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Archaeological Analysis of Built Environments at Coastal Ancient Maya Port Sites

by

Lindsey Goff

Under the Direction of Jeffrey Barron Glover

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in the College of Arts and Sciences

Georgia State University

2021

ABSTRACT

Archaeological research along the littoral of Mexico's Yucatán Peninsula has led to the discovery of hundreds of pre-contact coastal settlements. Following the work of Andrews (1990), these sites had multiple functions ranging for simple fishing villages to international port sites that facilitated long-distance, canoe-based trade. It is the latter category that I focus on in this thesis. The built environment of these port sites and the geomorphological characteristics of their surrounding coastline certainly played a critical role in the services they provided for traders. While individual site-level analyses exist, I take a broader comparative approach in order to highlight the similarities and differences in how these sites were constructed and in turn experienced by the people who inhabited them and who visited them.

INDEX WORDS: Archaeology, Coastal Archaeology, Ancient Maya, Maya, Built Environment, Ports, Yucatán Peninsula, Mexico, Coastal Ports

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Archaeological Analysis of Built Environments at Ancient Maya Coastal Port Sites

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December 2021

DEDICATION

I would like to dedicate this thesis to my parents, John and Christy Goff. Thank you for constantly encouraging and supporting me.

ACKNOWLEDGEMENTS

There are several people whom I would like to acknowledge for their help in both my academic and personal life. First and foremost, I would like to acknowledge my advisor and committee chair, Dr. Jeffrey Glover, whom had the patience of a saint through my time in school and gave constant help and support. Thank you to my committee, Dr. Nicola Sharratt and Dr. Joshua Kwoka for both being understanding, supportive, and amazing professors who were always willing to make time to help. I would also like to acknowledge and thank Dr. Walter Witschey who provided the GIS coordinates from the Electronic Maya Atlas which made most of this work possible. Thank you to my husband, Edward Alexander Smith, who was a constant rock through my time in graduate school; thank you for your help, support, and being my personal editor. I would like to thank those in my cohort who gave advice, stayed up late with me writing, and being a calm yet fierce force in my life during this time. Lastly, thank you to all of my close friends who did nothing but give me support and encouragement through this entire process. Thank you.

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LIST OF ABBREVIATIONS

Geographic Information Systems . . . GIS

Electronic Maya Atlas . . . EMA

1 INTRODUCTION

1.1 Overview

The ancient Maya lived throughout the highlands and lowlands of eastern Mesoamerica, where many Maya peoples live to this day. Specifically, they reside(d) in modern-day Belize, Guatemala, and parts of Honduras, El Salvador, and Mexico (Sabloff 1990). Looking specifically at the Yucatán Peninsula (Figure 1), the Maya are surrounded by the sea/water, which held important cultural and ideological significance to the society (Andrews 2020:269). The sea and marine resources are present at pre-historic sites in the shape of artifacts, art, and glyphs depicting their cultural relationship with the marine landscape (Andrews 2020:269). Prior settlement pattern research and coastal site reconnaissance have shown that over 400 ancient Maya coastal sites have been registered in Belize, Guatemala, and Mexico, including the Yucatán Peninsula (see Figure 1) (Andrews 2020:269; Clark 2015). Looking specifically at the Yucatan coastlines, over 250 coastal sites have been identified, though not all of them have been properly excavated and analyzed by Maya archaeologists (Clark 2015:484-501).

These pre-Columbian sites along the Yucatán coast allow an exploration of how the ancient Maya interacted, habituated, and manipulated this coastal landscape. Ashmore and Wiley (1970) explain how the built environment of these ancient Maya sites allows archaeologists to further analyze the relationship the Maya held with their physical and cultural surroundings, which can further be used to understand how a site fits into the ancient Maya world during various time periods. When examining the built environment of ancient Maya sites along the coast of the Yucatán peninsula in Mexico, are there certain shared features in the constructed environment that would indicate that these sites served similar functions? If present, are these

characteristics restricted to specific time periods (i.e., the Postclassic) or found only at specific sites?

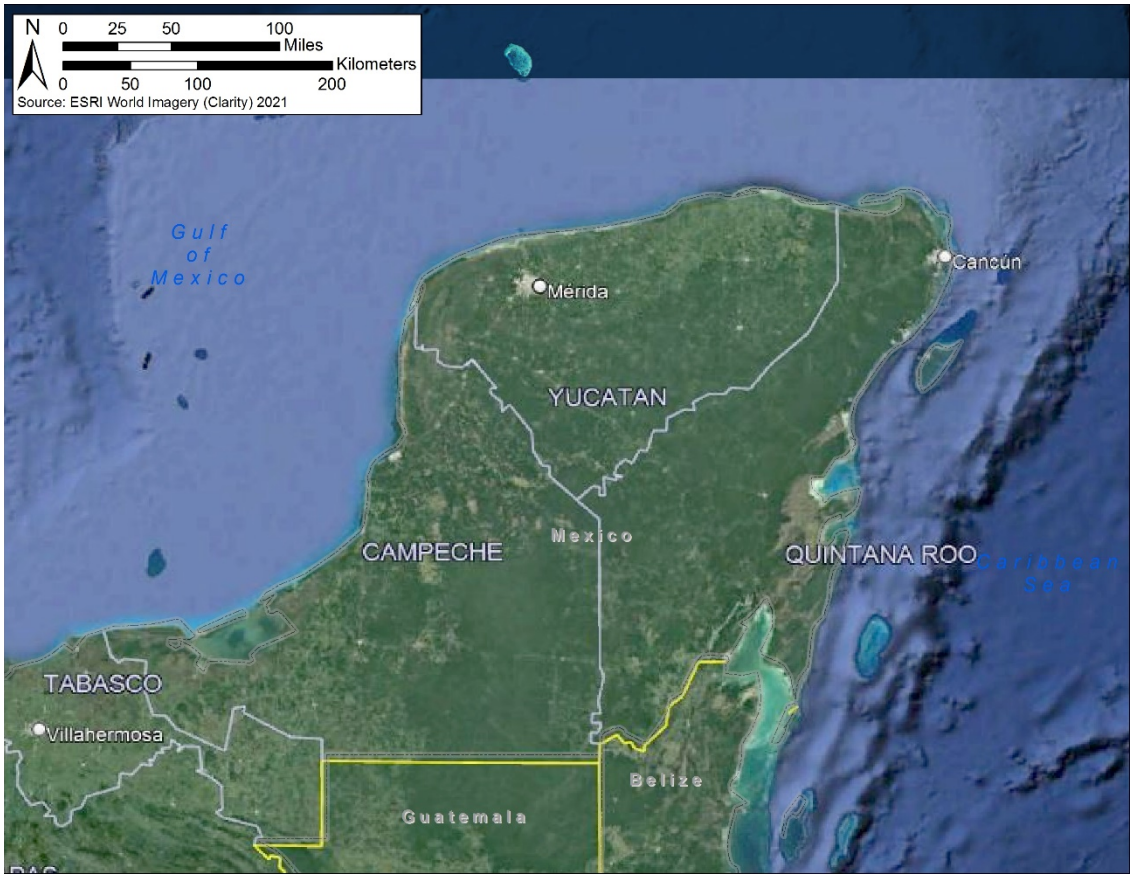

Figure 1: Map of Yucatan Peninsula, Mexico

If we are to address these questions, we must first differentiate a port site from other coastal sites. In essence, I am asking what makes a port a port? Anthony Andrews has done extensive research into ancient Maya coastal sites and their various functions throughout the ancient Maya world. Andrews's (1990, 2020) scholarship has laid the foundation for studying coastal sites and, in particular, ports in the Maya area. In his seminal work in 1990, Andrews described coastal sites' various functions, including coastal communities, coastal religious centers, island nercopoli, and specialized trading ports. There is additional typology of the various activities/functionality within the specialized trading ports, including ports of

embarkation to offshore islands, ports-of-trade, coastal transshipment ports, and seaports to inland polities. In 2020, Andrews refined these typologies with updated research and discussions of twenty years, which included refinement of the island necropolis discussion, expansion of port characteristics found within the built environment that have been discovered across the Maya area, and the discussion of water transportation and navigational routes.

While Andrews mentions several port sites, he does not have the opportunity to dive deeply into the built environment of those sites. Andrews does, however, describe characteristics of ports found within the built environment, which includes the presence of harbors, quays, piers, ramps, causeways (*sacbeob* and *andadores*). There are other characteristics of port complexes in which Andrews describes, such as ceremonial structures, altars, and shrines documented at several coastal ports throughout the Maya area. Regarding the described characteristics of the built environment, identified port sites along the coast of the Yucatán Peninsula will be analyzed for the presence and absence of these port characteristics with the addition of two criteria to add to Andrews's typology. For this study, in particular, the sites must be located along the coast, and the identified port must have a map to assess the built environment. Further, other aspects of the built environment will also be analyzed, or at the very least brought up based on the level of frequency it was mentioned through various ports, which may have similar commonalities. This includes open spaces along the littoral of settlement cores and the patterns of port settlements that have artificial land buildup.

While it may seem like an obvious characteristic to be included, the identified port settlements must be on the water to be considered a port, as many of the identified port characteristics have relation to port functions conducted on the water. Various settlements have been identified as coastal port settlements that are not directly related to a body of water. This is

not to rule out that these coastal settlements may, at one time in the last few thousand years, have been on the water due to the ever-changing coastline due to the rising and lowering of the sea level. It should also be stated that at one point and time, various sites identified as ports, in general, may have had a loss of built port structures/characteristics due to natural deterioration or loss from natural disasters and human interference. Many of the sites have gone unprotected, have been demolished by modern settlements, looted and deconstructed for their materials to use for new structures elsewhere, or looted for goods found throughout the site.

1.2 Organization of Thesis

The following chapters will briefly introduce various archaeological theories and cultural histories that give a basis for the background and research used for this thesis. Chapter Two reviews the background and literature review for the basic theoretical groundwork, which will give a general understanding of the previous work conducted within archaeology. In Chapter Three, I discuss the cultural history of the ancient Maya, which gives a synopsis of the important cultural attributes of various periods. Chapter Four details various typologies of ancient Maya coastal communities and ports. With a general understanding of the background, Chapter Five introduces the methodology used to gather information needed for the following research on the built environment of ancient Maya coastal ports. In Chapter Six, I discuss the data of the various environment and other archaeological information from previous research projects of identified coastal ports. Though several coastal ports fall within the research area, there are some well-known ports along the Yucatan littoral that I cannot discuss because there are no maps of these sites. This could be because cultural or natural processes have long destroyed the sites, or archaeological work has not yet been conducted to produce a map. The ports that have the information needed for

analysis will be discussed in Chapter Seven. All conclusions and discussions of future research are in Chapter Eight.

2 BACKGROUND AND LITERATURE REVIEW

Chapter Two provides the literature review of the various sources used to further understand settlement pattern studies, landscapes studies, and the built environment. In addition, I discuss how these various studies and theories have been used in research throughout the Maya area. It is vital to understand how these coastal settlements have been identified and interpreted through archaeological investigations.

2.1 Introduction to Literature Review

Archaeology is a field that is constantly developing and improving in both theory and methodology. The practice and theory of archaeology borrow aspects from socio-cultural anthropology while also considering ecological principles and studies. Various principles and theories are deployed when approaching the built environment, specifically those on the coast. It is also important to consider how the built environment has been approached archaeologically in the past through settlement pattern research and the archaeological theories behind these concepts. There are even more specific practices relating to coastal and maritime archaeology that will also be considered when approaching the analysis of the built environment of ancient Maya coastal sites. Further background research into the study area of the Yucatán and archaeological work that has been conducted that is relevant to this study will also be discussed due to the lack of fieldwork that cannot be conducted at this time.

While this study does not focus on settlement pattern studies, per se, it is crucial to understand the history and theories used as they provide the groundwork that allowed in the identification of the coastal settlements and ports discussed throughout this thesis. The thoughts and theories which came out of settlement pattern studies during the post-Processual turn in archaeology, such as landscape archaeology, provide an opportunity to delve deeper into the

cultural connections made between the settlements found and the environment landscape of which they are a dynamic part. Understanding the role of the exact location of these sites, or as well as understanding the cultural context of the landscape has been discussed by Wendy Ashmore (Ashmore and Knapp 1999). The "space" of a site describes to the physical environment: the topography, geology, and ecology. These factors all played a part in determining the best location for settlements. After establishing a place, communities would build up the environment to better suit their needs, creating a "place" through their interactions in that "space." The utilization of a specific place becomes ingrained into the everyday life of each individual member of a community. As Winston Churchill put it, "We shape our buildings; thereafter, they shape us." The built environment that is chosen to live in which is them altered and created also shapes the daily lives of those who inhabit it. Applying this to understanding the built environment of ancient coastal port sites allows us to understand not only how the Maya shaped the space but how they viewed and manipulated the environment to shape their lives.

2.2 Settlement Patterns and the Built Environment

Archaeological settlement pattern studies have led to the discovery of many ancient sites worldwide, including ancient Maya sites throughout the Yucatán Peninsula. First, it is important to discuss settlement pattern studies and their importance in archaeological research. Settlement pattern archaeology and research allow archaeologists to analyze where ancient peoples chose to settle or work, how they organized and built these settlements, and how specific areas may hold answers to how these ancient peoples lived thousands of years ago. This is only a tiny glimpse into what settlement pattern analysis can explore and how this practice can provide a basic understanding for further theoretical work, such as accurately analyzing anthropological and archaeological landscapes and built environments.

Settlement pattern research started with cultural anthropologist Julian Steward (1902-1972) and archaeologist F. M. Setzler (1938). They published a paper in 1938 on the importance of both archaeologists and ecologists making more of an effort to understand cultural change through ecological analysis (Trigger 2006:372). During this period, archaeologists were focused more on identifying artifacts and categorizing artifact styles. There became less focus on how ancient peoples may have set up their settlements and what could be learned by studying their distribution across a region. Many critics of archaeology called for archaeologists to move forward into a more 'ecological analysis of human behavior,' meaning they would have to use their data to analyze the various changes in population size, subsistence economics, and settlement patterns (Trigger 2006:372). Steward would inspire archaeologist Gordon Willey to develop settlement archaeology in the 1950s (Trigger 2006:375).

Gordon Willey was one of the first archaeologists to look at settlement patterns while studying in Peru and would later bring his methodologies of settlement archaeology to the Maya area (Trigger 2006:376). Willey saw settlement patterns as a way to see how these ancient peoples reflected their way of life through the natural environment and to analyze the technology needed to build these settlements (Willey 1974:1). Not only this, but Willey knew that settlement pattern research could also show how cultural groups organized and controlled social interaction within their society (Trigger 2006; Willey 1974:1). Further analysis showed that Willey understood this research was greatly needed and recognized that settlement pattern research and data could aid in systemic studies of these ancient civilizations' political and economic organization (Trigger 2006:380). In doing this, settlement archaeology showed how rapidly these adaptations change, challenging those who claimed that cultural changes were slow (Trigger 2006:380).

In the Maya area, settlement patterns are referred to as the "total disposition of ancient Maya remains over the landscapes" (Ashmore and Willey 1981:3). "Disposition: implies any man-made building or landscape modification created by people, and the associated artifacts found within these habituated areas (Ashmore and Willey 1981:3). This definition of settlement patterns and how Ashmore chooses to include the term "landforms" is important for further sections because "landscape" encompasses both the physical and cultural landscapes of the peoples who live there. This will be further expanded upon in Section 2.3 of the literature review.

Ashmore and Willey (1981) explain that settlement pattern studies have been a theme of interest for archaeologists working in the Maya area over the years, starting with settlement archaeology in the 1950s. Ashmore (1981) highlights that by the late 1970s, analysis of settlement patterns had become a common theme within archaeological investigations and experienced rapid growth. These settlement pattern studies allowed archaeologists to analyze how the ancient Maya settled around the Yucatán and provided a context of the relationship between people and their landscapes (ecological), including how they modified their landscape and how these people held relationships with other people (Ashmore 1981:4). To further elaborate, settlement pattern analysis in the Maya lowland allows archaeologists to look at how the Maya viewed their physical landscape and how their settlement patterns can show how people lived or connected as a society (Ashmore 1981:4). Taking this a step further, looking at how the ancient Maya physically altered their environment is another way of looking at a site's built environment.

When analyzing settlement patterns, it is essential to look at how these ancient communities chose to build their settlements and how they altered their environment in the

process. More specifically, the built environment can be defined as any architectural modification made to environmental features by humans, for example, building a shelter or a reservoir to collect rainwater. In doing this, archaeologists analyze the built forms, or "building types created by humans to shelter, define, and protect activity" (Lawrence and Low 1990:454) within the environment. Several questions help set up a theoretical approach to how archaeologists can view the built environment, some of which will be used to accurately analyze the built environments of the coastal sites for this study. Archaeologists analyze the built environment to see how ancient civilizations would modify and construct their environments to suit their social functions/activities better. So, in what ways do these built forms "accommodate human behavior, adapt to human needs, and how does the social group 'fit' the form it occupies" (Lawrence and Low 1990:455)? Analyzing this aspect of the built environment can show us how a specific settlement/site functioned, such as understanding the physical manifestation of port functions at a coastal site. This can then be compared to other sites, including how the site accommodated behavior, needs, and social groups in relation to other neighboring settlements or city-states (Lawrence and Low 1990:445).

Other questions that archaeologists use to analyze the built environment fall along the lines of understanding why ancient civilizations may have constructed certain buildings and how they reflect the culture of those who built them. Was a temple constructed to honor an individual or serve a more communal function? How does it show the relationship between space and power? What "roles do history and social institutions play in generating the built environment" (Lawrence and Low 1990:455)? These questions can be further expanded to understand how settlements' built environments relate to these civilizations as a whole in their respective times. This approach to these questions uses social production theories to determine how built environs

compare to other societies within the larger context of societal and institutional history (Lawrence and Low 1990:492).

While settlement patterns studies are not the sole focus of this thesis study, settlement pattern research has allowed archaeologists to understand the full extent of where and how the ancient Maya constructed their settlements around the littoral of Yucatán Peninsula. This further helps understand the built environment and how the ancient Maya chose to manipulate their environment to conduct specific activities. The theories and questions brought up in this thesis study will hopefully help interpret the available data regarding how the Ancient Maya built and lived in these coastal sites.

2.3 Landscapes and their Relation to the Ancient Maya

Looking back at Ashmore's definition of settlement patterns in the ancient Maya area. In the past, landscapes were often seen as a backdrop in archaeological investigations where remains of ancient civilizations resided instead of being part of the lived experience of these ancient peoples (Glover et al. 2011; Knapp and Ashmore 1999:1). However, landscapes are much more than a natural environment in which people live(d). Recent studies have focused on landscapes' cultural and symbolic aspects (e.g., Rodning 2009:182) and continue to expand in analyzing landscapes, built environment, and archaeological settlement pattern research.

Knapp and Ashmore (1999:10) have defined landscapes to be "the arena which and through which memory, identity, social order, and transformation are constructed, played out, re-invented, and changed." Landscapes are filled with the memory of ancient civilizations in which many descendants connect with today as part of a lived experience. With the growing movement on the consideration of landscapes, there has been incorporation to approach ancient Maya landscapes with a re-spatialization of social theory and its approach to analyzing the natural and

cultural aspects of landscapes (Ashmore 2000; Glover et al. 2011). There were reasons why ancient peoples chose to settle and build their landscapes the way they did, partly due to how their society viewed landscapes and how they chose to represent this socially within their environment.

Maritime cultural landscapes are an excellent example of how these theoretical approaches can be used in the archaeological analysis of built environments. The cultural landscapes linked to maritime environments are deeply rooted in local experiences (Glover et al. 2011:198). Using the re-specialization of social theory further allows archaeologists to analyze how cultures may have changed over time and reflect in their environment and cultural landscape, particularly in the ancient Maya area (Rodning 2009:15). This theory/perspective also analyzes and informs how all spatial data is interpreted (Glover et al. 2011). It also allows archaeologists to further explore what these ancient cultures did on land and sea by analyzing these settlements' built environments and the cultural materials left behind (Glover et al. 2011). Archaeologists can attempt to analyze the conceptualized and built landscapes across the Maya world and see how they played "tangibly active roles in constant creation and shaping of Maya life" (Brady and Ashmore 1999:126). Analyzing the social processes and the landscapes of coastal life within the Maya area have mainly been focused on examining the sacred landscape, both natural and constructed (Glover et al. 2011). It is well known that the ancient Maya used several materials found from coastal resources, such as salt or fish, or gathered other resources like stingray spines to perform rituals. However, there has not been a study that focuses on how these coastal settlements compare when analyzing various aspects of their natural and constructed landscapes.

2.4 Summary

Through settlement pattern research, understanding where the ancient Maya determined areas to live throughout time, such as the coast, helps archaeologists understand what influenced this settlement decision. While settlement pattern studies have long helped archaeologists understand the relationship between sites and their environment, a specific focus on the built environment draws attention to these coastal people's daily activities and lived experiences. Examination of the built environment provides an analysis of ancient Maya urban planning and further understanding their views on space and place, as previously discussed. Along the coast and at many port sites discussed in Chapter Six, the ancient Maya had limited space to construct their settlements due to the surrounding environment and rising sea waters. The amount of space used would have been considered in determining how and where structures would have been built. Not only this, but the cultural significance of landscapes would also influence the built environment-particularly when constructing ceremonial structures and complexes. Understanding the theoretical basis of settlement pattern research, built environments, and cultural landscapes provides me with the framework to analyze these coastal port sites.

3 CULTURE HISTORY

Chapter Three discusses various aspects of Ancient Maya cultural history on both inland and coastal settlements. Next, there is a general summary of the occupation periods highlighting important cultural and historical markers of the ancient Maya while discussing what was happening along the coast throughout time. Further, there will be a discussion of the coastal ecology of the Yucatán Peninsula to understand the coastal environment in which our data set of ports is located.

3.1 The Ancient Maya: Inland and Coastal

As previously stated, the ancient Maya are an indigenous group in parts of Mexico, Guatemala, Belize, Honduras, and El Salvador. The ancient Maya civilization was a complex society with developing polities of city-states, a complex written language, a calendar system depicted in glyphs, a calendar system that nearly matches the Gregorian calendar, and extensive knowledge of astronomy (Coe and Houston 2015). Ancient Maya society had a complex religion, with numerous gods associated with various aspects of the natural environment. This worldview holds tremendous importance in viewing the landscape and world around them. These various aspects of their culture further emphasized how they settled and constructed their environment. Further elaboration of these technological advances will be discussed in the chronological history of the ancient Maya in subsection 3.2.

Thousands of ancient Maya sites have been identified, varying in occupational history and size throughout the lowlands and highlands of eastern Mesoamerica. These sites range from small cities with monumental architecture reflecting their cultural beliefs holding thousands of occupants at the peak of their occupation to small villages or coastal fishing hamlets where smaller groups worked to bring resources to inland polities. Over time, the ancient Maya also

began settling along the coastline to take advantage of marine resources, such as salt and fish, to support their growing society. The coastline was also a travel conduit connecting coastal communities along the Yucatán Peninsula. As previously discussed, many coastal sites were fishing communities and ports, which aided in supplying resources to islands offshore and inland cities with long-distance trade items and coastal marine sources. Thus, creating "link(s) in a chain connecting people and ideas, and supporting the ambitions of the city and state" (Glover et al. 2011:195). These networks further show how the ancient Maya were a complex society who had mastered the land and sea of the Yucatán.

3.2 Chronology of the Ancient Maya

Archaeologists have categorized ancient Maya history by different phases of occupation, which are primarily defined by changing ceramic styles. However, in the Classic period, hieroglyphic writing allows specific dates for events across the Maya lowlands. The following section gives a brief chronological history of the ancient Maya from the Middle Preclassic to contact, specifically associated with the ancient coastal port sites within our dataset. We will be starting at the period dating back to the oldest known ancient Maya coastal site in the Middle Preclassic period (Andrews 1990:159). It is important to remember that some of the sites discussed in the following section have produced cultural materials that archaeologists have been able to date to their respective periods. Some have undergone excavations and have monumental architecture, while others have produced simple surface collection findings.

Table 1. Chronology of Occupational Periods of the Ancient Maya

Chronological Occupational Period	Dates
Middle Preclassic Period	1000-300 BC
Late Preclassic Period	300 BC- AD 250
Early Classic Period	AD 250-600
Late Classic Period	AD 600-800
Terminal/Early PostClassic Period	AD 800-1200
Late Post-Classic Period	AD 1200-1530

3.2.1 Middle Preclassic Period

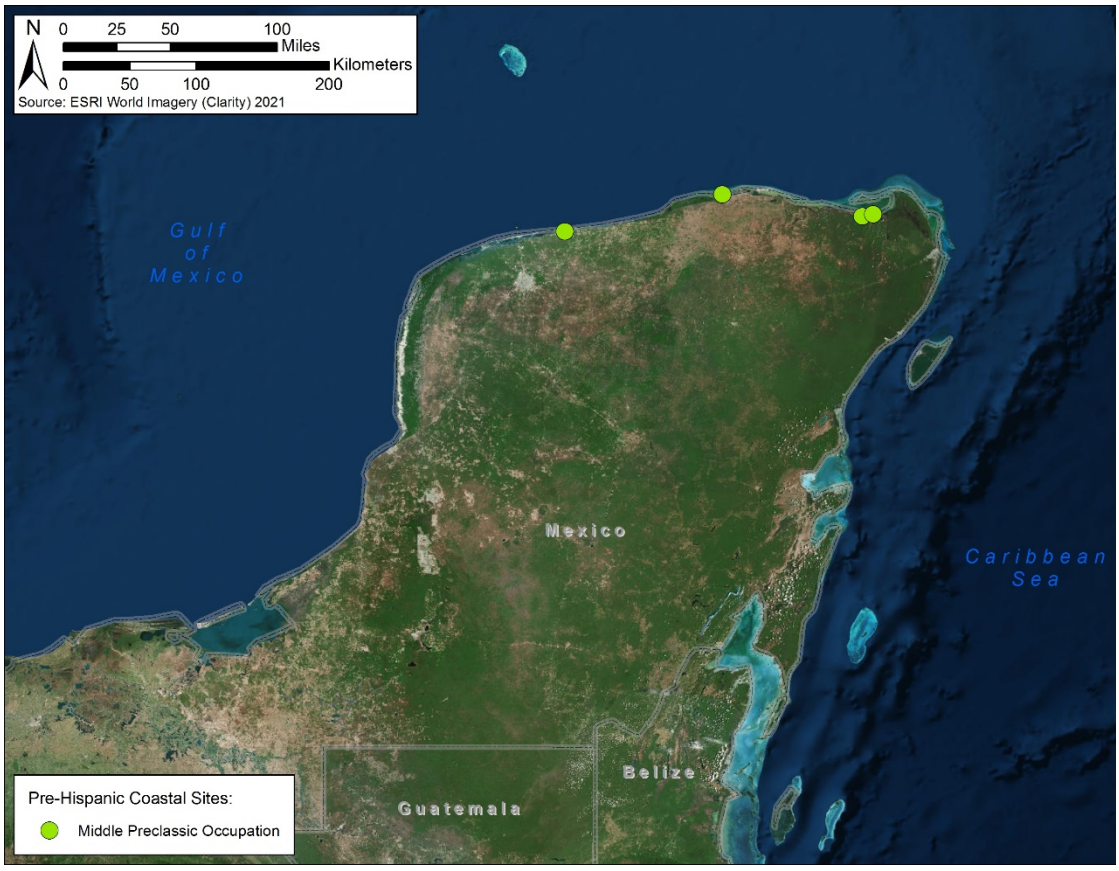

Figure 2. Middle Preclassic Coastal Sites

During the Middle Preclassic Period, the first monumental Maya cities appeared in the central lowland region (Foster 2002:32). The communities which arose had evidence of urban planning and monumental architecture. Around 700 B.C., the population within the Maya lowlands experienced a vast expansion, with settlements popping up around rivers or natural limestone wells, called cenotes.

Along the littoral of the Yucatán Peninsula, archaeologists have found evidence of around 17 coastal sites dating to the Middle Preclassic period (ca. 1000-400 BC) (Andrews 2020:170). The coastal settlements that eventually developed into ports (Figure 2) first started seeing their occupancies during this time, but more than likely did not have their port features built. The coastal sites within the Yucatán Peninsula have "small quantities of ceramics of the Early Nabanché (Nabanche-Mamom) ceramic horizon" (Clark 2015:109), which date back to the end of this period. Middle Preclassic sites have been found along the Campeche coast, the northern Yucatán State coast, and the northern and southern Quintana Roo coastlines (Clark 2015). These sites include sedentary coastal villages and small villages with shell middens. Some Middle Preclassic sites have experienced little archaeological excavation or surface collections to determine what the site may have been used for (Clark 2015:109). Glover et al. (2022) explain that it was also during this time when the sea levels were a few meters below what we see today. Further, it is explained that "while that minimal rise in sea-level would not impact settlement on sections of the coast with greater topographic relief, it could substantially change the coastal geomorphology of large sections of the coast, which makes locating those sites, if they exist, very challenging" (Glover et al. 2022). An excellent example of this is Vista Alegre, which has Middle Preclassic materials; however, excavations have not exposed any intact Middle Preclassic deposits (Glover et al. 2015). This may be due to shallow bathymetry due to the rising sea levels

along the western and northern coasts. This rise in sea level caused many sites to gradually become submerged (Glover 2021: direct communications).

3.2.2 Late Preclassic Period

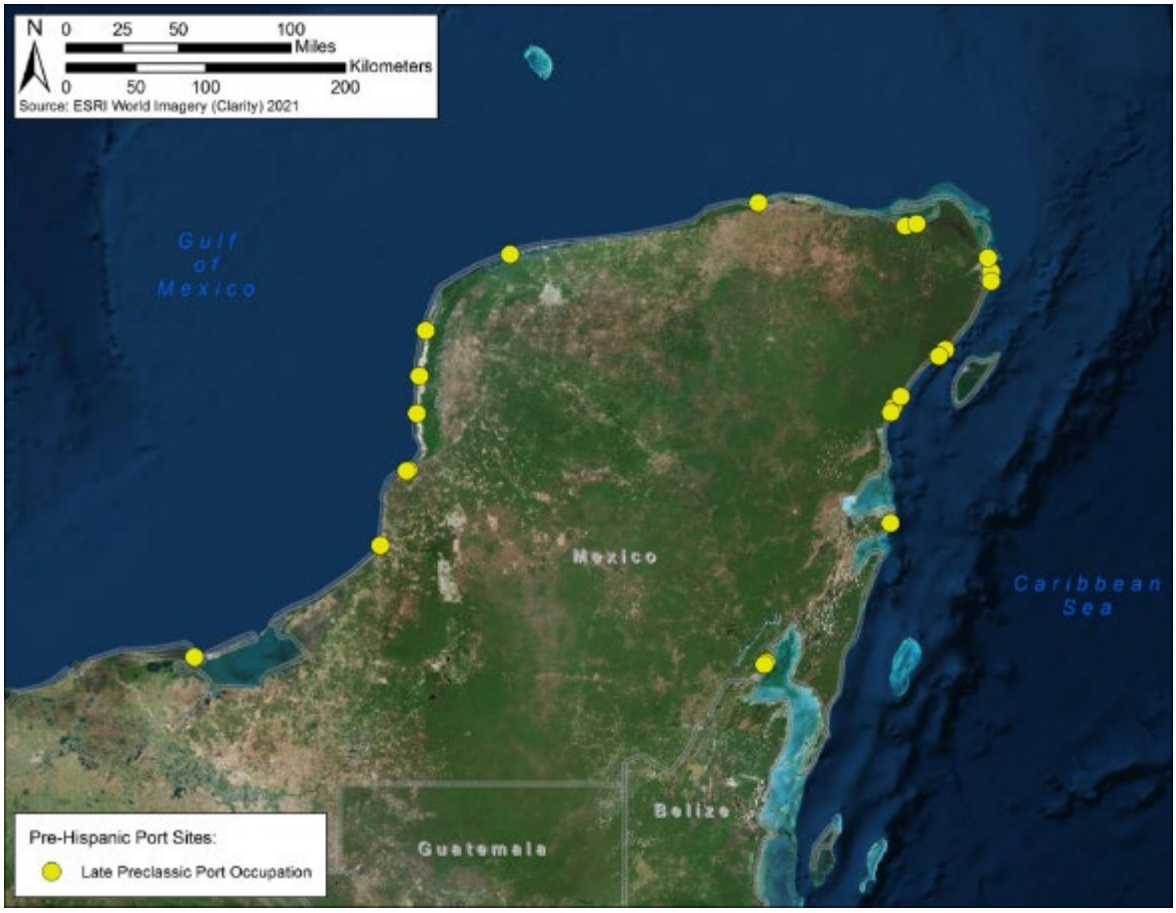

Figure 3. Late Preclassic Port Sites

The Late Preclassic Period has been described as a "period of dynamic growth and development" for ancient Maya culture and populations (Foster 2002:36). Throughout both the Guatemalan highlands and the Maya lowland region, cities and urban centers saw tremendous growth of urbanism, monumental and masonry architecture became more prevalent, and there was a significant population growth throughout the areas (Foster 2002:36). During the Late Preclassic, the Maya lowlands obtained exotic goods from an extensive trade network.

With the transition to the Late Preclassic period (300 B.C.-A.D. 250), Maya archaeologists noticed a jump in the number of coastal sites around the Yucatán and Belizean coastline, with at least 75 sites being registered as having cultural materials or characteristics relating to this period. However, archaeologists recognize that this significant increase could imply that there may be earlier occupations, particularly along the Caribbean; they could be found through further extensive archaeological excavations and analysis (Clark 2015:111). Many of these coastal sites are small fishing camps and hamlets, with some seasonal outposts that supply marine sources to inland sites (Andrews 1990:160).

With an increase in settlements and peoples, archaeologists see evidence of growth in solar saltworks, with at least 15 sites having adjoining salt flats (Andrews 2020:270). Andrews (2020) adds that it is most likely around this time that the ancient Maya fishermen would have begun supplying inland communities with salted and roasted fish, which provides sodium. Minerals, such as sodium, are essentials humans cannot gather from vegetal sources but rather from fishing and hunting (Andrews 2020:270). Many of these Late Preclassic period sites also have recovered long-distance trade goods, such as obsidian and ceramics, showing a growing trading network among the ancient Maya (Andrews 2020). Coastal port sites started becoming more established during this time (Figure 3) and are also found along the solar saltworks (i.e., Xcambo).

An example of this developing trade network can be seen at Cerro Maya, located on the "peninsula that juts into Corozal Bay near the mouth of the New River, a pivotal area where riverine and coastal trade routes meet" (Glover et al. 2022). Near the shore of Cerro Maya, an 80 m long docking facility and "clustering of settlements" indicates that it was previously linked to facilitating trade (Scarborough 1991; Walker 2016). On a stucco mask that flanks the stairs of

"the central structure at the site share an iconographic program that is found at sites across the lowlands" (Glover et al. 2022:6), as well as artifacts such as "jadeite bib heads, along with obsidian" connecting Cerro Maya to long-distance connections during the Late Preclassic. Glover et al. (2022:6) point out that the growth and proliferation patterns are what other coastal sites also experienced during this time.

