the XIIIth International Conference for Caribbean Archaeology, vol. 2. E.N. Ayubi and J.B. Haviser eds. Pp 576-588. Curacao: International Association for Caribbean Archaeology.

Draper, G., P. Mann and J. Lewis
1994 Hispaniola. In *Caribbean Geology*, S. K. Donovan and T. A. Jackson eds. Pp. 129-166. University of the West Indies Publisher's Association: Kingston, Jamaica.

Drewett, P. L.
2007 Getting Water, Pot-and Wood-Lined Waterholes. In *Above Sweet Waters: Cultural and Natural Change at Port St. Charles*, P.L. Drewett ed. Archetype Press, St Annes, Garrison, Barbados.

Dubelaar, C. N.
1995 *The Petroglyphs of The Lesser Antilles, The Virgin Islands and Trinidad*. Publications Foundation for Scientific Research in the Caribbean Region, Amsterdam.

1983 A Comparison Between Petroglyphs of the Antilles and of North Easern South America. *In* Proceedings of the Xth International Congress for Caribbean Archaeology, L Alliare and L Goupiel eds. Pp 421-448. Martinique: International Association for Caribbean Archaeology.

Emberling, G.
1997 Ethnicity in Complex Societies: Archaeological Perspectives. *Journal of Archaeological Research* 5(4):295-344.

Environmental Protection Agency
2002 A Lexicon of Cave and Karst Terminology with Special Reference to Environmental Karst Hydrology. Environmental Protection Agency, Washington DC.

Espenshade, C.
2000 Reconstructing Household Vessel Assemblages and Site Duration at an Early Ostionoid Site from South-Central Puerto Rico. *Journal of Caribbean Archaeology* 1: 1-22.

Faber Morse, B.
1999 The Salt River Site, St Croix at the time of the Encounter. In *The Indigenous People of the Caribbean*, S. M. Wilson ed. The University of Florida Press, Gainesville.

Fewkes, J.
1903 Prehistoric Porto Rican Pictographs. *American Anthropologist* 5(3):441-467.

1919 A Carved Wooden Object from Santo Domingo. *Man* 19:144-149.

Fleury, P., M. Bakalowicz and G. de Marsily
2007 Submarine Springs and Coastal Karst Aquifers: A Review. *Journal of Hydrology* 339:79-92.

Gallegher, J. M. and R. Josephs
2008 Using LiDAR to Detect Cultural Resources in a Forested Environment: an Example from Isle Royale National Park, Michigan, USA. *Archaeological Prospection* 14:187-206.

Gill, R. B., P. A. Mayewski, J. Nyberg, G. H. Haug and L. C. Peterson
2007 Drought and the Maya Collapse. *Ancient Mesoamerica* 18(2):293-302.

Guerrero, J. G.
1981 Dos Plazas Indigenas y el Poblado de Cotubanama, Parque nacional del Este. *Boletin Museo del Hombre Dominicano* 16: 13-30.

Hassan, F.
2004 Ecology in Archaeology: From Cognition to Action. In *A Companion to Archaeology*, J. Bintliff ed. Blackwell, Malden MA, USA.

Hayward, M. H., F. Schieppati and M. Cinquino
2001 On the Status of Puerto Rican Rock Art Interpretation. *In* Proceedings of the XIX International Congress for Caribbean Archaeology, vol 2., L Alof and A.C.F. Dijkhoff, eds. Pp 258-280. Aruba: International Association for Caribbean Archaeology.

Hodder, I.
1990 Style as a Historical Quality. In *The Uses of Style in Archaeology*, M.W. Conkey and. C. Hastorf eds. Pp 44-53. Cambridge University Press, Cambridge.

Hofman, C. L.
2007 Leiden Ceramic Codebook. Leiden University, Leiden, NL.

Hofman, C.L , A. Bright, A. Boomert, and S. Knippenburg
2007 Island Rhythms: The Web of Social Relationships and Interaction Networks in the Lesser Antillean Archipelago Between 400 B.C. and A.D. 1492. *Latin American Antiquity* 18(3):243-268.

Hofman C.L., and E.B. Carlin
2009 The Ever-Dynamic Caribbean: Exploring new approaches to unraveling social networks in the
pre-colonial and early colonial periods. In *Linguistics and Archaeology in the Americas: The Historization of Language and Society* E.B. Carlin and S van der Kerke eds. Brill, Leiden.

Hofman, C.L. and M.L.P. Hoogland
2004 Social Dynamics and Change in the Northern Lesser Antilles. In *Late Ceramic Age Societies in the Eastern Caribbean*, A. Delpuech and Corinne Hofman eds. Pp 47-58. Archeopress, Oxford.

Hofman, C. L. and M. L. P. Hoogland
1999 Expansion of the Taino Cacicazgos towards the Lesser Antilles. *Journal de la Societe des Americanistes* 85(1):93-113.

Hofman, C. L., M.L.P. Hoogland and J. R. Oliver
2004 *A First Reconnaissance of the Archaeological Sites in the Dominican Republic*. University of Leiden and Institute of Archaeology, University College London.

Hofman, C. L., M. L. P. Hoogland, J. R. Oliver and A. Samson
2006 Investigaciones Arqueologicas En El Cabo, Oriente De La Republica Dominicana: Resultados

Preliminares De La Campana de 2005. *El Caribe Arqueologico* 9:95-106.

Hofman, C. L., J. Ulloa Hung and L. Jacobs
2007 Juntando Las Piezas del Rompecabezas: A la Cronologia Ceramica del Este de la Republica Dominicana. *El Caribe Arqueologico* 10:104-115.

Hornborg, A.
2005 Ethnogenesis, Regional Integration, and Ecology in Prehistoric Amazonia: Toward a System Perspective. *Current Anthropology* 46(4):589-620.

Hostos, A.
1923 Anthropomorphic Carvings from the Greater Antilles. *American Anthropologist* 25(4):525-558.

Houston, S.D., Evans, S.T.
2000 Sweat Baths. *In* Archaeology of Ancient Mexico and Central America: An Encyclopedia. S.T. Evans and D.L. Webster eds. Pp 688-690. Garland, New York

Ingold, T.
1993 The Temporality of the Landscape. *World Archaeology* 25(2):152-174.

James, N. P. and P. W. Choquette
1988 Introduction. In *Paleokarst*, N. P. James and. P. W. Choquette eds.Pp 1-21. Springer-Verlag, Berlin.

Keegan, W. F.
1982 Lucayan Cave Burials from the Bahamas. *Journal of New World Archaeology* 5(2):57-65.

Kerchache, J. (editor)
1994 *L'art des sculpteurs Taínos: chefs-doeuvres des Grandes Antilles precolombiennes*. des Musees de la Ville de Paris, Paris, France.

Knippenburg, S.
2004 Distribution and Exchange of Lithic Materials: Three-Pointers and Axes from St. Martin. In *Late Ceramic Age Societies in the Eastern Caribbean*, A. Delpuech and Corinne Hofman eds. Pp 121-132. Archeopress, Oxford.

Krieger, H. W.
1929 Archaeological and Historical Investigations in Samaná Domincan Republic. *Smithsonian Institution Bulletin* 147.

Ladell, W. S.
1965 Water and Salt (Sodium Chloride) Intakes. In *The Physiology of Human Survival* O. G. Edholm and A. L. Bacharach eds. Pp 236-280. Academic Press, New York.

Lamarche, S. R.
2005 *Taínos y Caribes Las Culturasaborigenes Antillanas*. Editorial Punta y Coma, San Juan, PR.

Las Casas, B.
1876 *La Historia de Las Indias*. 3 vols. Imprinta de Miguel Ginesta, Madrid.

1992 *Historia Apologetica Sumeria*. Obras Completas de Bartolomeo de Las Casas, .vols 4-7 V, Abril Castelo ed. Alianza, Madrid.