3.2.3 Classic Period

Figure 4. Late Classic Port Sites

The Early Classic Period saw a slow continued growth of settlements along the coastline (Glover et al. 2022). With the rise of Classic Maya cities, clearer connections were made between coastal settlements and inland polities during this period. Due to the rise of these inland cities and growth on the coast, there was a higher "demand for salt and other coastal resources

(i.e., shell, stingray spines, fish) that were being exchanged" (Glover et al. 2022:6). During this time, a growing shared coastal identity was forming in various places along the coast, showing the facilitation of "the movement of goods" along the coast. This shows that they were not just serving inland cities in the Maya area but gaining independence that would 'buffer' them from the "collapse" that later impacted the Maya lowlands (Glover et al. 2022:6).

By the Classic period (A.D. 250-750), the ancient Maya developed an elaborate calendar, writing system, and highly sophisticated art style shown on ceramics and the walls of elaborate temple-pyramids and palaces. During this, the ancient Maya had also developed architectural layouts that emphasized how the buildings were arranged around plazas (Coe and Houston 2015). Some of these characteristics and traits developed in the Late Preclassic period and were carried through to the Classic period (Coe and Houston 2015:63).

With a growing population during the Classic period, the demand for salt grew (Andrews 2020:270). Archaeological evidence showed many sites associated with the ancient Maya along the East Coast of Quintana Roo, with Coba being the largest city, coastal or inland, at the time (Willey 1986:30). However, these sites showed a continued occupation or building phase through the Terminal Classic period (A.D. 850-1100). There is also a pattern of the "appearance of large settlements of urban proportions within 20 km of the coast" (Andrews 1990:160), for example, Chunchmil, Dzibilchaltun, San Gervasio, and Altun Ha. These sites are also examples of those related to 'capitals of small polities' (1990:160).

There have been nearly 300 coastal sites associated with Classic period occupation (Andrews 2020:270). Several of these Classic period sites were large settlements containing thousands of people and monumental architecture (Andrews 2020). Some of the major sites that are active during this period are:

> Champoton and Jaina on the Campeche coast, Tizikul, Xcambo, Emal and Conil on the north coast, and El Meco, El Rey-San Miguel (Isla Cancun), San Gervasio (Isla Cozumel), Playa del Carmen/Xamanha, Xcaret/Pole, Xelha/Xala, Tancah, Oxtanch, and Santa Rita on the Caribbean coast [Andrews 2020:270-271].

Andrews (1990:160) points out that the coast "may have also served as a channel for cultural contact with distant regions," which was suggested due to the cultural materials and trade goods found from Teotihuacan at Dzibilchaltun, Xelha, and Altun Ha. Andrews (1990:160) suggests that this evidence shows a type of integration of the Maya coastal networks into "Mesoamerican trade and cultural contacts by the end of the Early Classic Period," which also spread to inland polities such as Coba. During this time, this economy that developed from coastal trade played a significant role in "the political development of the northern lowlands" (Andrews 1990:160). Part of this political development was the major cities of Tikal and Calakmul.

During the Late Classic period, around A.D. 600-750/800 (Coe and Houston 2015:10), there was again growth in both population numbers and the number of Maya polities seen throughout the Maya area (Foster 2002:49). During this time, the Maya lowlands saw much political change, particularly with the rise in power of the elite class (Foster 2002:49). This period also saw a rise in artistic expression and hieroglyphic texts (Foster 2002:99). The ancient Maya also began exploring and recording the night sky, expanding their astronomical knowledge and improving their calendric system (Foster 2002). Not only this, but there was also an increase through the Classic period in occupied trading ports due to the beginnings of the coastal trading network (Figure 4).

3.2.4 Terminal Classic/ Early Postclassic Period

Figure 5. Terminal Classic Port Sites

Between the end of the Late Classic period and through the Terminal Classic period, the Maya saw a shift of power and cultural developments to the northern lowlands due to what is known as the Classic period's "collapse" (Foster 2002). The collapse did not happen overnight or within a short period but instead was gradual and was more than likely due to several competing factors. Some of the contributing factors may have included: over-population, war, fall of the ruling class, and natural causes such as drought (Foster 2002). Major city-states, such as Tikal, were part of this collapse. Chichen Itza gained control over much of the Yucatán Peninsula at this time. With a growth in population and control of the Peninsula came a greater reliance on marine resources (Glover et al. 2011). Chichen Itza's reach to the coast and its economy through

coastal communities containing ports allowed access to needed foreign goods and marine resources needed such as salt and obsidian.

It was during the Terminal Classic period (A.D. 850-1100) that there was a complete establishment of circum-peninsular trade routes around the Yucatán Peninsula (Glover et al. 2011), which can be seen with the number of occupied coastal port settlements (Figure 5). According to some ancient Maya mural paintings found at Chichen Itza, the coastal Maya settlements "took center stage in the historical narrative of identity and cosmological landscapes" (Clark 2015:476). At the time of contact, ethnohistorical accounts further elaborate the kinship, linguistic, and historical connections between coastal communities that were made throughout these various periods (Clark 2015:476). Through reconnaissance work conducted by archaeologist Jack D. Eaton (1978) to identify coastal sites along the Yucatán Peninsula, there were indications of significant construction episodes throughout this period (Willey 1986:28). Archaeological evidence also shows that Cozumel saw an increase in population and construction during this period (Sabloff and Rathje 1975; Willey 1986:300).

During the Early Postclassic period, there was a population shift towards the coast, resulting in the development along the Caribbean Sea coastline (Andrews et al. 2003; Clark 2015:134). While there was limited activity along the Campeche coast and the north coast of Yucatán, as previously mentioned, some sites saw minor continued occupations, such as the coastal Maya found inhabiting Isla Cerritos (Clark 2015:134). Andrews (2020:270) explains that archaeologists have traced more than 160 coastal sites associated with the Early Postclassic transitional period throughout the Yucatán Peninsula and Belize. At least 100 of these settlements can be found in Quintana Roo and 30 others along the Belizean coastline. However,

some areas, such as the Campeche and northwestern state of Yucatan, saw a decline in occupied sites, with an estimation of 10 sites being used around this time.

3.2.5 Late Postclassic Period

Figure 6. Late Postclassic Port Sites

In the Late Postclassic period (A.D. 1200-1550), there was a boom along the coastline of small-scale trading cities and towns (Willey 1968:46) (Figure 6). Most specifically, this boom happened around the east coast and islands along with Quintana Roo, down to Belize, with over 100 sites showing occupation during this time (Andrews 1990:161). Anthony Andrews (1993:40) states that "the east coast has the highest concentration of Late Postclassic sites in the lowlands." Andrews (1993) expands on this and explains that this growth in coastal communities and ports is evidence of large migrations from the interior, likely due to available resources and trade. This

shift to the east coast allowed it to become a new "conduit for trade between the northern and southern lowlands" (Andrews 1993:40).

However, along the north and west coastlines, there was a significant decrease in coastal settlements during this time (Andrews 1990:161). The collapse of Chichen Itza affected the associated outposts and economic trade happening along the west and northern coast at this time, which likely caused this decrease in coastal sites (Andrews 1990:161). Outside of the inland city-states, the Late Postclassic saw a "demographic expansion and significant political, cultural, and economic shift(s) visible in the evolving settlement pattern and material record of the Maya coast" (Clark 2015:126). These developments and growth reflect the changes happening within the inland populations during this time (Clark 2015:126). However, some of these developments and population growth may have contributed to some city-states' downfalls towards the Late Classic Period through the Terminal Classic/Early Postclassic Periods. With the growing and complex relationships of city-states and administrative centers, there was an increase in the importance of marine trade (Clark 2015:126). This gradual growth in trade allowed the ancient Maya to create large trade networks, providing them with the opportunity to supply their growing population numbers.

There was also a site and population increase during the Late Postclassic period on Cozumel Island (Sabloff and Rathje 1975; Willey 1986:39). Archaeologists have interpreted Cozumel island as an "important link in a Maya coastwide trading system of this period" (Willey 1986:39). The ancient Maya had an increasing reliance on the sea and its resources, which started in the Late Preclassic until it became a dominant factor in ancient Maya maritime economics (Andrews 1990:167). Some sites saw continued occupation through these periods and into the time of contact with the Spanish, such as Vista Alegre (Willey 1968:39). The Spanish

encountered various large settlements, such as Emal and Conil, at the time of contact on the north coast (Andrews 2020:271).

3.3 Coastal Ecology of the Yucatán Peninsula

As previously discussed, the environment played a vital role in ancient Maya life. The coast provides many resources and serves as a conduit for canoe-based travel, but the Yucatán Peninsula coastline is diverse. The coast varies ecologically, which becomes apparent when looking at ancient Maya coastal sites. Some aspect of the coast seems to be nearly inhabitable due to mangrove swamps and varying water levels that affect the land; however, within some of these mangrove swamps, remains of ancient Maya sites lay hidden. The following sections go into further description of the general ecology of the coast, which is ever-changing, and the specific ecology of the coastline surrounding the Yucatán Peninsula.

3.3.1 General Coastal Ecology

The coast is a dynamic environment. Often, it is an environment where the definition has been left open to interpretation depending on the culture and region, especially when it comes to research studies and questions of the coastal environment (Ford 2011:764). Generally, coastal environments can be defined as areas "where marine processes and storm surge influence terrestrial processes and vice versa (coastal process zone)" (Ford 2011:764). However, coastal processes and activity zones do vary. A coastal zone can be as limited as 10 miles on either side of the waterline or extend much further inland depending on humans' environmental landscape and coastal activities (Ford 2011:764). Simply put, there are several varying factors on what constitutes an area to be considered the 'coast.' Studies conducted within a coastal environment will vary in how coasts are defined depending on the study areas and specific research questions.

Due to the broad definition of a *coast*, this study will be defining the parameters of what will be considered coastal and, therefore, which ancient Maya sites/ports will be defined as *coastal sites*.

Before defining the coast for this study, one other factor will need to be kept in mind: the coastline is constantly changing due to erosion and rising sea/ocean levels within the coastal processing zone (Ford 2011:765). With the rise and receding of the tides, these factors make the coast a constant moving target. This leads to the consideration that the coastline around today is not the same as it would have been hundreds or thousands of years ago when ancient societies were creating their settlements (Ford 2011:765). Due to these factors in the ancient Maya area of the Yucatán Peninsula, there are ancient Maya sites that have been affected by rising sea levels; either being submerged by rising sea waters or are facing current weathering. Some archaeological evidence for these ancient Maya coastal sites may not be available due to these issues.

3.3.2 Ecology of the Yucatán Peninsula

The Yucatán Peninsula holds diverse environments ranging from dry and low scrubby forests in the northwest to mature tropical forests. Today, Mexico's Yucatán Peninsula comprises three separate states: Campeche, Yucatán, and Quintana Roo (see Figure 1), all of which share a coastline with the surrounding Caribbean Sea and the Gulf of Mexico. The Maya coastal area contains an "extensive system(s) of estuaries, bays, and lagoons often connected by natural or artificial canals," which would have given travelers an easier way of travel and avoiding the open sea for extended periods (Andrews 2020:281). Anthony Andrews (2020:281) points out that there are complex river and coastal networks for those traveling clockwise around the Yucatán Peninsula.

The western coastal zone of Campeche holds beach ridges around the Laguna de Terminos area, a rocky coastline near the city of Campeche, and a low and flooded coast to Punta Nimun (Terry 1980:7). There are areas within this region that are thought to provide limited agricultural land which extends to the waterfront while also providing forested areas for hunting (Ball and Eaton 1978:4). The waters along the Campeche coast have been described as "relatively easy-going" due to its calm waters from a shallow coast and the several areas within "rivers, bays, coves, and canals" where travelers could rest or seek shelter from storms (Andrews 2020:281). In the northern state of Yucatán, the coast is filled with lagoons and barrier beaches (Terry 1980:7). These barrier beaches separate the coastal lagoons and swamps from the sea (Eaton 1978:4; Robles Castellanos et al. 2020). The eastern shoreline of Quintana Roo has been described to have small and large embayments and swamps (Terry 1980:7). The Mesoamerican Barrier Reef, located in the waters along the eastern coastline, gives it protection, with a strong current near the shore (Glover et al. 2022). The coastline in this area has a rocky environment "defined by exposed headlands with incised Caletas, or natural harbors, along its margins" (Glover et al. 2022:2).

4 ANCIENT MAYA COASTAL ARCHAEOLOGY AND PORTS

While there are varying ways to describe the function of ancient ports around the world, Anthony Andrews has published specific typologies to help further depict these functions in an accurate way which will be used for the basis of description for each port site. Andrews (1990, 2020) has identified four different port typologies that help describe their functionality and specialization. However, some of these port facility types have been debated, which will be briefly discussed in the following sections.

4.1 Coastal Archaeology in the Maya Area

Archaeologists have been fascinated by the cultural remains of the ancient Maya along the coast since John Lloyd Stephens visited Quintana Roo in 1842 (Andrews 1990:159). It was there he visited ancient Maya archaeological sites, opening the door for further exploration of coastal sites. Later in the 1970's, reconnaissance efforts were made by Jack Eaton to identify ancient Maya coastal sites around the Yucatán Peninsula. With a growing list of ancient Maya sites along the coast, archaeologists were able to start piecing together the history of coastal Maya settlements in the Yucatán as a whole. However, it is important to note that while many coastal sites have been identified there is still limited information concerning their histories (Andrews 1990:159). In 1990, less than .5% of all known coastal sites had seen excavations (Andrews 1990:160). While more sites have started seeing more excavations over the last twenty years, there is still limited information for a lot of ancient Maya coastal sites. This will be taken into consideration during analysis when trying to cross reference other coastal sites built environments; some may be lacking information in time of occupation and site maps which hinders further research.

As previously mentioned, some of the oldest known coastal settlements within the Lowland Maya area have dated back to Preclassic times (Andrews 1990:159). Maya archaeologists have since been able to trace "the development of a Maya maritime traditions involving the exploitation of coastal resources and growing networks of trade that culminated in the complex seafaring work" (Andrews 1990:159). Many of these ancient coastal Maya sites started out as small fishing villages, which appeared between the Preclassic and Classic periods; with some eventually growing into highly specialized coastal communities. These different communities performed a variety of functions and activities for communication, trade, and food (Andrews 1990:159).

While archaeological evidence suggests that many coastal sites were briefly occupied and originated as fishing camps (Andrews 2020), there were some which expanded into communities which developed specific functions. Often, many of these coastal sites had a wide range of specific activities causing the categorization of these sites to be a concern with the broad definitions used in the past (Andrews 2020). Due to the wide range of activities that can be practiced at one coastal site, Anthony Andrews (1990, 2008, 2020) created several categories to specifically help describe how the ancient Maya conducted their activities along the coast. Some of these activity sites overlap with each other, further making this study on the built environment of coastal sites important in analyzing the complexity of ancient Maya civilization(s), as there may be certain built features that distinguish port activities from each other.

4.1.1 Coastal Communities

Andrews (2020) describes coastal communities to be the broadest category concerning coastal site typology. Coastal communities make up a large majority of the coastal sites on the Yucatán Peninsula, with many functioning as ports for local trade, both coastal and inland. The

primary function of these communities was to gather coastal and marine resources (Andrews 2020). As previously mentioned, the ancient Maya would often use coastal and marine resources such as fish and marine animals (Andrews 1990), as well as salt produced from salt flats located along the coast. Marine resources were also considered "important ceremonial and prestige items for inland polities" (Clark 2015:17). Trade routes were established along the coast and riverways to provide access to marine goods, such as salt, to those too far from waterways to obtain them.

4.1.2 Religious Coastal Centers

Religious coastal centers are sites where the ancient Maya built religious architecture at the water's edge (Andrews 2020). These religious coastal centers can be found within coastal communities and port sites. The ancient Maya views of the sea and water were linked with "fertility, birth, death, and the watery underworld" (Clark 2015:17; Finamore and Houston 2010), making sites along the coast prime spots to construct religious buildings or shrines (Andrews 1990, 2020; Clark 2015).

Examples of religious coastal centers have been identified at Cozumel, Isla Cerritos, and a few others throughout the coast of the Yucatán Peninsula and Belize (Andrews 1990; Clark 2015:17). It is also important to note that archaeologists have also identified isolated coastal shrines, many of which have been associated with nearby inland sites. Most of these coastal shrines are Postclassic constructions (A.D. 1200-1550) (Andrews 1990:161). Archaeologists have noted that this type of site further echoes the ancient Maya's connections to the sea and water (Andrews 1990:162).

4.1.3 Trading Ports

Archaeologists studying the ruins of ancient Maya coastal sites along the Yucatán Peninsula have identified several to be trading ports, varying in size and time occupations.

Andrews (2020:274) goes as far to state that "it is probably safe to assume that any major shoreline community with evidence of long-distance trade served such a purpose." Andrews has put forward four port function types to help describe the different ancient Maya port sites that have been found along the coastline and inland along rivers which empty out into the surround seas.

4.2 Port Typologies

The four different port typologies which Andrews (1990) created are the following: ports of embarkation to offshore islands, ports-of-trade, coastal transshipment ports, and seaports of inland polities; all varying in the type of trade activity. It is important to remember there are several coastal site types which also may have had ports connected to them and that some typologies may cross-over each other in the description of an individual port site. This further showing the diversity and complexity of ancient Maya coastal societies. Each typology description is listed in the following sections below.

4.2.1 Ports of Embarkation to Offshore Islands

Ports of embarkation to offshore islands were a way for islands to participate in trade to the mainland (Andrews 2020:274). Examples of this type of port can be found at sites such as:

> Pole (Xcaret), El Meco, Paso del Cerro, Oxtankah, Santa Rita, and Chiquilae, etc. located directly across from important island ports, such as Cozumel, Isla Mujeres, Isla Cerritos, Isla Tamalcab, Ambergris Cay, Isla Holbox, Isla de Carmen, that provided a direct transportation route and gateway to the island [Clark 2015:45].

However, Andrews (2020:274) also points out how these trading ports were also seen as religious centers where ancient Maya could make pilgrimages to honor their gods. Andrews (2020:274) has argued the ancient Maya could have performed rituals that have been interpreted as a way to purify and pray for safe passage on the waters they were traveling. At the coastal port of Xcaret/Pole, there is religious architecture that consist largely of shrines (Andrews 2020:274).

4.2.2 Ports-of-Trade

Ports-of-trade have been proposed at several locations around the Yucatán Peninsula by Mayanists studying ports in the area (Andrews 2020; Clark 2015); however, the qualifications for ports-of-trade are very specific and many of the proposed ports only qualify in certain aspects. There are many scholars who suggest that ports-of-trade are more so appropriate to ports found in the Old World, than those found in the New World (Andrews 2020). Not only this, but there was also a shift in how archaeologist working in the coastal areas consider economic based systems and interactions that have been put forward with the view of ports-of-trade model (Glover et al. 2022). Specifically, "[I]nstead of coastal trade and ports developing in the absence of a market-based economy, these coastal sites played an integral role in the movement of commodities that fueled the development of more open market-based exchange" (Glover et al. 2022:4).

4.2.3 Coastal Transshipment Ports

Coastal transshipment ports are coastal sites which specialized as being transshipment trading points (Andrews 2020:275). These ports were part of the long-distance trading network that took place along the peninsula (Andrews 1990:165). This concept was originally proposed by Norman Hammond who had defined a sequence of 'way-stations' on the coast of southern Belize (Andrews 1990, 2020:275). Ancient Maya coastal sites along the Yucatán Peninsula that have been categorized as coastal transshipment ports are Cancun, Xcaret, Tulum, and various others, with some ports also being located on the coast of Belize (Andrews 1990:165).

4.2.4 Seaports of Inland Polities

At least two coastal sites have been identified as seaports of inland polities, Xelhá and Isla Cerritos (Andrews 1990, 2020). There are cultural materials, such as ceramics and

architectural links that connect Xelhá to Cobá and Isla Cerritos to Chichen Itza (Andrews 2020:275). There have been other ancient Maya coastal sites that archaeologists suspect fall under this type of port activity, such as Canbalam, which is located near Chunchucmil. However, there is not much archaeological evidence to support this since the ancient Maya site of Canbalam has been destroyed (Andrews 2020).

4.3 Characteristics of Port Sites

There are various characteristics that Andrews (2020) discusses as to what built attributes constitutes a port site. However, it is important to remember that some of the discussed characteristics may have been built with perishable materials, such as wood, which do not preserve well. Therefore, some of these characteristics would not survive in the archaeological record; this makes it difficult to say for certain if the port sites discussed in the data section contained any of these attributes.

4.3.1 Harbors

There are various ways in which academia has defined a harbor. For the purposes of this thesis, I use Andrews' (2020) definition of harbors. A harbor can be natural, such as a coastal inlet, or artificially constructed. The distinctions between these are discussed below.

There are many ancient Maya ports which lay along natural harbors and inlets which offered the Maya protection from bad weather and the open sea, as well as a safe anchorage (Andrews 2020:276-277). Along the Caribbean coast "there are numerous small bays or coves enclosed by reefs, which offered safe havens for the coastal settlements located on their shores" (Andrews 2020:277) and served as natural harbors the ancient Maya utilized. There is some archaeological/geological evidence that the ancient Maya would alter these natural harbors found along the coastline which would allow them to facilitate access into the port/site or for further

protection from possible invaders (Andrews 2020:277). In other cases, the ancient Maya would also excavate or widen canals which gave them open access to the sea, "thus creating an artificial harbor at the center of the site" (Andrews 2020:277). At Vista Alegre, geophysical surveys were conducted which showed that there are areas surrounding the settlement that may be modified harbor areas (Jaijel et al. 2018).

4.3.2 Sea Walls

Pertaining to the building of artificial harbors, Mayanist's have documented a few cases in which the ancient Maya constructed a sea wall to enhance protection and control access into the coastal port (Andrews 2020; 1990). While Andrews (2020:278) points out that there are at least three [debatable] ports which have sea walls documented throughout the ancient Maya area, the only one within Isla Cerritos which is located on the north coast of Yucatán Peninsula. Isla Cerritos, which holds "the most famous sea wall…was the principal port of Chichen Itza in the Terminal Classic period" (Andrews 2020:278). Further details of this sea wall will be discussed below.

4.3.3 Quays, Piers, and Ramps

There are various built attributes that may have been part of ancient Maya coastal sites and ports, though some of these attributes may have not survived weathering or deterioration over the years. The ancient Maya may have constructed several attributes commonly found within ports such as a quay, or wharf, which "is a dock built on the edge of a body or water" (Andrews 2020:279); or a pier. A pier differs from a quay or wharf because it extends into the water (Andrews 2020: 279). Andrews' (2020) points out that many of these port sites may have had piers constructed from wood, however, there have only been some traces of wooden piers that have survived in the archaeological record. An example of this can be found at the Paynes

Creek Salt Works on the shore of Punta Ycacos Lagoon in Belize, where "a total of 4042 wooden architectural posts, beams, and wedges were mapped at 70 sites" (McKillop 2019, 2021). Such ideal preservation conditions have yet to be encountered in Mexico.

4.3.4 Causeways (*sacbeob*) and Walkways (*andadores*)

Built elevated or raised pathways/roads, which are referred to as *sacbeob* or causeways. Other communal walkways that were built and found throughout the Maya area are *andadores*. These built features are ways in which urban planning allows the facilitation of the flow of movement within the environment. At many coastal and port settlements, there are *sacbeob* or *andadores* which lead to various parts of the settlement core or out of the site to connecting settlements in the area like those used for agricultural purposes. See Hixson 2011 for addition discussion of *andadores* in the northern Maya lowlands.

4.3.5 Fortified Ports

There are several ancient Maya sites around the general Maya area which had fortifications surrounding the site. This can also be found in a handful of ancient Maya sites along the coastline, and specifically at sites which have been identified as ports. There are different variations of these fortifications found at Yucatan ports, such as the fortified wall found in the water surrounding the south side of Isla Cerritos or the inland fortification found at the port site of Tulum.

4.3.6 Port Complexes

Andrews (2020:280) states that port complexes mainly used for complex coastal settlements. An example of a port complex would be Xelha, which contains "a variety of port facilities and defensive features, a temple shrine and a cave shrine, and a sacbe connecting the port area to the center of the town of Xelha" (Andrews 2020:280). There are several port sites

which have several different built features, like Xelha, ranging from ceremonial complexes, storage facilities, and residential and elite structures that make up the site as a whole and play part in the functionality of the port. Main characteristics of port complexes that may be discussed, if mentioned from previous archaeological investigations, will include ceremonial structures/complexes, altars and shrines, storage facilities, and the potential importance of the urban planning of residential and elite structures.

4.3.7 Other Port Characteristics

While Andrews (1990, 2008, 2020) put forward characteristics that are commonly known to be port settlements/sites, there will be other aspects of the built environment that may also be analyzed. During both research and analysis, there were some built characteristics that other archaeologists have published on while working at identified coastal port site in the Maya area. One of these characteristics is the absences of built structures in certain areas found around ports, which may have been used for various activities such as merchant markets where trade could have been conducted or where perishable structures which could have accommodated travelers stopping at the ports (Glover et al. 2022). While there have been at least three port sites in which these areas have been recognized and published on, there will be further analysis of this feature that may be found at other identified port sites as well. Another characteristic includes the recognition of the number of identified ports having artificial land build-up. This characteristic may give evidence in how the planning of the built environment was needed, if not a necessity, to construct coastal ports. Particularly those which are located on island or in areas where the coastal waters directly affect the land and cause possible flooding during high tide.

In saying this, it should be recognized there are characteristics of the built environment found at some identified port sites that will not be analyzed. One example of this is the

hypothesis of some of ports also being possibly cemeteries, such as Isla Jaina and Isla Uaymil. While there is cultural significance to these burials in many ways, there is now discussion among Mayanist's that the 'cemeteries' on islands are simply there due to the lack of land available to them and possibly occupational periods (Andrews 2020). While it is still worthy to note the number of burials, positionality, and grave goods, using the description of a cemetery will not be a notable attribute that for analysis.

There are several coastal settlements which have been identified as ports, however they may be lacking this evidence within the built environment. The specific typologies of port sites within the built environment as described by Andrews (2020) and characteristics others stated above will be used to analyze identified coastal ports around the Yucatán Peninsula. The presence and absence of these characteristics will be used to compare the identified coastal ports within the study area. Further, there will be analysis of which built port characteristics are more prevalent than others and why that may be.

5 METHODOLOGY

Chapter Five discusses the methodologies used for the study of analysis of the built environment of ancient Maya coastal port settlements. Unfortunately, this project was affected by the Covid-19 pandemic. While no field work was conducted, other alternative methods and means of collecting data are used. This was mainly done through Geographic Information System databases and maps which assisted the analysis of the built environment.

5.1 Introduction to Methodology

The goal of this research is to analyze the built environment of ancient Maya coastal sites found along the Yucatán Peninsula in Mexico. There are various archaeological methods that have been used to gain information on the built environments. Learning how the ancient Maya chose to manipulate and evolve their surrounding environments allows archaeologists to analyze which aspects of the environment were important to them and further understanding of settlement patterns of ancient Maya ports. As previously mentioned, the built environment of ancient Maya settlements were influenced by cosmology and other ideologies. Determining whether these ideologies were also reflected in the various ancient Maya coastal sites is equally important; especially since living on the coast presents its own unique set of challenges, comparatively speaking to inland Maya cities.

The original fieldwork proposed for this project was canceled due to the 2020-21 global pandemic, which will be explained further in the Limitations section. To gather the resources needed to properly analyze these coastal sites, Dr. Jeffrey Glover advised how to approach this analysis from the United States since travel was prohibited. In order to compile a list of coastal sites to be used in the study, Geographic Information System (GIS) was used to visualize where ancient Maya coastal sites were located along the Yucatán Peninsula. This method will be

explained in more detail within the Resources section below. After establishing which ancient Maya coastal sites will be used in this study, peer-reviewed sources were gathered in order to collect further background information associated with the built environment of as many coastal sites as possible. Many ancient Maya coastal sites have not been extensively researched, which restricts the analysis of a built environment. Due to this, not all coastal sites within the research area can be analyzed.

5.2 Limitations of Fieldwork and Resources

In March of 2020 during my second semester of Georgia State University's Anthropology graduate program, there was an outbreak of the Covid-19 virus, causing a global pandemic. Due to this, planned fieldwork in the Yucatán Peninsula was cancelled. My original fieldwork was going to consist of a non-invasive survey exploring previous identified ancient Maya sites found along the coast of the Yucatán Peninsula, while taking GPS points to create a proper updated map of these Maya sites. Some of these sites, which have been identified over the last seventy years, have faced environmentally rough conditions such as rising sea levels due to climate change, other weathering conditions such as acid rain, or have been damaged by the environment (overgrowth/nature taking over due to lack of upkeep). By visiting the sites physically, I would have had a better sense of the information that the available maps are conveying and idea of how these various port sites are situated in their particular coastal environments.

As previously mentioned, there are various sites around the coast of the Yucatán Peninsula that are lacking information such as site maps, which would help offer further interpretation of the built environment. Not all sites that have been identified to be ancient Maya coastal site will have the necessary information to be included in the analysis. While data, such

as site maps, are still needed for many sites around the coast of the Yucatán Peninsula, this study gathers the available data to analyze the built environment of as many ancient Maya coastal sites as possible. A range of sources were used such as published and grey literature along with Esri ArcMap and Google Earth satellite imagery to analyze sites that are within the Electronic Atlas of Ancient Maya Sites (Brown and Witschey 2021; personal communication). The GIS resources allow for the visualization of the costal port sites in the context of their natural surroundings.

5.3 Peer-Reviewed Sources

There were various sources that aided my research and data collection. One method of gathering information for this study has been reading various peer-reviewed sources, such as articles and books, to obtain information of the various coastal Maya sites along the Yucatán Peninsula that are included in the data set. The main data that I am attempting to collect through these sources are maps and archaeological resources, such as reports and cultural analysis of artifacts, such as ceramics, found at the port sites. Some of these archaeological coastal sites have been extensively researched, having both site maps and accurate descriptions of the ancient Maya who lived at these coastal sites. There are also ethnohistories that allow further interpretation of how the ancient Maya conducted their lives along the coast. This ranges from written documentations from both the Maya and Europeans. Ethnohistories have allowed archaeologists to peer into the past of the ancient Maya, giving archaeologists further context into the people whose cultural materials and sites they study.

As previously mentioned in the background section, Maya archaeology has seen a rise in interest of ancient coastal sites, including their connections to larger cities located further inland. This rise in interest has allowed further archaeological investigations to produce site maps and other relevant information, such as the cultural historical information of when the site may have

been occupied. However, there will be several instances where there is a lack of information or archaeological investigations for identified port sites, such as missing maps or the need for further research. Even then, the site description itself may not be updated from its original re-discovery date. This is where developing certain attributes of the built environment, such as walls or structures located along the shore, will be key in the analysis of some of these ancient port sites.

5.4 GIS and the Ancient Maya Electronic Atlas

Since this study cannot obtain its own GPS coordinates, due to the global pandemic, other GIS sources gathered by other archaeologists must be used. The main GIS source that I am using is the Electronic Atlas of Ancient Maya sites. This database holds the geographic location data for each ancient Maya site that has been identified or that has been reported to Dr. Brown and Dr. Witschey, the two scholars responsible for giving the information of this database. To gain access to this database, Dr. Witschey (Brown and Witschey 2021; personal communication) was contacted and was kind enough to share the data with me. Due to the size of the database, specific criteria were asked to be given, such as the geographic location of the study and a distance buffer. For this specific study, *coastal* sites located around the Yucatán Peninsula, specifically in the states of Campeche, Yucatan, and Quintana Roo, Mexico, were needed. A buffer of 30 miles within the shoreline was given to be sure that all coastal sites, including ports, would be included in the database.

As mentioned in the introduction, the data starts with Isla Jaina on the west coast of the Yucatán Peninsula, followed by an examination of the north coast of Yucatán State, and ending with the east coast of Quintana Roo. Locational data from the Electronic Atlas of Ancient Maya sites will help aid in further analyzing the sites that will be included in our dataset by giving us

insight into spatial analysis of other coastal sites and ports, as well as a means to create maps for this study. Once information on these ancient Maya coastal sites is collected to uncover site maps and other archaeological data which has been collected, analysis of their built environments and how the coast affects those constructions was undertaken by using previous methods and theories discussed in Chapter Two.

5.5 Data Collection

Dylan Clark's (2015) dissertation on Isla Cerittos resulted in archaeological investigations and a report which provided further information into the built environment of the port of Isla Cerritos. Clark (2015) also documented an exhaustive list in the appendix of sites mentioned in literature and reported along the Yucatán Peninsula and Belize. However, when I first started conducting research it became apparent that there were various sites that were considered coastal in the study that can be considered a fair distance away from the shoreline. recognizing that I was interested in port sites specifically, I felt the need to reduce the number of sites in Clark's (2015) appendix for those located directly on the coast.

What has been defined are the characteristics of port sites that are found throughout the Maya area by Anthony Andrews. Using the Electronic Maya Atlas (EMA) and characteristics found at port sites established by Andrews, a distance buffer was established in order to give a defined area of study along the coast in order to gain the base data of coastal sites and further define port sites found within this dataset.

The original file of the EMA that was sent contained all sites within a 30-mile radius of a shoreline vector (Figure 7). Within this 30-mile distance of the coastline surrounding the Yucatán Peninsula, there are approximately 1670 ancient sites. When looking at the details on these sites on the attribute table in Esri's ArcMap, it showed that there were various points that

had the same locations under the same name, various points per site listing different structures/temples, or points which had no name designation and were potential sites that had been documented in the EMA. In these cases, the data was deleted in order to show one GIS point per identified site within the EMA.

From this point, queries, which allow the extraction of specific data from the GIS points, within Arcmap were conducted to see the number of sites within varying distances of the shoreline. These varying queries were the following: 3 km (Figure7; see appendix A for a list of sites and their distance to the coast), 2 km (Figure 8), and 1 km (Figure 9). These queries were run from the dataset from the 30-mile radius GPS points, after the general cleanup of data was conducted. Each query created a layer of GPS points showing specifically where the ancient Maya sites are located within each distance of the shoreline vector, further allowing specific measurement of each to be extracted and displayed on a map, as shown in the figures.

With narrowing down the distance, each dataset becomes smaller and more specific. However, an aspect of this that coastal line vector file use does not account for the marshes and wetlands that fall behind the sandy beaches of the coastline. In some instances, there is a direct waterway from the sea to these wetlands that lay behind the beaches. These waterways contain calmer conditions than the sea itself, thus making them better means of transportation via canoe (Robles Castellanos et al. 2020). In these instances, I hand selected points that fell within this category that may have also been a coastal settlement or port. In most cases, these specific sites fell within the 3 km queries (see Figure 8) but there may be some identified port sites that do not fall within the other queried distances.

The 3 km query from the shoreline vector showed a total of 249 sites. There were 227 sites located within the 2 km shoreline, as shown in Figure 9. While this query gave a slightly

better idea as to what sites lay closer to the *coast*, there was not a large difference in relation to the number of listed sites between the two queries. It does need to be noted that there were some sites which I discuss as ports have been identified to be ports that were lost when making this query. This needs to be considered when defining what this study considers to be coastal. One must recognize that the complex coastal morphology is not going to be easily represented in a single vector coastal.

After further investigation into published research concerning ancient Maya ports was conducted, it became clear that some of these port sites were located within a 3 km range of the *coastal* vector and not all necessarily listed on the 1 km list (see Figure 10). From this research, it became apparent that some of these sites are missing from the EMA due to site deterioration or rising sea levels leaving the site location unknown without further research. The other important factor to remember is that the coastline that is visible now is not the same as it was a thousand or even two thousand years ago, which is also something to consider when understanding the range of *coastal* settlements and ports. This may be a factor to consider for those settlements or identified ports that are located directly behind a beach today that may seem to be lacking the characteristic of being located on the water for dock/pier facilities.

Further, there are still a number of coastal sites which have been identified that may or may not contain the built characteristics of a port that were put forward by Andrews (1990,2008, 2020). Details of the coastal ports discussed will include details and analysis of the standing built features found at the assumed port sites to determine if the built environment supports the hypothesis of these coastal sites actually being ports. In Chapter Six, there will be mention of the number of built port attributes identified in Chapter Four as established by Andrews and the other characteristics that were discussed.

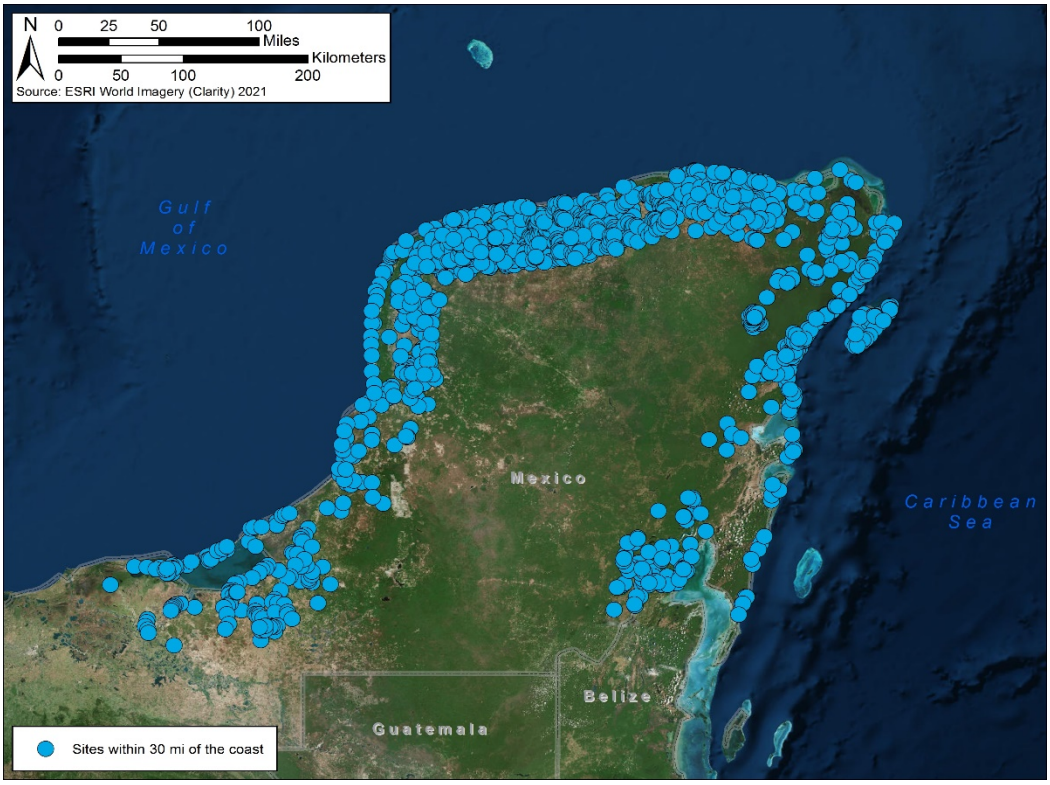

Figure 7. All ancient Maya sites within 30 miles of the coastline along the Yucatan Peninsula

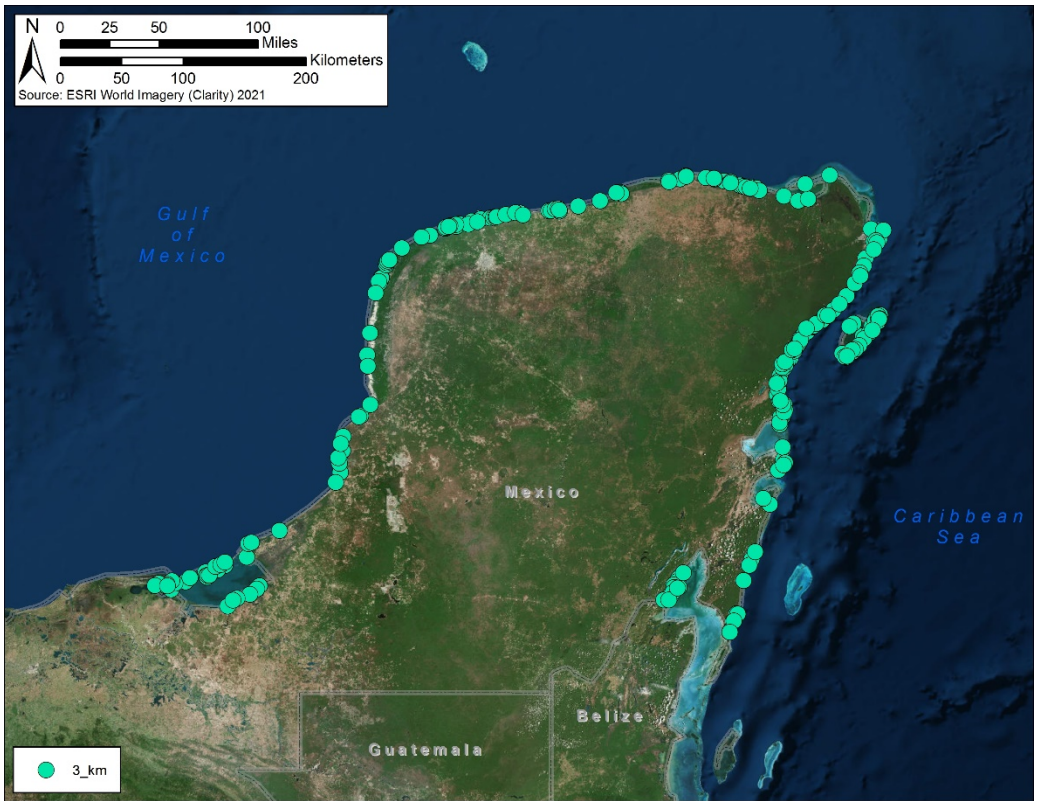

Figure 8. Map of documented ancient Maya sites within 3 km of the shoreline

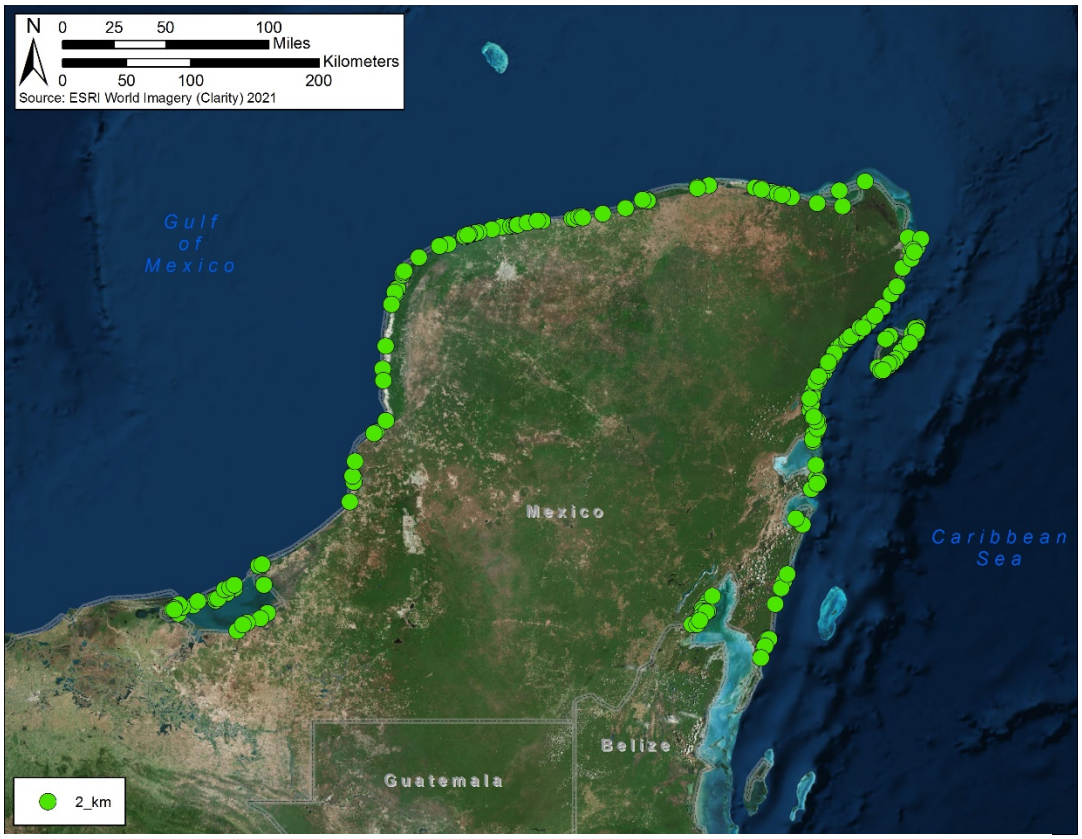

Figure 9. All documented ancient Maya sites within 2 km of the shoreline

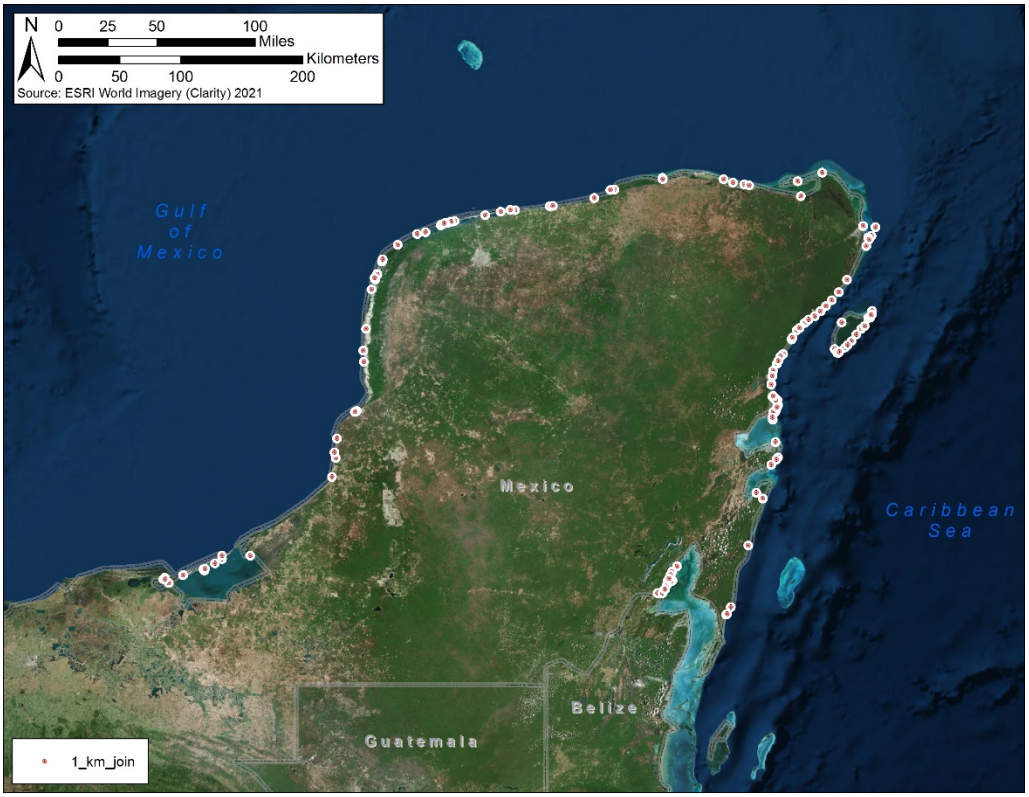

Figure 10. All documented ancient Maya sites within 1 km of the shoreline

6 DATA

In total, there have been 25 (Figure 11) ancient Maya coastal sites in which various archaeologists have published on or made mention of a settlement having a port function. From this point, further research was conducted to gather all information relative to each port site, which include maps and any other archaeological reports that had been published. For this specific study, there is the need for a map in order to properly analyze the built environment in order to be part of the dataset.

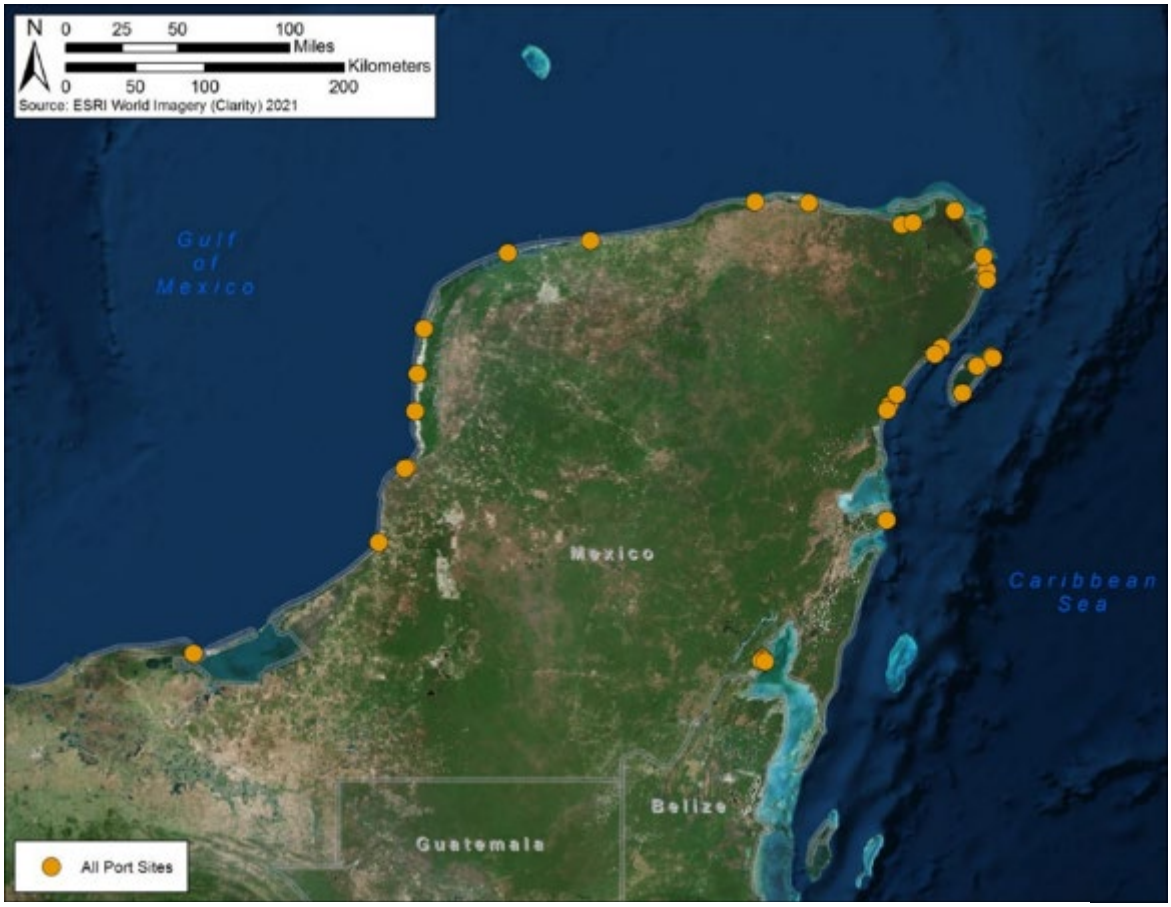

Figure 11. All ancient Maya Port Sites

Unfortunately, there are various coastal port sites which have been either been destroyed by natural elements or were built over by colonial or modern coastal town. These ports include: Xicalango, Champoton, Canbalam, Isla Piedras, Conil, and Ecab. While there is some

information available for these sites and were important ports, they will not be part of the analysis. It should also be stated while there are other ports located along the rivers in the Yucatán Peninsula and Belize, they will not be part of the analysis as the focus on this study is to identify and analyze ports with a coastal environment.

6.1 Isla Jaina

Jaina (Figure 12) is located 20 miles north of Campeche city (Piña Chan 1968; translated by author). The site was first investigated by Roman Piña Chan in the 1960, next visited by jack Eaton during his coastal survey. Most recently Antonio Benavides Castillo revisited the site for his dissertation research (2012). Isla Jaina has been described to be "a diameter or less than 1 km" (Dahlin et al. 1998:1). The island is 40 meters form the mainland which consists of a mangrove and swampy coast. (Piña Chan 1968:23). When archaeologists first investigated the island, they indicated that due to its elevation above the sea that it was artificially constructed. Roman Piña Chan (1968:24; as translated by author) states that the sea is "extremely low for several kilometers in front of Jaina, and the tides are very extreme, especially at the beginning and end of each year." Due to this, the parts of Isla Jaina flood due to its low elevation (C Piña Chan 1968:24).

The analysis of the structures and cultural materials from archaeological investigations showed that the original construction of Jaina to be during the Early Classic and Early Middle Classic Period (Piña Chan 1968:97; translated by author). The ceremonial complex of Jaina eventually grew in population and reached its peak around AD 600 in the Late Classic period (Piña Chan 1968:97; translated by author). Andrews (2020:163) identifies Isla Jaina (see Figure 11) as being a major coastal community with a port complex that was involved with fishing and trading actives for over 700 years. Isla Jaina has been connected to the "powerful inland city of

Edzna" and is only coastal site known to have its own unique 'emblem glyph' (Graña-Behrens 2006) which may be indictive of Jaina's political power" (Glover et al. 2022:6).

Figure 12. Plainview of the site of Jaina (after Benavides Castillo 2011: Figure 4.2)

On the center of the island, there are remains of plazas and mounds which form the ancient ceremonial center (Eaton 1978), which are separated into two complexes: El Zayosal and

Zac Pool (Piña Chan 1968:31; translated by author). El Zayosal lies to the northwest, and Zac Pool to the southeast. Unfortunately, many of the structures have been destroyed from stone robbing (Piña Chan 1968:31). The formal structures that have survived or were previously recorded within these complexes are within a zone that measures 600 m long by 175 m wide with the axis being oriented around 23 degrees west of magnetic north (Eaton 1978).

Within the Zayosal Complex, there are there are four structures which form a plaza. Within Structures A, B, and C there were several burials in each which expanded various occupations; with two structures also having different types of offerings, such as jade and shell beads, and figurines (Piña Chan 1968:34). Structure D and E did not receive archaeological investigations/excavations, however, its assumed that structure D was built during the original construction of Jaina and that Structure E was part of the ball court (Piña Chan 1968:34; translated by author).

The Zac Pool Complex is home to the largest mound, respectively named 'Zac Pol' [Mayan for 'White Head'], is the tallest structure on the southeastern part of the island (Piña Chan 1968:34; Eaton 1978). There are two other large mounds/structures, both named 'Zayasal', located within the northwest end of the complex near the shore facing the sea (Eaton 1978). Jaina has also been described as a large ancient cemetery, with burials dating from the Early Classic period (Piña Chan 1968:41-63), as well as an important religious center (Eaton 1978). As previously mentioned in Chapter Four, while the theory has been put forward of sites like Isla Jaina and Isla Uaymil being ancient cemeteries, it is more likely the density of burials found on the island is due to the limited available space (Finamore and Housten 2010).

Isla Jaina has several characteristics within its built environment which show its potential of being a coastal trading port. There are several structures on the island which have been

designated to be part of a ceremonial complex, which was pointed out by Andrews (2020) as being a characteristic of port complexes. Eaton (1978) argues that this ceremonial complex(es) may show that Jaina was an important religious center. Its location along the coast with surrounding mangroves and swamps would have made the settlement accessible by canoe along the coastal trade network route (Figure 13). Not only this, its potential connections to the inland polity of Edzna would further give the island potential political power and importance along the coastal trade network. Due to its coastal environment, the built environment shows that the ancient Maya acknowledged the need for the increase in land build up due to the rising of the tides as part of the urban planning process. Andrews (2008) points out that there is a possibility that there was a dock located on Isla Jaina as well. On the west side of the island, there are remnants of four spring stones which may be related to the Spanish occupation; however, Andrews (2008) states that these may be related or have been a replacement for a dock that was previously built during pre-Hispanic occupation. Though it has not been published, there also seems to be various places surrounding the littoral if the island where there is an absence of structures, which may have been potential during the urban planning process.

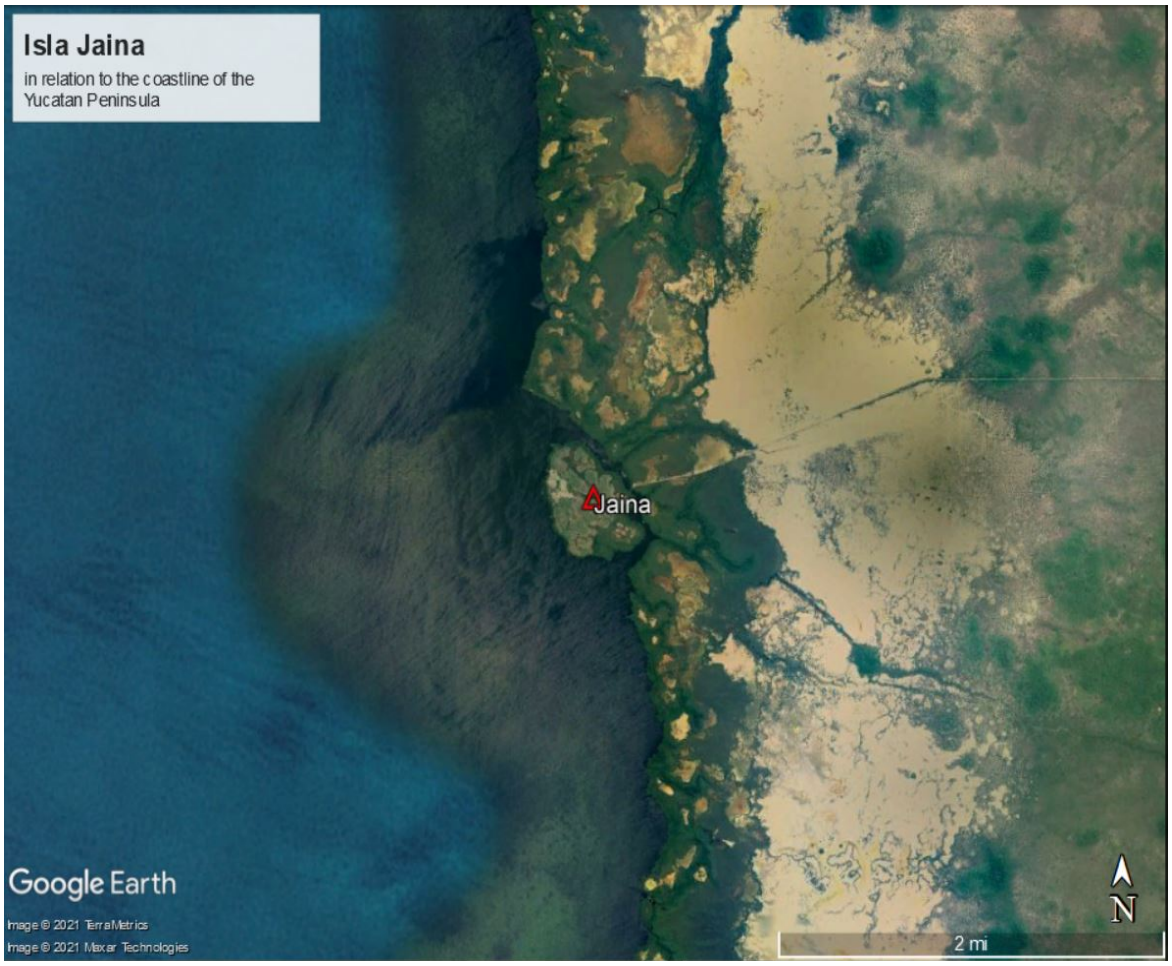

Figure 13. Isla Jaina modern aerial

6.2 Uaymil

Uaymil (Figure 14) is located on the west coast of the Yucatán Peninsula in a mangrove swamp 2.5 km from the sea, 2 km north of Isla Piedres, and 33 km away from another important Maya port, Canbalam (Eaton 1978; Inurreta Diaz 2004:94). Its main point of access is through the channel of Canal Uaymil, which runs perpendicular with the coastline (Inurreta Diaz 2004:94). The island of Uaymil is circular and roughly 400 m across, and possibly artificial (Eaton 1978).

Uaymil was originally visited by Edwin M. Shook during a survey of the coastline between Campeche and Sisal (Eaton 1978). Further archaeological investigations have

uncovered the potential importance Uaymil may have had as a port to the surrounding areas. Armando Francisco Inurreta Diaz (2004:231) states that based on the "spatial arrangement, architecture, and ceramics found at the site suggests that this port had the particular specifications of being a coastal transshipment port." The cultural materials and architecture found on Uaymil may show the connections that the port had with surrounding city-states, such as Chichen Itza (Inurreta Diaz 2004:231).

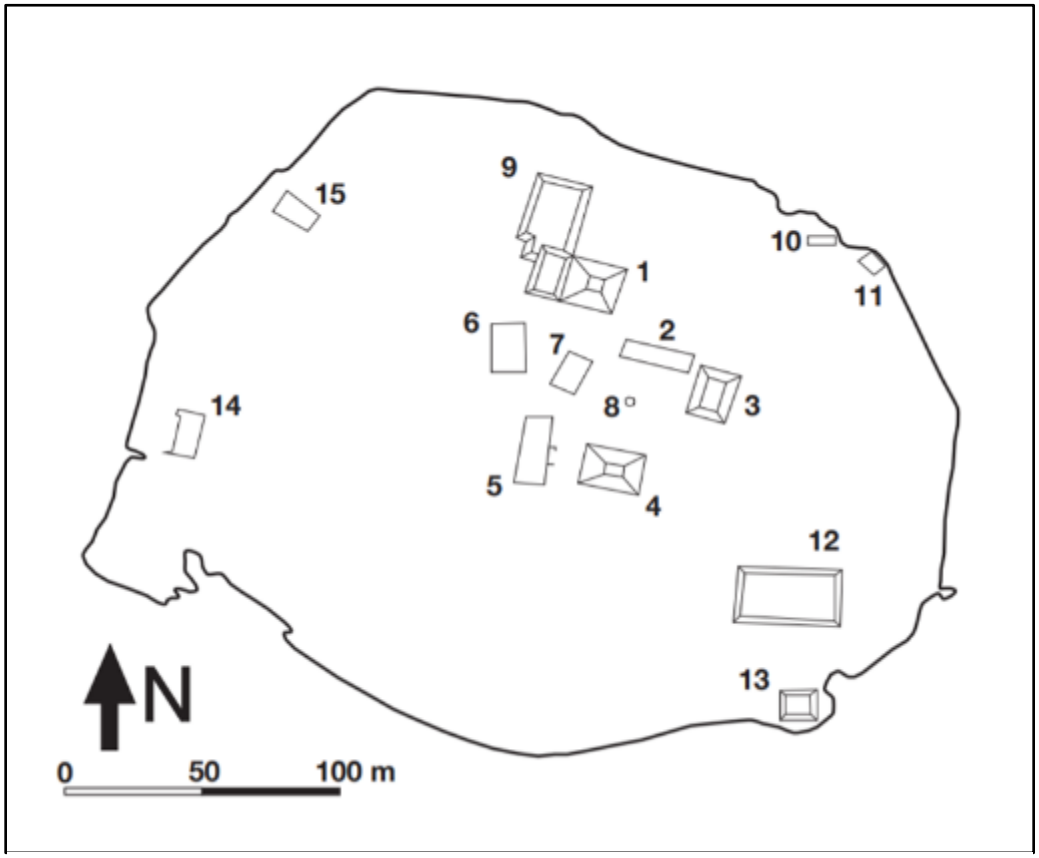

Figure 14. Site map of Uaymil (after Inurreta Diaz 2004: Figure 4.2; modified by Glover 2021)

Uaymil's main structural group is located at the center of the island with little to no contact to the surrounding sea water (Inurreta Diaz 2004:142). There are a total of 15 structures on the island (see Figure 7), and a large open space located to the west with an orientation towards the open sea between two structures. It should also be noted that there are other open

areas and little construction towards the southern end of Uaymil, as well. The largest mound in this small ceremonial center is about 10 m tall (Eaton 1978). Unfortunately, due to no guardian looking over the island, there has been intense looting (Eaton 1978). Previous artifact analysis of ceramics puts the period of Uaymil ranges from Late Preclassic to Terminal Classic periods.

There are various built characteristics that do point to Isla Uaymil as being a port based on Andrews (1990, 2008, 2020) descriptions of common features found at port sites throughout the Maya area, though not as many as others in this study. The ceremonial structures comprising the center, though small, conform to one of the characteristics listed under port complexes as put forward by Andrews (1990, 2008, 2020). The location of Isla Uaymil would have been optimal for a point of trade with the various inland polities, as previously mentioned above. There are various open spaces located throughout the island. Further, there are other areas that are void of architecture located on the central south littoral and the southwestern littoral of the island. As previously mentioned, these areas could have been used for various activities. For Isla Uaymil, the fact most of these open spaces are toward the side of the island that is the most easily accessible by sea seem to show that this may have been purposeful as it would be an easy means of access for travelers coming to the island. The lack of dock or pier-built attributes may be connected to the natural deterioration of the materials used for construction.

6.3 Xcopte

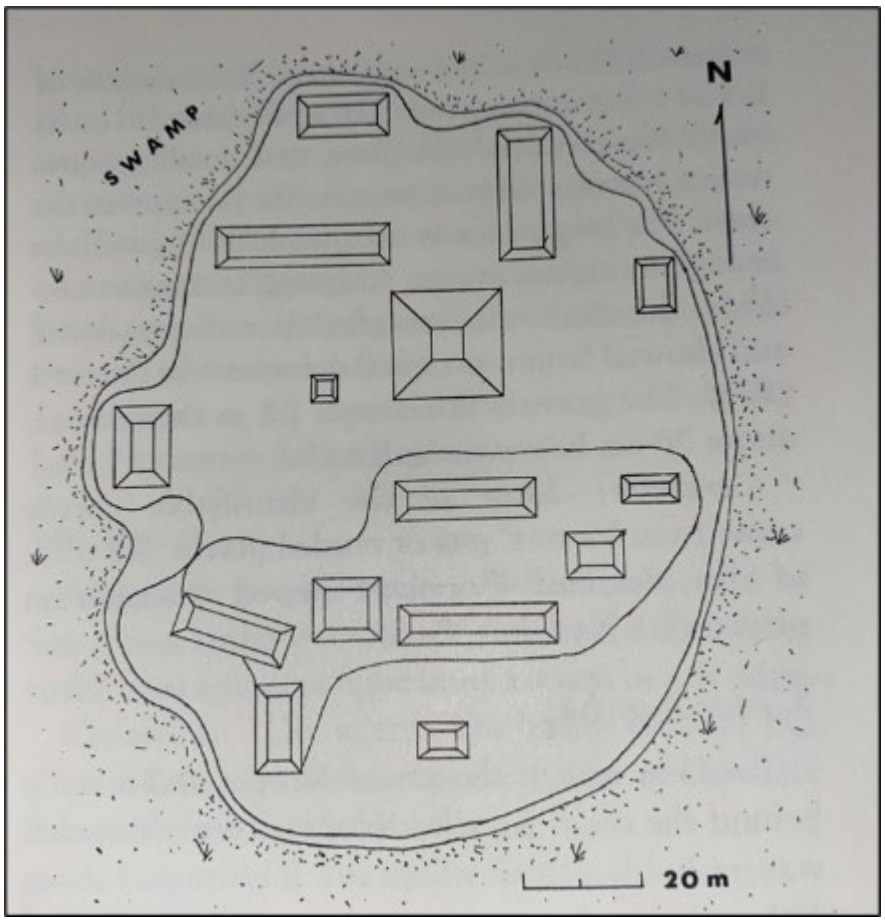

Figure 15. Xcopte site plainview (after Eaton 1978: Figure 13)

Xcopte (Figure 15) is a site that was documented during Eaton's 1960's survey of looking for ancient Maya sites along the coast. Eaton (1978) describes Xcopte being located on small island in a mangrove swamp on the north coastline of the Yucatán Peninsula. More specifically, Eaton states that it is "located in the cienaga behind the barrier beach near Punta Xcopte" (Eaton 1978:35). Fernando Robles Castellanos and Anthony P. Andrews (2004:8) give further details into the built location of Xcopte and explains that "the site stands on artificial islet of approximately 200 m in diameter, which was built on the back of the barrier of sand that separates the Chubuma estuary from the Gulf of Mexico." Interestingly, the Chubuma estuary system "expands between Celetstun and the mouths of Dzilam, [and] linked the coast of

Campeche with the central-north coast of the Yucatan" (Robles Castellanos and Andrews 2004:8).

Further investigations carried out by the Costa Yucatan project (Robles Castellanos 2004) on Xcopte gave further detail into the port. The ceramics found show evidence of Campeche-Tabasco descent which dates to the Terminal Late Classic, but they also found a "reduced but significant presence of ceramic materials from the Sotuta complex of Chichen Itza (AD 750-1100)" (Robles Castellanos 2004:8). They explain that "the inhabitants were all likely involved in exploiting marine resources and seasonal salt harvesting but were also heavily engaged in coastal trading activities" (Robles Castellanos 2004:10). Both investigations led to the conclusion that Xcopte only had one occupational phase during the Classic/Late Terminal Classic Periods. Since Xcopte was also described to be one of the larger sites in the area, leading Eaton (1978:35) to believe that it may possibly have been either a civic-religious center or military garrison during his original investigations. Eaton (1978:35) was able to excavate a small number of test units, which led to the discovery of two burials on the island that had no grave goods intact.

Xcopte's built environment does consist of some characteristics of being a coastal port, though not as many as others in this dataset. The materials and interpretations put forward of the possible exploitation of salt harvesting and marine resources would have made this a popular place of trade, as well as its geographic location. Not only this there are ceremonial structures and residential structures, and though it has not been investigated or published on, there seems to be an open area located on the southeastern portion of the island which could have been a potential place for merchants to conduct trade or rest while traveling. Not only this, it shows the potential need for planning with size of the island and the amount of built structures present,

while still taking into consideration the open space needed for conducting trade. Though there is a lack of evidence of potential dock or piers located on the island, the potential of this built characteristic cannot be ruled out completely. As previously mentioned, piers/docks were often made of perishable materials that may have not survived through time due to natural deterioration or evidence was submerged by rising sea waters.