Lee, J. W.
1990 Petroglyphs of Jamaica. *In* Proceedings of the XIth International Congress for Caribbean Archaeology, A.G. Pantel Tekakis, I Vargas Irenas and M Sanoja Obediente eds. Pp 153-161. San Juan Puerto Rico: International Association for Caribbean Archaeology.

2006 The Petroglyphs of Jamaica. In *The Earliest Inhabitants: The Dynamics of the Jamaican Taíno*, L. G. Atkinson ed. University of West Indies Press, Kingston, Jamaica.

LeGrand, H. E.
1973 Hydrological and Ecological Problems of Karst Regions. *Science* 179(4076):859-864.

LeGrand, H. E. and V. T. Stringfield
1973 Karst Hydrology A Review. *Journal of Hydrology* 20:97-120.

Lewis-Williams, J. D.
2002 *A Cosmos in Stone: Interpreting Religion and Society through Rock Art*. AltaMira, Walnut Creek, CA.

Linville, M. S.
2005 Cave Encounters: Rock Art Research in Cuba. In *Dialogues in Cuban Archaeology*, A. Curet, S. L. Dawdy and G. Rosa Corzo eds. University of Alabama Press, Tuscaloosa, AL.

Lopez Bolando, A.
2007 La Cueva de Jose Maria, Santuario Prehispanico De la Isla de Santo Domingo. *Perficit, Revista de Estudios Humanisticos* 27(1):131-180.

Loven, S.
1935 *Origin of the Tainan Culture, West Indies*. Elanders, Bokiryckeri Aktiebolag, Goteborg.

McGinnis, S. A. M.
2001 Patterns, Variations, and Anomalies in Ideographic Expression in the PreColumbian Caribbean. *In* the Proceedings of the XVIII International Congress for Caribbean Archaeology, vol. 2. G. Richard, ed. Pp. 99-104. Guadeloupe: International Association for Caribbean Archaeology.

Mithen, S.
2001 The Evolution of Imagination: An Archaeological Perspective. *SubStance* 30(94/95):28-54.

Morban Luacer, F.
1979 *Ritos Funerarios. Accion Del Fuego y Medio Ambiente en Las Osamenta Precolombinas*. Academia de las Ciencias de la Republica Domincana, Santo Domingo, Dominican Republic.

Mulligan, A. E., R. L. Evans and D. Lizarralde
2006 The Role of Paleochannels in Groundwater/Seawater Exchange. *Hydrology* 335:313-329.

Myers, K. A.
2007 *Fernandez de Oviedo's Chronicle of America: A New History of a New World*. University of Texas Press, Austin, TX.

Nash, M.
1989 *The Cauldron of Ethnicity in the Modern World*. University of Chicago Press, Chicago.

Newsom, L.
2006 Caribbean Maize: First Farmers to Columbus. In *Histories of Maize Multidisciplinary Approaches to the Prehistory, Linguistics, Biogeography, Domestication and Evolution of Maize*, J, Staller, R. H. Tykot and B. Benz. Pp 325-333. Elisvier, Burlington, MA.

Nuñez Jimenez, A.
1985 *Arte Rupestre de Cuba*. Jaca Books, Havana.

Officina Nacional de Estadisticas
2007 Proyecciones de Poblacion. Officina Nacional De Estadisticas. Accessed on January 19, 2009. http://www.one.gob.do/index.php?module=articles&func=view&catid=74. Santo Domingo.

Oliver, J. R.
2005 The Proto-*Taíno* Monumental Cemis of Caguana: A Political-Religious Manifesto. In *Ancient Borinquen: Archaeology and Ethnohistory of Native Puerto Rico*, P. Siegel ed. Pp 231-282. University of Alabama Press, Tuscaloosa, AL.

Oliver, J. R. and Y. M. Narganes Storde
2003 The Zooarchaeological Remains From Juan Miguel Cave and Finca de Doña Rosa, Barrio Caguana, Puerto Rico. Ritual Edibles or Quotidian Meals? In Proceedings of the XXth International Congress for Caribbean Archaeology, vol 1, C, Tavárez María and M. A. García Arévalo eds. Pp 227-242. Santo Domingo, Dominican Republic: International Association for Caribbean Archaeology.

Olsen Bogaert, H.
2000 *Estudio de Impacto Ambiental, Proyecto: Concesion de Explotacion Minera Carmelo. Higuey, Provincia La Altagracia*. Museo Del Hombre.

2001 *Estudio de Impacto Ambiental Proyecto Zona Franca Multimodal Caucedo y Puerto de Contendores*. Museo del Hombre Dominicano.

2002 *Estudio de Imacto Ambiental. Proyecto: Desarrollo Inmobiliario Juanillo. Higuey Provincia la Altagracia*. Museo Del Hombre.

2004 Prospecion Arqueologica en el Projecto Bayahibe. *Boletin Museo del Hombre Dominicano* 34: 130-160.

Ortega, E.
1978 Informe Sobre Investigaciones Realizadas en la Region este del Pais. Zona Costera desde Macao a Punta Espada. *Boletin del Museo del Hombre Dominicano* (11):77-105.

Oudhuis, M.
2008 *Fluctuating Identities. An Iconographic Study of Taíno Adornos at El Cabo, Eastern Dominican Republic*, University of Leiden.

Oviedo, F., G.
1851 *Historia General y Natural de Las Indias, Islas y Tierra-Firme Del Mar Ocieano*. La Real Academia De La Historia, Madrid.

Pagan Jimenez, J. R. and J. R. Oliver
2008 Starch Residues on Lithic Artifacts from Two Contrasting Contexts in Northwestern Puerto Rico. In *Crossing the Borders: New Methods and Techniques in the Study of Archaeological Materials from the Caribbean*, C. L. Hofman, M. L. P. Hoogland and A. L. Van Gijn eds. Pp 101-137. University of Alabama Press, Tuscaloosa, AL.

Pané, R
1999 *An Account of the Antiquities of the Indians,* J.J. Arrom ed. Duke University Press, London.

Perdomo, P.
1999 El Estudio del Arte Rupestre en la Isla de Santo Domingo. *Boletin Museo del Hombre Dominicano* 27: 20-45.

Perdomo, P. and A. Jimenez Lamburtus
1983 Reconocimiento Arqueologico y Espeleologico de la Region de Samaná. *Boletin Museo del Hombre Dominicano* 18: 42-75.

Pereira, E.
2001 Testimony in Stone: Rock Art in the Amazon. In *Unknown Amazon: Culture in nature in ancient Brazil*, C. McEwan, C. Barreto and E. Neves eds. Pp 214-231. British Museum Press, London.

Petersen, J. B., Cox, B.J., Crock, J.G., Coldwell, E
2003 Big Springs: A Ceremonial Petroglyph Site in Anguilla, Lesser Antilles. *In* Proceedings of the XX International Congress for Caribbean Archaeology, vol 2, C,Tavárez María and M.A. García Arévalo eds. Pp 657-666. Santo Domingo, Dominican Republic: International Association for Caribbean Archaeology.

Petersen, J. B. and D. P. Watters
1991 Amerindian Ceramic Remains from Fountain Cavern, Anguilla, West Indies. *Annals of the Carnegie Museum* 60(4):321-357.

Petersen, J.
1999 *Taíno* , Island Carib, and Prehistoric Amerindian Economies in the West Indies: Tropical Forest Adaptations to Island Environments. In *The Indigenous People of the Caribbean*, by S.M. Wilson ed. Pp118-130. The University of Florida Press, Gainesville.

Price, R.
1966 Caribbean Fishing and Fishermen: A Historical Sketch. *American Anthropologist* 68(6):1363-1383.

Rickliss, R. A. and M. D. Blum
1997 The Geoarchaeological Record of Holocene Sea Level Change and Human Occupation of the Texas Gulf Coast. *Geoarchaeology: An International Journal* 12(4):287-314.

Rodriguez Ramos, R.
2008 From Guanahatababey to the Archaic of Puerto Rico; The Nonevident Evidence. *Ethnohistory* 55(3): 393-415.