6.4 Xcambo

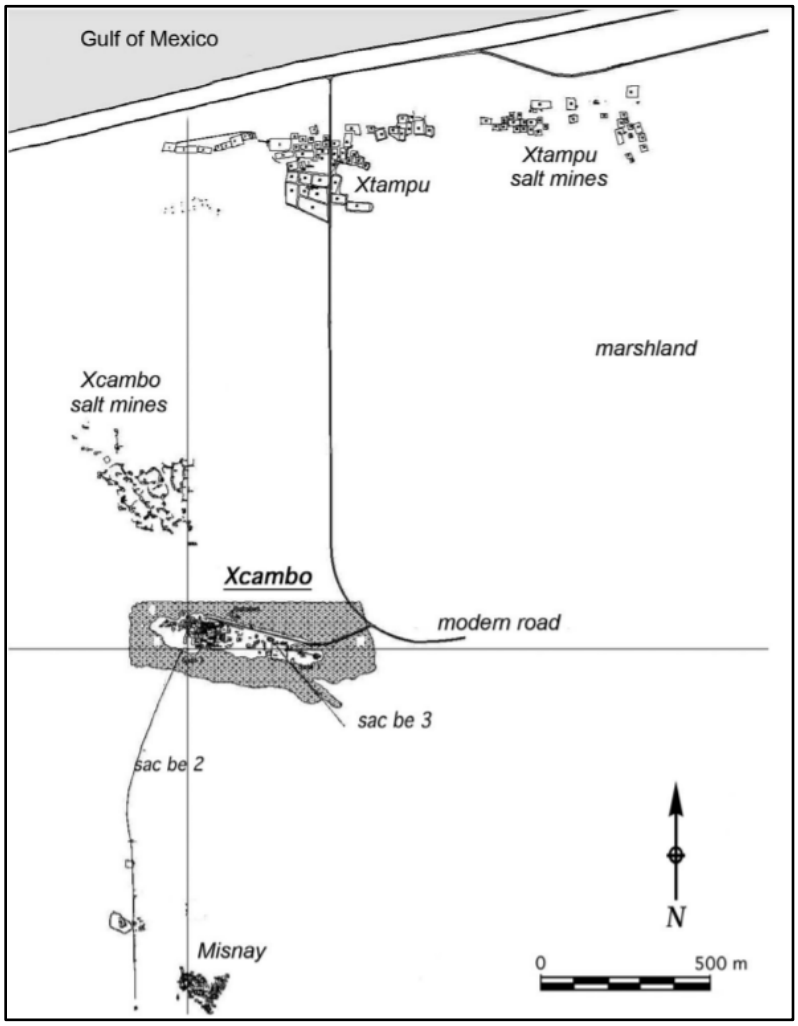

Figure 16. Area map of coastline, salt beds, archaeological sites, and roads around the elevated marshland Island of Xcambo (after Sosa et al. 2014: Figure 1)

Xcambo (Figure 16) is located along the west Yucatán coastline on a "700 m east-west by 150 m north-south area on top of a natural mound that was artificially expanded" (Sierra Sosa et al. 2014:222) by the ancient Maya during the Classic period (A.D. 250-750). This natural and modified mound is surrounded by marshlands south of the coast (Sierra Sosa 2004). Xcambo was first registered by Anthony Andrews in 1976, with further archaeological investigations happening nearly twenty years after its rediscovery in 1999 and 2000 (Sierra Sosa 2004). These archaeological investigations were conducted throughout most of the site and led to the excavations and restoration of various components of the site, such as public spaces and residential compounds, and the characterization of Xcambo's site plans and structures (Sierra Sosa 2004). Strategic test pits yielded artifacts for analysis and over 500 burials which included burial offerings at the settlement core, as well as residential areas (Sierra Sosa 2001). Archaeological investigations and interpretations have led Xcambo to be as described as both a port complex (Andrews 2020) and a salt production center for the ancient Maya (Sierra Sosa 2004).

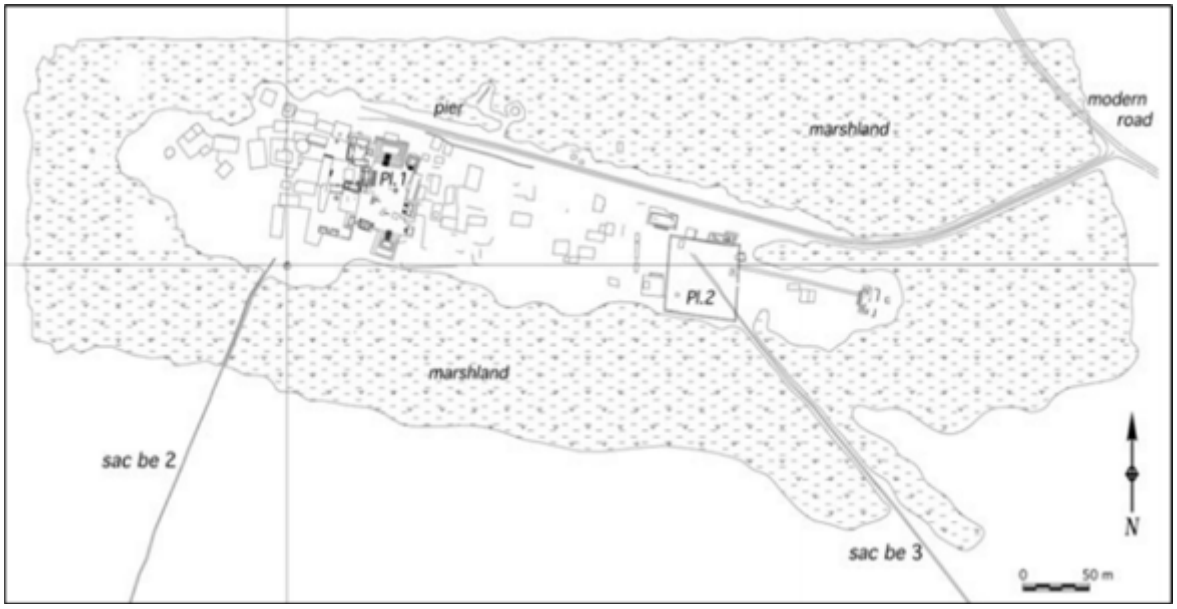

Figure 17. Site map of Xcambo with delineation of structures, plazas, and sacbeab (after Sosa et al. 2014: Figure 2)

As previously mentioned, Xcambo was constructed on top of a natural mound that was artificially expanded and raised. During ancient times, the natural mound that Xcambo is located on was located nearly one km inland (Ortega-Munoz et al. 2018:596). Constructions at Xcambo are arranged along the east-west axis of the up-rise on the mound with the main plaza and residences on the 'peten' are positioned along its edges (Ortega-Munoz et al. 2018:596). There is also a sacbe which leads to the eastern periphery which is the residential settlement of the port site (2018:596).

Sierra Sosa's (2004:223) archaeological excavation of 300 test pits and analysis of various parts of the site's artifacts and mounds showed that the site had an uninterrupted occupation for about 1,000 years. The initial settlement dates to the Middle Preclassic, but excavations show that Xcambo prospered during the Classic period (Sierra Sosa et al. 2014:223). During the Early Classic period, the port site held a small settlement core where the Ancient Maya held "administrative and ceremonial functions and was surrounded by small residential platforms with patios" (Sierra Sosa et. 2014:223). The foundations of these small residential platforms were built with carved stones that had rounded corners that were then covered with stucco, and the ancient costal Maya built wooden huts with thatched roofs on top of these platforms (Sierra Sosa et al. 2014:223). Sierra Sosa et al. (2014) notes how for the most part there are rounded, conical stone foundations which supported structures that were designated as storage facilities throughout the site (Sierra Sosa 2004:102-103). Residential spaces that surrounded two of the public plazas of the site replaced some of the earlier storage facilities and some ceremonial structures (Sierra Sosa et al. 2014:223).

Sierra Sosa and colleagues (2014:223) explain that toward the Late Classic period, the main plaza with surrounded by 11 structures, with a smaller plaza about 250 m east containing

three public structures was constructed (Ortega-Munoz et al. 2018:596). The main plaza structures are the largest at the site and built with carved stones that are different from other structures at Xcambo (Sierra Sosa et al. 2014:223). Archaeological analysis of the main plaza was interpreted to be the where "civic, religious, and administrative functions were likely carried out…and in the surrounding area, specifically toward the north pier of the elevated island settlement with embarking facilities" (Sierra Sosa et al. 2014:233). Previous structures that had been constructed at the site were eventually built over during this period, including the earlier ceremonial architecture found in the main plaza and storage facilities (Sierra Sosa et al. 2014:223). On the most eastern side of the site, about 250 m from the main plaza, is a second plaza area with three public structures which form a U-shape (Sierra Sosa et al. 2014:223). There are two sacbeob at this plaza, on located at the opening of the plaza which leads to residential compounds 110 m to the east, and another which lead to two other Xcombo agricultural sites located further inland (Sierra Sosa et al. 2014:223). As previously mentioned, most of the residential mounds/structures are located around the plaza areas (Sierra Sosa et al. 2014:223). To the west of the main plaza are the older residential complexes which "supported stone-wall structures with straw roofs distributed around small inner patios" (Sierra Sosa et al. 2014:223). The proximity of the residential structures, as well as other non-ceremonial structures at the site to the plazas is mainly due to the limited elevated space Xcambo has due to the surrounding marshlands (Sierra Sosa et al. 2014:223).

There are various aspects of both cultural artifacts and built attributes that point to Xcambo functioning as a trading port (Sierra Sosa et al. 2014:225). Sierra Sosa and coauthors (2014:226) explain that there is evidence of a pier which connects Xcambo's "seaside marshlands and the open sea" which provide evidence in support of activity of transportation of goods via canoe

(Figure 18). The abundance of foreign ceramics found at Xcambo also give insight into the communication and trade happening both along the east coast and inland communities (Sierra Sosa et al. 2014:226). Among these foreign ceramic wares are “monochrome and polychrome vessels from Campeche, the Guatemalan Peten and Belize, among which stand out the Triunfo, Balanza, Águila, and Pucte groups, and polychrome vessels from the north of Quintana Roo, including the Tituc variety” (Sierra Sosa et al. 2014:226). Sierra Sosa and colleagues (2014) go on to explain that there was a difference in trade patterns and connects with large quantities of ceramics coming from ceramic groups of the Canbalam and Cehpech spheres further connecting the site with various areas around the Yucatán Peninsula (Sierra Sosa at al. 2014).

Figure 18. Xcambo on a modern aerial

In all, Xcambo has various characteristics within its built environment which Andrews (2020) has put forward as a port settlement. The island itself is located within marshlands that have a direct route to the sea, allowing easy access via canoe to the settlement. Further, Sierra Sosa et al. (2014) document that there is a pier at the north end of the island, across from the main plaza area. There is also mention of structures that could have been possible storage facilities that would have held trade goods. Another port characteristic found at Xcambo is the presence of two sacbeob at the southwest and southeastern littoral of the island. There are several designated ceremonial structures and possible storage facilities which are other built characteristics mentioned that are found at port sites throughout the Maya area. This, accompanied by the presence of the salt flats, provided a valuable coastal resource needed throughout the Maya area, and the abundance of diverse cultural materials support Xcambo as being a coastal port.

6.5 Isla Cerritos

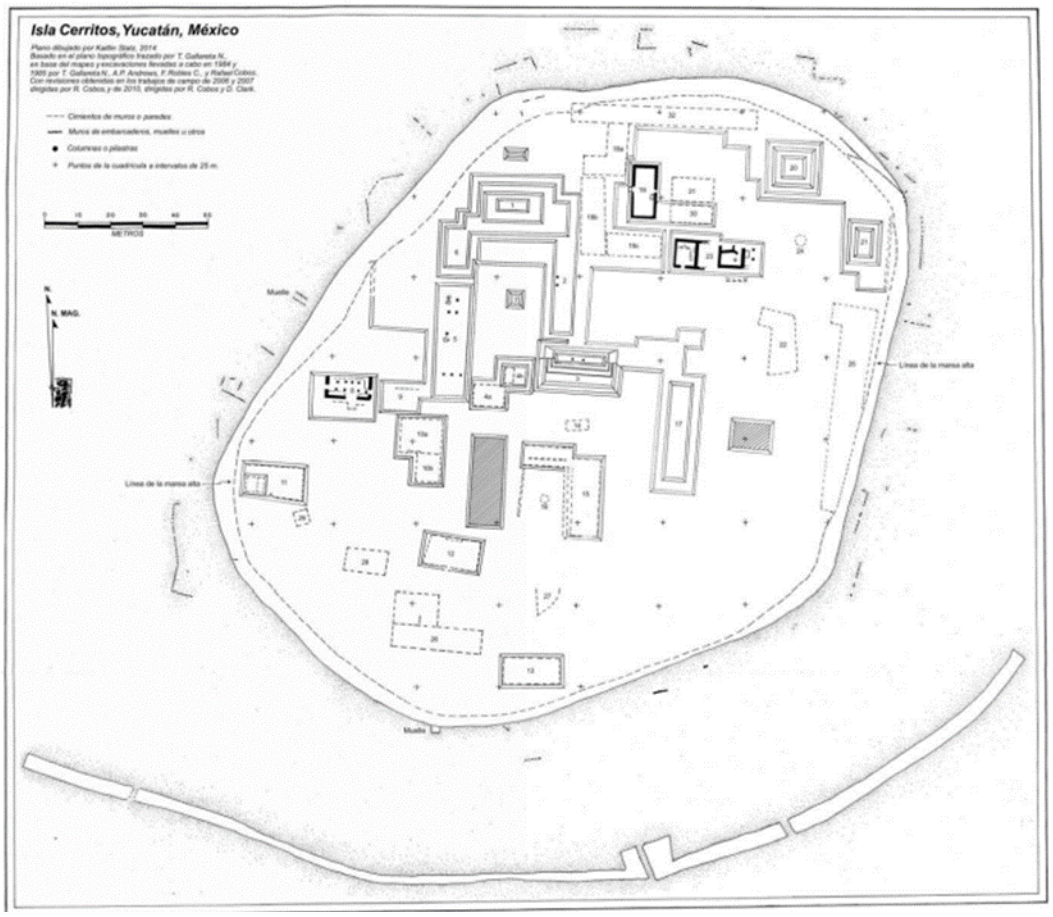

Figure 19. Map of Isla Cerritos, Yucatan (after Clark 2015: Figure 2; Andrews 1984: Figure 15.4)

Isla Cerritos (Figure 19) is an island located in the Gulf of Mexico, 500 meters off the north coast of the Yucatan (Clark 2015:21). The island itself is approximately 200 meters in diameter, 3.15 h (Clark 2015). Andrews (1995:17) also points out that the island's location is strategically placed at the mouth of the Rio Lagartos estuary, which was a "major navigational conduit for the salt of Las Coloradas, the largest salt beds in Yucatan." The island holds 36 masonry structures, and "represents a densely constructed and organized built environment" (Clark 2015:23). There are several residential structures, temples, artificially leveled platforms, and underwater features that are associated with fishing and port facilities (Andrews et al. 1984, Clark 2015:23, Cobos, et al. 2007). Clark (2015:188) states that "while the entire island is highly

constructed environment, the northern half forms the bedrock core upon which platforms support subsequent architecture."

Isla Cerritos was identified by Eaton and Andrews, with Andrews taking lead on the archaeological work conducted on the island. The archaeological investigations and test excavations conducted on Isla Cerritos by Anthony Andrews and colleagues led to the mapping of the site. Some of these port attributes that were mapped included evidence of docks located underwater and an offshore seaway (Andrews et al. 1988:196). More recent work on the island has been directed by Cobos and his colleagues (2007). As part of this project, Clark (2015) completed his dissertation on residential households which supports the claim that this an important port site.

Analysis of the structures on the island and cultural materials recovered puts the occupation of Isla Cerritos from Late Preclassic to Early Colonial times (16th century) (Andrews et al. 1988:196). There are several built features located on the island, with a total of 36 structures to date (Clark 2015). During Andrews original investigations into Isla Cerritos during the late 1980's, they reported a total of 29 structures (Andrews et al. 1988:202). These excavations of the island showed indication that it is largely artificial; "the remains of the past construction [were] found everywhere at considerable depths" (Andrews et al. 1988:201). Clark (2015:188) states that:

> In general, the architecture on Isla Cerritos can be described as low rough-cut limestone enhanced in ancient times with thick layers of stucco, along with upper walls and roofs made of perishable materials, including wood, wattle and daub, and *huano* (palm thatch).

Of the 36 structures, the largest constructions on the island are four mounds which ranged from 3-5 meters in height. Andrews (1986:46) states were either elite residences or civic-religious centers. Clark (2015:217) states that,

> the main civic-ceremonial group at Isla Cerritos includes masonry structures that were constructed on an artificial platform with packed earth floors from as early as the Late Pre-Classic Period (c.100 BCE). Subsequent Terminal Classic period architecture, however, eliminated almost all physical traces of these earlier structures.

Other renovations to this group were conducted by the Late Classic period but saw the last of construction during the Terminal Classic period (Clark 2015:217).

The second largest group of structures are those believed to be of elite residences. Andrews points out that many of the large mounds and rectangular platforms are arranged "around plazas in the center and north of the island" (Andrews 1988:203). The south half of the island has few structures along the surface and largely open plain. After archaeological excavations, it was suggested that the southern half of the island was artificially extended from the sites core during the Terminal-Early Postclassic period (Andrews 1988:203).

Andrews and his team (1988:201) also discovered several built features that connect Isla Cerritos to being a port such as piers, docks, and terraces that are located at the north, east, and west sides of the island. The original stone that was used to build these facilities "has been removed and the sea has regained some of the ground" (Andrews et al. 1988:201). Due to high tide, many of the built stone features are submerged by the sea. One of the more prominent features of Isla Cerritos is what Andrews and his team have called a seawall which created "a calm harbor for pre-Hispanic watercraft(s)" (Andrews et al. 1988:201). This harbor-wall is located 80 meters off the islands shore along the entire south side, reaching 330 meters long and 2-5 meters in width. Though the original height of the sea wall is unknown due to rising sea levels and erosion, it measures today to 1.8 meters from the bottom of the sea. There are three breaks in the seawall, which would have served as entrances to the south beaches of Isla Cerritos (1988:204).

During archaeological investigations, Clark (2015) uncovered a retaining wall that may have been used for the artificial land build-up along with several artifacts ranging from marine mammal bones, ceramics, lithics, and burned charcoal and bone were discovered in this area (2015:227). While there is still a discussion happening among the coastal Maya archaeology community as to what these areas devoid of structures, Clark (2015) proposed that this area may have possibly been used as a type of water management area for the island. Clark (2015:224) points out that there is a flat plain which has no stone architecture located "southeast of the plaza group in the center of the island and beyond Structure 17." While this area of Isla Cerritos is closer to sea level, archaeological investigations show that this part of the island was artificially leveled (Clark 2015:224). Clark (2015:224) explains that this part of the island is a good location for watercrafts to dock along the islands shore and go towards the center structures. During the time of occupation, Clark (2015:224-225) states that "this shoreline could have been located just 80 meters or less behind the harbor wall between the island and mainland."

Andrews (2020) states that Isla Cerritos is one of two sites in which there is documentation for linkages to inland polities. This specific seaport was specifically linked to the capital of Chichen Itza, based on the archaeological excavations, built environmental analysis, and cultural materials found at the site. Isla Cerritos was "one of the richest trade enclaves on the Maya coast" (Andrews 1996:166). Analysis of cultural materials gathered from Isla Cerritos show that long-distance trade was being conducted due to the cultural materials origins belonging to various areas throughout Central America (Andrews et al. 1988:204). Some of the materials recovered come from:

> more than 1200 km away: ceramics from the gulf and Caribbean coasts, southern Maya lowlands and Guatemala; obsidian from central Mexico and Guatemalan highlands; greenstone from the Guatemalan Highlands; turquoise from northern Mexico or the southwestern United States; and basalt from Veracruz or Belize [Andrews et al.1988:204].

The obsidian found at Isla Cerritos was compared to other source materials found at Chichen Itza further shows evidence that this port was tightly connected to the prominent city-state (Andrews et al. 1988:204). Most of the samples collection ranges from the Terminal to Early Postclassic periods, which falls in line with the obsidian trade network that was being conducted by Chichen Iza as well (1988). Dylan Clark (2015:216) points out that there are architectural features that parallel those found at Chichen Itza, such as those found on Structure 5, which is Terminal Classic structure believed to be part of a civic-ceremonial space. Clark (2015:216) notes that the similar characteristics of this structure that can be found at Chichen Itza include "the open side facing the plaza, a long-wide bench, and inset altar."

In all, Isla Cerritos holds various characteristics within its built environment which point to it being a coastal port, specifically to inland polities such as Chichen Itza, and an important port along the coastal trade network. Firstly, Isla Cerritos has an artificial harbor via the constructed seawall found at the south end of the island which also could have doubled as fortifications, both of which are built characteristics as put forward by Andrews (2008, 2020). There are various linear stone features extending into the water on the western, northern, and eastern sides of the island which may have had multiple functions such as possible use of dock/pier functions, or foundations of possible storage facilities. Several structures have been identified to be ceremonial and some displaying altars within them, which are characteristics found within port complexes. Further the display of urban planning shown with the exclusion of structures found at the southeastern littoral of the island, shows a running theme starting to be highlighted within coastal Maya settlements as to why these areas were left cleared, as previously discussed. In relation to Isla Cerritos, Clark (2015) has suggested that this area may have been where travelers could have had access to breach the land via canoe, as well as a place

to possibly conduct trade with merchants on the island. The built environment, combined with the foreign cultural materials found on the island fully support Isla Cerritos being a prime example of an ancient Maya coastal port.

6.6 Emal

Emal (Figure 20) is located along the Yucatan coast between Rio Lagartos and El Cuyo, at the southern end of an estuary, in-between the mainland and barrier of beach along the coast (Johnson 2014:1). This barrier of islands and estuary gives natural protection to the site of Emal (Johnson 2014:1). The estuary near Emal once was part of the canoe trade network conducted by the Maya, and houses “rich archaeological data and sites” (Johnson 2014:1). Due to its small size, Emal has been inferred to be in control by a more powerful city, such as Chichen Itza (Johnson 2014:1). Emal’s occupation dates from the Late Preclassic to Postclassic period/conquest and is known to be one of the larger settlements that the Spanish encountered on the northeastern coast, which also includes the port site of Conil (Andrews 2020:271, 276). A major environmental attribute of Emal and its location is that it “lies in the midst of the *salinas* of Las Coloradas, on the northeast coast of the Yucatan” (Andrews 2020:276). These Salinas are the largest salt beds in Mesoamerica. This had led archaeologists to come to theory that “Emal was most likely the main administrative center of the Salinas" (2020:276). Due to the importance of salt and the location of Emal, many of suggested that it must have served as a seaport (2020:276).

Johnson (2014:3) explains that “the site is essentially an artificial island measuring 500 m from east to west and 350 m from north to south.” Anthony Andrews (2012:18) further discussed the artificial island built up along with Johnson, who explains in his report that:

> During the more than 1000 years of occupation, the site may have grown in high and diameter, as happened on Isla Cerritos, where the center of the island is the oldest and deepest deposits and the outer edges having the last and shallowest deposits.

Further, the surrounding land is less than 50 cm above sea level with the site itself reaching up to 4 m above sea level (Johnson 2014). Johnson (2014:1) also points out that the "location [of Emal] is ideal for the production of salt through solar evaporation due to its flat topography, high temperatures, low rainfall, and hypersaline estuary water."

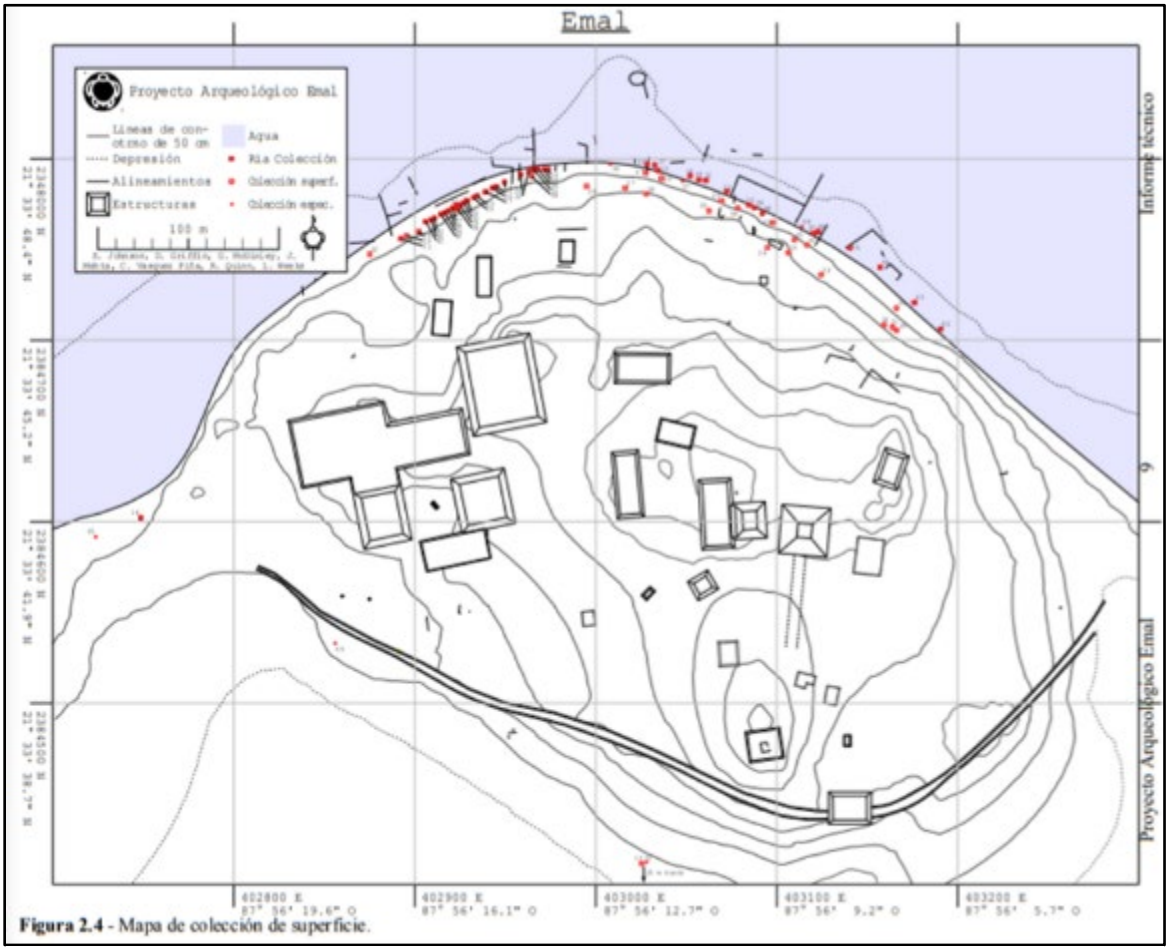

Figure 20. Archaeological map of Emal (after Johnson 2014: Figure 2.4)

The structures located on Emal have been characterized by Johnson (2014) as having fairly sizable low platforms and stone alignments. Due to the lack of archaeological survey and investigation of Emal, as well as anti-cleanup rules and dense vegetation, there have only been so many structures mapped and analyzed (Johnson 2014). Kepecs (1999; Kepecs et al.1994:149)

originally reported that Emal contained 61 monumental and residential mounds, a causeway measuring 1.8 km in length, and two "sculptured 'standard barriers' that once greeted those who arrived at the site by water." Johnson (2014) explained that during their field season there were 26 structures and 81 stone alignments which were mapped. When comparing his maps to Kepecs, Johnson (2014) pointed out that while they were able to identify many of the same structures, there was the identification of four new structures but there were also 18 instances in which Johnsons team was unsure if correlating mapped structures were actual or if they were just elevated topography. Due to the dense vegetation and the need for further investigation, Johnson (2014) and his crew were unable to confirm their validity.

Emal has a constructed wall on the west side of the site, which blocks the site from the interior (Johnson 2014). The wall is approximately 550 meters long to date, though Johnson (2014) suspects that an additional 50 m at the west end. Johnson (2014) further explains that it is possibly on the east end of the wall that it may have existed towards the estuary edge. The wall stands between 0.5 to 1 meter high with some points reaching 1.6 m high (Johnson 2014). The West Plaza measures to be about 30-40 meters east-west by north-south and is surrounded by four structures (2014). The largest structure (by volume) identified at Emal lays northeast of the West Plaza, with long low platforms laying north of this structure located in a flat area which slopes down to the estuary (Johnson 2014). Laying to the east of the West Plaza, are various rectangular platforms as well as the two tallest pyramids located at Email (Johnson 2014). These two pyramids were constructed at the highest elevation of the site, giving views to the surrounding estuary (Johnson 2014). Laying due north of these pyramids are a number of platforms and stone alignments along an uneven terrain; to the south there are four platforms and three housing foundations (Johnson 2014).

Johnson (2014) mentions that one of the most interesting built features at Emal is located along the north coast of the site. This feature contains various stone alignments which stretch out into the current estuary (Johnson 2014). Previous research by Susan Kepecs (1999:311) resulted in the identification of 21 stone alignments, with Johnson (2014) identifying a total of 28. Johnson (2014) contributes the varying numbers to how each investigator defined a single stone alignment. Today the stone alignments range from 0.5 to 1.25 meters in length, made with large flat sided stones. Both Johnson (2014) and Kepecs (1999:35) note that there are some alignments which form rectilinear shapes, however many of the stone filled platforms were showing erosion; with Kepecs (1999:311) contributing the lack of stone structures due to locals looting for construction purposes during modern times. Other alignments have been documented south of the wall in the low-lying areas, which Johnson (2014) described as possibly being used for salt production. These alignments are different from those found on the north coastal side of Emal which are longer, some measuring up to 115 meters, and they "appear to delineate areas rather than function as retaining walls for platforms" (Johnson 2014). This is a feature which has been found at both Isla Cerritos and Vista Alegre (Kepecs 1999; Glover et al. 2011). If these characteristics are similar to those found at Isla Cerritos, it may also be possible that these retaining walls had the purpose of being used as docks and piers.

To sum, there are various built characteristics found at Emal that would support the coastal settlement as being a port. First and foremost, its location along a natural harbor offers travelers calmer waters comparatively speaking to the open sea (Figure 21). Emal's location near the largest Salinas would have attracted peoples to the settlement as it was a necessity needed throughout the Maya area, while also making it an important coastal settlement to conduct trade along the coastal trade network. Another built feature which should be pointed out that may

accompany the port's built environment is the presence of stone alignments stretching out into the estuary which may have been used for a variety of functions, as previously discussed. There is also the presence of a fortification surrounding the south side, inland littoral of the settlement. Other built features which Andrews has constituted to be ones of a port environment, include the presence of ceremonial complexes/structures, which some structures at Emal have been designated to be via archaeological investigations.

Figure 21. Emal on a modern aerial

6.7 Vista Alegre

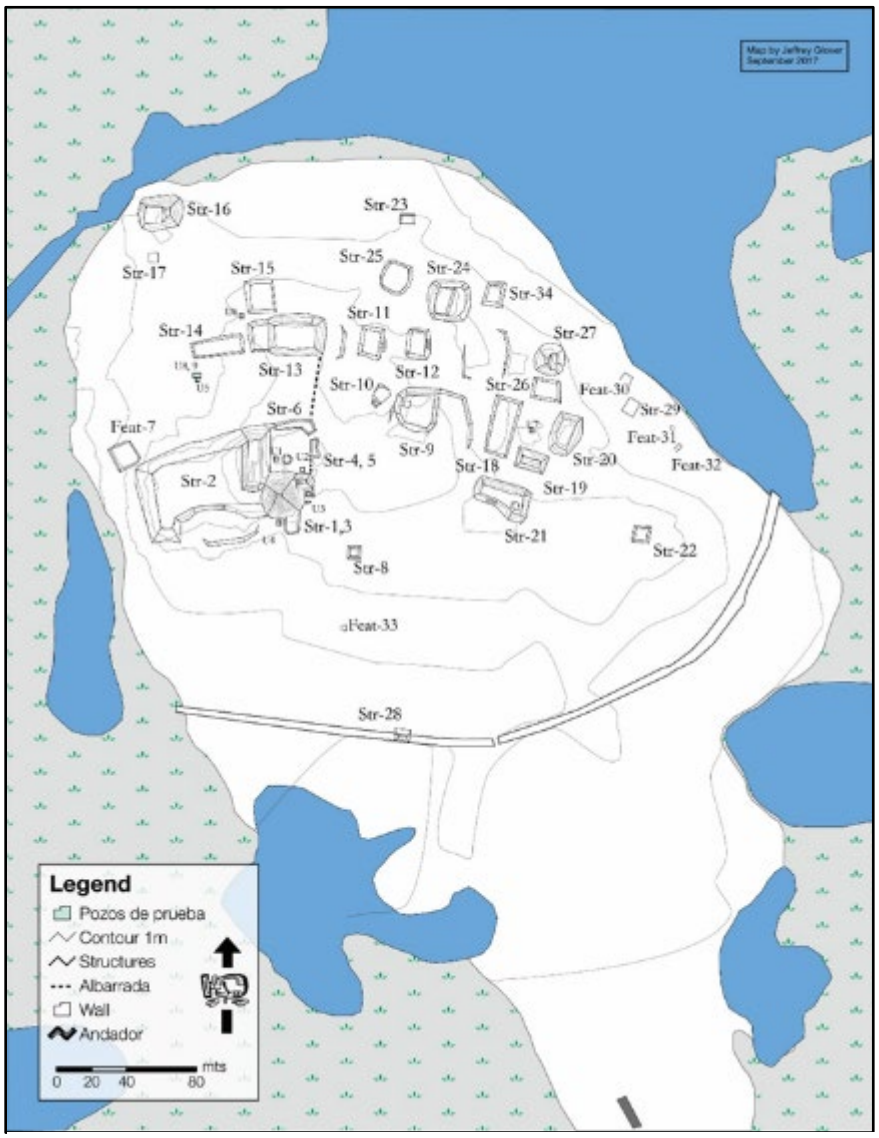

Figure 22. Vista Alegre (after Glover et al. 2018: Figure 3)

Vista Alegre (Figure 22) is a small island located along the coast of Quintana Roo and nearly surrounded by an estuary (Glover 2011:199). To the south of the 16 ha island, there are "mangroves, tintal (dyewood ecosystem), and tidal flats, while expansive wetlands lie to the east and west" (2011:199). The site of Vista Alegre is in a relatively "high topographic relief (less than 2 m asl)" (2011:139), and within a forested area of the island. Glover and colleagues (2011:139) point out that due to the physiographic setting, Vista Alegre is "ideal for a port site

with sheltered bays flanking the island." The location of the island is also protected by the area of Laguna Holbox which buffers the "*nortes*, winds that often close the small, modern port at neighboring Chiquila" (Glover at al. 2011:139). The ancient Maya coastal port site of Conil lays west of Vista Alegre, which, as previously mentioned in section 6.10, is believed to have connections to each other due to their proximity (Glover et al. 2011).