Rodriguez Ramos, R., E. Babilonia, A. Curet and J. Ulloa Hung
2008 The Pre-Arawak Pottery Horizon in the Antilles: A New Approximation. *Latin American Antiquity*

19(1):47-63.

Rodriguez Suarez, R. and J. R. Pagan Jimenez
2008 The Buren in Pre-Colonial Cuban Archaeology: New Information Regarding the Use of Plans and Ceramic Griddles During the Late Ceramic Age of Eastern Cuba Gathered through Starch Analysis. In *Crossing the Borders New Methods and Techniques in the Study of Archaeological Materials from the Caribbean*, C.L. Hofman, M. L. P. Hoogland and A. L. van Gijn eds. Pp 137-160. University of Alabama Press, Tuscaloosa,.

Roe, P. G.
1987 The Petroglyphs of Maisabel: A study in Methodology. *In* the Proceedings of the XII International Congress for Caribbean Archaeology, L Sickler Robinson ed. Pp 109-116. International Association for Caribbean Archaeology: French Guinea
.
2005 Rivers of Stone, Rivers within Stone: Rock Art in Ancient Puerto Rico. In *Ancient Borinquen: Archeology and Prehistory of Native Puerto Rico*, P. Siegel. Pp. 285-336. University of Alabama Press, Tuscaloosa.

Rouse, I
1992 *The Taínos, Rise and Decline of the People who Greeted Columbus*. Yale University Press, New Haven.

Rouse, I. and R. Alegria
1990 Excavations at Maria de La Cruz Cave and Hacienda Grande Village Site, Loiza, Puerto Rico. *Yale University Publications in Anthorpology* 80.

Sackett, J.
1990 Style and Ethnicity in Archaeology: the Case for Isochrestism. In *Uses of Style in Archaeology*, M.W. Conkey and. C. Hasdorf eds. Pp 32-45/ Cambridge University Press, Cambridge.

Samson, A. and M. Hoogland
2007 Residencia Taina: Huellas de Asentamiento en El Cabo, Republica Domincana. *El Caribe Arqueologico* 10:93-103.

Scarbourough, V.
1998 Ecology and Ritual: Water Management and the Maya. *Latin American Antiquity* 9(2):135-159.

Schomburgk, R. H.
1854 Ethnological Researches in Santo Domingo. *Journal of the Ethnological Society of London* 3:115-122.

Schortman, E. and S. Nakamura
1991 A Crisis of Identity: Late Classic Competition and Interaction on the Southeast Maya Periphery. *Latin American Antiquity* 2(4):311-336.

Schultz, C.
1999 The Carriacou Hypothesis: Bottomless Stacked Pots, A Study in Amerindian Fresh Water Procurement. *In* the Proceedings of teh *XVI International Congress For Caribbean Archaeology* vol 2, L Michaux Chevry ed. Guadeloupe: International Association for Caribbean Archaeology.

Sharer, R and L. Traxler
2006 The Ancient Maya 6th edition. Stanford University Press, Stanford, CA.

Siskind, J.
1973 *To Hunt in the Morning*. Oxford University Press, Oxford, UK.

Stevens-Arroyo, A. M.
2006 *Cave of the Jagua: The Mythological World of the Taínos*. University of Scranton Press, Scranton.

Strauss, L. G.
1990 Underground Archaeology: Perspectives on Caves and Rockshetlers. In *Archaeological Method and Theory*, vol 2, M. B. Schiffer ed. Pp 255-304. University of Arizona Press, Tuscon.

Sturtevant, W. C.
2007 History and Ethnography of Some West Indian Starches. In *The Domestication and Exploitation of Plants and Animals*, P. Ucko and G. Dimbleby eds. Pp 177-200. Aldine Transaction, London.

Thomas, J.
2001 Archaeologies of Place and Landscape. In *Archaeological Theory Today*, I. Hodder ed. Pp 165-186.

Polity Press, Cambridge.

Tilley, C.
1994 Space, Place, Landscape and Perception: Phenomenological Perspectives. In *A Phenomenology of Landscape: Places, Paths, and Monuments*, C. Tilley ed. Pp 9-34. Berg Publishers, London, UK.

Turner, S.
2001 The Conquest of Higuey The Eyewitness Account of Las Casas Examined and the Archaeological Implications for the Parque Nacional Del Este, Republica Dominicana. University of Indiana, Bloomington Indiana. http://www.indiana.edu/~r317doc/dr/higuey/higuey3.html

Ulloa Hung, J.
2005 Approaches to Early Ceramics in the Caribbean: Between Diversity and Unilineality. In *Dialogues in Cuban Archaeology*, A. Curet, S. L. Dawdy and G. Rosa Corzo eds. University of Alabama Press, Tuscaloosa, AL.

van As, A., L. Jacobs and C. L. Hofman
2008 In Search of Potential Clay Sources Used for manufacture of the Pre-Columbian Pottery of El Cabo, Eastern Dominican Republic. *Leiden Journal of Pottery Studies* 24: 1-10.

Velos Maggiolo, M.
1993a La Zamia y Los Grupos Precolombinos. In *La Isla de Santo Domingo antes de Colon*, M Veloz Maggiolo ed. Banco Central de La Republica Dominicana, Santo Domingo.

1993b Para una Definicion de la Cultura Taina. In *La Isla De Santo Domingo Antes de Colon*, M Veloz Maggiolo ed. Banco Central de la Republica Domincana, Santo Domingo, Dominican Republic.

Velos Maggiolo, M. and E. Ortega
1977 Arquelogia de Cueva de Berna Informe Preliminar. In *Arquelogia de Cueva de Berna*, edited by M. Veloz Maggiolo. Universidad Central de Este, San Pedro de Macoris.

Velos Maggiolo, M., P. Pina, E. Ortega and B. Vega
1971 Antillean Pictographs and Petroglyphs: Patterns and Procedures which can be Applied in the Study of their Location in Time. *In* the Proceddings of the IV International Conference for Caribbean Archaeology. Pp 1-9. St Lucia: International Association for Caribbean Archaeology.

Velos Maggiolo, M., R. O. Rimoli and F. L. Calderon
1983 Investigaciones Arqueologicas En Cueva Collantes, D.N. *Boletin Museo del Hombre Dominicano* 18: 73-84.

Watters, D. P.
1991 Archaeology of Fountain Cavern, Anguilla, West Indies. *Annals of the Carnagie Museum* 60(4):255-319.

Weather Channel
2009 Monthly Averages for Punta Cana Dominican Republic. vol. 2009. Weather Channel. http://www.weather.com/outlook/travel/businesstraveler/wxclimatology/monthly/DRXX0022

Weeks, J. M., P. J. Ferbel and V. Ramirez
1996 Rock Art of Corral de los Indios de Chacuey, Northwestern Dominican Republic. *Latin American Indian Literatures Journal* 12(1):89-97.

Wells, E. C.
2004 Investigating Activity Patterns in Prehispanic Plazas: Weak Acid-Extraction ICP-AES Analysis of Anthrosols at Classic Period El Coyote, Northwestern Honduras. *Archaeometry* 36(1).

White, G. F., D. J. Bradley and A. U. White
1971 *Drawers of Water: Domestic Water Use in East Africa*. The University of Chicago Press, Chicago.

Wilkinson, T. J.
2004 The Archaeology of Landscape. In *A Companion to Archaeology*, J. Bintliff ed. Blackwell, Malden MA, USA.

Wilson, S.
2007 *The Archaeology of the Caribbean*. Cambridge University Press, Cambridge, UK.

1993a The Cultural Mosaic of the Indigenous Caribbean. *Proceedings of the British Academy* 81:37-66.

1993b Structure and History: Combining Archaeology and Ethnohistory in the Contact Period Caribbean. In *Ethnohistory and Archaeology*, J. D. Rogers and S. Wilson eds. Pp 19-29/ Springer, New York.

1990 *Hispaniola: Caribbean Chiefdoms in the Age of Columbus*. University of Alabama Press, Tuscaloosa, AL.