The Costa Escondida Project conducted archaeological investigations since 2005 and has registered and mapped 40 structures on the Vista Alegre (Glover et al. 2018). Among the 40 documented structures, there were "platforms, mounds, and a principal pyramidal structure, which dominates the central plaza" (Glover et al. 2011:199). The recorded pyramidal structure is steep-sided and stands at 11 meters tall. Unfortunately, the pyramid was damaged from looting and erosion from the seasonal hurricanes that hit the area. Due to the construction technique used, which allowed the Maya to build up the pyramid using minimal volume concrete in order to allow those standing to oversee the surrounding coastline; because of this, the pyramid most likely served as a mirador, or lookout, (Glover et al. 2011:199).

Other features that were documented at the ancient Maya port site of Vista Alegre include a wall located on the southern portion of the island (Glover et al. 2011:199). Glover and his colleagues' note that the wall feature extends into the water and possibly were used for docks at the harbors. Vista Alegre is not the only ancient port site in which this built feature is seen. Another built feature that was discovered at Vista Alegre was an andador, or narrow walkway "that connects Vista Alegre to a structure 1.4 km to the south (on the mainland) named Templo Perdido" (Glover et al. 2011:200).

Archaeological field work and analysis of the cultural materials recovered showed a range of periods in which Vista Alegre was occupied, starting from the Middle Preclassic period

(800-400 BC) to the Postclassic (AD 1100-1521) (Glover et al. 2011:201). However, Vista Alegre was not continuously occupied, and the port of Visa Alegre was not consistently used throughout its different occupations (Glover et al. 2011:201). It has been suggested that even though there was an abandonment period "close to the Terminal Classic or in the Late Postclassic period, Vista Alegre maintained its ritual significance for coastal inhabitants and traders" (Glover et al. 2011:206).

There are various aspects of the built environment of Vista Alegre that support the coastal settlement as being a port. First is the location of Vista Alegre, which is in an environment that one could argue allows for natural harbors to be found surrounding the settlement, as well as possible construction into the harbor to make it easier for canoe travel/access. Jaijel and colleagues (2018) conducted a geophysical survey that revealed deeper harbor on the east site of the site. Vista Alegre also has an *andador* located at the south of the settlement, as well. There is a ceremonial complex, which falls under one of the built characteristics of a port complex. Vista Alegre is also a port settlement in which there has been published regarding an open space lacking in architecture away from the complex center, that is not a plaza area. These built attributes, combined with the cultural materials which have been identified as foreign trade goods from around the Maya lowlands, supports Vista Alegre as being a coastal port.

6.8 El Meco

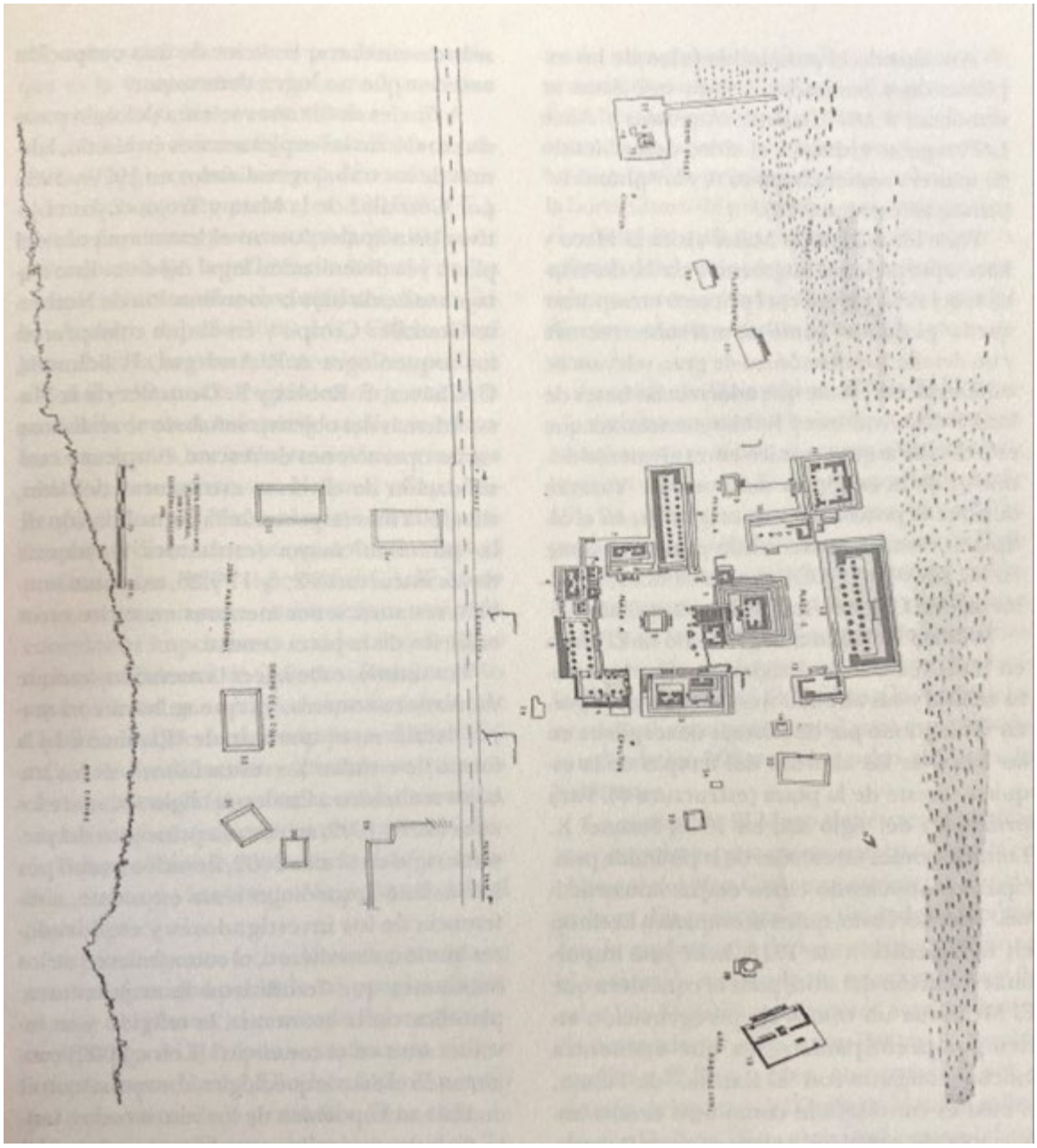

Figure 23. El Meco site map (after Leira 2002: Figure 2)

El Meco (Figure 23) is a Classic period seaport along the Caribbean coast (Andrews 2020:270), specifically at the north of the contemporary city of Cancun (Kurnick 2019:54). The site is surrounded by mangroves swamps, with the rocky coastline bordering the east forming a barrier 5.50 m above sea level (Andrews and Robles Castellanos 1986). The port lies along a

passage which was protected by the Great Mesoamerican Reef. The entirety of El Meco has not fully been investigated, however, there is still access to some parts of the site which allowed for archaeological investigation.

Archaeologists have been able to gain access to the civic-religious complex found at the sites core (Elizalde-Rodarte et al. 2016:25). This complex has three plazas El Meco's core civic religious complex contains 14 structures, which are located besides the tallest pyramidal structure on the north coast of Quintana Roo (Elizalde-Rodarte et al. 2016:25). Elizalde-Rodarte and colleagues (2016:25) state that in total there are "34 Costa Oriental structures grouped in three places, with spacious palaces, housing platforms, and platforms for civil and religious events beside [a] pyramid, which has five construction phases and snakeheads at the bottom of both ramps." Through further archaeological investigations and survey, 20 housing structures were identified as well (Elizalde-Rodarte et al. 2016:25).

Ceramic analysis found at the site of El Meco places the beginning of its occupation in the Early Classic period (Kurnick 2019:54). However, at this early point of the site's occupation, it was more than likely a fishing hamlet (Andrews and Robles Castellanos 1986:131). However, Andrews and Robles Castellanos (1986) point out that there was a temporary abandonment of El Meco that lasted from the Middle Classic period to the Late Classic period, which was inferred by the lack of certain ceramic complexes found at the sites- specifically Tepeu 1-1 and Motul ceramic materials (1986:127-128). It was not until around A.D. 1200 when El Meco was reoccupied and reached its constructive peak, which Andrews and Robles Castellanos point out is apparent in both the built constructions and cultural materials, specifically ceramic, found (1986:131). It was during this period of occupation in which El Meco received the majority of its built features, having comparable architectural characteristics to those found at Maypan

(1986:131). The ceramics found from this period of reoccupation also have close ties to other sites that are located along the coast of Quintana Roo (1986:131).

Andrews (2020) has identified El Meco as a port of embarkation to an offshore island, being port Isla Mujeres. Andrews (1993:55) states that El Meco was one of the largest communities with monumental architecture on the north coast during the Late Postclassic. El Meco holds religious architecture which Andrews (2020:274) suggests that the site "would have served a similar function to that of Xcaret and Playa del Carmen." Due to diversity of the built environment, El Meco also can be categorized as a port complex as well (Andrews 2020:280).

Andrews and Robles Castellanos (1986:132) explain that there are several arguments that can be made showing that El Meco was an "important commercial port of a mercantile system with a wide geographic scope." First and foremost, its position along the coast has access to interior communities, as well as a close location to Isla Mujeres, give way as a point of embarkation to the island (Andrews and Castellanos 1986:132). There are aspects of the surrounding natural environment that give further evidence toward the argument for El Meco as a pre-Hispanic port. Andrews and Castellanos (197:132) point out that the surrounding waters of the Bahia de Murjes have relatively calm waters which would allow for easier canoe travel. The surrounding swamps to the west of El Meco could have provided safe shallow waters and a protective seaway between Cabo, Ecab, and El Meco (1986:132). There is also a small sacbe located on the southern side of El Meco near several structures near the swamp, which Andrews and Robles Castellanos (1986:132) argues as being used as a spring for a freshwater resource (Figure 24).

Further, Andrews and Robles Castellanos (1986:133) state that the built environment of the site give archaeologists other evidence as to the function of El Meco, including its

importance as a ceremonial and administrative power. They claim that “the shape, orientation, and distribution of the structure that form the central part of El Meco suggest a function both ceremonial and economic-administrative” (Andrews and Robles Castellanos 1986:133). Andrews and Robles Castellanos (1986:133) state that there are several structures in which were constructed specifically to house goods and not habitable as warehouses; specially structures 1,2,3,6, and 7. The ceremonial complexes that appear at El Meco, which were previously explained at the beginning of this section, would have given further evidence of it being a place where travelers could possibly pay homage to their Gods; though it would not be as important as other surrounding pilgrimage sites such as Cozumel or Xcaret-Pole (Andrews and Castellanos 1986:133). Lastly, the cultural materials and ceramics found at El Meco further show linkages to other coastal sites.

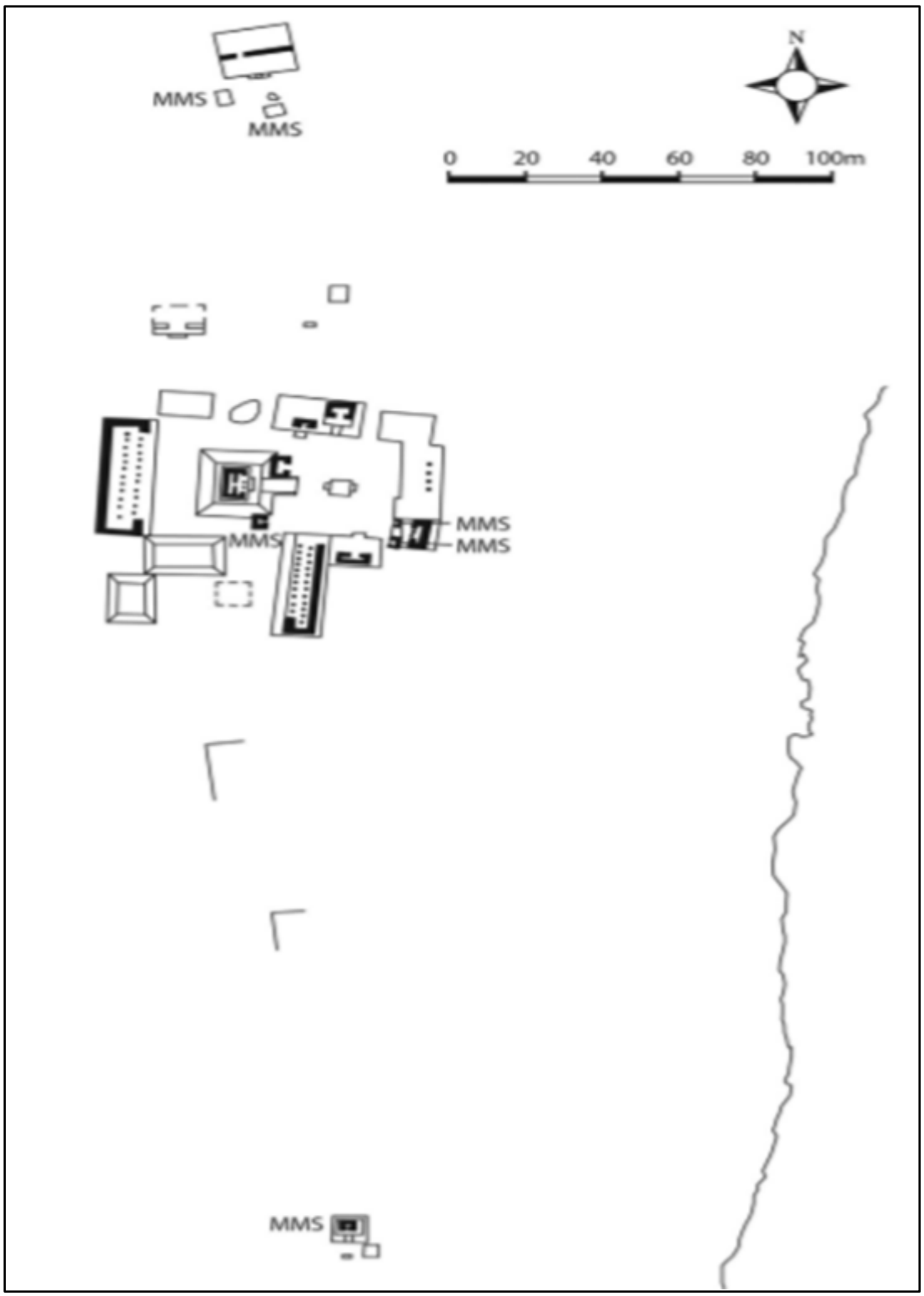

Figure 24. El Meco site map (after Kurnick 2019: Figure 2, redrawn; original from Andrews and Robles Castellanos 1986: Figure 2)

6.9 Playa del Carmen/Xamanha

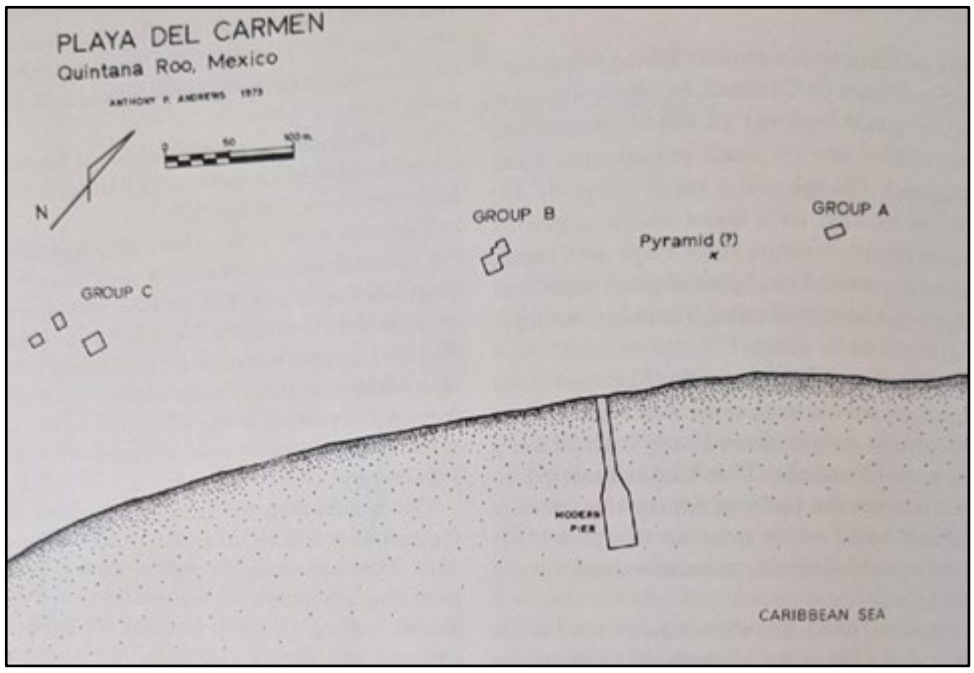

Figure 25. Map of the Ruins of Playa del Carmen (After Andrews 1975: Figure 89)

Playa del Carmen is a small fishing village located directly across from San Miguel on Cozumel Island, which is also the main embarkation point to gain access to Cozumel (Andrews IV and Andrews 1975). Andrews IV and Andrews (1975:75) put forward the tentative hypothesis that based on Playa del Carmen's position on the coast, the pre-Hispanic/colonial ruins surrounding the area, and ethnohistorical data more that this was also the location of the ancient port of embarkation for Cozumel, Xamanha. Andrews IV and Andrews (1975:75) further explain that "Playa del Carmen is the logical place for a secondary port of embarkation for Cozumel, that is, alternative to Xcaret." This secondary port could allow extra areas where goods passing through the ports could be stored and accessed. Xamanha, meaning "north water," may "also suggest that it was the northern outpost of Xcaret, or Pole" (Andrews IV and Andrews 1975:75). Playa del Carmen is a smaller site compared to Xcaret and Cozumel, and though there is little natural protection in the area, the sandy beaches offer an easy means of access to the port

comparatively speaking to the rocky narrow inlet that Xcaret located on (Andrews IV and Andrews 1975:75).

Archaeological work has been carried out by Andrews, Andrews IV, Gilder (1972), and Miller (1973) which allowed the mapping of the standing structures located at Playa de Carmen (Andrews IV and Andrews 1975:75). The map produced provided a map documenting three Structural Groups (A,B,C) and a structural pyramid located between Groups A and B that was previously documented by Lothrop in 1924, though he states that the structure had disappeared (Andrews 1975:75). Unfortunately, the work completed was only able to document so much with locals explaining that there was once "the existence of several additional structures before the construction of the present town" (Andrews 1975:75).

Group A is located 90 meters away from the beach and has two structures. Andrews IV and Andrews (1975:75) explain that this group "consists of two rooms side by side on a low platform, facing the sea on the north edge of the town." Only one of the two structures has standing architecture, with Str. A-I being:

> a partially standing vaulted temple with a single doorway. The façade has a medial and a superior molding, and the outline of the inset panel is evident above the doorway [Andrews IV and Andrews 1975:76].

Unfortunately, Str. A-II has had most of the loose rubble removed and only has some wall outlines visible (Andrews IV and Andrews 1975:76). Andrews IV and Andrews (1975) explain that it is impossible to infer if there was a masonry roof constructed (1975:76). Group B lays 90 meters away from the beach and is comprised of two structures that have been identified to be complex vaulted shrines, that both hold smaller vaulted shrines within them (Andrews IV and Andrews 1975:76). The ceremonial structures are "laying at right angles to each other on a platform," facing away from the ocean (Andrews 1975:76). The larger of the two structures is

Str. B-II, with both structures missing the rear walls (1975:76). The shrines located in both of the structures:

> display inset panels above the doorways and single moldings on their facades…[and] Str. B-I has several positive red hands imprinted on the exterior front wall of the inner shrine [Andrews IV and Andrews 1975:76].

Group C is the larger of the structural groups, holding three structures 140 meters away from the beach and 300 meters away from Group B (Andrews IV and Andrews 1975:76). The largest structure that faces the coast, Str. C-I, has been identified to be a complex shrine that was constructed on top of a "low double-terraced platform with two-stepped balustraded stairway in front" (1975:76). The structure holds two shrines, located inside and out, which are vaulted; with the inner shrine also holding a large bench or alter (1975:76). There an "inset panel with several layers of painted plaster" on the inside of this ceremonial structure, with exposure of the layers showing "part of a jade variant glyph, drawn in a fine black line" (1975:77) as well as red handprints on the front wall (1975). Miller (1973:77) compared this style to the murals found at Tulum and Tancah, "which may suggest that these structures are contemporaneous with those of Playa del Carmen." The other structures found in this group have been partially or fully collapsed (Andrews IV and Andrews 1975:77). All of which have been identified to be ceremonial structures through archaeological investigations.

All standing structures located at Playa del Carmen have been identified to be ceremonial (Andrews IV and Andrews 1975:77). The architecture characteristics reflects that this potential port site was occupied during the Late Postclassic period (1975:77). Andrews IV and Andrews (1975:77) explain that this site "may have been a religious center on the pilgrimage route to Cozumel." While Playa del Carmen has some of the characteristics which Andrews (2020) describes as being features of port sites and falls under our definition of a coastal site, it is still

lacking many characteristics which are found in other coastal port sites in this study. While its location further behind the beach would have exempted the need for features such as piers or docks since canoes could directly pull up to the beach, the site itself is still lacking in size and structural diversity. This may be what prompted Andrews (1975) comments on Playa del Carmen possibly being an important place of pilgrimage, as were other coastal port sites on the route to Cozumel, as well as a place for storage for other major port sites in the area.

6.10 Xcaret-Pole

Xcaret is located on the central coast of the Yucatan located in Quinatana Roo, opposite of Cancun, and "one of the largest prehistoric settlements on the central coast of Quintana Roo" (Andrews 1972:473). However, there is no historical reference to the name Xcaret known before 1926 (Andrews 1975:10). The name itself "seems to be a native corruption of the Spanish word for inlet, *caleta*" (Andrews 1972:10). Xcaret is also the location of the colonial port of Pole, which is why Xcaret-Pole are hyphenated as previously explained. Xcaret's core and inlet lie midway along the coastal strip facing Cozumel (Andrews 1972:474).

Xcaret's site core is extending along the beach five hundred meters inland, which is also next to "the rocky inlet of Xcaret" (Andrews 1972:473). The sites core holds 11 groups of structures, most of which "lie approximately one hundred meters in from the rocky shore on a ridge overlooking a swamp" (Andrews 1972:472). In total there are 35 masonry building which make up the 11 structural groups, along with several small house-mounds. Anthony Andrews' (1972:473) also points out that there is a large wall on top of this ridge that separates the inland core from the inlet and shore in this part of the sites core. The wall found "appears to have had the function of protecting the community against maritime invaders" (Andrews 2020:280).

Andrews (1972:474) explains that there are other structures located beyond the sites core, dispersed along 5 km of the coast. In total there are 13 groups of structures, equaling to 23 masonry buildings total scattered along the coast (Andrews 1972). Andrews (1972:474) further explains that in-between these groups are remains of "many house-mounds, walls, small *sacbeob, chultunes,* and heavy occupational debris." Due to the total area of the built environment which is thought to belong Xcaret. Andrews (1972:474) created a term for the "inclusion of satellite groups…Xcaret Archaeological Zone, which so defined, covers the area of ten square kilometers between the modern settlements of Punta Piedras and La Ina" [Figure 26]. Andrews IV and Andrews (1976:13) state that "the core area of Xcaret depended on; the groups in its periphery for its vital needs of drinking water and agricultural produce.

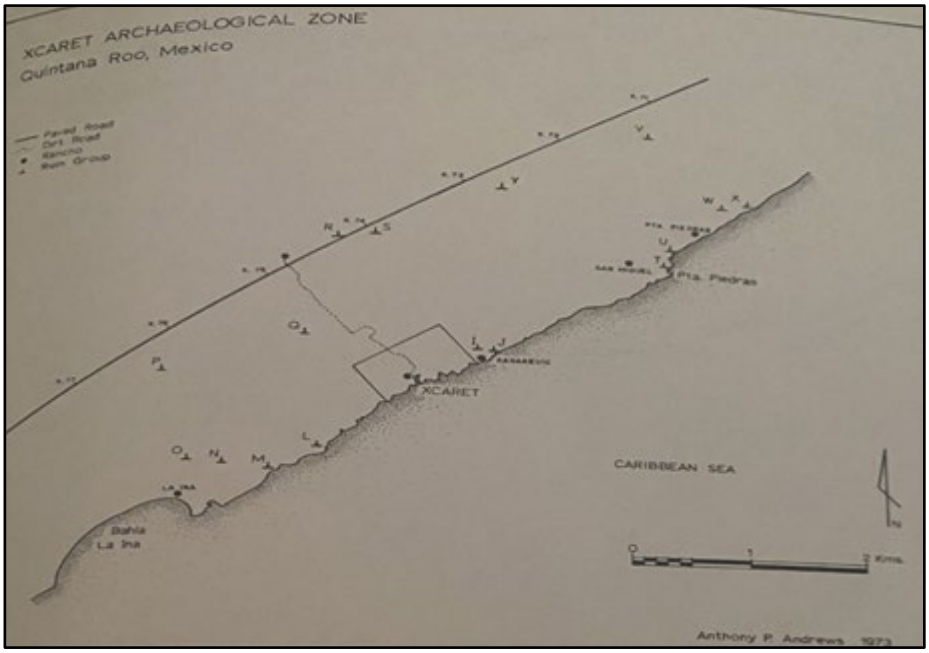

Figure 26. Map of Xcaret Archaeological Zone (after Andrews 1975: Figure 3)

The structures found at Xcaret generally follow the East Coast architectural tradition, many of which are "small single room temples, or temples atop pyramidal substructures" (Andrews 1972:474). Andrews (1972:474) points out that there are some structures which are

visibly different from others, which include “twin temples atop a rectangular pyramidal platform, a round temple on a rectangular substructure, and two rectangular temples atop rounded truncated pyramidal substructures.” Further, two of these structures held shrines within them (Andrews 1972:474). The general built characteristics of the structures on Xcaret that were visible contained crude slab and mortar variety, corbeled vaults, and balustrades staircases (Andrews 1972:474). During the Late Postclassic, the mortar and crude slab was a common characteristic of sites constructed at this time. Andrews (1972:474) observed that nearly all the structures “have inset panels above the doors, and only in two instances do the panels touch the bottom of the molding.” The majority of the alters found within the structures at Xcaret “protruded out of the center rear wall,” many of which held offerings or hold idols with basins in the center (Andrews 1974:474).

There are also standing structures located at the site that reflect the colonial period of the port. These structures include a “low standing wall of a small open chapel, [and] a Spanish cemetery” (Andrews 1972:475). R.L. Roys (1957:148) explains that the presence of the colonial settlements and the location of the structures in the area, both pre-Hispanic and colonial, suggests that this site is also the location of the colonial port of Pole. Anthony Andrews (1974:475) further states that both in prehistoric and early colonial times, “Pole served as the main embarkation port for Cozumel, its rocky inlet offering a well-sheltered harbor for seafaring canoes.” The site of Pole was later taken over by Motejo the Younger, who also took control of Cozumel (Roys 1957:148). The architectural and cultural material research conducted at Xcaret/Pole by both Roys (1957) and Andrews (1972), place the occupation of Xcaret to the Late Postclassic, though there is some ceramic evidence that may suggest some type of earlier occupation (Andrews 1974:475).

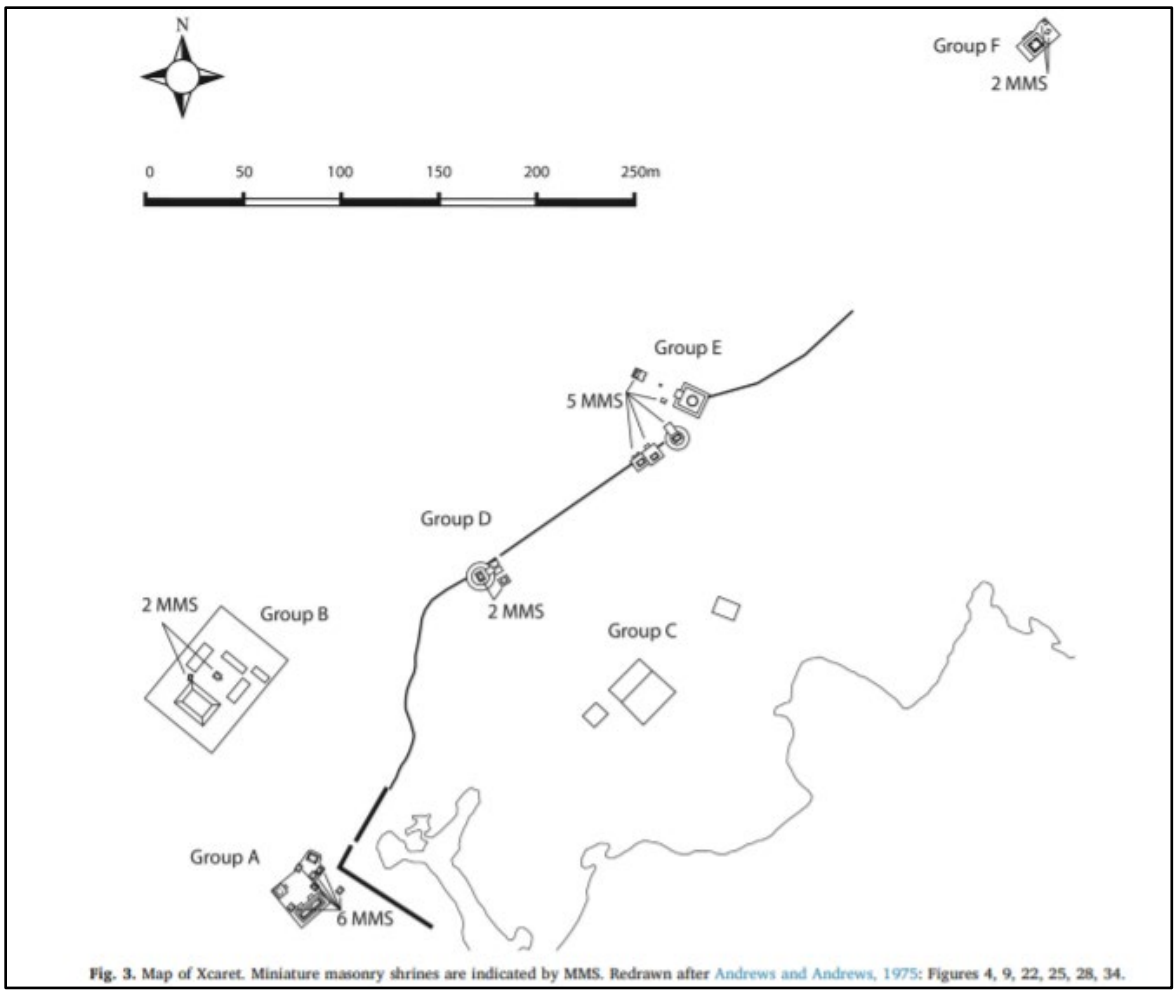

Figure 27. Map of Xcaret (after Kurnick 2019: Figure 3; after Andrews IV and Andrews 1975: Figures 4, 9, 22, 25, 28, 34)

In his later research, Anthony Andrews (1990) describes Xcaret as being a fortified port of embarkation to offshore islands which also holds similar religious architecture to El Meco and Playa del Carmen. Though archaeologists originally thought that Xcaret/Pole was a Postclassic site, further archaeological analysis of the cultural materials recovered from Xcaret have led to the conclusion that it was occupied during the Classic period. Many Classic period sites exhibit "substantial settlements, with monumental architecture and thousands of inhabitants" (Andrews 2020:780), some of which can be seen at Xcaret.

6.11 Cozumel

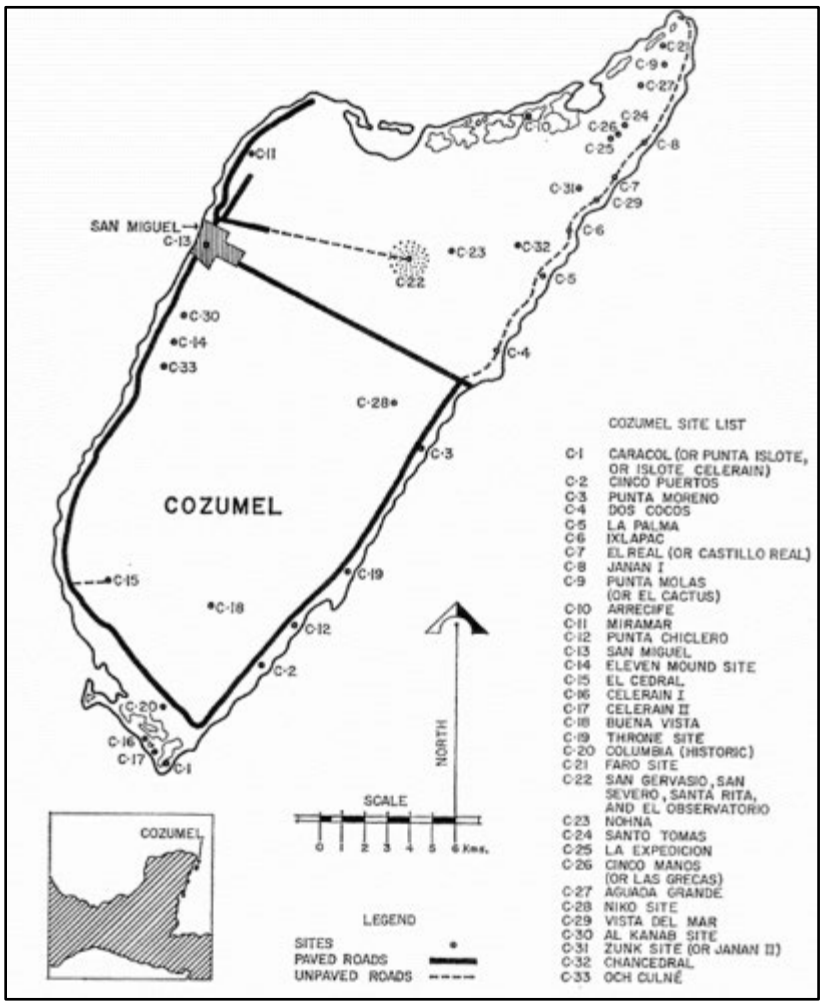

Figure 28. Map of Cozumel (after Rathje and Sabloff 1973: Figure 2)

Cozumel is an island located 16 km off the coast of Quintana Roo (Freidel and Sabloff 1984) (Figure 28). The island is approximately 392 km2 and has been described as "virtually a flat slab of limestone" (Freidel and Sabloff 1984:1). The environment around the island includes lagoons and mangrove swamps, while the island has some rainforest growth at the higher elevations (Freidel and Sabloff 1984:1). Archaeologists have also documented "numerous networks of causeways and *andadores*" (Andrews 2020:279) in the lagoons along the north end

of the island. Natural drainage on the island makes water mainly accessible through the wells and natural sink holes (1984:1)

This island has several pre-Hispanic settlements, some of which may have been used as port facilities. Cozumel was the most "active three centuries before the Spanish conquest" (Hunter 1986:303). Since the island consists of several sites, a few of the major sites and their built environment will be discussed. However, not every site will be discussed due to the number of them and in that most of them do not have a built environment which is directly related to its coast. After introducing some of the sites, there will be a discussion on its relevance along the Maya coastal trade route, and the hypothesis of the island being a conduit of trade which functioned as a port, as well as an important civic-religious center that held great importance for Maya pilgrimages.

At the site of Aguada Grande, which is located near the northeastern tip of Cozumel (C27 on Figure 28), J. Sabloff and colleagues (1972) conducted investigations finding that this settlement had boundary walls (1972:404). While there are other settlements/ports have large built walls/fortifications, such as those found at Tulum, Xcaret, and Ichpaatun, this seems to be a feature lacking on Cozumel (Sabloff et al. 1972). The boundary walls at Aguada Grande "comprise a rectangular grid system oriented approximately 20 degrees east of north that covers all but a fraction of the 186 square miles of the island" (Sabloff et al. 1972:404). The structures within this area seem to be "orient to the grid, so that the wall connecting these structures and forming house lots around them conform to them" (1972:404). Archaeological analysis of the walls and structures date 'to a construction period in the Late Postclassic' (1972). There is no evidence of elite residential assemblages at Aguada Grande, with few residential structures (1972:408). Sabloff and colleagues (1972) concluded that Aguada Grande "gives the appearance

of a planned center built in one period for some specific function rather than a slowly developing community ceremonial center" (1972:408). This settlement on Cozumel is located along a road, which runs north-south, leads to the site of La Expedicion (Sabloff et al. 1972:408).

La Expedicion is located on the northeastern side of Cozumel, along a "ridge of high ground running north-south about 500 m inland from the northeast coast of the island" (Sabloff et al. 1972:408). This site consists of elite residential structures, with platforms containing shrines 200 m west of the elite residents (1972:408). In the south-central part of Cozumel, there is another site with elite residential structures/assemblages along with civil-religious architecture at the site of Buena Vista (Sabloff et al. 1972:409). The architecture found connecting several of these elite assemblages are colonnaded halls, which were previously found at Mayapan within their civil-religious structures (1972:409).

The largest site on the east coast of Cozumel is San Gervasio which covers 100 ha (Sabloff et al. 1972:409). This site contains at least 200 structures, with two ceremonial complexes at the eastern and western extremities (1972:409). With further archaeological investigations, there were three structures located near the ceremonial centers that were identified to be elite residential structures (1972:409). The ceremonial center located at the eastern site of San Gervasio "comprises two colonnaded halls, a large colonnaded temple, two smaller temples and a long low platform that probably was the foundation for a perishable structure" (Sabloff et al. 1972:409). These ceremonial assemblages we constructed along a plaza with an alter/shrine located at the center, with the largest structure dating to the Late Postclassic period (1972:409). The western complex consists of "long, narrow rubble platforms in a plaza arrangement" (Sabloff et al. 1972:409) but needs further archaeological investigations (Sabloff et al. 1972:409). Due to its size and number of elite complexes and ceremonial centers, it has been

inferred that San Gervasio most likely functions as the "center of political authority on the island" (Sabloff et al. 1972:409). There are also sacbeob to the east, north, and south of the site (1972:409).

There are several ethnographic sources which state that "Cozumel was the home of the shrine of Ixchel, the goddess of pregnancy, childbirth and fertility" (Andrews 2020:274), and who Arthur Miller (1982) refers to as 'Ix Chel' the Goddess of the Moon. This shrine was known to specifically be located at the site of San Gervasico on the north side of the island of Cozumel (Hunter 1986:303), though further archaeological investigations were needed as stated by Freidel and Sabloff (1984). The shrine to the "Lady of the Rainbow" further gives this ancient Maya site importance as being a place for pilgrimages due to the shrine's significance.

Sabloff and colleagues (1972:410) state that "it seems unlikely that major seaside settlement that functioned as a port existed on Cozumel in the Late Postclassic period, at least nothing that might be compared with Tulum." However, Sabloff and his colleagues (1972:410) put forward that the island as a whole may have been used a port, "with the functions usually nucleated in a single-seaside location dispersed throughout the island." On the north and south ends of Cozumel, are lagoons which have either a shrine in or near them, along with causeways at each leading to the interior of the island (Sabloff et al. 1972:410). These locations would have been ample locations as natural docking facilities on the island. Sabloff and colleagues (1972:410) state that the elites more than likely "moved commodities to centralized locations on the island such as San Gervasio, while probably also supplying temporary warehouse and residential facilities." This increased centralization and organization of the island, along with data that indicates a "tight" sociopolitical elite, shows a great advantage of the island functioning as a port (Sabloff et al. 1972:410). This would also explain why there is a lack of fortification

found on the island, since the centralized storage facilities would take more effort for invaders to get to (1972:410). Sabloff and his colleagues (1972:410) also mention that the various small shrines found on the east coast also may have been used as either "warning systems against attacks, and an elaborate internal communication and transportation network would have facilitated rapid mobilization for defense." In sum, the various sites on Cozumel arguably create one massive port site and will be treated as such.

6.12 Xelha

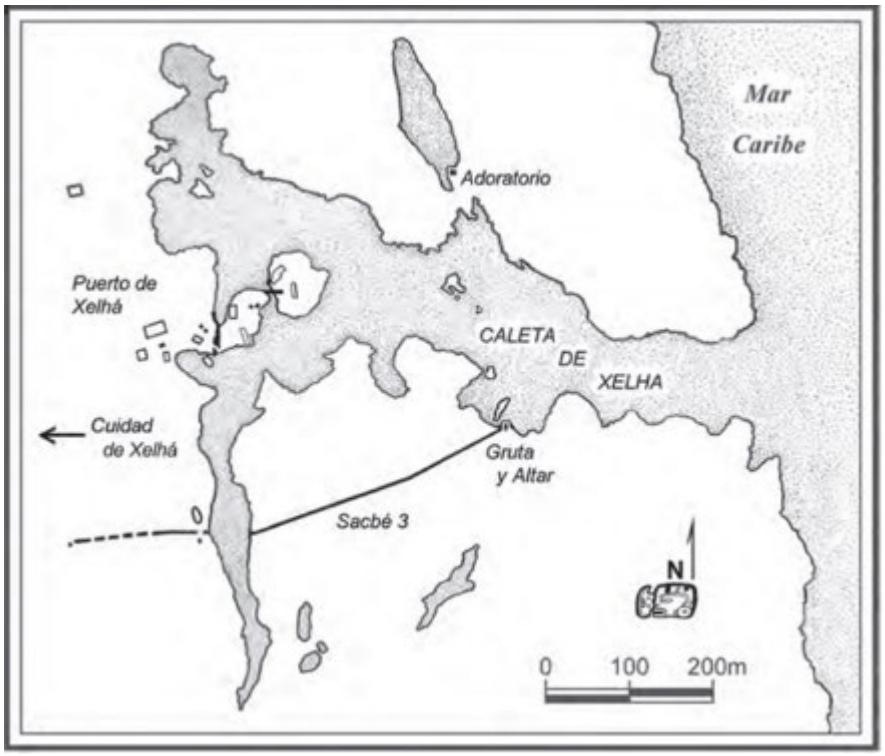

Figure 29. Map of inlet of Xelha, Quintana Roo (after Andrews 2020 Figure 2, originally published Andrews 2008: Figure 3)

Xelha is located on the coast of the peninsula located in Quintana Roo (Kurnick 2019:54), 14 km of Tulum (Andrews IV and Andrews 1975). The port lies along a natural harbor (Figure 29), which is the "largest and deepest rocky inlet on the east coast" (Andrews 2020:275), as well as the largest protected harbor (Andrews IV and Andrews 1975). The actual site of Xelha is located 500 meters west of the Xelha coastal inlet (Andrews and Andrews 1975).

Xelha has a large fortification (Figure 30), or defensive wall, at the entrance of the site which forms some of the harbor facilities (Andrews 2020:275). The wall is about 8 feet in height and varies between 8-25 feet in thickness (Lothrop 1924:134). To the south end of the wall, there is a narrow passage "with a right-angle turn," which "is the only entrance into the peninsula" (Lothrop 1924:134). A short distance to the west of the wall lays a large limestone slab which acts as a bridge to a small island. Andrews (2008) mentions that this connection is a sacbe where the wall becomes thicker north of the passage and has a "well-defined curtain-wall or parapet on the outer edge" (Lothrop 1924:134). Lothrop (1924:134) continues to explain that:

> Thirty-five feet from the passage there is an offset in the outer slope, similar to those in the south arm of the Tulum wall and affording a vantage-point for crossfire. At this corner is a small room built in the thickness of the parapet, probably for the purpose of string-arms. Forty feet north of the offset the wall reaches the water on the other side of the peninsula.

The wall continues to fall the shore for 60 feet, which Lothrop (1924) contributes to being built for fortification/defense reasons.

In total, Xelha has four architectural groups with the earliest and largest Group (B) being constructed during the Late Preclassic period (Kurnick 2019). This group was further constructed during the Late Classic, along with the new construction of Group D located west of group (2019). Xelha has low-terraced pyramids, which are small with "one to two rooms with altars against the back wall" (Kurnick 2019:57). Group A is the location of Xelha's port facilities, which includes the previously mentioned wall fortification and sacbe 2 connecting the smaller island to the port. Another characteristic Andrews (2008:22) points out that is located at the port facilities of Xelha are the "embarcadero escalondao," or "tiered jetty," found at structure 5 south of the connected island (see Figure 30), which is a staircase going down into the water. This

staircase would have been used as a pier were travelers could exit their canoes (Andrews 2008:22, as translated by author).

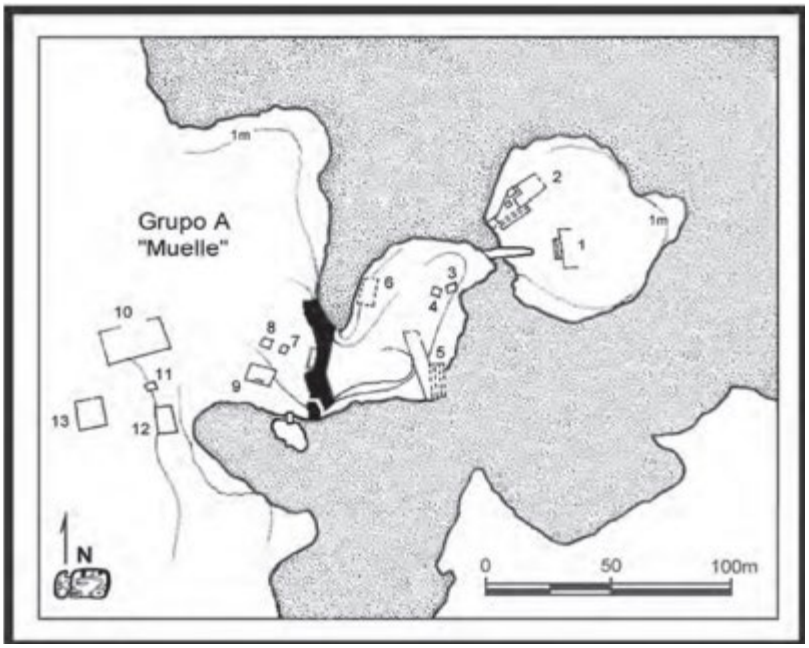

Figure 30. Map of the port Xelha, Quintana Roo (after Andrews 2008, 2020: Figure 3)

Anthony Andrews (2020) also mentions that Xelha also has a cave shrine, dated to be from the Terminal Classic period, and sacbe which connects "the port area to the center of the town of Xelha" (2020:280). Further, Andrews (2020) states that it "likely functioned as a major trading entrepot in Classic and Postclassic times" (2020:280). The actual built characteristics of the port have not been dated, the structures in Group A date to the Late Postclassic period (Andrews 2008, as translated by author). Several of the characteristics found within Group A match the described built environment found at port sites in the Maya area, i.e. natural harbor, fortifications, sacbeob which may have also acted as a potential dock, stairs leading down the water which would have also been a docking point to enter the Group A settlement, and ceremonial structures including a cave shrine.

6.13 Tancah

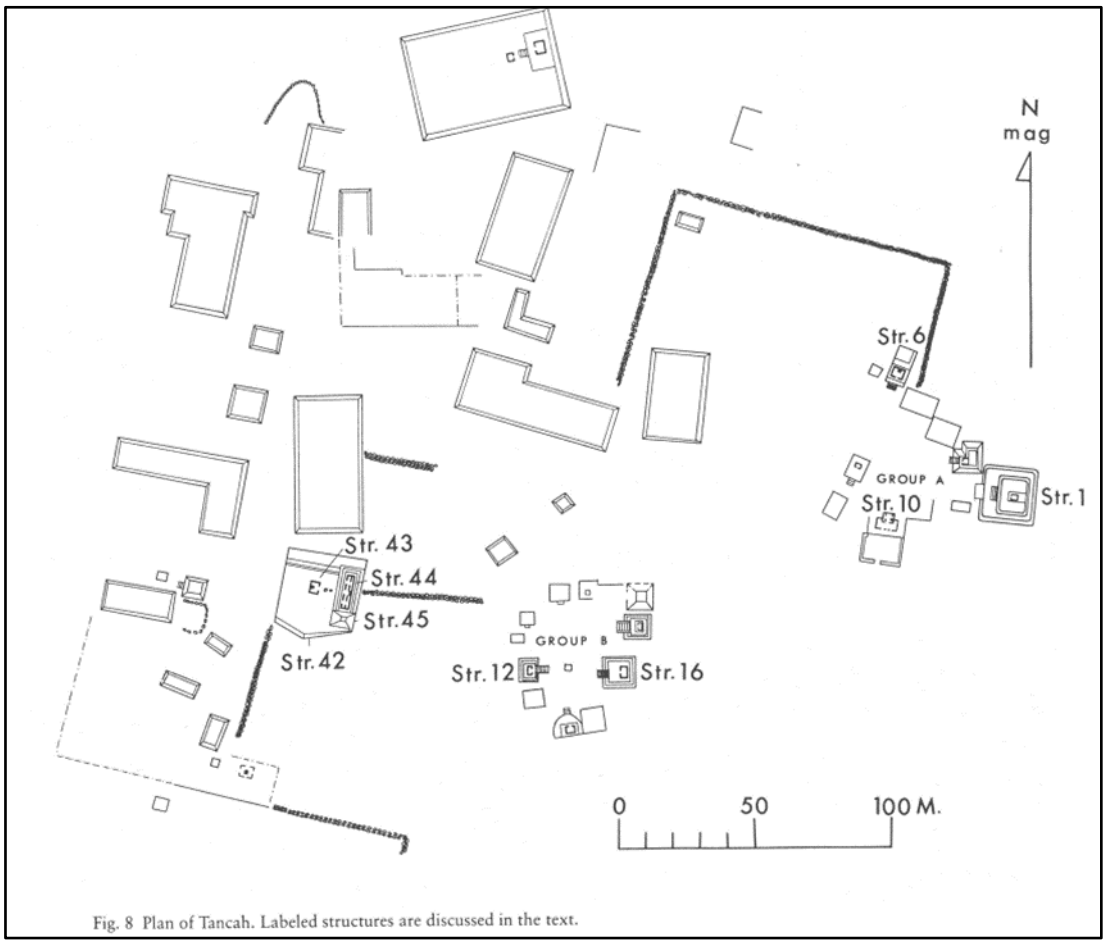

Figure 31. Plan of Tancah (after Miller 1982: Figure 8)

Tancah (Figure 31) is located in what Arthur Miller (1982) describes as the Tancah-Tulum zone on the east coast. This area includes the archaeological region containing Xelha, Tancah, and Tulum on the east coast of the Yucatán Peninsula, in Quintana Roo. The ruins of Tancah are located slightly inland of the coast bordering the Tancah Bay, which lays behind reef bordering the Caribbean Sea. The 6 kilometer of beach front that is between Tancah and Tulum is home to several freshwater springs, which would have provided the drinking water needed for the two port sites (Miller 1982:4).

Originally, archaeological investigations conducted by Lothrop (1924) led to the documentation of Tancah's structural assemblage, which consisted of Group A and Plaza B.

Lothrop (1924) documented 5 standing structures and 5 mounds in Group A and describes Plaza B as being "much more definitely forms an enclosed court with the usual platform mound in front the chief temple" (1924:121). However, further archaeological investigations by Sanders in the 1954 and Arthur Miller in the early 1980s which identified and mapped other structures found at Tancah (see Figure 31) that Lothrop did not document or map in earlier investigations, as well as archaeological excavations by both which helped further give Tancah its proper occupational period.

Sanders (1955:162) gave further clarification into these structural groups explaining that Group A "consists of 11 structures around a somewhat trapezoidal-shape plaza with the small end of the trapezoid to the east." The structural group is oriented almost due north, but not all the structures themselves are on the same north axis (Sanders 1955:162). Further, Sanders (1955:162) states that all the structures within this group are "religious in function," or ceremonial, with "2 temples on high terraced pyramids…three altar-like platforms, and 1 stone-walled enclosure." Group B includes 12 structures which are all situated around a elongated irregular plaza. Sanders (1955:162) identifies these structures to also all be ceremonial in function with three pyramids, 1 temple, and 7 altar like platforms. Sanders (1955) and Miller (1982) both expanded and documented the surrounding structures to the west of both groups A and B, though there were not many archaeological excavations into the newly mapped structures

Lothrop's (1924) initial report pointed out several different architectural differences found at Tancah, which are unique to the site, and uses Tulum as a comparison to describe the sites as being the most similar than other coastal sites found along the east coast. These differences that Lothrop (1924:121) notices are: there are no columns or building of the palace type and there are four examples of three-member moldings "which are typical of western and northern Yucatec

buildings of the period of the League of Mayapan, is not seen at Tulum." Further, Lothrop (1924:232) points out that the shrines located at Tancah are on higher terraced pyramids, whereas other areas such Tulum are placed on the ground or on low platforms.

While Tancah is technically a coastal site and has been identified as being a coastal transshipment port, the location of the site is behind the beaches and does not have a direct position on the water like other port sites. Tancah does have some of the port characteristics which Andrews (2020) describes, such as ceremonial complexes and altars, and its relation to Tulum, Xelha, and Cozumel not only in location but built environment similarities give reason for the port to still be discussed in the analysis. Otherwise, Tancah is not directly located on the shoreline where the settlement has direct access to the water, thus making it impossible for the built attributes needed to be considered a port such as quey's, piers, or docking facilities. The fact that Tancah is not directly on the water would rule it out for its place in the original dataset, but its importance as a possible ceremonial center or place of pilgrimage on the way to Cozumel should still be highlighted and discussed. This is also true as it has been categorized as a coastal port site but lack most of the built environment that was put forward by Andrews to be categorized as such. The main built characteristics found at Tancah is the identification of structures being religious in function.

6.14 Tulum

Tulum is a 16-acre site located along the Quintana Roo coast between Xelha and Chac Mool on the northwestern shoreline and is one of the more famous trading ports along the Maya Lowlands (Andrews 2020:274; Hunter 1986:304) (Figure 32). Tulum was referred to by the ancient Maya as "Tzama" or Zumal, meaning "The City of the Dawn" (Miller 1982:3). The site sits along a cliff which forms the eastern boundary of the site and is surrounded by a constructed

wall to the north, west and south (Hunter 1986:304). This gives those within the fortified complex optimal view of the sea. Below the cliff, there are sandy beaches hugging the Caribbean Sea (Hunter1986:304).

The Spanish encountered Tulum in the sixteenth century, which they later exploited and caused a decrease in population. In 1848, John Floyd Stephens and Fredrick Catherwoord cleared the site of its overgrowth which exposed the site (Hunter 1986:304). Tulum was not revisited until the twentieth century by archaeologists Samuel Lothrop, William Sanders, and Arthur Miller (1986:304). Further archaeological research conducted at Tulum by the by the National Institute of Anthropology and History in Mexico City (1986:304).

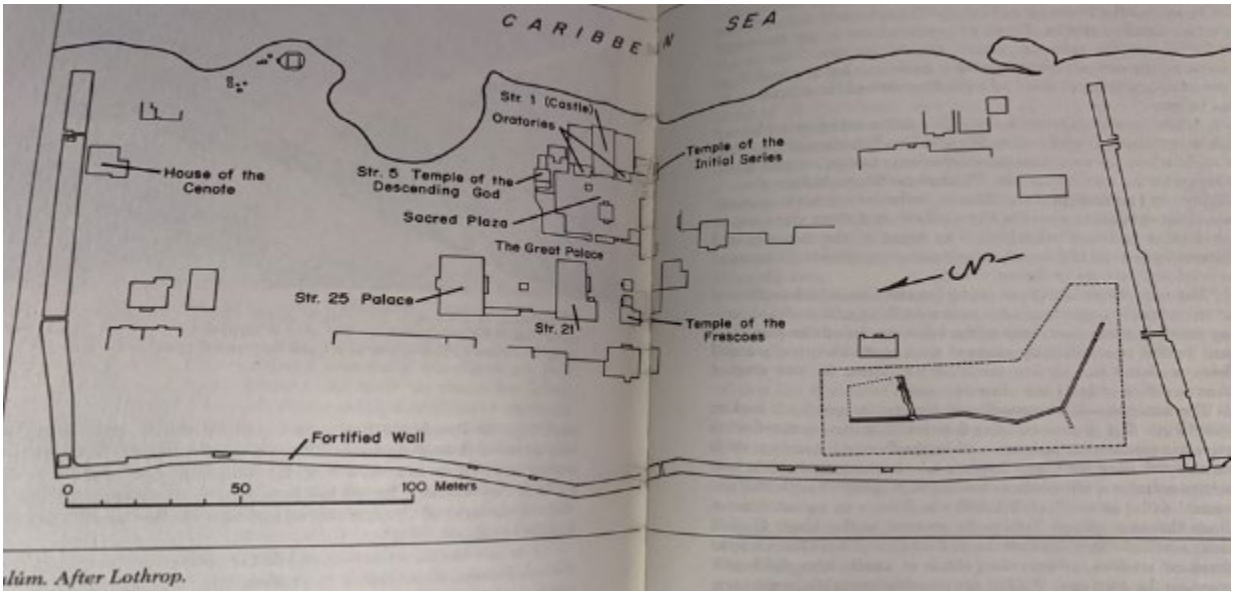

Figure 32. Map of Tulum (after Lothrop 1924; from Gunter 1986)

Tulum's built environment is particularly interesting compared to other coastal sites along the Yucatan. The scale of the structures themselves are relatively small compared to neighboring sites, while the architecture has been described as being "crudely finished and lacks the proportions that would give temple and palacelike building distinction" (Hunter 1986:306).

There is no evidence of corbel vaulted ceilings located at Tulum, but instead are made of beams and mortar (1986:306).

Tulum's ceremonial center lays on the eastern side of the site overlooking the sea and is separated by the rest of the structures by a courtyard (Hunter 1986:308). Like most ceremonial centers, it is oriented by the cardinal directions (1986:308). Within this ceremonial group are the "Castillo. The Temple of the Descending God, the Temple of the Initial Series, and two small oratories" (Hunter 1986:308), many of which make up the larger built structures within the site (1986). The main street within Tulum, "which separates the ceremonial center from the palace buildings, formed an axis from north to south, and many of the buildings faced this roadway" (Hunter 1986:308).

The Castillo is the tallest structure in Tulum (1986:314) (Figure 33). Hunter (1986:314) explains that there are various structures within Tulum that also have these superimpositions which could indicate urban growth and development. The structure was used as a temple, not as a palace as it was named by Spanish invaders (Hunter 1986:314). The temple has a small building on each side of it, which Hunter (1986:314) explains would have been used by priests during ceremonies. Hunter (1986:314) further describes the characteristics of the temple as having:

> A great stairway with ramps [which] leads to the temple, three stories above ground level. Two plumed-serpent columns support the lintels of the doorways. As in the Temple of the Frescoes, niches over the doorways contain stuccos sculptures, the central one again being the descending god.

Figure 33. The Castillo at Tulum (from https://www.cntraveler.com/galleries/2014-11-20/5-things-to-do-in-tulum-mexico)

North of the Castillo is Structure 5, also named Temple of the Descending/Diving God, which follows similar architectural features of the surrounding structures of Tulum (Hunter 1986:314). Southeast of the Castillo in the ceremonial center is the Temple of the Initial Series, which was previously home to a dated (A.D. 564) stela that had been broken into pieces. This structure, as well as a few other structures within Tulum, have open windows (1986:314).

One of the more important structures within the ceremonial center is known as the Temple of Frescos (Hunter 1986:311). This structure has three superimpositions, with the inner walls having some well-preserved murals (1986:311). Hunter (1986:311) explains that one part of the murals inside of the temple possibly depicts Ix Chel, a walking deity, and Chac, the rain god. There are stucco sculptures within the temple which were crudely made, as well as “a

stucco sculpture of a facemask that sweeps the ends of the facade" (1986:311). As previously mentioned, Cozumel is also home to an alter dedicated to Ix Chel.

As previously mentioned, there is a wall that surrounds Tulum along the north, west and south with 5 entrances into the city (Hunter 1986). Anthony Andrews (2020) states that since the site core is within the fortified walls on the interior side, it may suggest that it was to protect the inhabitants from outside forces (2020:280). This fortified wall "is broken by archways that gives access [to] other communities active during the Postclassic times" (Hunter 1986:308). Along the west wall are single room watch towers, each holding an alter (1986:308).

Andrews (1990) has identified Tulum to be a port of trade. As previously discussed, port-of-trade has some problematic implications with the definition and qualifications. Andrews later discusses that Tulum also has been categorized as a port complex, due to its various built attributes within the site. There is an aspect of the built environment which would allow travelers within this trade network access into the site via the beach (Hunter 1986). According to Hunter (1986) there is "a pathway north of the Temple of the Descending God [which] leads down the embankment to the sea" (1986:315). This pathway would also allow those within the fortified walls to have access to the sea's resources.

Within the built environment, there are several characteristics which show that Tulum was likely used a port. Tulum's location along a harbor would have allowed for access to calmer waters while canoeing to the beach, or to a potential pier that may or may have not been located at the site. Further, Tulum has a fortification surrounding the northern, western, and southern sides of the settlement core; since the eastern littoral of the site is a cliff, there would have not been a need for a fortified wall. There is a pathway leading down to the beach below the eastern cliff line. As previously discussed, there is no pier or dock feature that has survived the

archaeological record but that is not to say that there was never one built at the site. Further, there is a ceremonial complex which featured altars/shrines positioned on the eastern littoral of the settlement core, which falls under other characteristics categorized by port complexes. Its proximity to Cozumel would have allowed Tulum to be a place where structures could be used for various reasons. It could have been used for extra storage facilities, as a place to stop along the way to Cozumel for those traveling there for pilgrimage or served as their port facilities. It is also possible that Tulum was used as a place for pilgrimage itself on the way to Cozumel, due to its ceremonial complex and frescos dedicated to Ix Chel.

6.15 Chac Mool

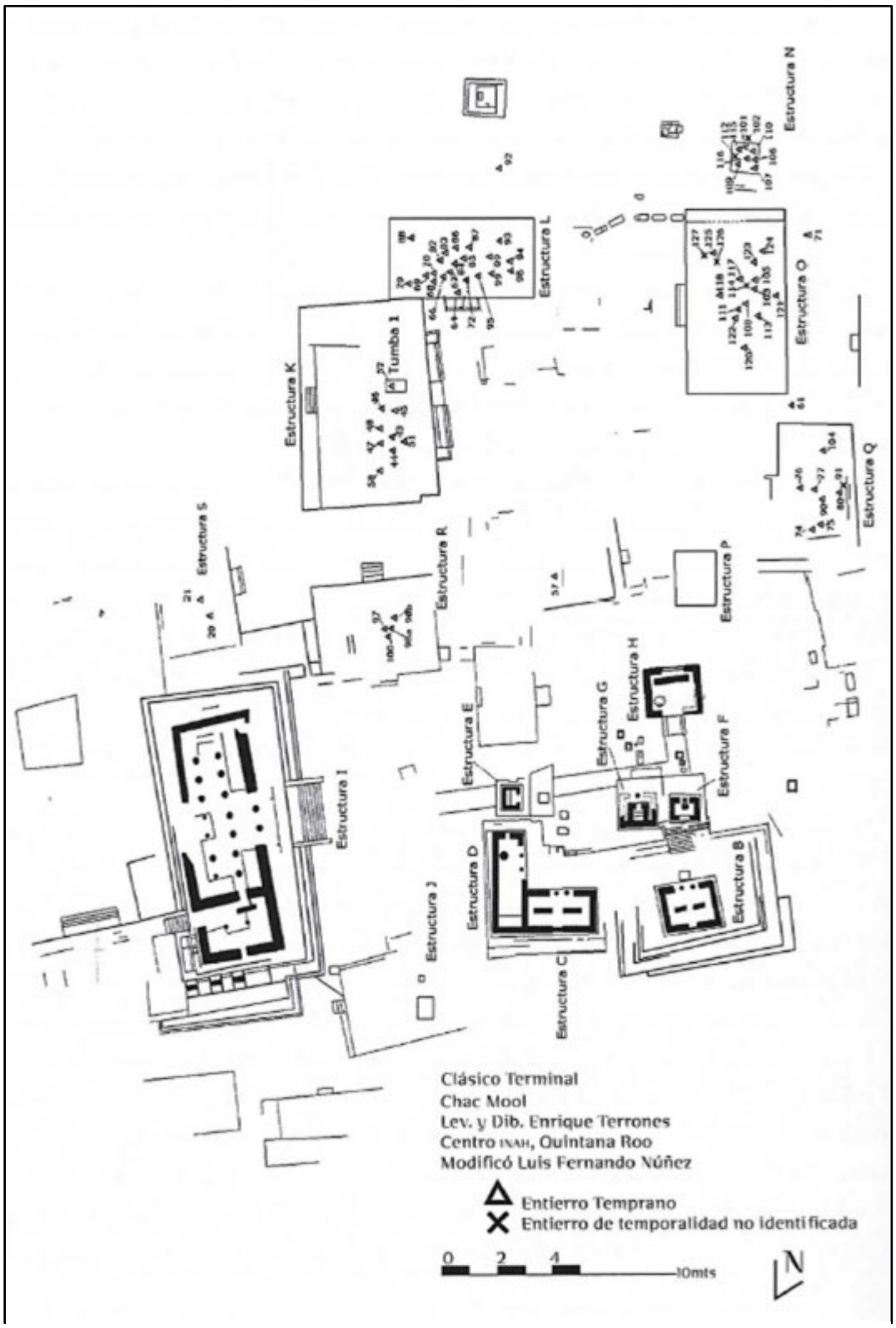

Figure 34. Site map of Chac Mool (after Marquez et al. 2006)

Chac Mool is located on the center of the eastern coast of Quintana Roo (Elizalde-Rodarte et al. 2016:23); specifically, between Ascension Bay and the Holy Spirit Bay (Figure 34). The site measures to be about 1.5 ha and its surrounding environment consists of lagoons and mangroves (Terrones Gonzalez 1995:15). Sharer and Traxler (2006:574) point out that the Terminal Classic site of Chac Mool is "named after its Chichen Itza-style sculpture." Due to its location, Chac Mool most likely function as part of the "vital communication and trade network" that was in place during occupation in the Terminal Classic (Terrones Gonzalez 1995:18).

Terrones Gonzalez (1995) carried out various archaeological investigations into Chac Mool which led to the rediscovery of 20 structures. These early structures identified follow the "Costa Oriental" architectural style which has been associated with the early Postclassic period (Elizalde-Rodarte et al. 2016; Terrones Gonzalez 1995). Though the site of Chac Mool is a relatively small site, archaeological investigations show that the structures documented are residential and ceremonial. These structures form three plazas which consists of mostly ceremonial and administrative structures, are also surrounded by residential platforms (Terrones Gonzalez 1995:18). Terrones Gonzalez (1995) goes on to explain that there was a second construction period during the late Postclassic period which can be seen on several structures at Chac Mool in order to modify the architecture commonly seen during this time; more specifically Structures B and C, which are known to be ceremonial temples, Structure D which has been identified to be a domestic, and Administrative I. This second period of construction more than likely was due to the decline of the Chichen Itza (Clark 2015; Terrones Gonzalez 1995). Further, Terrones Gonzalez (2006:18) mentions that it was during this reconstruction phase that the sites core shifted east.

Structures that consisted shrines and conform to a complicated structural pattern include Structures E,F, G,H and P (Elizalde-Rodarte et al. 2016; Terrones Gonzalez 1995). Archaeological investigations into Structure H uncovered an alter that was once home to a staircase, which was previously dismantled likely due to looting (Terrones Gonzalez 1995; Elizalde-Rodarte et al. 2016). Investigation into Structure P, which is located almost center of the site, have shown that it is an alter which may have been used ritual sacrifice (Terrones Gonzalez 1995). The domestic structures located around Chac Mool were constructed on platforms with perishable materials (Terrones 1995; Elizalde-Rodarte et al. 2016). There is a residential structural group which has been described as elaborate and consists of staircases for access to the residential space, located near the sites core. Terrones Gonzalez (1995) mentions while these structures have been identified there may very well be several more that have yet to be identified through further archaeological investigations.

Further cultural materials found, such as the ceramic deposits found associated with Chichen Itza. It's believed that Chac Mool was a port and place of trade for Chichen Itza before its collapse, though after Itza's collapse the port seemed to have continued trade (Terrones Gonzalez 1995). Terrones Gonzalez (1995:28) explains that during both occupational periods, Classic and Postclassic, the port was able to keep communication and trade with merchants sailing through the coastal trade network and continue exploiting marine resources. This exploitation and movement of marine resources was done through the mangrove swamps and lakes found near Chac Mool, which also functioned as areas for alternative food sources for the port (1995:28).

While there are some built features and many cultural materials at Chac Mool which support the evidence of port activities or at least the facilitation of trade, there are still

characteristics missing such as a potential dock or pier. Its location between the Ascension Bay and Holy Spirit Bay gives it a place where waters are calmer, as well as an ample position along the coastal tread network. Chac Mool's affiliates with Chichen Itza would have made it a place of importance as the inland polity was known for it extraction of marine and coastal resources, and its use of the coastal trade network. There are several ceremonial structures and altars, which fall under the port complex characteristics as set forth by Andrews (2020). However, comparatively speaking to other identified ports in this data set, Chac Mool does not have as many built characteristics within its environment which point to it being a port.