Wing, S. R. and E. Wing
2001 Prehistoric Fisheries in the Caribbean. *Coral Reefs* 20:1-8.

Winter, J.
1987 Multiple Lucayan Burial From New Providence Bahamas. *In* the Proceedings of the XII International Congress for Caribbean Archaeology, L Sickler Robinson ed. Pp 153-162. French Guinea: International Association for Caribbean Archaeology.

1991 Petroglyphs of the Bahamas. *In* the Proceedings of the XIV International Congress for Caribbean Archaeology A Cummins and P King eds. Pp 672-680. Barbados: International Association for Caribbean Archaeology.

Winter, J., E. Wing and L. Newsom
1997 A Lucayan Funeral Offering. *In* the Proceedings of the XVII International Congress for Caribbean Archaeology, J Winter ed. Bahamas: International Association for Caribbean Archaeology.

World Health Orginization
2003 *Chloride in Drinking Water: Background Document for Development WHO Guidelines for Drinking-Water Quality 2nd ed*. World Health Organization, Geneva.

Wobst, H. M.
1999 Style in Archaeology or Archaeologists in Style. In *Material Meanings: Critical Approaches to Material Culture*, E. S. Chilton, ed. Pp 118-132. University of Utah Press, Salt Lake City.

endix 1: GIS Data Table

Lat	Lon	Site Catergory	Entrance	Entrance E/W cm	N/S cm	Height cm	Area (Est) m	Water Quality	W
18.410762	-68.448569	Settlement							
18.410643	-68.449478	Flooded Sinkhole	Vertical	142	114	315	1.5x1x3	8290	hig
18.413823	-68.448402	Flooded Sinkhole	Vertical	190	226	164	2x2x1.5	NoData	Cl
18.414901	-68.447857	Flooded Sinkhole	Vertical	379	716	114	4x7x1	NoData	hig
18.414243	-68.448255	Flooded Sinkhole	Vertical	98	95	170	1x1x2	NoData	hig
18.415983	-68.448112	Flooded Sinkhole	Vertical	600	600	115	6x6x1	NoData	hig
18.417337	-68.448009	Flooded Sinkhole	Vertical	100	208	210	1x2x2	NoData	Cl
18.41869	-68.447197	Flooded Sinkhole	Vertical	110	176	223	1x1.5x2	NoData	hig
18.426767	-68.446051	Flooded Cave	Vertical	835	785	400	8.5x8x4	NoData	hig
18.426333	-68.4466	Flooded Cave	Vertical	175	468	600	18x24x6	3300	cle
18.437702	-68.437574	Cave Complex	Horizontal	30	400	150	7x25x8	NoData	hig
18.426247	-68.454619	Cave Complex	Horizontal	20	500	800	massive	NoData	No
18.424642	-68.457691	Cave Complex	Horizontal	20	300	200	massive	NoData	No
18.424769	-68.457582	Cave Complex	Horizontal	20	200	200	massive	NoData	No
18.403742	-68.450361	Flooded Cave	Horizontal	400	40	150	32x3x5	5600	cle
18.401986	-68.454682	Flooded Sinkhole	Vertical	420	700	400	4x7x4	4500	cle
18.403311	-68.454481	Sinkhole	Vertical	600	700	120	6x7x1	NoData	No
18.40651	-68.451055	Flooded Sinkhole	Vertical	912	125	160	9x1x1.5	NoData	cle
18.434053	-68.441852	Sinkhole	Vertical	290	540	645	3x5.5x6.5	NoData	No
18.443785	-68.4309	Flooded Cave	Horizontal	0	250	150	15x3x3	NoData	cle
18.414933	-68.462027	Flooded Sinkhole	Vertical	60	153	400	.5x1.5x4m	NoData	hig
18.416907	-68.460826	Flooded Sinkhole	Vertical	140	171	164	7x6x1.5	NoData	cle
18.425916	-68.447037	Flooded Cave	Horizontal	0	1200	200	20x4x3	3200	cle

Lat	Lon	Site Catergory	Entrance	Entrance E/W cm	N/S cm	Height cm	Area (Est) m	Water Quality	W
18.420758	-68.459119	Flooded Sinkhole	Vertical	130	170	394	1.5x1.5x4	3510	cle
18.430383	-68.442022	Sinkhole	Vertical	170	160	140	1.5x1.5x1.5	NoData	No
18.431459	-68.441278	Sinkhole	Vertical	185	217	199	2x2x2	NoData	No
18.432771	-68.441984	Sinkhole	Vertical	416	517	120	4x5x1	NoData	No
18.411579	-68.465784	Cavern	Horizontal	2000	0	1500	12x12x15	NoData	No
18.415868	-68.473617	Rock Shelter	Horizontal	0	1200	200	12x5x2	NoData	No
18.425861	-68.454169	Flooded Sinkhole	Vertical	60	85	1500	.5x1x15+	6190	cle
18.425988	-68.454786	Sinkhole	Horizontal	105	80	280	5x5x3	NoData	No
18.39262	-68.449297	Flooded Cave	Vertical	400	390	167	7x6x1.5	5200	cle
18.393393	-68.452202	Flooded Cave	Horizontal	0	374	103	12x5x2	4300	cle
18.394095	-68.454157	Cave Complex	Horizontal	0	476	250	15x5x2	NoData	No
18.401619	-68.460908	Sinkhole	Vertical	222	178	406	2x2x4	NoData	No
18.402125	-68.463388	Rock Shelter	Horizontal	170	0	274	2x2x2	NoData	No
18.377276	-68.449821	Sea Cave	Vertical	170	74	276	2x1x3	NoData	cle
18.383167	-68.449023	Beach	Horizontal	0	730	198	2x7x2	NoData	cle
18.360402	-68.451757	Sea Cave	Vertical	580	770	350	6x8x4	NoData	cle
18.360662	-68.453787	Rock Shelter	Horizontal	0	850	180	9x3x2	NoData	No
18.359118	-68.452037	Rock Shelter	Horizontal	0	390	180	4x2x2	NoData	No
18.359297	-68.45166	Sea Cave	Horizontal	0	275	120	12x4x2	NoData	cle
18.37251	-68.45327	Cave	Horizontal	0	340	355	3x3x2	NoData	No
18.377129	-68.451403	Flooded Cave	Horizontal	560	0	85	20x6x2	7090	cle
18.376405	-68.451813	Rock Shelter	Horizontal	210	0	287	8x2x1.5	NoData	No
18.375826	-68.451766	Rock Shelter	Horizontal	0	174	148	10x2x2	NoData	No
18.375518	-68.451612	Cavern	Horizontal	430	0	300	30x5x3	NoData	No
18.436245	-68.438864	Greenstone Source	NoData	NoData	NoData	NoData	NoData	NoData	No

Lat	Lon	Site Catergory	Entrance	Entrance E/W cm	N/S cm	Height cm	Area (Est) m	Water Quality	W
18.430982	-68.445033	Flooded Sinkhole	Vertical	2000	2500	1000	25x20x10m	5300	hig
18.438383	-68.43728	Rock Shelter	Horizontal	0	524	200	5x2x3	NoData	No
18.438804	-68.437666	Rock Shelter	Horizontal	0	660	203	6.5x2x3	NoData	No
18.438694	-68.437902	Rock Shelter	Horizontal	0	330	140	3x2x1.5	NoData	No
18.407145	-68.456205	Cave Complex	Horizontal	0	166	45	20x4x1	NoData	No
18.432469	-68.445377	Rock Shelter	Horizontal	0	1400	1000	14x6x10	NoData	No
18.426386	-68.443912	Scatter	NoData	0	0	0	60x20	NoData	No
18.420813	-68.44816	Scatter	NoData	0	0	0	30x20	NoData	No
18.376111	-68.452203	Scatter	NoData	0	0	0	10x10	NoData	No
18.375365	-68.451796	Cave Complex	Horizontal	0	500	300	30x5x3	NoData	No
18.375837	-68.45149	Rock Shelter	Horizontal	0	700	300	7x2x3	NoData	No
18.377477	-68.452401	Rock Shelter	Horizontal	0	1500	300	15x2x3	NoData	No
18.377725	-68.452362	Rock Shelter	Horizontal	0	2000	250	2000x3x2.5	NoData	No
18.378087	-68.452249	Cave Complex	Horizontal	0	500	200	2000x5x2	NoData	No
18.428984	-68.44271	Flooded Cave	Vertical	300	500	600	1000x400x300	4900	hig
18.411951	-68.453153	Scatter	NoData	NoData	NoData	NoData	10x10	NoData	No
18.406882	-68.452864	Scatter	NoData	NoData	NoData	NoData	3x3	NoData	No
18.377017	-68.450821	Scatter	NoData	NoData	NoData	NoData	3x3	NoData	No
18.434703	-68.467694	Settlement	NoData	NoData	NoData	NoData	150x100	NoData	No
18.42623	-68.459679	Cave Complex	Vertical	630	525	1110	unknown	NoData	No
18.420413	-68.460621	Scatter	NoData	NoData	NoData	NoData	3x3	NoData	No
18.44032	-68.471887	Flooded Sinkhole	Vertical	3000	1500	2000	30x15x35	466	cle
18.438391	-68.473488	Sinkhole	Vertical	3000	3000	2500	30x30x25	NoData	No
18.439166	-68.477447	Flooded Sinkhole	Vertical	6000	7000	4500	60x70x45	677	cle
18.439309	-68.479928	Sinkhole	Vertical	3000	7000	1000	30x70x10	NoData	No

Lat	Lon	Site Catergory	Entrance	Entrance E/W cm	N/S cm	Height cm	Area (Est) m	Water Quality	W
18.442764	-68.483056	Flooded Sinkhole	Horizontal	0	153	130	7x10x50	NoData	hig
18.432944	-68.436119	Flooded Sinkhole	Horizontal	740	0	220	10x6x2	20,500	cle
18.436833	-68.434898	Flooded Sinkhole	Horizontal	600	0	150	6x4x1.5	NoData	cle
18.436854	-68.435069	Flooded Sinkhole	Horizontal	0	900	200	9x6x2	NoData	cle
18.437496	-68.437711	Cave Complex	Horizontal	0	500	120	70x5x1.2	NoData	cle
18.439248	-68.436249	Rock Shelter	Horizontal	1000	0	220	1x4x2.2	NoData	No
18.425042	-68.454396	Sinkhole	Vertical	1500	1500	300	15x15x3	NoData	No
18.424402	-68.455488	Flooded Sinkhole	Vertical	2500	3000	300	25x30x3	NoData	No
18.423995	-68.456171	Flooded Sinkhole	Vertical	360	390	530	4x4x5	NoData	cle
18.421719	-68.458221	Flooded Sinkhole	Vertical	230	270	621	2x3x6	3560	cle
18.421477	-68.458502	Rock Shelter	Horizontal	0	325	218	2x5x2	NoData	No
18.42331	-68.4588	Scatter	NoData	0	0	0	2x2	NoData	No
18.4235	-68.458753	Scatter	NoData	0	0	0	1x1	NoData	No
18.424241	-68.45782	Scatter	NoData	0	0	0	3x3	NoData	No
18.416165	-68.447116	Beach	NoData	0	0	0	20x3	NoData	No
18.425401	-68.454144	Cave	Vertical	414	498	325	2.5x5x3	NoData	No
18.424155	-68.454924	Rock Shelter	Horizontal	0	432	130	4x8x1	NoData	No
18.421321	-68.459467	Scatter	NoData	0	0	0	3x3	NoData	No
18.422224	-68.459033	Scatter	NoData	0	0	0	5x6	NoData	No
18.426196	-68.44575	Scatter	NoData	0	0	0	1x1	NoData	No
18.434752	-68.439233	Scatter	NoData	0	0	0	2x2	NoData	No
18.433875	-68.437667	Scatter	NoData	0	0	0	2x2	NoData	No
18.433655	-68.437578	Scatter	NoData	0	0	0	1x1	NoData	No
18.433659	-68.436958	Scatter	NoData	0	0	0	1x1	NoData	No
18.43357	-68.436903	Scatter	NoData	0	0	0	2x2	NoData	No

18.433387	-68.436283	Scatter	NoData	0	0	0	5x5x3	NoData	No
18.430609	-68.445211	Rock Shelter	Horizontal	0	250	50	2.5x1x.5	NoData	No
18.431253	-68.446584	Cave	Horizontal	70	0	100	1x10x1	NoData	No
18.430922	-68.446946	Cave	Horizontal	0	350	200	3.5x15x2	NoData	No
18.430839	-68.447259	Cave	Horizontal	0	200	70	200x15x1	NoData	No
18.430722	-68.447235	Rock Shelter	Horizontal	0	1000	300	10x4x3	NoData	No
18.429943	-68.448418	Cave	Horizontal	0	200	100	15x4x2	NoData	No
18.429471	-68.449198	Rock Shelter	Horizontal	0	500	600	5x3x6	NoData	No

ramics	In Feature	In area	Density per m2	Chicoid	Ostionoid	Indeterminate	Stone	Shell	Petroglyphs	Modern Use
			127							
24	1	23	19	7	0	1	1	0	0	Cooking/cleaning
4	0	4	2	0	0	4	0	1	0	Unused
5	0	5	3	0	1	4	0	1	0	Livestock
1	0	1	1	0	0	1	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Livestock
5	0	5	2	1	0	4	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Livestock
90	90	0	NoData	5	0	10	0	0	0	Bathing
0	0	0	0	0	0	0	0	0	0	Unused
2	2	0	1	0	0	2	0	0	1	Curiosity
2	2	0	2	0	0	2	3	3	0	Curiosity
3	0	3	1	0	0	3	0	4	0	Curiosity
193	193	0	NoData	2	150	41	0	0	0	Bathing
0	0	0	0	0	0	0	0	0	0	Livestock
0	0	0	0	0	0	0	0	0	0	Conuco
4	0	4	3	0	0	4	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Bathing
0	0	0	0	0	0	0	0	0	0	Cooking/cleaning
4	4	0	3	0	0	4	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Bathing
0	0	0	0	0	0	0	0	0	0	Livestock

ramics	In Feature	In area	Density per m2	Chicoid	Ostionoid	Indeterminate	Stone	Shell	Petroglyphs	Modern Use
2	0	2	1	0	0	2	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
2	2	0	2	0	0	2	0	2	0	Shelter
6	2	4	2	0	0	6	0	0	0	Livestock
0	0	0	0	0	0	0	0	0	0	Livestock
0	0	0	0	0	0	0	0	0	0	Unused
1	1	0	1	0	0	1	0	0	0	Unused
55	55	0	NoData	12	0	43	1	0	0	Bathing
86	86	0	4	8	0	78	5	13	0	Livestock
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
31	31	0	NoData	4	0	27	0	0	0	Bathing
179	35	144	144	10	0	134	1	5	2	Unused
4	4	0	2	0	0	4	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
Data	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	Unused
2	2	0	NoData	0	0	0	0	0	0	Livestock/Bathin

ramics	In Feature	In area	Density per m2	Chicoid	Ostionoid	Indeterminate	Stone	Shell	Petroglyphs	Modern Use
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
60	NoData	NoData	1	0	0	60	0	0	0	Unused
39	NoData	NoData	1	0	0	39	0	0	0	Unused
20	NoData	NoData	1	0	0	20	0	0	0	Unused
21	21	0	0	0	21	0	0	4	0	Unused
5	0	5	0	0	0	5	0	0	0	Unused
5	0	5	1	0	0	5	0	0	2	Unused
9	0	9	1	0	0	9	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
6	6	0	0	1	0	5	0	1	0	Unused
19	19	0	4	2	0	17	0	0	0	Conuco
6	6	0	2	0	0	7	0	0	0	Conuco
5	5	0	1	0	0	5	0	0	0	Unused
200	NoData	NoData	40	30	0	9	6	8	0	Conuco/House
0	0	0	0	0	0	0	0	0	0	Unused
3	3	0	1	0	0	3	0	0	0	Conuco
0	0	0	0	0	0	0	0	0	0	Drinking/Livesto
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Drinking/Livesto
0	0	0	0	0	0	0	0	0	0	Conuco
0	0	0	0	0	0	0	0	0	0	Unused