6.16 Ichpaatun-Oxtankah-Isla Tamalcab

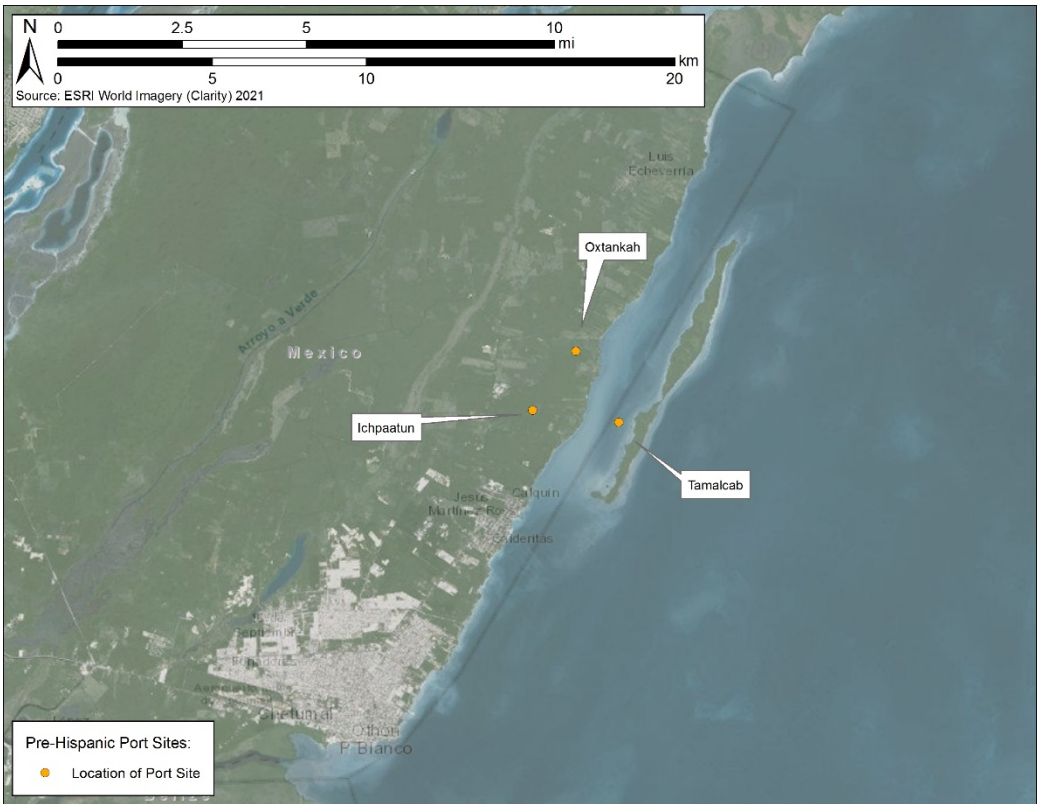

Figure 35. Location of Ichpaatun, Oxtankah, and Tamalcab on a modern aerial photograph

Ichpaatun, Oxtankah, and Isla Tamalcab (Figure 35) are located in the Bahia de Chetumal, which is along the southeastern coast in Quintana Roo, bordering Belize. These three *coastal*

settlements are often paired together due to their close proximity together. It is likely that they may have been reliant together/acted as a continuous coastal settlement, as previously suggested Andrews (2020). These coastal settlements may have acted as ports or facilitated trade along the coastal trade network that the ancient Maya created, with several ancient site and ports continuing down the coast of Belize.

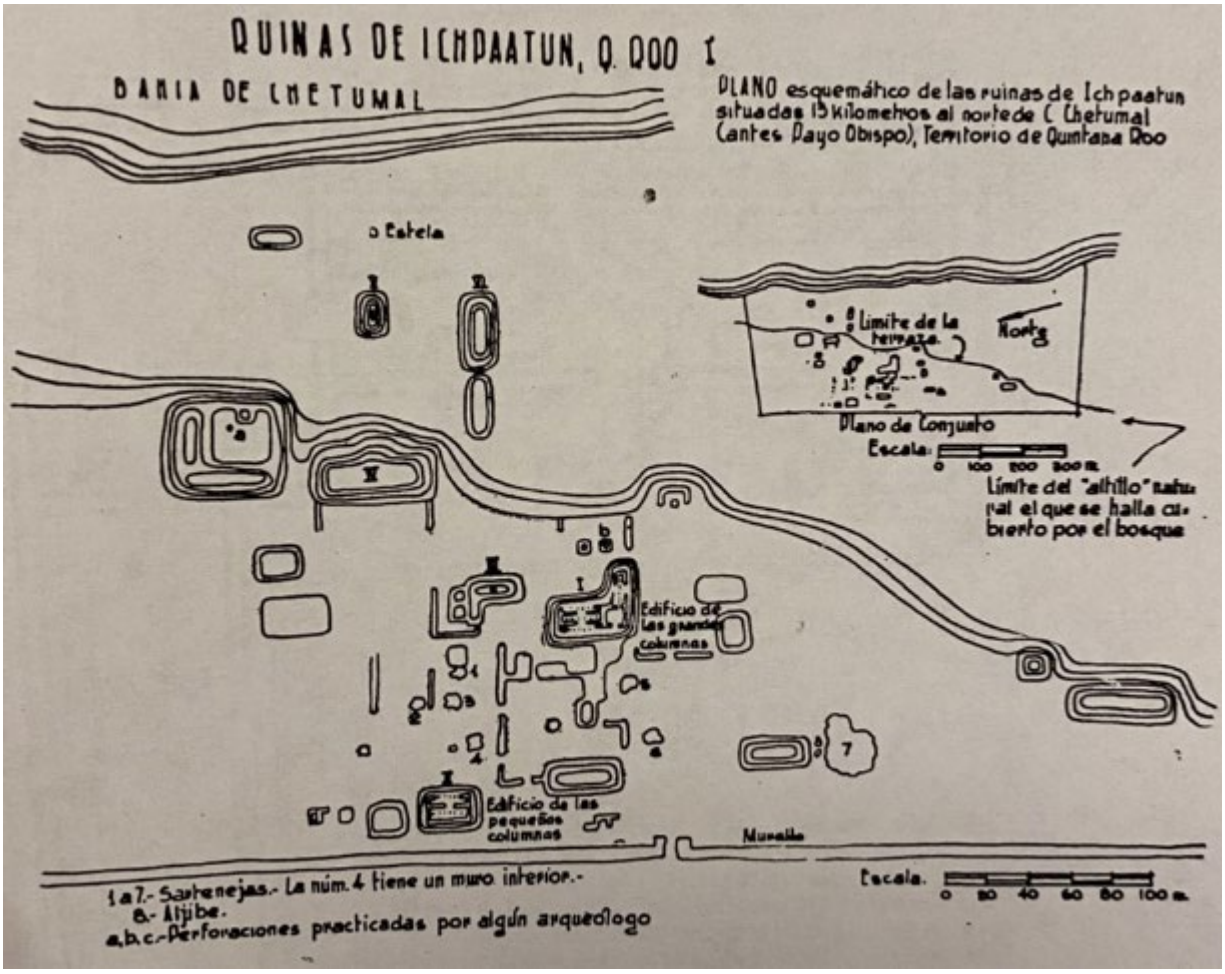

Figure 36. Map of Ichpaatun (Ramos 1946)

Ichpaatun is located "on the west shore of the Bahia de Chetumal" (Sanders 1955:203) (Figure 36). Ichpaatun is approximately 1 km away from the shoreline. Ichpaatun is an enclosed area surrounded by three walls with the eastern side 'being delimited by the sea' (Sanders 1955:203). Sanders (1955) states that the wall resembles the wall fortification found at the site of

Tulum and is constructed of limestone squared blocks (1960:260). Further, Sanders (1955) discusses how original investigations into Ichpaatun by Escalona Ramos (1946) resulted in the rediscovery of 18 structures (1946:203). Of the identified structures there were "2 columned palaces and 16 mounds," all of which were in poor conditions (Sanders 1955). Sanders (1955) states that "most of the structures are on the elevated plateau-like area, densely clustered around four courts in the center of the long axis of the site" (1960:203). South of the north wall lays the main set of mounds, with small walls that form an artificial terraced plazas (1960:203). Andrews (1990:162) has described Ichpaatun as being a Late Classic period port complex that emerged as a center of power on this section of the coast. Based on cultural materials found at the site, the occupational period of Ichpaatun was 'evidently' short (1960:204).

Ichpaatun does hold some characteristics of being a port site based on the built environment, though some of the surrounding coastal settlements which may have been part of a continuous community does not. The settlement is within 1 km of water, which give canoes an almost direct route to the settlement core. While there is an absence of pier and dock feature, it cannot be ruled out as the materials that were used to construct them may have either been destroyed due to natural deterioration or deconstructed. The fortification surrounding three side of the settlement is another feature found throughout the Maya area, as put forward by Andrews (2020). Some of the structures have also been identified have to be ceremonial.

The pre-Hispanic settlement of Oxtankah (Figure 37) is located 16 km north of the capital of Quintana Roo, Chetmul (A. Ortega-Munoz et al. 2021:3). While the settlement is within 3 km of the coastline, it is not directly settled on coastal waters. Oxtancah's settlement pattern consists of 12 plazas, "of which only 4 have been archaeologically excavated" (2021:4). Based on cultural materials recovered from excavations, mainly ceramic evidence, it is suggested that

Oxtancah was first occupied during the Middle Preclassic period (2021:4). This ceramic evidence also shows the cultural material connections to other settlements in the northern Yucatán Peninsula during the Preclassic and Classic periods (Melgar Tísoc, 2008; Vega Nova, 2013). It is believed that Oxtancah was "under the political influence of the Kan or Kanul dynasty of Dzibanche and Calakmul" (Helmke and Awe 2016; Velasquez García 2008). Due to these materials, it has been inferred that Oxtankah was possibly a port of transshipment (Andrews 1990; Hammond 1982; Polanyi 1975). However, based on the characteristics found within the built environment there is not as many built features to support this site being a port. While there are several ceremonial complexes and structures that may have possibly been used as storage, the site is not within direct proximity to water which rules out various

Isla Tamalcab (Figure 35) is an island which is in the Bay of Chetumal, which is within 2 km of the shoreline of the mainland. Tamalcab consists of two large plazas which are both surrounding by mounds ranging in size and oriented north to east (Escalona Ramos 1946; as translated by author). However, the mounds are manly the remains of walls or foundations of previously standing walls or columns. There are some carved stones that were located near the shore, which may have been from pre-Hispanic structures (Escalona Ramos 1946; as translated by author).

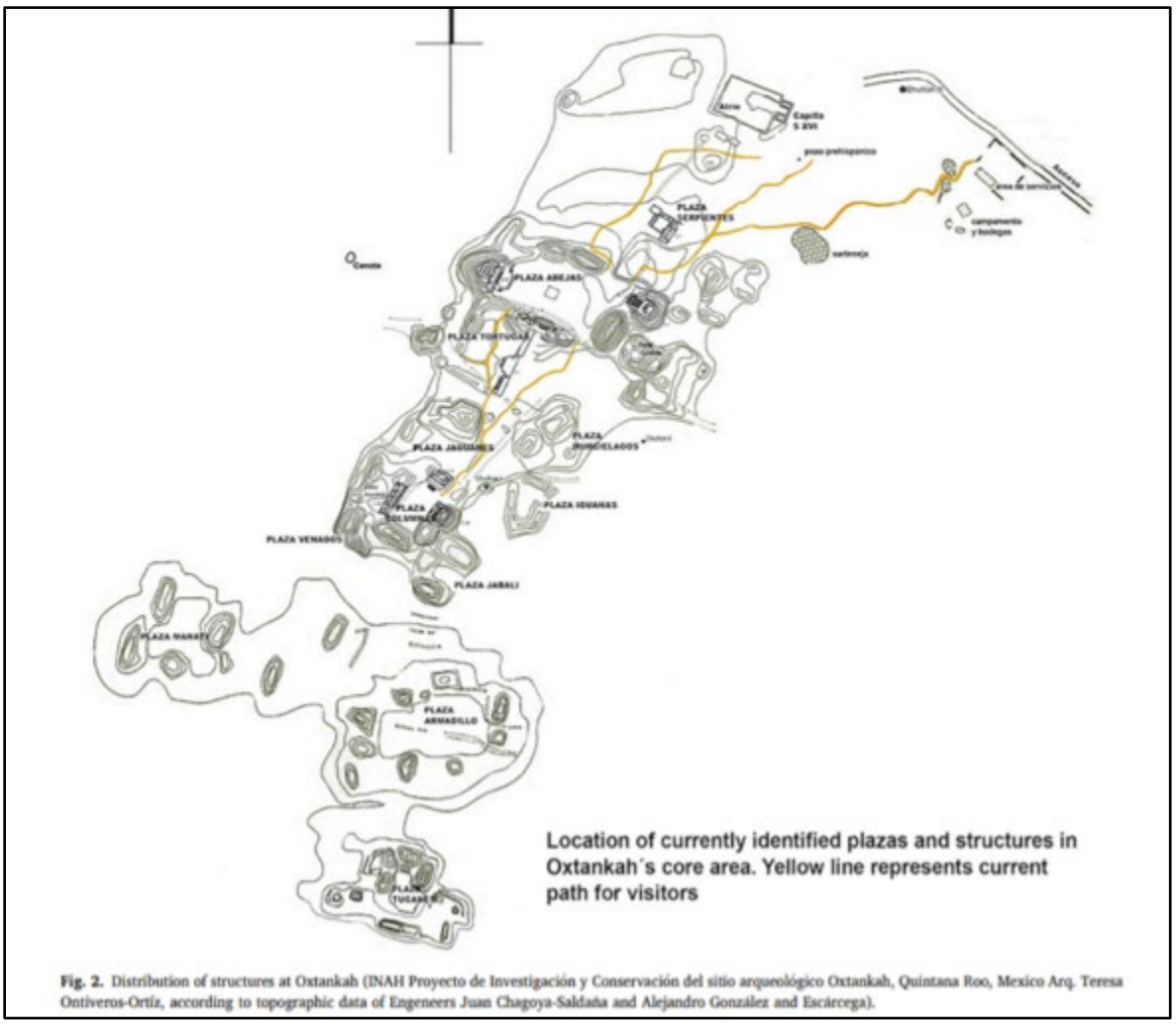

Fig. 2. Distribution of structures at Oxtankah (INAH Proyecto de Investigación y Conservación del sitio arqueológico Oxtankah, Quintana Roo, Mexico Arq. Teresa Ontiveros-Ortíz, according to topographic data of Engeneers Juan Chagoya-Saldaña and Alejandro González and Escárcega).

Figure 37. Distribution of structures at Oxtankah (Ortega-Munoz et al. 2021: Figure 2)

7 ANALYSIS

There are a handful of sites within the original data set of ancient Maya coastal sites that were identified as port sites that did not have the necessary maps for analysis of the built environment. Due to this, they will not be part of the full built environment analysis. Of the 25 coastal settlements/sites (see Figure 11) that have been identified as port, only 11 had the necessary documentation and maps needed for the analysis of their built environments. Information from all 11 sites were compiled into a chart to show and compare the information to the other port sites that had the necessary information for the analysis of their built environments. However, there needs to be the restatement of the sites within the analysis may have aspects of their built environment in which may have been lost due to time and deterioration.

Various characteristics that were mentioned in Chapter Four and discussed the data section, are expanded upon and shown in relation to other coastal ports in the dataset that had enough information for analysis. The hope of this analysis it to expand on the presence and absence of these port site characteristics in relation to other ports located in the ancient Maya costal area described by Andrews (2008, as translated by author, 2020), as well as identify other characteristics noticed by myself and other archaeologists working in the Maya coastal area of the Yucatán Peninsula. Further understanding the built environment of these ports may help highlight which features the ancient Maya thought necessary for daily living and what was culturally important to have as part of their surrounding environment of coastal port settlements.

Table 2. Built Characteristics of Port Settlements, where 0=no, 1=possibly, and 2=yes

Pre-Hispanic Port Sites	Ceremonial / Civic-Religious Complexes	Shrine/ Altars	Harbor/ Canals	Open Spaces	Artificial Land	Fortified/ Walls	Quays, Piers, Ramps, Docks	Sacbe/ Andador	Total Count
Isla Jaina	2	2	2	1	2	0	2	0	11
Isla Uaymil	2	0	1	2	2	0	0	0	7
Xcopte	2	0	1	1	2	0	0	0	6
Xcambo	2	2	1	2	2	0	2	2	13
Isla Cerritos	2	2	2	2	2	2	2	0	14
Emal	2	0	1	1	2	2	1	0	9
Vista Alegre	2	2	1	2	2	2	1	2	14
El Meco	2	2	1	1	0	0	2	1	10
Playa de Carmen/ Xamanha	2	2	2	2	0	0	0	0	8
Xcaret/ Pole	2	2	1	1	0	2	0	0	8
Cozumel	2	2	1	2	0	0	0	2	9
Xelha	2	2	1	1	0	2	0	2	10
Tancah	2	2	2	0	0	0	0	0	6
Tulum	2	2	2	0	0	2	2	0	10
Chac Mool	2	2	1	0	0	0	0	0	5
Ichpaatun - Oxtanca-Tamalcab	2	0	1	0	0	2	0	0	5
Total Count:	32	24	21	18	14	14	12	9	

In the table above, each observed site in the dataset was assigned number designations for each port characteristic that was present. If there was a characteristic present, it was designated the number 2, if a characteristic can be argued of its presence at a port it was given a number designation of 1, and if there was no port characteristic observed within the built environment it was given the designation of zero. Sites with a sum of a higher score are more likely to have evidence in their built environment to support that the coastal site was a port. However, if there

is a lower score for a site, this shows that the built environment is lacking evidence of a port feature at the coastal settlement.. Discussion of these characteristics and what port sites had a presence of them, as well as the characteristics scores, will be in the following sections.

7.1 Harbors

First, a characteristic found with many of these ancient ports is where they are located. Andrews (2020) states that there are coastal sites and ports located in every natural harbor and cove found along the coastline of the Yucatán Peninsula (see Figure 11). This would be due to the shelter coves provide and safer seafaring conditions for traveling merchants and the ports (Andrews 1974:476). The natural sheltered inlets and coves, like those found on the east coast, influenced site selection, as well as they provided harbors for seafaring canoes (Andrews 1974:477). A few examples of this within our data set are on the east coast: Tulum, Xcaret, and Xelha. As previously mentioned, this caleta has calmer waters which would have been ideal for canoe travel along the coast. Tulum's position along the cliffside of a natural coastal cove acted as a natural harbor. There is another site which has a built characteristic which could be considered to fall into a few different categories in the built attributes of port sites: Isla Cerritos. The identified 'sea-wall' found in the waters south of the island, has been described as an acting artificial harbor that doubled as active fortification. The built wall allows for calmer waters for those entering from one of the multiple entrances in the south wall, as well as a means of protection from invaders. Excavations into the surrounding harbor at Vista Alegre shows that there may have been man-mad alterations made in order to create the surrounding harbor areas at the site (Jaijel et al. 2018).

There are also various settlements which were located behind barrier beaches where mangroves and swamp areas are located or like along the east coast where there are settlements

behind the reef that separates the sea and waters leading to the coast. The location of some of the port sites were in areas where they were away from deep coastal waters, and instead use the wetland areas along or behind the shore connected to the sea with the rising tides where the waters were shallower and calmer like many of the ports along the west and northern coasts. It can be argued that many of these sites lay within a type of natural harbor behind these barrier beaches. This explains why various coastal settlements scored a 1 within this section of the characteristic table (3), since it can be argued that their position is within a natural type of harbor. Overall, harbors were one of the more common characteristics of the coastal port site.

7.2 Fortifications

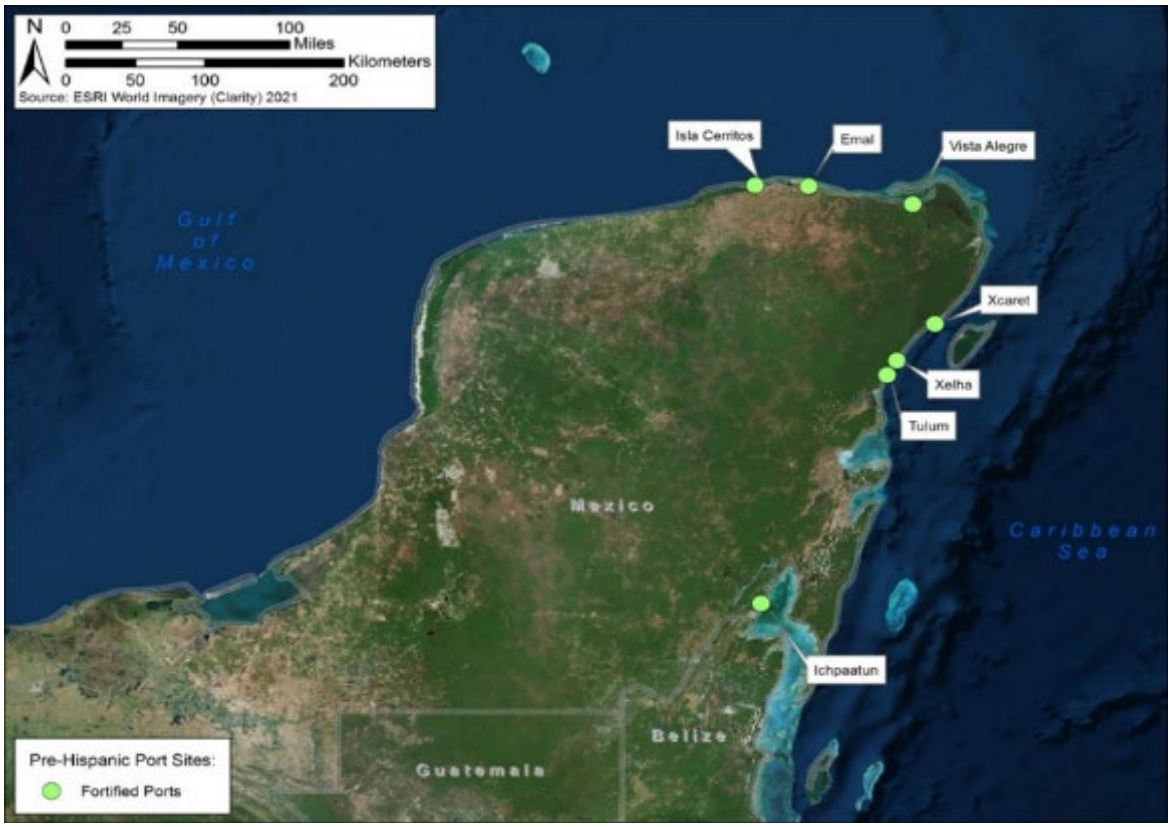

Figure 38. Fortified port sites

While it has been mentioned a few times throughout various chapters, an important built attribute found at various sites is the presence of a type of wall or fortification surrounding the

ports core area as pointed out by Andrews (1990,2008,2020). Tulum's entire settlement is almost completely fortified, surrounding the north, west, and southern boundaries of the port while the eastern side of the site is an exposed cliff with the ceremonial structures lining it. Other port sites which had the presence of a fortifications or walls surrounding the city core include: Xelha, Xcaret, Vista Alegre, Emal, and Ichpaatun (Glover et al 2022) (Figure 38). The constructed walls/fortifications are "indictive of the need to safeguard the valuable cargo that was moving through these coastal sites" (Glover et al. 2022). Some of these sites may have had to fend for themselves, particularly after potential city-state collapses, building the extra protection they need to protect themselves and the goods coming through the port (Glover et al. 2022). This collapse of polities that may have had some hold on these port sites, and the strength of the coastal trade network at the time of these would have explained how some of these sites saw continuous occupation and was able to function independently (Glover et al. 2022). A mention of Cozumel should also have a brief mention regarding the building of walls; though the walls found among the sites of Cozumel were more so built as a grid connecting structures and other built structures, as previously mentioned in section 6.11. Rathje and Sabloff (1973) discuss that the most likely reason as to why Cozumel did not have any fortifications found on the island was since there was no reason for it. The complex urban design of Cozumel as a whole, which was incredibly spread out with storage facilities toward the center of the island, would have taken invaders a lot of time and effort to loot trade goods and attack those living on the island.

Overall, fortifications scored a 14 compared to other port characteristics found at coastal port settlements. While this is not found at every port site, it may more of an important indicator of the political climate during the time of occupation. As previously stated, some identified port sites may have had fortifications may signify that the settlement may have had to act

independently from other settlements or connected major inland cities, and defend for themselves.

7.3 Quays, Piers, and Docks

Another characteristic of port sites that has been mentioned or discussed by Andrews (1990, 2020) and various archaeologists investigating these ports sites is the potential presence of quays, piers, and ramps; or as Andrews (2008, as translated by author) addresses as docks, ramps, sacbeob that functioned as piers in the water. There is some difficulty identifying some of these built characteristics due to the materials used to originally build them, such as wood, did not survive the archaeological record. However, there have been ethnographic resources which contest to these attributes being located at ancient Maya port sites, coastal and inland. There may also be a lack of these characteristics at some coastal sites as they may have had beaches that would have allowed canoes to 'dock' instead of needing to build one themselves.

There are coastal ports in this study which have identified piers or docks functioned as piers as part of their built environments, as Andrews (2020) states as built characteristic to a port (Figure 39). At Xcambo, Sierra Sosa et al. (2014) identifies a pier at the north end of the elevated island which includes embarkment facilities (2014:233). This pier is located at the central northwestern half of the island, across from the main plaza area which is where many of the administrative and ceremonial structures are found. At Isla Cerritos, Andrews (1996) and Clark (2015) identify a number of stone structures which may have acted as potential docks that also functioned as piers on northern, western, and easter littoral of the island (Andrews 2008:24, as translated by author). El Meco has a dock/pier at the northern end of the settlement which extends into the coastal waters (Andrews and Robles Castellanos 1986:60). To the south of Tulum, there is a lagoon in which remanence of pier have been found (Andrews 1983; Rique

1995; Romero 1998). At the coastal port site of Xelha there is a sacbe (Sacbe 2) which connects the peninsula to the island, thus also creating a dock (Andrews 2008:24, as translated by author). Andrews (2008:25, as translated by author) states that on Isla Jaina, "there are remains of four springs of stone on the west site of the island which were probably built in historic time periods." However, like many of these coastal sites with direct relation to water, there may have been piers or docks located around the island during pre-Hispanic times (Andrews 2008:25, as translated by author).

Queys, docks, and piers scored on the lower end of the built characteristics of port environment evaluation. While there are a handful of coastal port sites which have reported these features or have wall features which may have acted as a pier or dock, this may be indication of the material originally used to construct these port features. As previously stated, many piers, docks, and queys were constructed of wood. While there has been some evidence of these structural materials surviving the archaeological record, it is not a feature that has been found throughout the coastal Yucatán Peninsula.

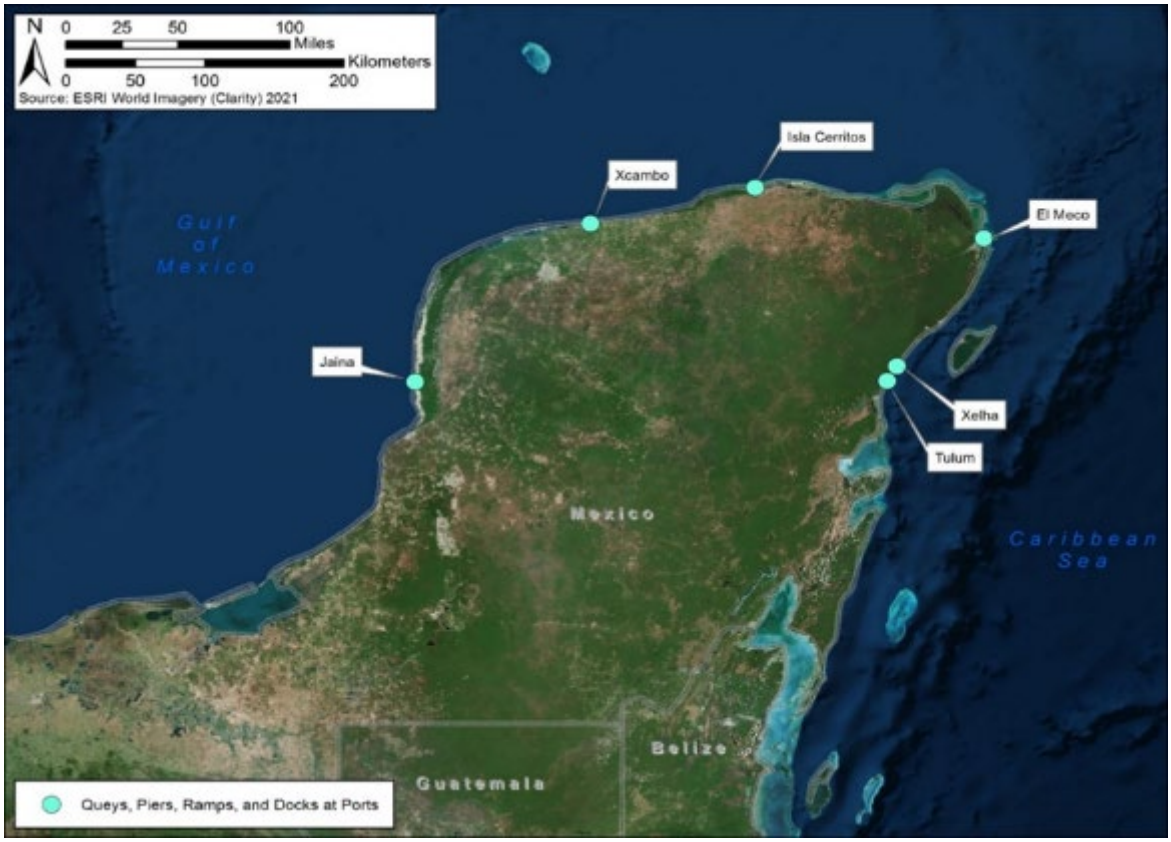

Figure 39. Quays, piers, and docks at port sites

7.4 Sacbeob and *Andadores*

Other built characteristics of port sites identified by Andrews (1990,2020) are causeways (*sacbeob*) and *andadores* (walkways), all of which would have been used a built means of facilitating where and how people travel among the settlement. A total of 5 sites identified *sacbeob* and *andadores*, with 1 having both (Figure 40). These port sites include: Xcambo, Xelha, Vista Alegre, El Meco and Cozumel. At Xcambo, there have been a total of three sacbeob recorded, one "departs north towards the village and salt flats of Xtampu, but only advances about 20 m before disappearing under the mud of the swamp (Sierra et al. 1996; Andrews 2008:28, as translated by author). Xelha only holds 1 sacbe, which leads to the natural cove of the same name. This would have allowed merchants a path to follow to the settlement, as well to access the cave shrine located in the cove. Vista Alegre is reported 1 *andadores* located to the

south of the sites core. At El Meco, there is one sacbe which ends in a pier at the northern end of the settlement (Andrews and Robles Castellanos 1986:60). On Cozumel there have been 'numerous causeways and *andadores*' located across the island which connect various settlements and port facilities.

Sacbeob and *andadores* scored the lowest on the built feature found at ancient Maya coastal sites. This may be due to the size of some of these settlements, though some which have identified these features are comparatively small than others with the same built characteristic. While these are prime ways to facilitate movement in and out of the coastal settlement, there may have not been a major need for them at some of these identified ports. Size cannot be fully attributed to whether or not a port may have had a *sacbe or andadores*, as this attribute is seen at a variety of port settlement sizes.

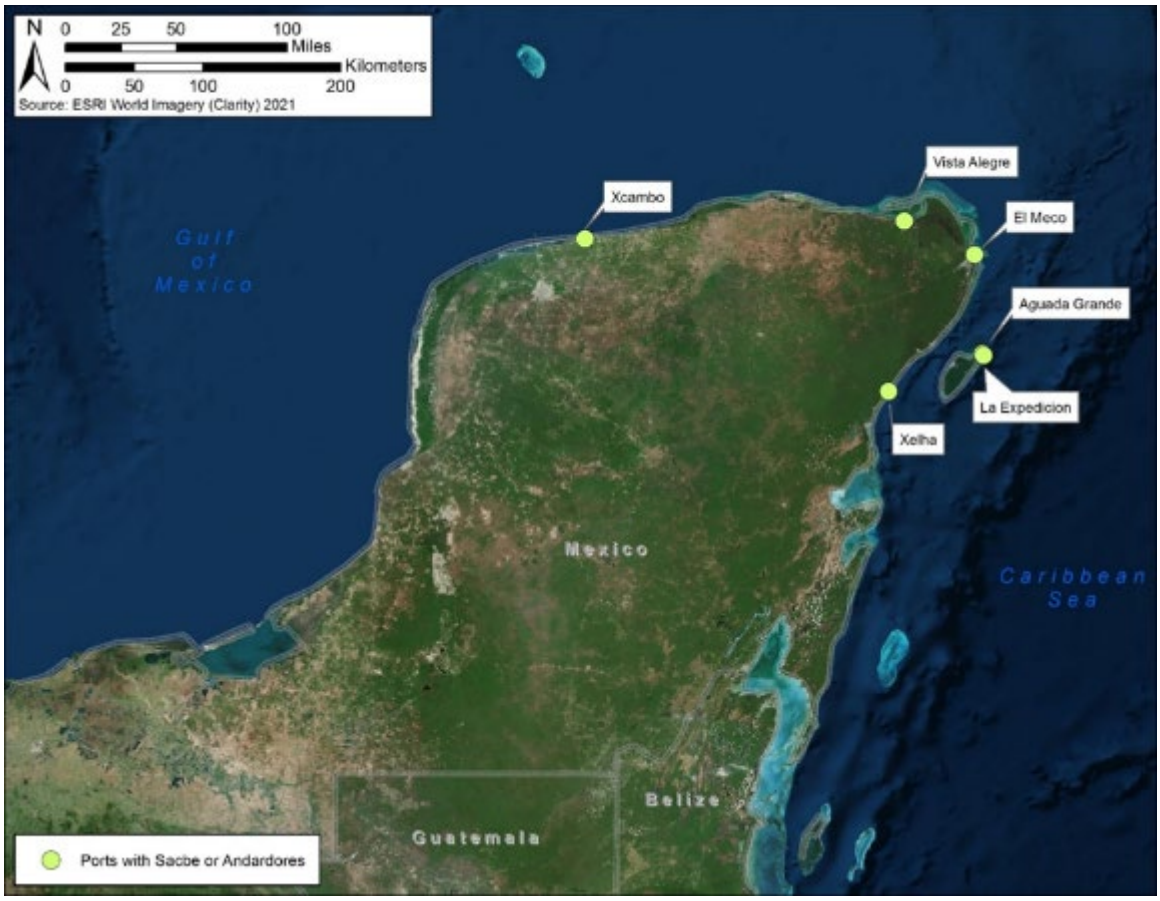

Figure 40. Port sites with sacbeob or andadores

7.5 Ceremonial Structures

Ceremonial structures, such as structural complexes, shrines, and alters should be mentioned as a good majority of the port sites who have had archaeological investigations have a least one of the built features (Figure 41). First and foremost, Anthony Andrews (2020) makes mention that there were ports that saw construction of ceremonial complexes during the Classic period at: Isla Jaina, Xcambo, Emal, Vista Alegre, Cozumel, Xelha, and Chacmool. Andrews (2020) does make the note that ceremonial centers are likely at several other sites where remains of religious architecture have not been investigated yet. During the Postclassic, Andrews (2020) explains that there were ceremonial centers that appeared up and down the northeastern and eastern coast to Chetmul Bay, at ports like Isla Cerritos and Cozumel. Tulum is another coastal

port which contains a ceremonial complex/center which is situated on the eastern cliff of the site overlooking the ocean.