ramics	In Feature	In area	Density per m2	Chicoid	Ostionoid	Indeterminate	Stone	Shell	Petroglyphs	Modern Use
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0	0	2	2	0	Livestock
0	0	0	0	0	0	0	0	0	0	Livestock
0	0	0	0	0	0	0	0	0	0	Drinking Water
3	0	3	1	0	0	3	0	0	0	Nicholas' House
0	0	0	0	0	0	0	0	0	0	Conuco
0	0	0	0	0	0	0	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Cooking/cleaning
0	0	0	0	0	0	0	0	0	0	Livestock
8	8	0	4	0	0	8	0	0	0	Unused
0	0	0	0	0	0	0	1	0	0	Unused
6	6	0	1	0	0	6	0	0	0	Unused
0	0	0	0	0	0	0	0	0	0	Landing
0	0	0	0	0	0	0	0	0	0	Unused
2	2	0	1	0	0	2	0	0	0	Unused
42	42	0	14	0	0	42	0	0	0	Unused
30	30	0	6	0	0	30	0	0	0	Unused
2	2	0	2	0	0	2	0	0	0	Conuco
10	10	0	5	0	0	10	0	0	0	Conuco
11	11	0	5.5	0	0	11	0	0	0	Conuco
5	5	0	5	0	0	5	0	0	0	Conuco
1	1	0	1	0	0	1	0	0	0	Conuco
5	5	0	2	0	0	5	0	0	0	Conuco

ramics	In Feature	In area	Density per m2	Chicoid	Ostionoid	Indeterminate	Stone	Shell	Petroglyphs	Modern Use
40	40	0	8	0	4	36	0	0	0	Unused
16	0	16	3	0	0	16	2	20	0	Goat shelter
0	0	0	0	0	0	0		0	0	Unused
0	0	0	0	0	0	0	0	0	0	Unused
0	0	0	0	0	0		0	0	0	Unused
5	5	0	1	0	0	5	0	1	0	Goat shelter
0	0	0	0	0	0	0	0	0	0	Unused
3	3	0	1	0	0	3	0	1	0	Goat shelter

endix 2 Vessel Form analysis table

Chicoid	Ostionoid	Unrestricted vessel with a simple contour	Restricted vessel with closed contour (bowls)	Unrestricted vessel with a composite contour	Restricted vessel with composite contour	Independent Restricted vessel with a composite contour	Unrestricted vessel with an inflected contour	Restricted vessel with an inflected contour	independen restricted vessel with a inflected contour
all			5		2				
all			1						
some	some		1						
some	some		5		1				
all						1			
all			7		1	2			
all			1						
p									
1	maybe				1				
1	maybe								
	1								
	1								

Appendix 3: Site and Artifact Photos

St 1

Location

Chicoid Sherd found in flooded sinkhole

Diagnostic Sherds

St 2

Location

St 3

Location

St 4

Location

St 6

Location

St 9

Inside of Flooded Cave St 9

Diagnostic Sherds from St 9

St 11

St 11 Entrance

Inside of St 11

St 12 & 13

Entrance at St 12

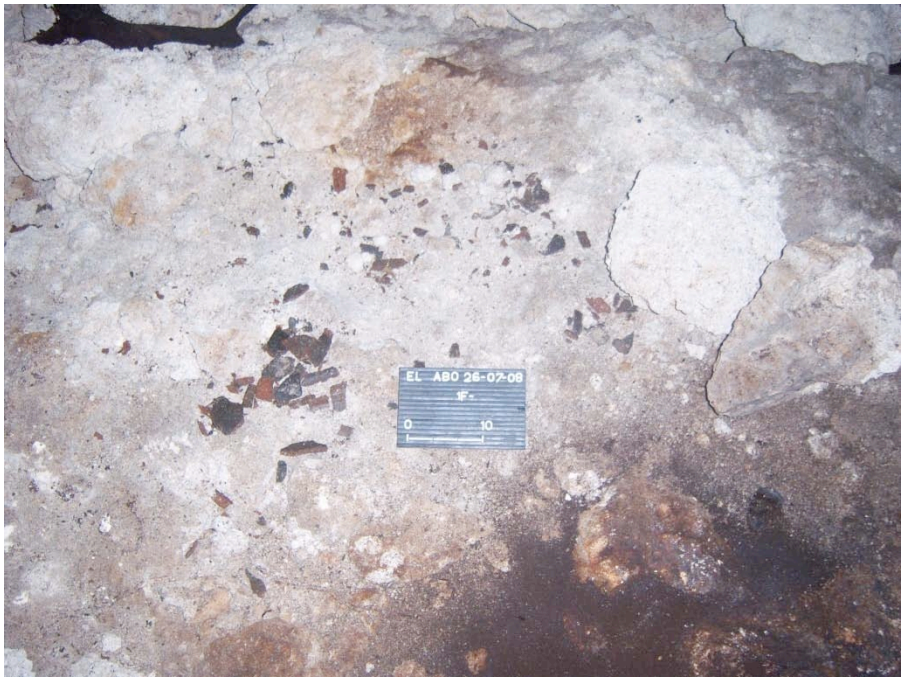
Inside St 12&13

Evidence of looting in St 12&13

Diagnostic Sherds from St 12&13

St 14

Inside of Flooded Cave St 14



Ostionoid Scatter inside of dry part of St 14

Diagnostic Chicoid sherds from St 14

Ostionoid Sherds St 14

St 17

Location

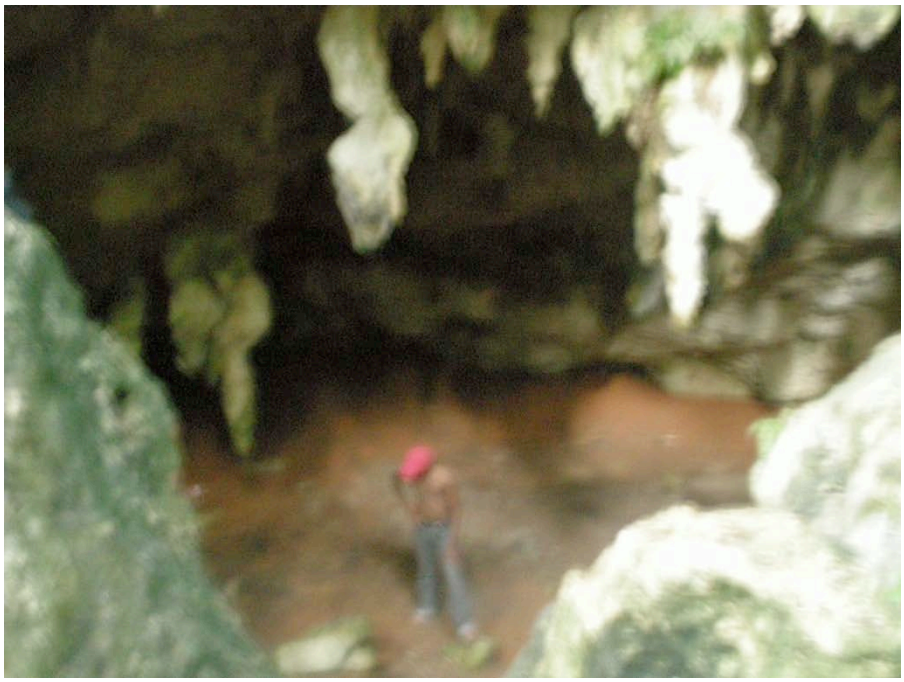
St 21

Inside of St 21

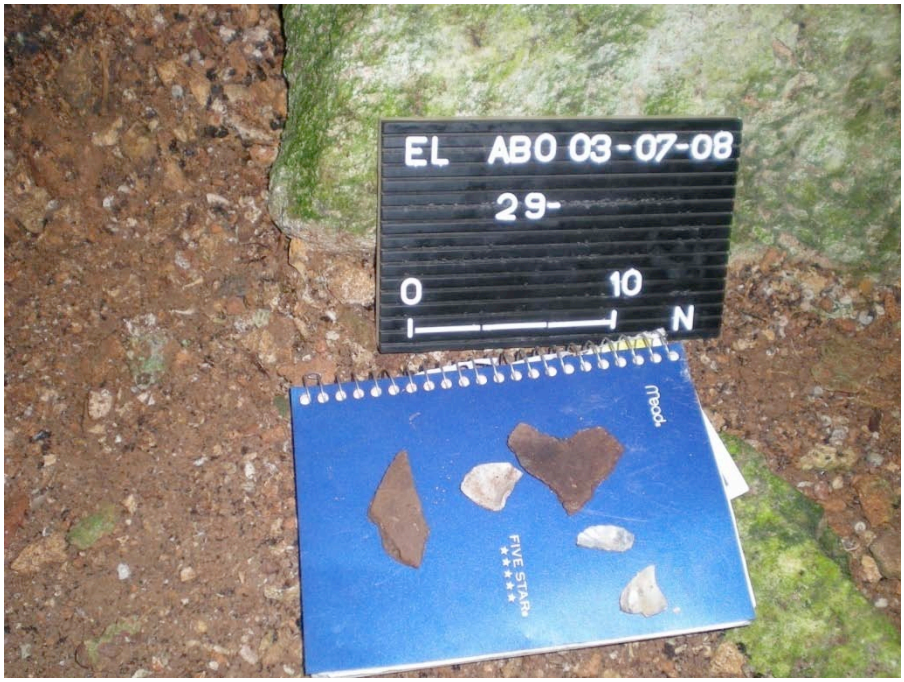
St 24

Location

St 28



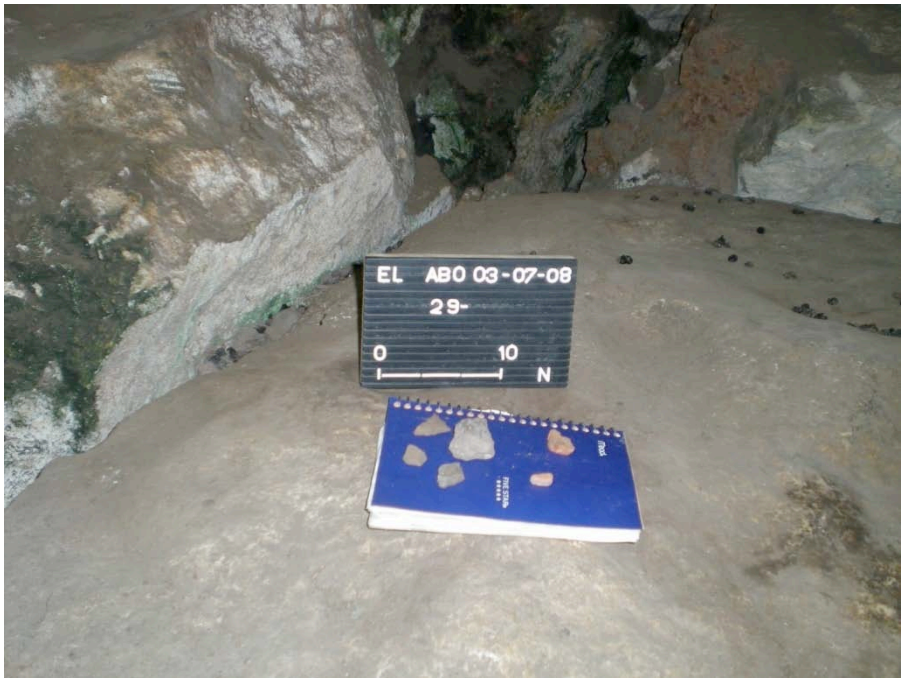
Location



Sherds found at St 28

St 29

Location



Sherds collected at St 29

St 30

Location

St 33

Entrance to St 33

Inside of St 33

Diagnostic Sherds from St 33

St 34

Site

Sherds from St 34

St 38

Small Beach St 44

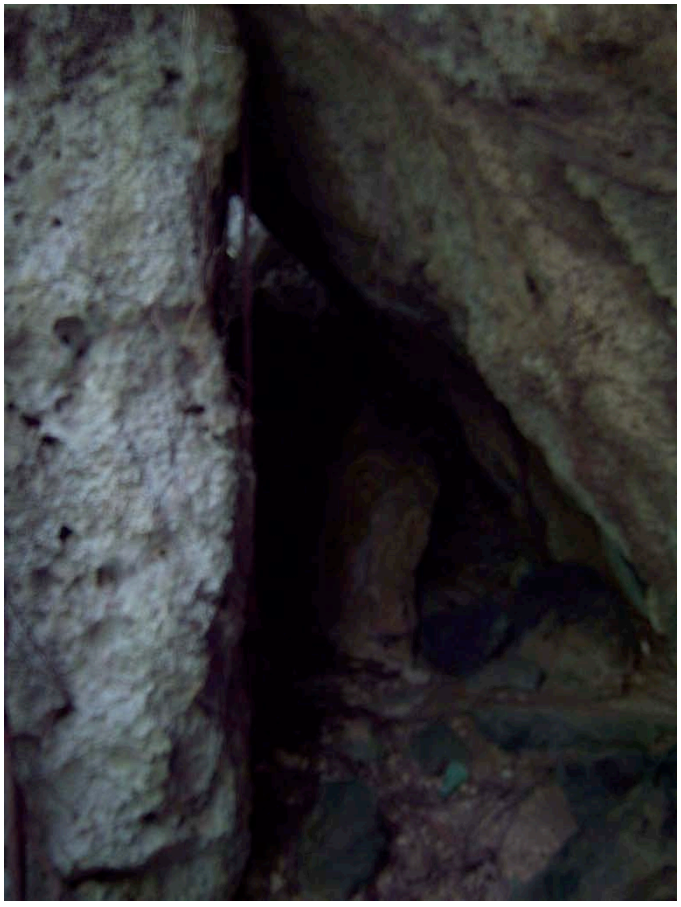
Entrance to St 44

Inside of St 44

Adornos from St 44

Sherds from St 44

St 45



Site