Other port sites with religious architecture include El Meco, Xcaret/Pole, and Playa del Carmen, though most of the associated religious or ceremonial architecture are shrines or alters (Andrews 2020; Kurnick 2019). In relation to the previously mentioned sites where minatory masonry shrines from the Postclassic period, Kurnick (2019) points out that these are also found at these sites. Not only this, but Cozumel was also once home to the ceremonial shrine of Ixchl, as previously discussed in the data section. Ethnographic resources stated Cozumel was a place of pilgrimage to the Ancient Maya and to many of the traveling merchants who wanted to pay tribute to Ixchl. With this shrine, along with the several different ceremonial complexes and architecture found on Cozumel highlights its importance of a religious significance and of its place on the coastal trade network established by the Maya. It should be said that Arthur Miller (1982) put forward the idea that the Tancah-Tulum zone and Cozumel were areas of great cultural and religious significance and should be seen as a place of pilgrimage due to the areas religious shrines and frescos of the goddess Ix Chel found at Cozumel, Tancah, Tulum (1983). Miller (1982:3) discusses how the placement of the sites are on the edge of both the land and sea, which shows the religious significance of the east coast as a "transitional zone, at least in the terms of the suns cycle." It is here I also refer back to the Mayan transition of Tulum, meaning City of the Dawn (Miller 1982). This area could have been chosen purposefully for its position geographically, religiously, and culturally.

There are other instances of 'small isolated coastal shrines' along the central and east coasts of the Yucatán Peninsula (Andrews 1975:476). More specifically, they are located 'in the vicinity of Xcaret, between Punta Piedras and La Ina, there are shrines along the coast"

(1975:476). South of this, near Xelha and Punta Cadenas are seven more shrines. Andrews (1975:477) analyzed a pattern that these coastal shrines are in the areas where there are inland sites which may suggest that they were landmarks for those traveling up and down the coast. Another pattern that Andrews (1975:47) noticed with these isolated coastal shrines is that one is located in "every natural harbor of the central coast," like that at Xelha, which may potentially show connections with these previously mentioned inland sites.

Ceremonial and Civic complexes, along with shrines and altars, were the two built characteristics as put forward by Andrews (2020). This may speak to the importance of religious ideologies woven through Maya culture which would be interpreted in their built environment. As previously discussed, the number of coastal ports which reported shrines or altars with ceremonial complexes found along the east coast may speak to how the Maya view the coastal landscape and the rising of the sun.

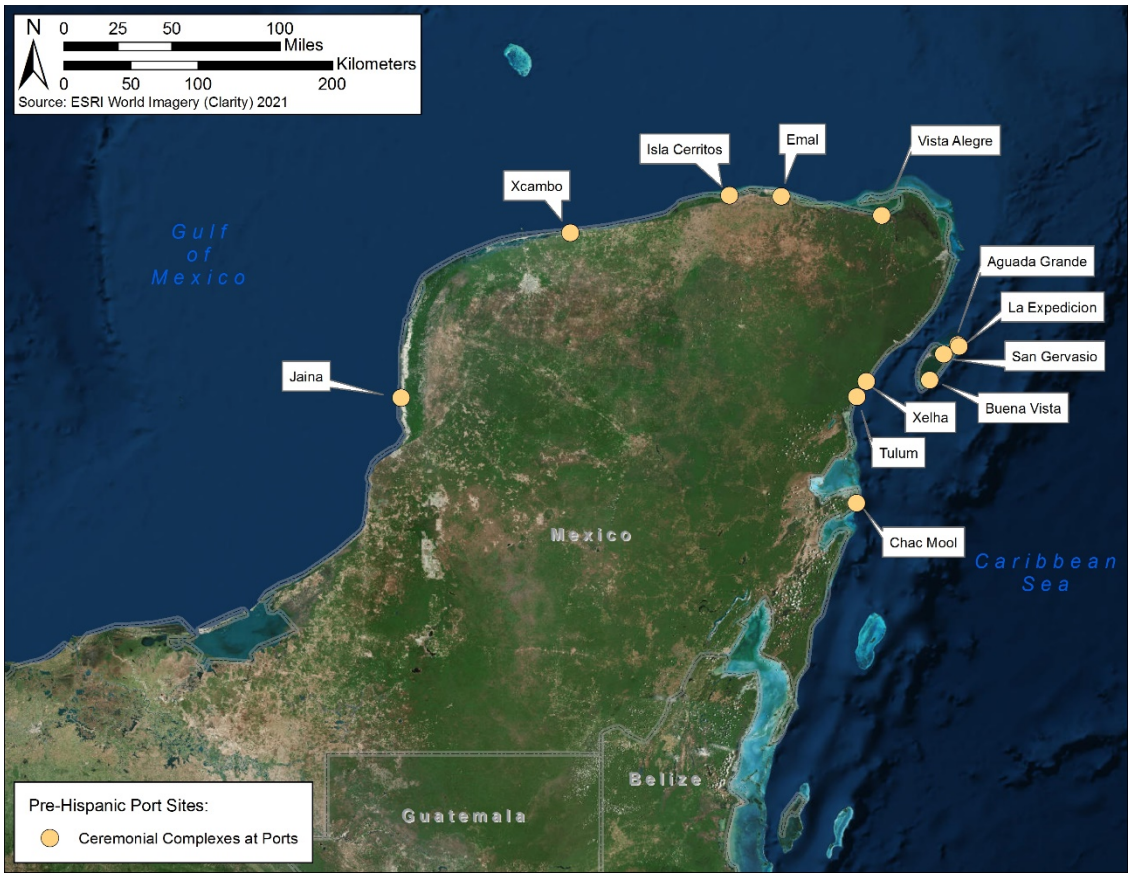

Figure 41. Port sites with ceremonial complexes

7.6 Open Spaces

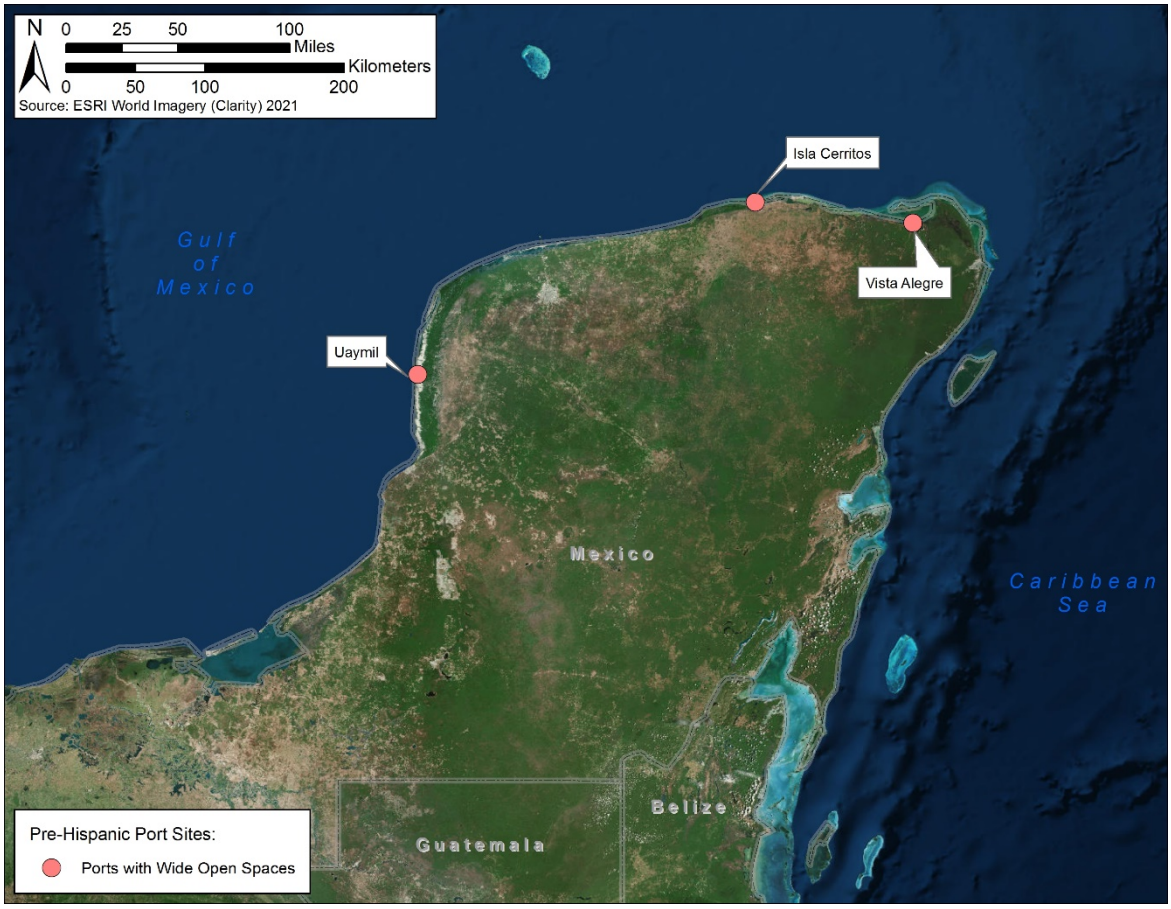

Figure 42. Ports with open spaces

Glover, McKillop, Cobos, and Rissolo (2022) point out that during the tenth century, both Isla Cerritos (Clark 2015; Cobos 2010) and Uaymil (Inurreta Diaz 2004) experienced a type of settlement extension to the sites. More in particular these:

> large open spaces in both settlements were built and these areas probably accommodated numerous perishable structures consisting of simple platforms made of stones filled with fine limestone material (sascab), and soil floors and/or stucco that were covered by thatched roofs, as illustrated in a mural that once adorned the Temple of the Warriors at Chichen Itza [Glover et al. 2022:8] (Figure 42).

Both sea ports also experienced structural expansion as well, with the construction of "temples, colonnaded halls, altars, and domestic dwellings" (Glover et al. 2022:8). This expansion may have been due to the economic wealth from being part of the Pan-Mesoamerican trade network

(Glover et al. 2022). These wide-open spaces discussed may also be part of several other port sites, though not all may be artificial extensions to the port itself and may have been part of the original urban planning. Nor have all potential areas where there is lack of evidence of structural modification been part of original archaeological investigations or areas of interest. Another port site which has seen artificial modification and sees a large open area at the coastal port site of Vista Alegre, as discussed in Chapter 6.7. While these specific port sites have published their findings and theories behind these open spaces, during the analysis of the various coastal settlements in the dataset there were other sites which had areas where there was an absence of structures near the littoral of the sites core. This includes, and may not be limited to: Xcopte, Isla Uaymil, Isla Jaina, Emal, El Meco, Playa del Carmen, Xcaret, and Xelha.

The presence of open spaces at coastal port sites scored high on the evaluation of built characteristics found at port sites as put forward by Andrews (2020). However, there have only been a few of these spaces which have been published on. Identified coastal ports which were analyzed by the author were given the equivalent of 1 as they have not been archaeological investigated or published on. The presence of this feature should be further considered and explored at the identified coastal ports listed above.

7.7 Artificial Land

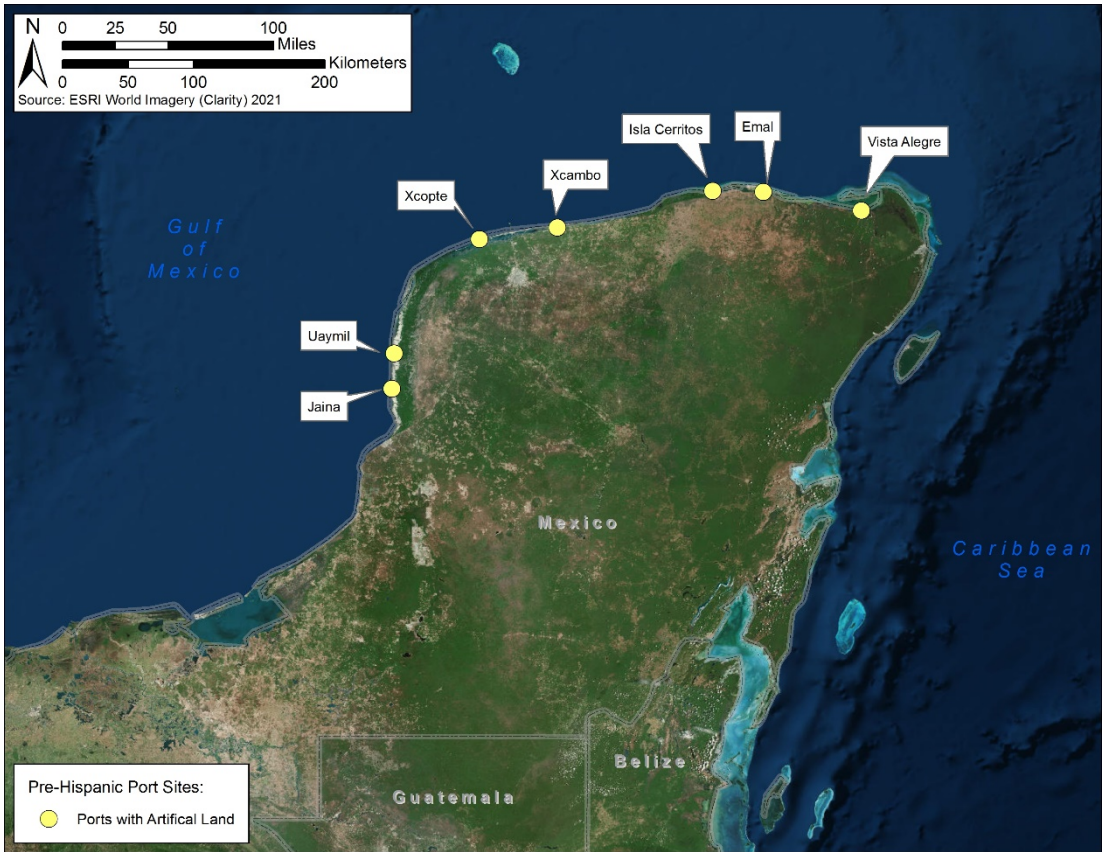

Figure 43. Ports with artificial land

An attribute that stood out among some of the port sites was the presence of artificial land build-up. The port sites that received archaeological investigation showing the presence of artificial land is seen at: Isla Cerritos, Vista Alegre, Isla Jaina, Uaymil, Xcopte, Xcambo, and Emal (Figure 43). All these sites have the surroundings of mangrove swamps affected by the rising tides of coastal waters. The tides would have affected how the ancient Maya planned to build these ports on the mounds or islands that they did and having further understanding of their surrounding costal environment. Not only this, the ancient Maya would have also had to deal with the rise and fall water elevation which was not necessarily consistent over the last thousand years. As previously mentioned, it is not exactly known where the ancient seacoast would have

been and there are many ancient Maya sites that have either been submerged or have parts of the original site in the surrounding waters around it.

The artificial build up could show that at the time of construction, the sea levels were affecting the land mass enough that artificial land needed to be constructed to support the sites structures and port. There were not many sites which had this feature, which reflects in the characteristics of the built environment of ancient Maya coastal settlements table. This may be attributed more so to the environment in which these sites were constructed than an active feature found within the built environment of the settlement.

7.8 Summary of Analysis

As previously mentioned, the ports containing the greatest number of built environment features are Isla Cerritos, Xcambo, and Vista Alegre. The coastal settlements that have been identified as ports along the coast with the fewest number of port characteristics, thusly providing a lack of evidence of having a port function, include Chac Mool and Ichpatun-Oxtankah-Isla Tamalcab. Comparatively, Xcopte and Tancah also contain fewer port characteristics than other port sites, having only one additional characteristic each than Chac Mool or Ichpaatun-Oxtankah-Isla Tamalcab. It is worth noting that the sites that have received the greatest amount of archaeological work are the same port sites that have been recorded containing the greatest number of port characteristics.

Looking at the most common characteristic found at coastal port sites, there was a predominant presence of ceremonial or administrative complexes, as well as a significant presence of shrines and altars. The characteristics which had the least presence within the built environments of pre-Hispanic coastal sites were queys, piers, and docks which may be attributed to the materials they were constructed with. Overall, there were various coastal port sites in

which their built environment supported the evidence of port activities within the settlement. However, given these characteristics, there are more sites in need of investigation, so that we can better ascertain whether they have the built environmental characteristics of a port. in regards to their built environment to support if there was a port function to the settlement.

8 CONCLUSION AND FUTURE WORK

With archaeologists still researching how this ancient civilization managed to live and build throughout in the lowlands of Mesoamerica, their cultural remains have allowed further interpretation into how they viewed and interacted with their environment. As explained before, the ancient Maya were a complex society who reflected their cultural views into their built environment and influenced where they chose to create these settlements. By focusing on how the ancient Maya built these coastal communities and cross referencing them with other sites, archaeologists can analyze how their lifestyles grew and developed, and focus on how this change is reflected through time.

Further, there needs to be a more specific definition within coastal Maya archaeology as to what dictates a coastal settlement, and further of what characteristics are absolutely necessary to define a coastal trading port. While it's understandable why many coastal sites along the trade network route would be places where trade would be conducted, thus explaining foreign materials from across the Maya area, it does not necessarily mean that the settlement itself had a port or conducted port activities. There are many sites, like Playa del Carmen, in which all standing structures are ceremonial. The site lacks many of the built characteristics that would constitute that it had a port function, yet it has been publicized as being a port settlement mainly due to its location along the trade network and its proximity to Cozumel. There are other sites, like Xelha, which would have had the necessary storage facilities and port characteristics built within its environment supports that are lacking at Playa del Carmen. It is an ample place of embarkation to Cozumel, but it does not mean that it was an active port. A closer analysis of what has been categorized as a port within the coastal Maya area is in need. For settlements

which have been identified as port, a clear outline of not only cultural connections via the materials left behind is needed, but the analysis of the built features in the environment should also be clearly provided to support the evidence of port activity; particularly for those settlements which have not seen archaeological investigations since the 1970s.

There is still much to explore about coastal built environments of ancient Maya port. As we can see with the data provided, there are some sites which have seen extensive archaeological investigations, producing a clearer image into the complexity of the coastal trade network and the importance of these ports. However, there are many coastal ports which still need further archaeological survey and investigation to identify mounds and structures, as well as gaining a better idea of the cultural history of these sites through the materials and structures left behind. The need for these investigations to happen sooner, rather than later, is great due to various reasons. First and foremost, the rising sea-levels are a threat to many coastal sites in general. These sites are also faced with seasonal weather of hurricanes and periods of heavy rains which causes structures to deteriorate or collapse. Further, as Glover et al. (2022) points out, many of these coastal sites are in jeopardy of either being torn down for their close locations to beaches for resorts, being incorporated into the resort causing restricted access for archaeologists to conduct investigations or analysis (2022:12).

Investigations into coastal settlements should include looking at the relationship in which the coastal environment affected how the ancient Maya constructed their environments, and the continued highlighting of the use of the environment for the benefit of those inhabiting it as many Maya archaeologists have incorporated into their investigations. Suggestions made by other archaeologists working in this field, such as those made by Glover et al. (2022), include the incorporations different surveying techniques such as using “shallow marine remote sensing

techniques and sediment coring" to obtain paleoecological and palocoastline data (2022:12). This would allow further understanding how the Maya adapted to their costal environment in order to survive and later thrive (Glover et al. 2022:12).

While this research gives a ground basis for the analysis of port sites and their built environment, there is still much to explore. This research will more than likely be a continued subject of interest and research not only to my advisor Dr. Glover but may also be carried out myself as a potential PhD dissertation topic. There is more research into grey literature and possible pay walls is needed in order to gain accessed to further information of identified coastal port sites previously discussed both in the data and analysis chapters. However, until further archaeological work in carried out at these port sites or further publishment to academic sources is done, the information needed for the analysis of their build environments is still needed.

APPENDICES

Appendix A

Coastal Settlement Name	Municiple	State	Distance from shoreline
Cerrillos	Carmen	Campeche	2.79
Los Cerritos	Carmen	Campeche	2.55
Pozas de Ventura	Carmen	Campeche	1.01
Carmen or C. Carmen	Carmen	Campeche	0.95
Isla del Carmen	Carmen	Campeche	1.44
Matamoros	Carmen	Campeche	2.30
El Tiestal	Carmen	Campeche	0.16
Cocoyoles	Carmen	Campeche	0.05
Cerro Pelon	Carmen	Campeche	0.96
El Cuyo	Carmen	Campeche	0.59
Boca Nueva	Carmen	Campeche	1.55
Los Guarixes	Carmen	Campeche	1.39
El Rosario	Carmen	Campeche	1.55
Punta Estuardo	Carmen	Campeche	0.25
Chumpa	Carmen	Campeche	1.88
Horno	Carmen	Campeche	2.23
El Palmar 1	Carmen	Campeche	1.77
El Palmar 2	Carmen	Campeche	1.68
La Sirena	Carmen	Campeche	2.78
Suma	Carmen	Campeche	1.49
Laguna de Terminos 1	Carmen	Campeche	1.57
Laguna Chacahito 1	Carmen	Campeche	1.43
Cuyos de Avila	Carmen	Campeche	1.52
Punta Gorda	Carmen	Campeche	0.51
Panteon	Carmen	Campeche	1.35
Xicalango	Carmen	Campeche	1.31
Cuyeros del Puerto Rico	Carmen	Campeche	0.73
Zapotal	Carmen	Campeche	0.71
Aguacatal	Carmen	Campeche	0.26
Polkai	Carmen	Campeche	3.08
Boxol	Campeche	Campeche	2.35
Niop	Champotón	Campeche	2.21
Villa Madero	Champotón	Campeche	1.56
Champoton	Champotón	Campeche	0.27
Haltunchen	Champotón	Campeche	0.61
Chuncan	Champotón	Campeche	2.41
Acapulquito	Champotón	Campeche	0.08

Campeche	Campeche	Campeche	0.93
Seybaplaya	Champotón	Campeche	0.60
Dos Bocas	Campeche	Campeche	1.74
El Cuyo	Campeche	Campeche	0.66
Jaina	Hecelchakán	Campeche	0.16
Sisal	Hunucmá	Yucatán	0.68
Punta Piedra	Hunucmá	Yucatán	0.86
Cauich	Celestún	Yucatán	0.51
Cimitun	Celestún	Yucatán	0.17
Punta Lastre	Calkiní	Campeche	0.00
Holbach	Celestún	Yucatán	0.02
Real de Salinas	Calkiní	Campeche	0.09
Uaymil	Calkiní	Campeche	0.96
Tambor	Celestún	Yucatán	0.47
Xuxac	Celestún	Yucatán	0.48
Okmil	Celestún	Yucatán	1.85
Cerros de Caracoles	Celestún	Yucatán	2.48
Cambalam	Calkiní	Campeche	0.60
Isla de Piedras	Calkiní	Campeche	0.53
Los Pesos	Othón P. Blanco	Quintana Roo	0.31
Tamalcab	Othón P. Blanco	Quintana Roo	0.22
El Bosque	Othón P. Blanco	Quintana Roo	1.01
El Cocal	Othón P. Blanco	Quintana Roo	0.90
El Rancho	Othón P. Blanco	Quintana Roo	0.15
Oxtancah	Othón P. Blanco	Quintana Roo	0.09
San Manuel	Othón P. Blanco	Quintana Roo	0.60
Nohuchmul	Othón P. Blanco	Quintana Roo	0.90
La Iglesia	Othón P. Blanco	Quintana Roo	1.67
Ichpaatun	Othón P. Blanco	Quintana Roo	0.98
Chetumal or Payo Obispo	Othón P. Blanco	Quintana Roo	0.95
Dimas Lopez	Othón P. Blanco	Quintana Roo	0.78
Calderitas	Othón P. Blanco	Quintana Roo	0.34
Chetumal	Othón P. Blanco	Quintana Roo	0.04
Chequitaquil	Othón P. Blanco	Quintana Roo	0.79
Tampalam	Felipe Carrillo Puerto	Quintana Roo	0.05
Canche Balam	Felipe Carrillo Puerto	Quintana Roo	0.60
Punta Koson	Tulum	Quintana Roo	0.06
Santa Rosa	Felipe Carrillo Puerto	Quintana Roo	1.15
El Cano	Tulum	Quintana Roo	0.42
Chanchamac or Chenchomac	Tulum	Quintana Roo	0.06
La Victoria	Felipe Carrillo Puerto	Quintana Roo	0.26
Nohku Point	Felipe Carrillo Puerto	Quintana Roo	0.29
Punta Allen	Tulum	Quintana Roo	0.21

Mogoto San Juan	Tulum	Quintana Roo	0.17
Punto San Juan	Tulum	Quintana Roo	0.19
Paso de la Viuda	Tulum	Quintana Roo	0.59
Colonia Javier Rojo Gomez	Tulum	Quintana Roo	0.18
Chac Mool	Felipe Carrillo Puerto	Quintana Roo	0.81
Chamax	Tulum	Quintana Roo	0.21
Pistolas	Tulum	Quintana Roo	0.64
Punta Chamax	Tulum	Quintana Roo	0.65
Recodo San Juan	Tulum	Quintana Roo	0.21
San Francisco	Tulum	Quintana Roo	0.10
Tupak	Felipe Carrillo Puerto	Quintana Roo	0.11
San Miguel X	Tulum	Quintana Roo	0.13
San Miguel de Ruz	Tulum	Quintana Roo	0.54
San Antonio I	Othón P. Blanco	Quintana Roo	1.06
Guadalupe	Othón P. Blanco	Quintana Roo	1.01
Rio Indio	Othón P. Blanco	Quintana Roo	1.95
Rio Huach	Othón P. Blanco	Quintana Roo	1.58
E. Villanueva	Othón P. Blanco	Quintana Roo	0.42
Jomna	Othón P. Blanco	Quintana Roo	0.42
La Curva	Othón P. Blanco	Quintana Roo	0.63
Punta Gavilan	Othón P. Blanco	Quintana Roo	0.72
Xcalak	Othón P. Blanco	Quintana Roo	1.03
Tantaman	Othón P. Blanco	Quintana Roo	0.42
Santa Ursula	Dzidzantún	Yucatán	3.01
Providencia II	Yobaín	Yucatán	0.52
Providencia or El Cocal Grande	Yobaín	Yucatán	1.78
Progresso	Progreso	Yucatán	1.34
Yukalpeten	Progreso	Yucatán	1.40
Chicxulub Puerto	Progreso	Yucatán	0.87
Diana Milan or Millan	Progreso	Yucatán	1.10
San Miguel	Progreso	Yucatán	1.32
Camara Peon	Progreso	Yucatán	1.12
San Bruno	Dzemul	Yucatán	1.00
Dolores	Ixil	Yucatán	0.63
Yapak	Hunucmá	Yucatán	0.66
Rancho Xcopte	Hunucmá	Yucatán	0.77
El Peten	Hunucmá	Yucatán	0.74
Chuburna Puerto	Progreso	Yucatán	0.80
El Peten 2	Hunucmá	Yucatán	0.37
Chuburna 2	Progreso	Yucatán	2.36
Mul de Chelem	Progreso	Yucatán	3.21
El Cerrito or Laguna de Progreso	Progreso	Yucatán	2.83

San Crisanto I or Basinilla	Sinanché	Yucatán	1.56
San Crisanto II or Peten Xnuc	Yobaín	Yucatán	1.57
Chabihau	Yobaín	Yucatán	0.38
Chuburna 1	Progreso	Yucatán	0.80
Xcopte	Hunucmá	Yucatán	0.42
Yapak II	Hunucmá	Yucatán	0.56
Xtampu	Dzemul	Yucatán	0.38
Xcambo	Dzemul	Yucatán	2.78
Rio Lagartos	Río Lagartos	Yucatán	2.58
San Celso	San Felipe	Yucatán	1.33
Holkoben 1	Río Lagartos	Yucatán	2.46
Holkoben 2 or campo deportivo	Río Lagartos	Yucatán	3.09
El Muc	Dzilam de Bravo	Yucatán	1.16
El Cerrito	Dzilam de Bravo	Yucatán	1.06
El Remate	Dzilam de Bravo	Yucatán	0.26
Paso Holuntun	Dzilam de Bravo	Yucatán	1.42
Isla Cerritos	San Felipe	Yucatán	0.23
Paso del Cerro	San Felipe	Yucatán	0.44
Isla Muertos	Río Lagartos	Yucatán	3.13
Punta Cerritos	Dzilam de Bravo	Yucatán	0.18
Celerain I	Cozumel	Quintana Roo	0.50
Yalku	Solidaridad	Quintana Roo	1.61
Pasa Juana	Tulum	Quintana Roo	0.07
Cayo Venado	Tulum	Quintana Roo	0.48
Tischbactum	Tulum	Quintana Roo	0.66
P. Tulsayab	Tulum	Quintana Roo	0.03
Ak 1	Tulum	Quintana Roo	1.17
Mantancero	Tulum	Quintana Roo	1.90
Palmar Playa	Solidaridad	Quintana Roo	0.84
El Palmar	Solidaridad	Quintana Roo	0.26
Puerto Chile	Solidaridad	Quintana Roo	0.17
Puerto Venado	Solidaridad	Quintana Roo	0.46
Playa del Carmen / Xamanha	Solidaridad	Quintana Roo	0.36
Soliman Point	Tulum	Quintana Roo	1.17
Villas Boca Paila or Poca Lirios	Tulum	Quintana Roo	0.19
Ak 2	Tulum	Quintana Roo	0.59
Xcassel	Tulum	Quintana Roo	0.37
Yochac	Solidaridad	Quintana Roo	0.25
Islota Capechen	Tulum	Quintana Roo	1.68
Chakalal	Solidaridad	Quintana Roo	0.14
Paamul	Solidaridad	Quintana Roo	0.55
Tulum Playa	Tulum	Quintana Roo	0.08
Xcalacoco	Solidaridad	Quintana Roo	0.54

Akumal	Tulum	Quintana Roo	1.12
Rancho Ina	Cozumel	Quintana Roo	1.96
Tancah	Tulum	Quintana Roo	0.46
Tulum	Tulum	Quintana Roo	0.10
Xcaret	Solidaridad	Quintana Roo	0.47
Xelha	Tulum	Quintana Roo	1.25
Ak Tulum	Tulum	Quintana Roo	1.60
Camilo	Tulum	Quintana Roo	2.94
Naval	Tulum	Quintana Roo	1.85
Dos Palmas	Tulum	Quintana Roo	2.98
El Templo	Tulum	Quintana Roo	1.18
Taj Ma Ha	Solidaridad	Quintana Roo	2.56
Boca de Paila	Tulum	Quintana Roo	1.28
Cabo Catoche	Isla Mujeres	Quintana Roo	0.11
Yukluuk	Lázaro Cárdenas	Quintana Roo	0.59
Yalahau	Lázaro Cárdenas	Quintana Roo	1.84
El Cuyo	Tizimín	Yucatán	0.65
Alegria 4	Tizimín	Yucatán	0.67
El Cuyo Este	Tizimín	Yucatán	0.79
San Fernando Orilla	Tizimín	Yucatán	1.52
Las Coloradas	Río Lagartos	Yucatán	2.92
Alegria 5	Tizimín	Yucatán	0.30
Alegria 1	Tizimín	Yucatán	1.29
Alegria 2	Tizimín	Yucatán	1.34
Alegria 3	Tizimín	Yucatán	2.30
Helicoptero	Tizimín	Yucatán	2.07
Tixchel	Río Lagartos	Yucatán	2.64
Isla Chivos	Tizimín	Yucatán	1.98
Angostura	Tizimín	Yucatán	1.21
Emal	Tizimín	Yucatán	4.28
Conil	Lázaro Cárdenas	Quintana Roo	2.22
Vista Alegre	Lázaro Cárdenas	Quintana Roo	0.96
La Caleta	Solidaridad	Quintana Roo	0.67
El Altar	Puerto Moreles	Quintana Roo	0.95
Nisucte	Benito Juárez	Quintana Roo	1.85
Petampich	Benito Juárez	Quintana Roo	2.16
Carolina	Puerto Moreles	Quintana Roo	2.71
Cocal 1	Puerto Moreles	Quintana Roo	1.66
Isla Mujeres	Isla Mujeres	Quintana Roo	0.09
San Miguel	Benito Juárez	Quintana Roo	1.94
El Meco	Benito Juárez	Quintana Roo	0.07
Ni Ku	Benito Juárez	Quintana Roo	0.02
Pok ta Pok	Benito Juárez	Quintana Roo	0.31

Yamilum	Benito Juárez	Quintana Roo	0.18
El Rey	Benito Juárez	Quintana Roo	0.12
Ecab	Isla Mujeres	Quintana Roo	3.24
Niko Site	Cozumel	Quintana Roo	2.25
Dos Cocos	Cozumel	Quintana Roo	0.49
Vista del Mar	Cozumel	Quintana Roo	0.88
Zuuk site or Janan II	Cozumel	Quintana Roo	2.07
Cinco Manos or Las Grecas	Cozumel	Quintana Roo	2.38
Santo Tomas	Cozumel	Quintana Roo	2.29
Chancedral	Cozumel	Quintana Roo	2.58
Ixlapac	Cozumel	Quintana Roo	1.11
Punta Molas or El Cactus	Cozumel	Quintana Roo	1.18
Aguada Grande	Cozumel	Quintana Roo	1.54
Grecas	Cozumel	Quintana Roo	1.97
Miramar	Cozumel	Quintana Roo	1.37
Punta Islote	Cozumel	Quintana Roo	2.15
Caracol or Punta Islote, Islote Celerain	Cozumel	Quintana Roo	0.33
Cinco Puertos	Cozumel	Quintana Roo	0.36
Punta Moreno	Cozumel	Quintana Roo	0.21
Faro site	Cozumel	Quintana Roo	0.69
San Miguel	Cozumel	Quintana Roo	0.29
Celerain II	Cozumel	Quintana Roo	0.54
Throne Site	Cozumel	Quintana Roo	0.18
Punta Chiclero	Cozumel	Quintana Roo	0.14
Arrecife	Cozumel	Quintana Roo	1.30
Buena Vista	Cozumel	Quintana Roo	1.90
Castillo Real	Cozumel	Quintana Roo	0.36
El Caracol	Cozumel	Quintana Roo	0.54
Janan I	Cozumel	Quintana Roo	0.24
La Expedicion	Cozumel	Quintana Roo	0.31
La Palma	Cozumel	Quintana Roo	0.09
San Gervasio	Cozumel	Quintana Roo	5.21

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