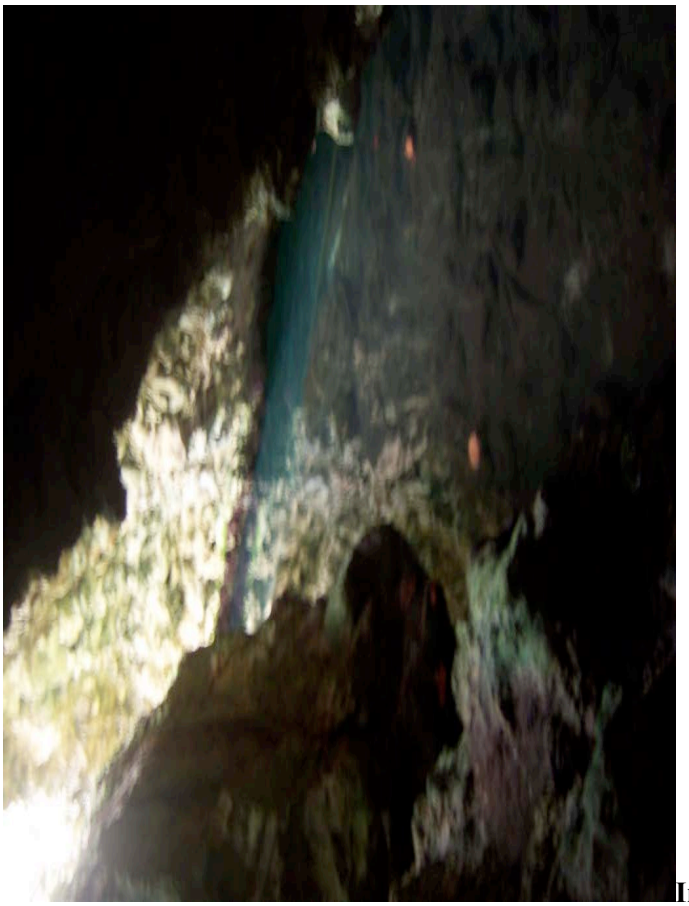
Diagnostic Sherds at St 45

St 46

Location

Diagnostic Sherd St 46

St 49



Inside St 49

Same view from above

St 56

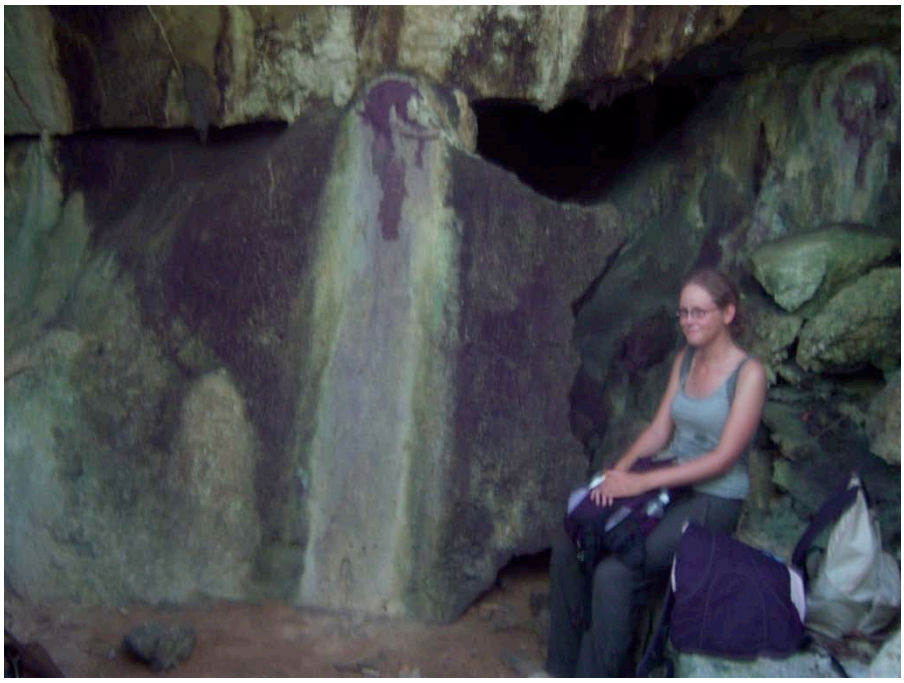
Location

St 58

Location

Diagnostic Sherds, Ostionoid

St 59



Location

St 59 Diagnostic Sherds

St 60

Location

St 60 Diagnostic sherds

St 62

Site

Diagnostic Sherds from St 62

St 64

Inside St 64

Diagnostic Sherds from St 64

St 65

Location

Diagnostic Sherds from St 65

St 66

Location

Diagnostic Sherds for St 66

St 68

Location

Adornos From St 68

Diagnostic Sherds from St 68

St 69

Entrance to Cave

View of some postholes at St 69

St 71

Large flooded sinkhole on top of the cliffs

St 73

Second large floded sinkhole on top of cliffs

St 76

Broken Ostionoid sherds inside of St 76

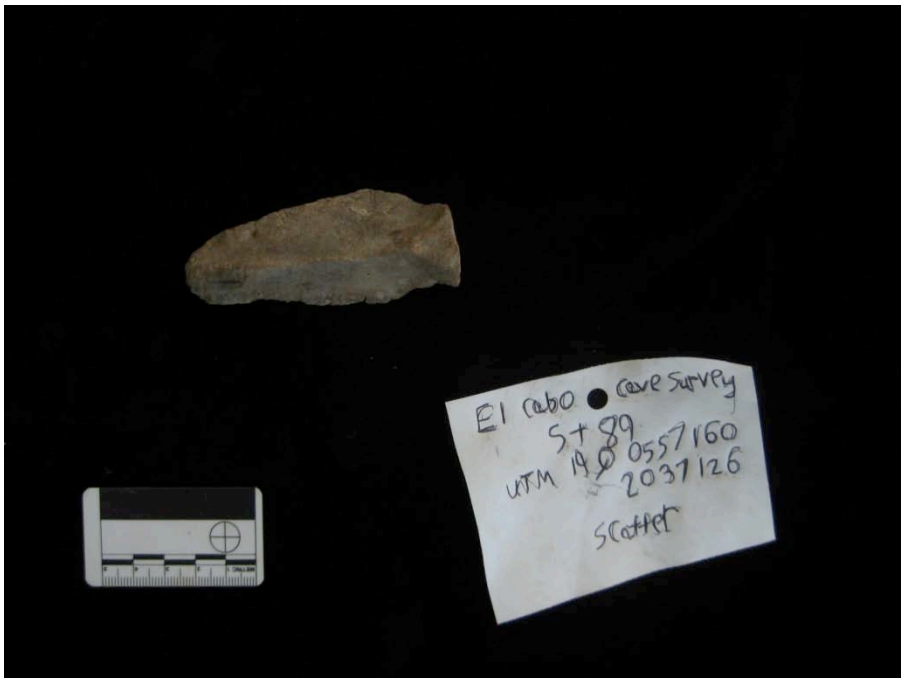
Diagnostic shreds from St 76

St 81

Location

Diagnostic Sherds from St 81

St 89



Lithic found at St 89

St 90

Largest sand Beach at El Cabo

St 95

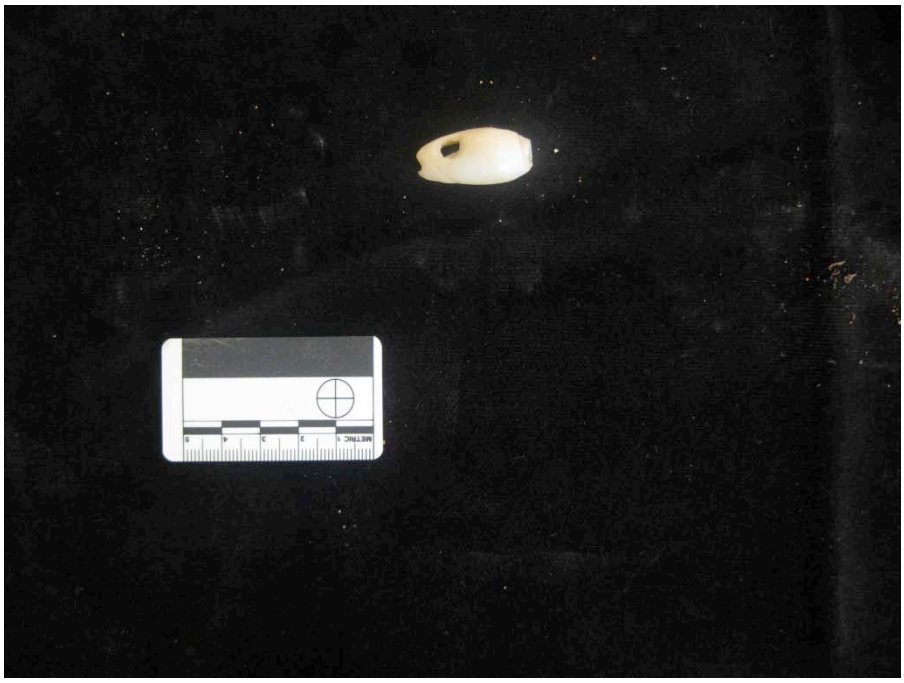
Diagnostic sherds from St 95

St 102

Location

Lithic Blades found at St 102

St 106



Shell net weight found at St 106